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Publisher Name: International Research Organization for Life & Health Sciences (IROLHS)

Registered Office: L 214, Mega Center, Magarpatta, Pune - Solapur Road, Pune, Maharashtra, India – 411028. Contact Number: +919759370871.

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International Journal of Scientific Study

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International Journal of Scientific Study
January 2023 • Vol 10 • Issue 10

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International Journal of Scientific Study
January 2023 • Vol 10 • Issue 10

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Coexistence of Systemic Lupus Erythematosus and Ankylosing Spondylitis: Another Case Report

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Abstract

Coexistence of ankylosing spondylitis (AS) and systemic lupus erythematosus (SLE) is very rare. Untill now only 8–10 cases has been reported in English literature. Here, in this study, we will discuss another case with coexistence of these two diseases and review the previously reported cases. 35-year-female patient with previously diagnosed AS with typical inflammatory lower back pain and HLA b27 positivity, MRI confirmed the presence of B/L active sacroilitis 10 years back now came with locomotor, skin, hematopoitic system involvement, with typical autoimmune disorder facies, showing strong positivity for ANA BLOT study and specific pattern on ANA by IFA, hypocomplementimia thus diagnosed as SLE in our hospital. Including our case most of the cases of coexistence of AS and SLE are females and SLE precedes occurrence of AS.

Key words: ANA BLOT, Ankylosing spondylitis, Connective tissue disorder, HLA b27, Systemic lupus erythematosus

INTRODUCTION

Ankylosing spondylitis (AS) is a chronic inflammatory disease of axial skeleton which manifests as inflammatory back pain, progressive stiffness of spine, assymetrical peripheral oligoarthritis, and specific organ involvement such as anterior uveitis. AS is more prevalent in males. Systemic lupus erythomatosis, on the other hand, is complex rheumatologic disease involving skin, joints, serous membranes, kidneys, lungs, and other organs of the body. The most characteristic features include rash, sores in mouth, and musculoskeletal manifestations such as arthritis and currently diagnosis is based on ACR criteria. Systemic lupus erythematosus (SLE) classified as systemic autoimmune disorder since autoantibodies presence against antinuclear antibody (ANA), double stranded DNA. These two autoimmune rheumatologic diseases which have different etiopathogenesis and diverse clinical and genetic characteristics features are rarely seen together. Here, we report another case with coexistence of AS and SLE.[1-5]

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

CASE REPORT

A 35-year-old female patient admitted to our hospital with h/o inflammatory back pain, and severe morning joint stiffness for 1–2 h was diagnosed as AS on basis of X-ray and magnetic resonance imaging showing b/l sacroilitis responding well to non-steroidal anti-inflammatory drugs. Now she came with c/o generalized weakness, fatigue, alopecia since 5–6 months, oral ulcers, severe joint pain since 1 month. On examination, she was afebrile, vitally stable, showing generalized lymphadenopathy. Her laboratory test results were as follows: Raised erythrocyte sedimentation rate 55 mm/h, C-reactive protein 107, rheumatoid factor negative, white blood cell count 2.7/μL (4.60–10.2), hemoglobin 8.7 g/dL (12.2–18.1), ANA test positive with titer of 1/2304 and homogenous pattern on ANA BY IFA, anti-double-stranded DNA (Crithidia test) was positive (2+), complement 3 (C3): 60 mg/dL (83–193) and complement 4 (C4): 6 mg/dL (15–57). Urine routine showing 1+protein with non nephrotic range proteinuria (247 mg/24 h). Liver and renal function tests, serum protein and creatinine phosphokinase levels, and thyroid function tests were within the normal limits. Montoux taest was positive. Hence, lymph node biopsy was done to rule out disseminated kochs shown reactive follicular hyperplasia and was negative for AFB stain, culture, and gene expert. Above symptoms along with anti-ds DNA and ANA blott strong

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Table 1: EULAR/ACR clinical domains and criteria for SLE

Domain	Criteria	Points
Constitutional	Fever	2
Hematologic	Leukopenia	3
	Thrombocytopenia	4
	Autoimmune hemolysis	4
Neuropsychiatric	Delirium	2
	Psychosis	3
	Seizure	5
Mucocutaneous	Non-scarring alopecia	2
	Oral ulcers	2
	Subacute cutaneous or discoid lupus	4
	Acute cutaneous lupus	6
Serosal	Pleural or pericardial effusion	5
	Acute pericarditis	6
Musculoskeletal	Joint involvement	6
Renal	Proteinuria >0.5 g/24 h	4
	Kidney biopsy class II or V lupus nephritis	8
	Kidney biopsy class III or IV lupus nephritis	10

SLE: Systemic lupus erythematosus

Table 2: EULAR/ACR immunologic domains and criteria for SLE

Domain	Criteria	Points
Antiphospholipid antibodies	Anti-cardiolipin antibodies or Anti-β2GP1 antibodies or lupus anticoagulant	2
Complement proteins	Low C3 or low C4	3
	Low C3 and low C4	4
SLE-specific antibodies	Anti-dsDNA antibody or anti-smith antibody	6

SLE: Systemic lupus erythematosus

positivity, with low C3, C4 complement levels, with raised titers on ANA by IFA (>1:2308) with homogenous pattern on IFA confirmed the diagnosis of SLE. Since there was only joint, skin, serous membrane involvement, the initial treatment included hydroxychloroquine (200 mg/day), and moderate to low doses of methylprednisolone (10 mg/day) as she does not responded that well to treatment dose of methylprednisolone increased (40 mg/day) and added mycofenolet mofetil (MMF) orally (360 mg twice a day) with oral proton pump inhibitor (40 mg/day) [Tables 1 and 2].

DISCUSSION

Coexistence of AS and SLE is very rare and to the best of our knowledge, there are only 8–10 reported cases in English literature. AS is frequently seen in male patients and SLE is seen mainly in female patient. Coexistence of both is seen in female patients and majority of patients complaints are related to AS. Diagnosis of AS was before diagnosis of SLE. Our patient is female her complaints started with AS and later developed SLE. There was combination of AS findings like b/l sacroilitis, HLA b27 positivity with SLE findings such as hematological pancytopenia, renal involvement with 1+ protein in urine, hypocomplementemia, positive autoantibodies for ANA, anti dsDNA. The coexistence of these two diseases with different genetic backgrounds in the same patient is much lower than expected based upon their prevalence in the general population. It has been suggested that the combination of HLA-B27 with HLA-A1 and HLA-DR2 is very rare. The rare combinations of the susceptibility genes of AS and SLE were speculated to explain the rarity of the coexistence of these two diseases. Diagnosis of SLE made on basis of ACR criteria as follows:[6-11]

Treatment for SLE

EULAR recommendations

For the treatment of SLE in 2008 and updated them in 2019. EULAR recommends that treatment in SLE aim at remission, or at low disease activity in all organ systems if remission cannot be achieved. Specific medication recommendations include the following:

1. Hydroxychloroquine is recommended for all patients with SLE
2. Glucocorticoids can provide rapid symptom relief, but the medium- to long-term aim should be to minimize the daily dose to ≤7.5 mg/day prednisone equivalent or to discontinue them
3. Subsequent initiation of immunosuppressive drugs facilitates more rapid tapering of glucocorticoids and may prevent disease flares. The choice of agent depends on prevailing disease manifestation(s), patient age and childbearing potential, safety concerns, and cost.

Regarding Immunosuppressive Drugs:

1. Consider methotrexate and azathioprine in patients with poor symptom control with glucocorticoids and hydroxychloroquine, or when hydroxychloroquine alone is unlikely to be sufficient
2. MMF is a potent immunosuppressant with efficacy in renal and non-renal SLE (but not in neuropsychiatric lupus), but its teratogenic potential and higher cost limit its recommendation in women of reproductive age with non-renal manifestations
3. Cyclophosphamide can be considered in organ-threatening disease (especially renal, cardiopulmonary, or neuropsychiatric) and as rescue therapy in patients with non–major organ manifestations refractory to other agents. Due to its gonadotoxic effects, it should be used with caution in women and men of fertile age; concomitant use of gonadotropin-releasing hormone analogues is recommended in premenopausal patients

Regarding biologic agents for SLE are as follows:

4. Consider belimumab in patients with extrarenal disease inadequately controlled by first-line treatments.

CONCLUSION

In conclusion, the coexistence of SLE and AS is very rare. Including the present case, there are only nine to eleven reported cases. Most of the cases are females. The present case is also a 35 yr female with known case of AS with HLA B27 positivity and B/L sacroillitis recently diagnosed with SLE with help of clinical symptoms, ANA BLOT study , ACR /EULAR criterias ,and other relevant blood investigations and treated accordingly.

REFERENCES

1. Hochberg MC. Updating the American college of rheumatology revised criteria for the classification of systemic lupus erythematosus. Arthritis Rheum 1997;40:1725.
2. Kook MH, Yoo HG, Hong MJ, Yoo WH. Coexisting systemic lupus erythematosus and ankylosing spondylitis: A case report and review of the literature. Lupus 2012;21:348-9.
3. Nashel DJ, Leonard A, Mann DL, Guccion JG, Katz AL, Sliwinski AJ. Ankylosing spondylitis and systemic lupus erythematosus: A rare HLA combination. Arch Intern Med 1982;142:1227-8.
4. Olivieri I, Gemignani G, Balagi M, Pasquariello A, Gremignai G, Pasero G. Concomitant systemic lupus erythematosus and ankylosing spondylitis. Ann Rheum Dis 1990;49:323-4.
5. Korkmaz C. Delayed diagnosis of porphyria based on manifestations of systemic lupus erythematosus and ankylosing spondylitis. J Nephrol 2006;19:535-9.
6. Chandrasekhara PK, Jayachandran NV, Thomas J, Narsimulu G. Systemic lupus erythematosus and dermatomyositis with symtomatic bilateral sacroiliitis: An unusual and interesting association. Mod Rheumatol 2009;19:84-6.
7. Singh S, Sonkar GK, Singh U. Coexistence of ankylosing spondylitis and systemic lupus erythematosus. J Chin Med Assoc 2010;73:260-1.
8. Jiang L, Dai X, Liu J, Ma L, Yu F. Hypoparathyroidism in a patient with systemic lupus erythematosus coexisted with ankylosing spondylitis: A case report and review of literature. Joint Bone Spine 2010;77:608-10.
9. Mrabet D, Rekik S, Sahli H, Trojet S, Cheour I, Eleuch M, *et al*. Ankylosing spondylitis in female systemic lupus erythematosus: A rare combination. Lupus 2011;20:777-8.
10. Maksymowych WP. MRI in ankylosing spondylitis. Curr Opin Rheumatol 2009;21:313-7.
11. Tarhan F, Argın M, Can G, Özmen M, Keser G. Coexistence of systemic lupus erythematosus and ankylosing spondylitis: Another case report and review of the literature. Eur J Rheumatol 2014;1:39-43.

How to cite this article: Kashiva R, Memon D, Surwase S, Tungenwar A, Shakeel A. Coexistence of Systemic Lupus Erythematosus and Ankylosing Spondylitis: Another Case Report. Int J Sci Stud 2023;10(10):1-3.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Isolated Anterior Thoracic Myelomeningocele: A Rare Case Report

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Abstract

Context: Myelomeningocele (MMC) is a type of spinal dysraphism that often affects the lumbosacral area with a rare thoracic form of presentation. Spinal abnormalities brought on by spinal dysraphism present a difficult issue. In the literature that is currently available, only few cases have been described. Often found posteriorly in the lumbosacral region, a spinal meningocele is a herniation of the meninges through a foramen or a defect in the vertebral column. The majority of documented thoracic meningoceles are not only anterior but also lateral or anterolateral in position. In this case report, a genuine anterior thoracic meningocele without extensive mesenchymal dysplasia is described. These rarely present alone, but commonly as a symptom of a widespread mesenchymal dysplasia such Marfan syndrome or neurofibromatosis type 1.

Case Report: A 2-year-old child presented with swelling in the upper thorax and with gradual onset upper limb weakness. Scoliosis was present. Magnetic resonance imaging (MRI) of spine showed anterior herniation of spinal cord and meninges through the bony defect in thoracic region. MRI imaging with its excellent soft tissue contrast helps in accurately mapping the anatomy and enables surgical planning.

Conclusion: Spinal cord lesions can be diagnosed on MRI. MRI imaging with its excellent soft-tissue contrast helps in accurately mapping the anatomy and enables surgical planning. The case report's goal is to raise awareness of the MMC's uncommon thoracic spine presentation and the possibility of scoliosis association with the lesion.

Key words: Butterfly vertebrae, Magnetic resonance imaging, Myelomeningocele, Thoracic

INTRODUCTION

Myelomeningocele (MMC) is a type of spinal dysraphism that often affects the lumbosacral area with a rare thoracic form of presentation. Spinal abnormalities brought on by spinal dysraphism present a difficult issue. In the literature that is currently available, only few cases have been described. Often found posteriorly in the lumbosacral region, a spinal meningocele is a herniation of the meninges through a foramen or a defect in the vertebral column. The majority of documented thoracic meningoceles are not only anterior but also lateral or anterolateral in position. In this case report, an anterior thoracic meningocele without extensive mesenchymal dysplasia is described. These rarely present alone, but commonly as a symptom of a widespread mesenchymal dysplasia such Marfan syndrome or neurofibromatosis type 1 (NF-1).

In this case, a 2-year-old boy had edema in his upper thorax and gradually developed upper limb paralysis. The case report's goal is to raise awareness of the MMC's uncommon thoracic spine presentation and the possibility of scoliosis association with the lesion.

Access this article online

www.ijss-sn.com

Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

CASE REPORT

A 2-year-old boy complained of palpitation and shortness of breath, which were exacerbated by physical activity. He had diminished upper chest breath sounds on clinical examination. There was no evidence of focal neurologic signs or clinical evidence of NF-1 or Marfan syndrome on physical examination. The laboratory test results were within normal ranges.

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The patient underwent MR imaging. MR imaging confirmed the presence of thoracal vertebral segmentation anomalies and a large anterior meningocele herniating into the thoracic cavity through a bone defect at the level of T3-T4 vertebrae [Figure 1]. The cystic lesion was close to the trachea and the main vessels of the mediastinum, and it pushed the trachea to the left [Figure 2]. The patient had dorsal spine scoliosis and butterfly vertebrae at T1, T2, and T3 vertebral levels [Figure 3]. Sagittal T1 WI shows herniation of cord and CSF filled sac in anterior thoracic region through bony defect [Figure 4].

At the level of T3, the spinal cord was displaced anterior to the Meningocele's neck. There was no discernible change in parenchymal signal intensity or syrinx in the spinal cord. The meningocele was scheduled for surgical intervention with an anterior approach due to its size and location. However, the patient was lost to follow-up.

DISCUSSION

The herniation of meninges through bone defects or foramina to form a CSF-filled sac is referred to as a spinal meningocele. This is classified as either acquired or congenital, with acquired meningocele being a complication of laminectomy.[1] Neural tube defects (NTD) are common congenital disorders, with thoracic meningomyelocele accounting for 1–5% of all NTD.[2] Ectodermal cells proliferate near the midline of the embryo during normal embryogenesis in the 2nd week of pregnancy, forming the neural plate. On day 17, this plate invaginates, with adjacent lateral thickening forming the neural folds. The pathogenesis of spinal dysraphism is a failure of neural tube closure, which occurs in a bidirectional pattern beginning in the mid-cervical region and progressing cranially and caudally. According to this theory, the most common location of MMC is at the most cranial or most caudal ends; however, this theory fails to explain MMC

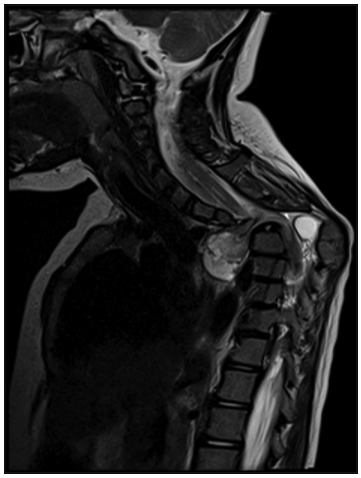

Figure 1: Sagittal T2 showing herniation of cord and CSF filled sac in anterior thoracic region through bony defect

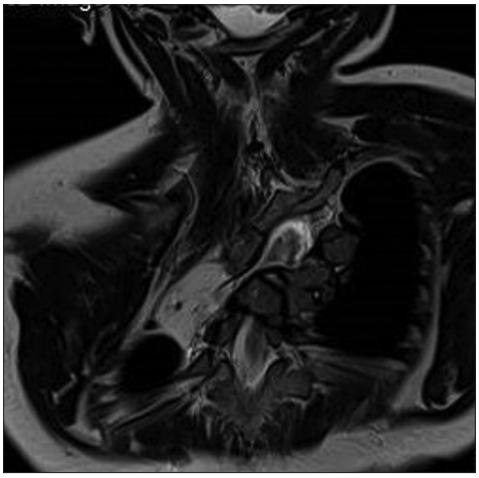

Figure 3: Coronal T2 WI showing scoliosis of dorsal spine and butterfly vertebrae of D1, D2, and D3

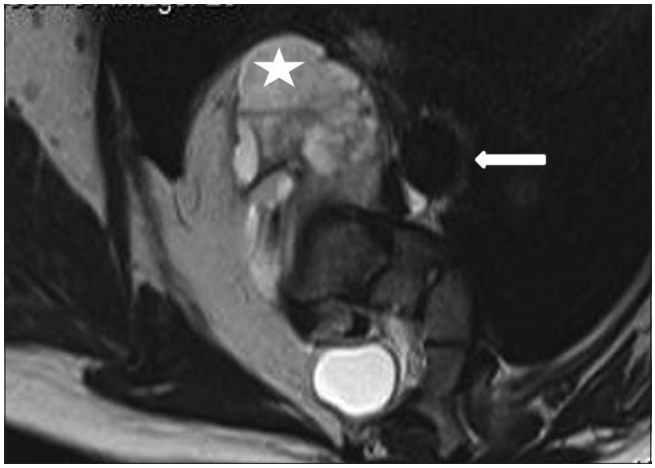

Figure 2: Axial T2 WI showing displacement of trachea (white arrow) to the left side by the meningomyelocele (asterix)

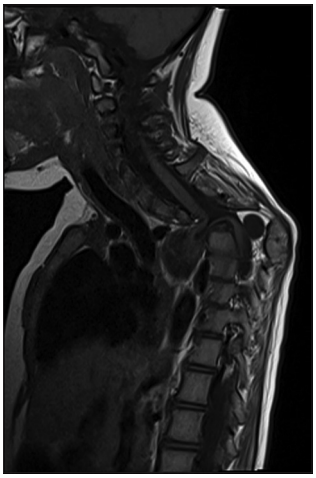

Figure 4: Sagittal T1 WI showing herniation of cord and CSF filled sac in anterior thoracic region through bony defect

in the thoracic region. Instead of forming a tube, the neural folds remain as a flat plate of tissue known as the neural placode. These defects can occur in any part of the vertebral column, with posterior defects being more common than anterior. Mesoderm development around the neural tube is incomplete in anterior meningocele.[1] A thoracic meningocele's clinical manifestations are closely related to its size and relationship to surrounding structures. Back pain, paraparesis from spinal cord injury, or shortness of breath, coughing, and palpitation caused by compression of the lung and mediastinal structures, as was the case for the patient presented here, are all possible symptoms. Even progressive hydrothorax caused by meningoceles rupture has been reported in the literature.[3] They are associated with less neurological deficits than their lumbosacral counterparts, but if left untreated due to tethering, they can progress to neurologic deficits.[2,4] In the presence of gross neurologic deficits in thoracic MMC, kyphosis occurs invariably due to unrestricted pull of the normally innervated proximal anterior abdominal and intercostal muscles, preventing tensionless closure of the defect and may necessitate kyphectomy, thereby improving lung endurance and functional capacity.

Intradural exploration with meticulous microsurgical release of the spinal cord through careful resection of all tethering bands has been suggested in those cases.[1] This case raises awareness of the thoracic MMC's distinctive presentation. A Cystoperitoneal shunt is the gold standard treatment for anterior dorsal meningocele; however, treatment options vary depending on the size of the lesion.[3,5] Laminectomy and duroplasty are preferred in smaller lesions of anterior dorsal meningocele, while thoracotomy can be planned in larger lesions.[2,4]

Cross-sectional imaging methods, such as computed tomography and magnetic resonance imaging (MRI), are crucial, regardless of the choice of treatment, not only for the diagnosis but also for the depiction of its relationships to surrounding structures and the exclusion of any additional potential accompanying lesions, such as a neuroma in the context of NF-1. The extension of the spinal canal and segmentation defects brought on by the thoracic meningocele in this case were detected by MR imaging, which also revealed the anatomic connections.

CONCLUSION

Spinal cord lesions can be diagnosed on MRI. MRI imaging with its excellent soft tissue contrast helps in accurately mapping the anatomy and enables surgical planning. The case report's goal is to raise awareness of the MMC's uncommon thoracic spine presentation and the possibility of scoliosis association with the lesion.

REFERENCES

1. Gutierrez FR, Woodard PK, Fleishman MJ. Normal anatomy and congenital anomalies of the spine and spinal cord. In: Osborn AG, Maack H, editors. Diagnostic Neuroradiology. 1st ed. St. Louis: Mosby; 1994. *p.* 785-819.
2. Von Koch CS, Glenn OA, Goldstein RB, Barkovich AJ. Fetal magnetic resonance imaging enhances detection of spinal cord anomalies in patients with sonographically detected bony anomalies of the spine. J Ultrasound Med 2005;24:781-9.
3. Mizuno J, Nakagawa H, Yamada T, Watabe T. Intrathoracic giant meningocele developing hydrothorax: **A** case report. J Spinal Disord Tech 2002;15:529-32.
4. Kumar J, Afsal M, Garg A. Imaging spectrum of spinal dysraphism on magnetic resonance: A pictorial review. World J Radiol 2017;9:178-90.
5. Tortori-Donati P, Rossi A, Cama A. Spinal dysraphism: A review of neuroradiological features with embryological correlations and proposal for a new classification. Neuroradiology 2000;42:471-91.

How to cite this article: Gadupudi V, Chaparala P, Vidavaluru AS. Isolated Anterior Thoracic Myelomeningocele: A Rare Case Report. Int J Sci Stud 2023;10(10):4-6.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Nut-cracker Phenomenon Masquerading as Loin Pain Micro-hematuria Syndrome: Anatomical and Urological Perspectives

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Abstract

Nutcracker syndrome (NCS) is a rare congenital anomaly, where the left renal vein (LRV) is sandwiched between two structures. It is defined as anterior or posterior NCS (PNCS), depending on whether the course of the LRV is anterior or posterior to descending aorta. We report a rare case of a 40-year-old lady, who presented to us with left lumbar pain, nausea, vomiting, and dyspepsia. On initial clinical evaluation, based on her diabetic status, biochemical findings of an elevated absolute leukocyte count and microscopic hematuria with an ultrasonography finding of cystitis with bilateral increased renal cortical echogenicity, a provisional diagnosis of the left acute pyelonephritis was made. On further evaluation with axial imaging, she was diagnosed to have a retro-aortic LRV, where the LRV is compressed between the aorta and vertebral body. Correlating her clinical and radiological findings, a diagnosis of PNCS was made. She was symptomatically better with antibiotics and anti-inflammatory drugs and was advised a regular follow-up. This manuscript emphasizes the need for a higher index of clinical suspicion to make a prompt diagnosis of such rare congenital venous anomalies that present with vague gastrointestinal symptoms or mimic pyelonephritis. The majority of such patients are conservatively managed. Those with intractable symptoms might need surgical intervention.

Key words: Kidney, Left renal vein, Microhematuria, Nutcracker, Pyelonephritis

INTRODUCTION

Nutcracker syndrome (NCS) is an uncommon clinical condition caused by mechanical compression of the left renal vein (LRV).[1] This condition is caused by compression of the LRV, either between the Superior Mesenteric artery and abdominal aorta Anterior NCS (ANCS) or between the vertebral column and the abdominal aorta Posterior NCS (PNCS).[2] The NCS must be distinguished from the nutcracker phenomenon. This phenomenon is a common anatomical abnormality, which is asymptomatic and diagnosed in routinely performed abdominal imaging. It usually affects women more than men and, in most cases, present in the 3rd or 4th decades of life.[3]

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

Anatomical Perspectives

The ANCS occurs when the LRV is sandwiched between the abdominal aorta and the origin of the superior mesenteric artery. Figure 1 illustrates the anatomical course of the LRV in ANCS. When the LRV gets compressed between these two arteries, there is a mechanical impediment to the return of blood from the renal vein, resulting in congestion of the left kidney.

On the other hand, PNCS occurs when the LRV gets compressed between the aorta and vertebral body.[4] Usually, the LRV runs anterior to the aorta, but in PNCS, the LRV runs behind the aorta, getting compressed from behind by the vertebral body. The course of this vein is called a retro-aortic LRV (RLRV). Figure 2 illustrates the

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PNCS e, with the yellow arrow pointing at the course of the LRV.

Due to mechanical compression on LRV, a renocaval pressure gradient is created which is the fundamental reason for all symptoms associated with PNCS. Venostasis or distension of the left ovarian or spermatic vein caused by LRV entrapment often results in loin pain, which may lead to confusion in making a proper diagnosis.[6] As PNCS is often under-reported, its clinical manifestations closely mimic and are often mistaken as presentations of other more common illnesses.[7]

Urological Perspectives

Loin pain and hematuria have always been perplexing problems for urologists since time immemorial. Most patients with PNCS present with vague loin pain or upper abdominal discomfort. In the absence of overt hematuria, most of these patients seek gastroenterologists' consultation. The presence of either micro or macroscopic hematuria adds to the confusion for urologists. Various authors have described renal cysts, angiomas, micro-hemangiomas, vascular anomalies, and renal veno-calyceal fistulae in the renal fornices as potential causes for this condition.[8] The lack of specific clinical findings necessitate a higher suspicion of PNCS. Non-invasive computed tomography (CT) angiogram imaging may be needed for the confirmation of PNCS.[9] This manuscript discusses an interesting case of PNCS associated with dyspepsia, vomiting, left loin pain, and microhematuria. The purpose of this manuscript is to highlight the myriad of symptoms that the PNCS may present with and also to give a clinico-anatomical overview of this underlying problem.

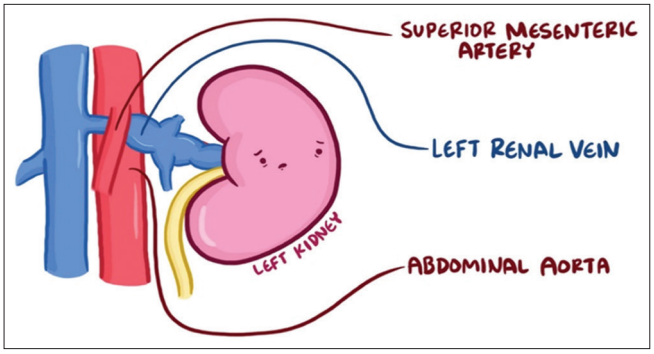

Figure 1: Diagrammatic illustration of the anterior nutcracker syndrome

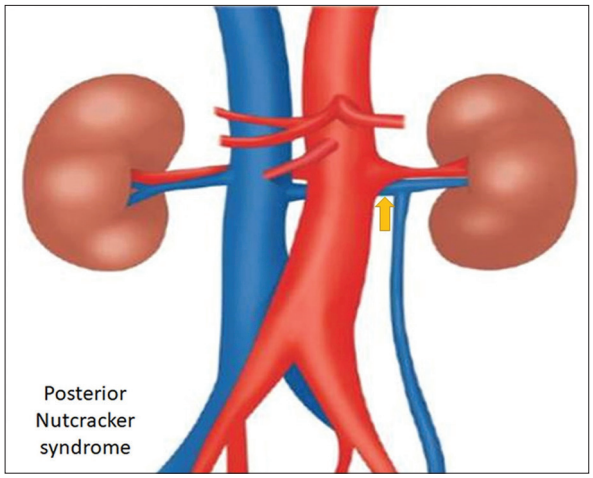

Figure 2: Diagrammatic illustration of Posterior NCS (reproduced with permission from Jang *et al.*[5])

CASE REPORT

A 40-year-old female presented with abdominal pain for the past 5 months. The pain was mainly in the left upper back. The left lumbar pain was non-radiating, dull aching, and relieved on analgesic intake. She also had epigastric pain that was burning in nature, associated with vomiting and not related to food intake. There was no abdominal distension and her bowel movements were normal. She had no macro-hematuria, dysuria or decreased urine output. Her appetite was normal. She was a known diabetic and on regular oral hypoglycemic agents. Physical examination was unremarkable.

On evaluation, she was anemic. Her renal function tests and Serum electrolyte levels were normal. Urine microscopy showed 25–30 RBCs per high power field with plenty of pus cells and albuminuria. Urine culture grew *Escherichia coli*. Ultrasound of the whole abdomen revealed a thick-walled urinary bladder and a bilateral mild increase in renal cortical echoes. All other abdominal viscera were normal. Based on the clinical symptoms, her diabetic status, and laboratory and ultrasound abdomen findings, a provisional diagnosis of acute infective pyelonephritis was made. Contrast-enhanced CT of the abdomen was suggestive of left pyelonephritis and cystitis. Contrast-enhanced CT abdomen revealed a compressed RLRV between the aorta and vertebral column [Figure 3].

Figure 3 illustrates that the left renal vein was single and identified to course behind the abdominal aorta. There

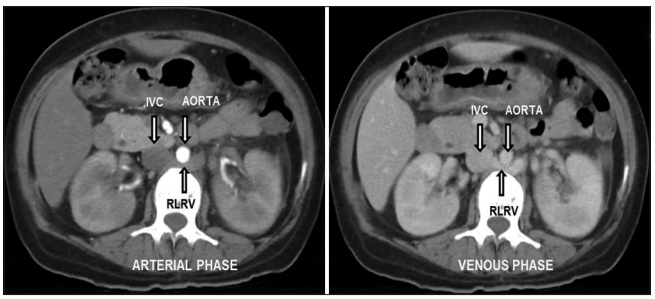

Figure 3: Computed tomography scan of the abdomen showing the course of RLRV

were no collateral veins. Correlating the clinical symptoms and the radiological findings, a diagnosis of PNCS was made. She was started on antibiotics and anti-inflammatory drugs, following which her symptoms improved. She was discharged with advice to follow-up regularly for the recurrence of symptoms.

DISCUSSION

The development of the inferior vena cava by itself is such a complex process that efforts to understand the development of the renal vein make it even more complicated. LRV entrapment, also known as nutcracker syndrome, was first described by El-Sadr and Mina in 1950.[10] Belgian physician De Schepper was first credited with the terminology, NCS, in 1972. [11] The overall incidence of RLRV was reported as 3% and a vast majority of them are asymptomatic.

Traditionally, RLRV is classified into two distinct types. Type 1 is associated with an obliterated ventral preaortic limb of the LRV, but persistent dorsal retro aortic limb which subsequently joins the IVC in the orthotopic position. Type II anomaly results from the obliteration of the ventral limb of the LRV. The dorsal limb turns into the RLRV and lies at the level of L4 L5 and joins the gonadal and ascending lumbar veins before joining IVC. Jang *et al.* subsequently reported the congenital anomalies of the RLRV as four types. Type III anomaly is the circum-aortic LRV. One vein passes posterior and the other vein passes anterior to the aorta to join the IVC. In type IV anomaly, the ventral preaortic limb of the LRV is obliterated, and the remaining dorsal limb becomes the RLRV and joins the left common iliac vein.[5]

Most of the patients remain asymptomatic throughout their lifetime. While most remain healthy, some of the symptomatic ones develop clinical manifestations during their second or third decade of life. Few patients show only microscopic hematuria, which may be picked up during routine evaluation. Others may present with left loin pain, and unilateral left varicocele due to venous stasis at the gonadal vessel, also known as pelvic congestion syndrome. Gastrointestinal symptoms and arterial hypertension may occasionally be the presenting symptoms.

Microhematuria in PCNS, though rare, is not so uncommon. The mechanical compression of the LRV between the aorta and the vertebral body results in a rise in the pressure gradient between the LRV and the vena cava. This rise in pressure gradient, in turn, leads to the rupture of the membranous barrier between the smaller veins and the collecting system in the renal fornix, resulting in microhematuria.[12] Daily *et al.* reported a direct correlation between the LRV pressure (LRVP) and the degree of hematuria.[13] Patients with PNCS are best managed based on their symptomatology, clinical manifestations, the severity of LRVP, and hypertension.

In patients with mild hematuria and in young individuals, who are willing to come for a regular follow-up, conservative and supportive treatment is offered. Young adults, aged <18 years can be followed up for a minimum period of 2 years as there is a 75% chance that there may be a complete resolution of microhematuria. Endovascular stenting is a viable option for patients who have bothersome pain and hypertension due to elevated LRVP.[14] However, its future role in the management of this condition remains to be established and the potential complications such as fibromuscular dysplasia, stent migration, thrombosis, restenosis, and embolization have to be borne in mind.

The various treatment options include conservative treatment, intra-vascular stents, chemical cauterization, open surgical intervention, auto-transplantation, and finally if everything fails, nephrectomy.[15]

CONCLUSION

The authors report a case of a 40-year-old female who presented with left loin pain and microscopic hematuria, diagnosed as PNCS due to the compression noted in the retro aortic renal vein. Our case report discusses a rare presentation of PNCS. A thorough anatomical knowledge of this rare anomaly is imperative as this rare entity may present with a variety of signs and symptoms. This manuscript also reinforces the need for a high index of clinical suspicion to achieve a prompt diagnosis. Conservative treatment is recommended for patients with mild symptoms. Patients with serious impairment or severe symptoms may benefit from surgical or endovascular intervention.

REFERENCES

1. Hanna HE, Santella RN, Zawada ET Jr., Masterson TE. Nutcracker syndrome: An underdiagnosed cause for hematuria? S D J Med 1997; 50:429-36.
2. Gong Yu, Song BO. The nutcracker syndrome. J Urol 2003;169:2293-4.
3. Shin JI, Lee JS. Nutcracker phenomenon or nutcracker syndrome? Nephrol Dial Transplant 2005;20:2015.
4. Kurklinsky AK, Rooke TW. Nutcracker phenomenon and nutcracker syndrome. Mayo Clin Proc 2010;85:552□9.
5. Jang YB, Kang KP, Lee S, Kim W, Kwak HS, Park SK. Posterior nutcracker phenomenon. Nephrol Dial Transplant 2005;20:2573-4.
6. Ozkan MB, Bilgici CM, Hayalioglu E. Anterior and posterior nutcracker syndrome accompanying left circumaortic renal vein in an adolescent: Case report. Arch Argent Pediatr 2016;114:e114-6.

7. Noorani A, Walsh SR, Cooper DG, Varty K. Entrapment syndromes. Eur J Vasc Endovasc Surg 2009;37:213-20.
8. Stewart BH, Reiman G. Left renal venous hypertension "nutcracker" syndrome. managed by direct renocavalreimplantation. Urology 1982;20:365-9.
9. Shah D, Qiu X, Shah A, Cao D. Posterior nutcracker syndrome with left renal vein duplication: An uncommon cause of hematuria. Int J Surg Case Rep 2013;4:1142□4.
10. El-Sadr AR, Mina E. Anatomical and surgical aspects in the operative management of varicocele. Urol Cutaneous Rev 1950;54:257-62.
11. DeSchepper A. "Nutcracker" phenomenon of the renal vein and venous pathology of the left kidney. J Belge Radiol 1972;55:507-11.
12. Buschi AJ, Harrison RB, Norman A, Brenbridge AG, Williamson BR, Gentry RR, *et al*. Distended left renal vein: CT/sonographic normal variant. AJR Am J Roentgenol 1980;135:339-42.
13. Daily R, Matteo J, Loper T, Northup M. Nutcracker syndrome: Symptoms of syncope and hypotension improved following endovascular stenting. Vascular 2012;20:337-41.
14. Segawa N, Azuma H, Iwamoto Y, Sakamoto T, Suzuki T, Yamamoto K, *et al*. Expandable metallic stent placement for nutcracker phenomenon. Urology 1999;53:631-3.
15. Ananthan K, Onida S, Davies AH. Nutcracker syndrome: An Update on current diagnostic criteria and management guidelines. Eur J Vasc Endovasc Surg 2017;53:886-94.

How to cite this article: Bose JD, Krishnamoorthy S, Ramachandran K. Nut-cracker Phenomenon Masquerading as Loin Pain Micro-hematuria Syndrome: Anatomical and Urological Perspectives. Int J Sci Stud 2023;10(10):7-10.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Rare Presentation of Kimura's Disease – A Case Report

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Abstract

Kimura's illness is an immune disorder that frequently affects the head and neck lymph nodes. A bulge in the forearm rarely forms. A positive outcome is less frequent after glucocorticoid medication and surgical resection. We present a unique example of a right forearm mass in a 45 year old female with Kimura's disease. The postoperative pathology was unknown after the patient had the tumour resected two years before at a nearby hospital. Due to expansion of the mass, he underwent a second resection. After postoperative pathology revealed the patient had Kimura's Disease. He was given corticosteroid therapy. We followed the patient for one year after surgery. He is now recovering well and continues to be closely monitored during follow-up. It is unusual for Kimura's disease to be identified as the painless lump in the forearm. The patient had a successful outcome following full removal of the tumour and systemic administration of prednisone.

Key words: Kimura's Disease, Vascular proliferation, Esinophilia

INTRODUCTION

Kimura's disease is a chronic inflammatory condition that rarely affects the forearm and frequently affects the lymph nodes. Its cause is unknown. Clinical signs and symptoms vary depending on the location and size of the masses, which are typically painless and increase gradually.[1] A patient just brought to our hospital has Kimura's Disease of the right forearm.

CASE DETAILS

A 45-year-oldfemale patient complained of a right forearm swelling that had changed his appearance and gradually grown larger over the previous five years. Five years ago, the patient noticed the swelling on the right forearm. of size of a peanut, soft, smooth, with normal skin colour and no additional symptoms. A local hospital performed a mass excision two years before, however the postoperative pathology was not evident. The tumour gradually grew over the next 10 months to a size of 5 cm x 2.5 cm after a relapse. The patient came to our department in need of a precise diagnosis and course of action. The patient was in good condition and had never had a chronic illness.

A physical examination revealed right forearm mass measured roughly 5 cm x 2.5 cm. There was no redness, swelling, ulceration, or discomfort, and it was soft with a smooth surface. No abnormalities were discovered in routine investigations. Prior to surgery, neither IgG4 nor IgE levels were checked, nor was the likelihood of Kimura's condition taken into account.

Imaging by MRI and CT revealed features of Malignant soft tissue lesion. FNAC of swelling was done. But we could not give the definite diagnosis as material yeided was sparse. Surgical excision was done and sent for histopathological examination. On histology, in the hyperplastic fibrous tissue, there were hyperplastic lymphoid tissues, lymphoid follicles, a significant number of eosinophils between follicles, and small hyperplastic blood vessels in the follicles [Figure 1 and 2].

Final diagnosis was made as Kimura's disease of forearm. After surgery, patient was treated with corticosteroids and there was no recurrence.

Access this article online

www.ijss-sn.com

Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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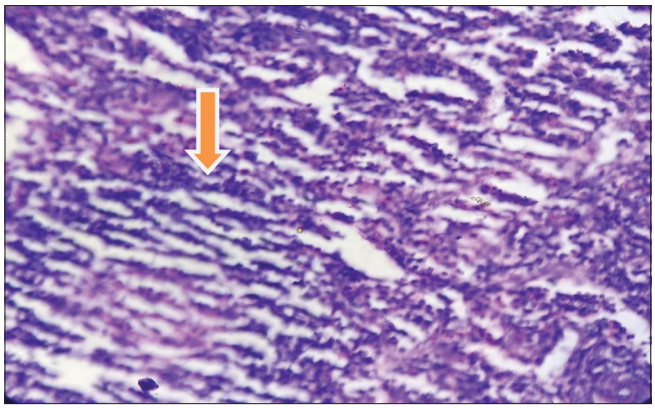

Figure 1: Hyperplastic lymphoid tissues, lymphoid follicle and small hyperplastic blood vessels in the follicles H&E 40X

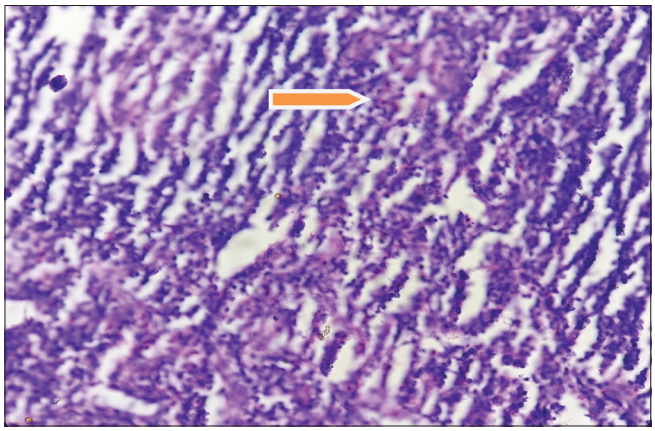

Figure 2: A significant number of eosinophils between follicles, and small hyperplastic blood vessels in the follicles H&E 40x

DISCUSSION

A rare, benign immune-system disorder with an unknown cause, Kimura's disease is more common in the craniofacial area.[1] Eosinophilic granulomas and lympho-proliferative lymphoid follicles in soft tissue or lymph nodes are its defining features.[2] Kimura's disease can occur at any age, but the peak incidence period is between the ages of 20 and 40. Middle-aged males make up the majority of the disease's patients.[3,4] Kimura's disease has to be distinguished from Kaposi sarcoma, benign tumours, lymphomas and Langerhans cell histiocytosis.

At the moment, histopathology is the key factor used in the diagnosis of Kimura's disease. Kimura's disease can also be diagnosed with the aid of CT and MRI scans. The majority of lesions exhibit moderate to severe enhancement in post-contrast MR images and mild to moderate enhancement in post-contrast CT scans.[5] The histological features of Kimura's disease include tissue infiltration, lymphocyte follicular hyperplasia, fibro-collagenous deposition, and vascular proliferation.[6]

In the past, Kimura's disease have occasionally been confused angiolymphoid hyperplasia with eosinophilia (ALHE). As opposed to Kimura's disease, which manifests as a subcutaneous lesion, ALHE mostly affects the skin. Both are distinguished by a propensity to develop in the head and neck region, a significant eosinophilic infiltrate, and vascular proliferation. On histology, Kimura's disease is evidently characterised by eosinophilic infiltration and hyperplastic lymphoid follicles with obvious germinal centres. According to laboratory results, people with Kimura's disease had significantly higher levels of eosinophils on normal blood tests and serum IgE.[6–11] Regular blood tests show a large increase in eosinophils and IgE levels.

The management of Kimura's disease is not yet governed by any consensus guidelines. The surgical excision of the mass and a pathological evaluation are the mainstays of treatment for Kimura's disease, which is then followed by post-operative care. We offer the patients oral glucocorticoid medication, demonstrating a stepwise drop, because of the greater levels of eosinophils and IgE in their peripheral blood, even though the tumour has been fully removed.

Although recurrence is common, in this case there was no significant recurrence seen during follow-up. We think systemic medication therapy, which regulates eosinophil and IgE levels, is a key strategy for preventing postoperative recurrence in cases where the mass was entirely excised but the peripheral blood levels of eosinophil and IgE were high

CONCLUSION

Kimura's disease is an uncommon condition that is often diagnosed through histological analysis in addition to physical and radiological evaluation. After systemic therapy, the result is noticeably better. Even though there was no recurrence over the one year follow-up period in the current case, closer observation is needed. Our case report shows that a painless forearm mass should be ruled out as having Kimura's disease, and that the condition responds well to surgery and prednisone treatment without radiotherapy.

REFERENCES

1. Dokania V *et al*, Kimura's disease without peripheral eosinophilia: an unusual and challenging case simulating venous malformation on imaging studies-case report and review of literature. J Clin Diagn Res. (2017)11:ME01–4. doi: 10.7860/JCDR/2017/28603.10063
2. Wang DY, Mao JH, Zhang Y, Gu WZ, Zhao SA, Chen YF, *et al*. Kimura disease: a case report and review of the Chinese literature. Nephron Clin Pract. (2009) 111:c55–61. doi: 10.1159/0001 78980
3. Chen C, Chen K, *et al*. Concurrent eosinophilia and IgG4-related disease

in a child: a case report and review of the literature. Exp Ther Med. (2018) 15:2739–48. doi: 10.3892/etm.2018.5743
4. Iguchi Y, Inoue T etal, Kimura's disease and its relation to angiolymphoid hyperplasia with eosinophilia: report of three cases and review of the literature. J Oral Pathol. (1986) 15:132–7. doi: 10.1111/j.1600-0714.1986.tb0 0593.x
5. Park SW, Kim HJ, etal. Kimura disease: CT and MR imaging findings. AJNR Am J Neuroradiol. (2012) 33:784–8. doi: 10.3174/ajnr.A2854
6. Zhou P, Zhang W, etal Kimura disease. Dermatol Online J. (2017) 23:13030/qt4jx9v026.
7. Gurram P, Chandran S, etal. KIMURA'S disease - an e[X]clusive condition. Ann Maxillofac Surg. (2019) 9:183–7. doi: 10.4103/ams.ams_159_17
8. Bastos JT, Rocha CRMD, *et al*. Angiolymphoid hyperplasia with eosinophilia versus Kimura's disease: a case report and a clinical and histopathological comparison. An Bras Dermatol. (2017) 92:392–4. doi: 10.1590/abd1806-4841.201 75318
9. Fite-Trepat L, Martos-Fernandez M, *et al*, Angiolymphoid hyperplasia with eosinophilia involving the occipital artery: case report and review of literature. J Clin Diagn Res. (2017) 11:ZD21–3. doi: 10.7860/JCDR/2017/23323. 9569
10. Don DM, Ishiyama A, *et al*. Angiolymphoid hyperplasia with eosinophilia and vascular tumors of the head and neck. Am J Otolaryngol. (1996) 17:240–5. doi: 10.1016/S0196-0709(96)9 0088-5
11. Rosai J, Gold J, *et al*. The histiocytoid hemangiomas. A unifying concept embracing several previously described entities of skin, soft tissue, large vessels, bone, and heart. Hum Pathol. (1979) 10:707–30. doi: 10.1016/S0046-8177(79)80114-8.

How to cite this article: Vithalrao NS, Kalyani D. Rare Presentation of Kimura's Disease – A Case Report. Int J Sci Stud 2023;10(10):11-13.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Series

A Case Series of Mycetoma

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Abstract

Nocardia is a gram-positive, aerobic, acid-fast bacteria presenting a range of clinical symptoms. They arise as a result of local trauma and contamination of the site, although invasive disseminated infections are more common in immunocompromised or less robust hosts.[1] Examples of clinical manifestations include abscesses, cellulitis, and mycetoma infections. The presence of the causal organism in tissue samples, cultures, or exudates is required to support the diagnosis, which is made mostly by clinical presentation (as granules). A diagnosis may take longer than expected due to the wide range of clinical symptoms, but it is crucial for effective chemotherapy and surgery, which can help the majority of patients. The five case reports presented in this research illustrate the need for a high index of clinical suspicion, particularly in costalbelt.

Key words: Actinomycosis, Mycetoma, Mucormycois

INTRODUCTION

Tumefaction, draining sinuses, and granules in the discharging pus make up the distinctive clinical triad of mycetoma, which is simple to diagnose clinically. [1,2] Confirmatory steps include the isolation of the microorganism in culture and species identification using different biochemical reactions or molecular approaches. To prevent harsh surgical procedures like deep tissue debridement or amputation, an early diagnosis of mycetoma cases and early treatment are crucial. Mycetoma infection in non-endemic locations, a lack of clinical suspicion, a variety of clinical manifestations, and resemblances to deep mycoses are the causes of the diagnostic challenges. This article shows five clinical instances of the rare disease mycetoma while highlighting the value of a high index of clinical suspicion in terms of diagnosis and care.

Differential diagnoses include chromomycosis, blastomycosis, coccidioidomycosis, sporotrichosis, TB, botryomycosis, syphilis, yaws, and neoplasia.

Access this article online

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

CASE SUMMARY

Case 1

A 38-year-old farmer man presented with swelling and several sinuses that had been draining for the past 4 years on his left foot, which appeared a few days after the injury [Figure 1]. Upon examination, the dorsum of the foot and the ankle were swollen and dotted with many discharge sinuses. Systemic evaluation and routine tests such as complete blood counts, serum biochemistry, urinalyses, and chest X-ray films did not reveal anything. We took a biopsy and sent it off for histological analysis. It showed focal epidermal hyperplasia, a chronic granulomatous inflammatory infiltration with neutrophils, lymphocytes, histiocytes, and a small number of plasma cells, as well as fibroblastic and vascular proliferation. Special stains like Periodic Acid Schiff (PAS) and Ziehl-Neelsen (Z-N) staining were done out for additional confirmation. Purulent material in potassium hydrogenide (KOH) mounts revealed multilobulated, vermiform grains. Based on a histological examination and the results of special stains, the case was ultimately identified as having Actinomycosis. The patient received a modified Welsh regimen of antibiotic injections Amikacin and Clotrimazole BD for three weeks.

Case 2

A 42-year-old male presented with nasal obstruction and sinusitis for the past six months. One year prior, the patient had been infected with COVID-19. On examination,

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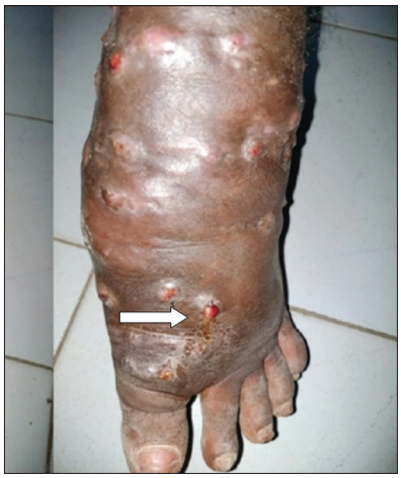

Figure 1: Severe edema, multiple sinuses, and yellowish-white discharge affecting the left foot and lower leg

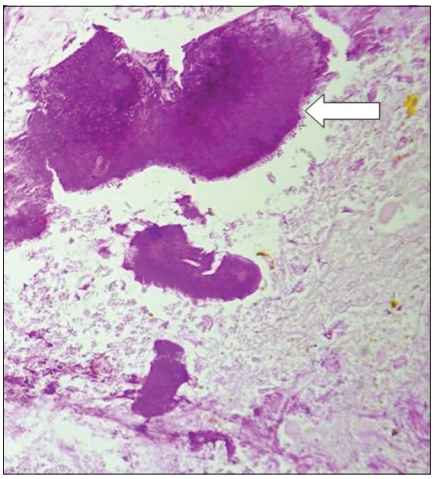

Figure 2: Actinomycosiss, filamentous bacteria on histopathology surrounded by suppurative inflammation, H&E 100X

the patient had tenderness over the bilateral maxillary sinuses. CT scan revealed necrtotic masses involved in both maxillary sinuses. Surgery was performed, and the curettage was done [Figure 2]. The tissue was sent for histopathological analysis, and revealed a suppurative and granulomatous inflammation which supported the actinomycosis diagnosis. In addition to this, there are aseptate, wide, right-angled branching hyphae exhibiting Mucor mycosis-specific morphological characteristics. Finally, a diagnosis of fungal sinusitis caused by an infection with Mucor Mycosis and Actinomycosis was made.

Case 3

A 40-year-old male was presented with left foot swelling that had been going on for 4 years. He had type 2 diabetes mellitus and was taking oral medication. The swelling has gotten worse over the last four years, and there are several dischraging drains. Upon inspection, a huge hyperpigmented swelling with many sinuses stretching

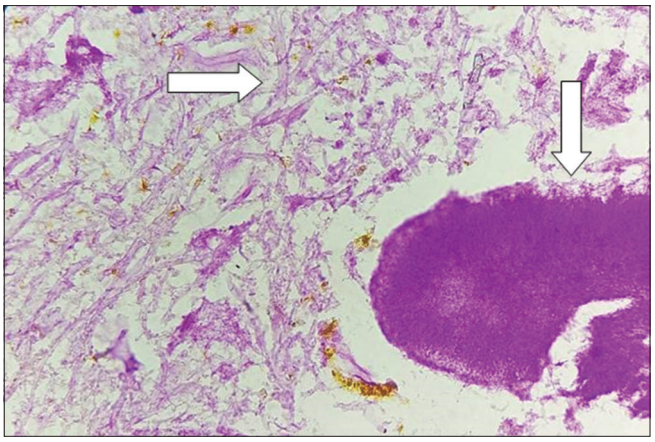

Figure 3: Mixed infection of Actinomycosis and Mucor mycosis, H&E 100X

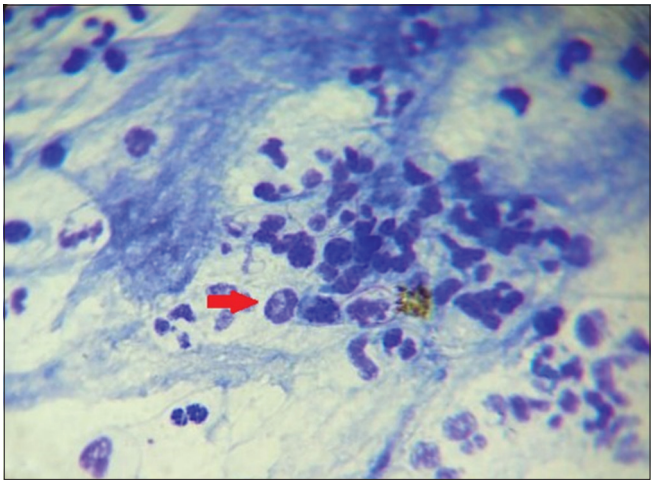

Figure 4: Long filamentous, branching bacilli on modified Acid fast staining

from the dorsum of the foot to the lower third of the left leg was discovered. The discharge was yellowish-white in colour and contained yellowish-white granules.

On histology, it was shown that the underlying tissue had a slight inflammatory infiltration and haemorrhage as well as a hyperplastic stratified squamous epithelium. Additionally, there are fungi that may indicate actinomycosis. Microbiological staining revealed the presence of Gram-positive, periodic acid-Schiff-negative, and acid-fast-positive organisms [Figure 3]. The sample was not cultured on Sabouraud dextrose agar, and there was no growth. The tarsals and metatarsals of the left foot have osteolysis, as seen on the X-ray. A computed tomography scan of the distal leg region also revealed soft tissue edoema with thickening in addition to the ongoing infection and inflammatory illness in the foot.

Clinical examinations revealed that the patient had mycetoma, and subsequent microbiological tests led to the ultimate diagnosis of Actinomycetoma caused by Nocardia.

He started taking antibiotics after being hospitalised. Along with exploration, sinus tract drainage, and debridement of sick tissue, parenteral antibiotics were initiated.

Case 4

A 45-year-old male has had swelling on his left flank for three months. He was on ART for ten years and tested positive for HIV. Upon examination, the patient had a 10x7 cm enlarged mass with several leaking sinuses. The biopsies were taken and sent for histopathological analysis. He has several erythematous, painful, nodular lesions in her right flank and lumboscral areas. He had recieved routine antibiotics and anti-tuberculosis medication at remote facilities. In addition to a few sinuses with serosanguineous discharge and creamy white granules, cutaneous examination revealed sensitive, erythematous nodules overlying the right flank.

Regular haematology, serum biochemistry, chest, and lumbar spine X-rays as well as the thorough inspection did not find any anomalies. Gram-positive, branching filamentous bacilli were found as granules in KOH mounts and Gram-stained smears [Figure 4]. Chronic inflammation and several foci of PAS-positive organisms were seen on the histology. After 3 days of incubation, an aerobic culture of the biopsy material on blood agar at 35 °C produced minute, pale-white colonies that were recognised as belonging to the Nocardia species. The final diagnosis in this case was Actinomycosis. He was prescribed co-trimoxazole, which contains trimethoprim (160 mg bid) and sulfamethoxazole (800 mg), but he failed to show up for the follow-up appointment.

Case 5

A 68-year-old woman came with a persistent, non-healing ulcer and underlying right foot edema that had been present for six months. She was diabetic in the past. During a clinical examination, the patient had a 4x3 cm enlargement, an ulcer with granulation tissue, several discharging sinuses, and oozing black granules. According to her medical history, she had initially developed several erythematous, barely itchy, papular lesions, some of which had minor purulent discharge, over her right calf. She was unable to recall any prior wounds. She was treated by general practitioners with intramuscular penicillin and anti-tuberculosis medications without experiencing a noticeable benefit. Her lesions had grown during that interval. The right calf showed extensive swelling, along with a number of sinuses, some of which were puckered and covered in adherent black-gray crusts. There was no regional lymphadenopathy.

Her systemic checkup, and regular diagnostics, including a chest X-ray, turned up no abnormalities. On blood agar at 35 °C, chalky white colonies were visible that were later determined to be Nocardia spp., branching, gram-positive, filamentous bacilli. X-ray films of the injured leg also showed soft tissue edema that suggested thickened skin beneath. The case was finally diagnosed as Madhura mycetoma.

DISCUSSION

Mycetoma, chromomycosis, blastomycosis, coccidioidomycosis, sporotrichosis, tuberculosis, botryomycosis, syphilis, yaws, and neoplasia are all differential diagnoses for chronic discharging localized disease in an extremity.[3,4] Mycetoma (Madura Foot, maduromycosis) is characterized by indolent swelling and discharge from sinuses containing granules, which are aggregates of microcolonies of the organism. It is a chronic, localized infection of the dermis and subcutaneous tissue. Approximately 40% of cases are due to true fungi (eumycetoma), and 60% are caused by aerobic actinomycetes (actinomycetoma). In most cases, the infection is caused by Nocardia brasiliensis or N. asteroids and develops after a mostly forgotten, traumatic implantation or contamination of a wound involving a limb.

The involvement of the flank, leg (as in our case), arm or thigh is unusual but frequently documented in the literature because the lesions are generally brought on by injury.[5,6] Particularly at risk are 20 to 50-year-old men and women who labor outside barefoot in rural areas. All of our patients shared, in large part, the same clinical characteristics. Our first instance experienced a left foot mycetoma as a result of a work-related accident. Since even long-standing nocardial mycetomas respond well to co-trimoxazole therapy, a high index of clinical suspicion would have averted surgery in him.

In actinomycotic and nocardial mycetoma instances, fibrosis, mutilation, and ultimately loss of function can advance quickly. Involvement of the bones happens occasionally. Without requiring surgery, two cases were responded to co-trimoxazole in an appropriate manner.

All of our patients went for a long time without receiving a diagnosis despite distinct clinical symptoms, probably as a result of a lack of clinical suspicion. The significance of an investigative work-up guided by clinical correlation, a good biopsy, and repeated microscopy for granules in pus specimens needs to be stressed to combat the issue of delayed or no diagnosis. For a successful outcome, prompt treatment commencement is essential, but the length of therapy is unpredictable.[7,8] Given that many patients experience relapses following shorter courses of medication, it must last for an extended period. The preferred first-line treatment for Nocardia infections is co-trimoxazole. The

therapeutic regimen introduced by Welsh *et al.* [9,10] consists of intravenous amikacin 500 mg, and co-trimoxazole (both in b.i.d. doses) for 3 weeks, followed by the continuation of co-trimoxazole alone for another 2 weeks.

REFERENCES

1. Zijlstra EE, van de Sande WWJ, Welsh O, *et al*., a unique neglected tropical disease. Lancet Infect Dis. 2016;16(1):100–12.
2. Sampaio FM, Galhardo MC, *et al*. Eumycetoma by *Madurella mycetomatis* with 30 years of evolution: a therapeutic challenge. An Bras Dermatol. 2013;88(6 Suppl 1):82–4.
3. Ahmed AO, Van Leeuwen W, *et al*. Mycetoma caused by *Madurella mycetomatis*: a neglected infectious burden. Lancet Infect Dis. 2004;4(9):566–74.
4. Ahmed AO, Desplaces N, *et al*. Molecular detection and identification of agents of eumycetoma: detailed report of two cases. J Clinical Microbiol. 2003;41(12):5813–6.
6. Kallel K, Belhaj S, *et al*. Qu'en est-il des mycétomes en Tunisie ? À propos de 13 cas colligés en 13 ans. J Mycol Med. 2005;15:56–60.
7. Tligui H, Aoufi S,*et al*. Mycétome du creux poplité à *Madurella mycetomatis*: à propos d'un cas. Journal de Mycologie Médicale. 2006;16:173–6.
8. Rao KV, Praveen A, *et al*. Atypical craniocerebral eumycetoma: a case report and review of literature. Asian J Neurosurg. 2015;10(1):56.
9. Ahmed SA, van *et al*. Rapid identification of black grain eumycetoma causative agents using rolling circle amplification. PLoS Negl Trop Dis. 2014;8:1–7.
10. Welsh O, Cabrera LV *et al*, Mycetoma. Clin Dermatol. 2007;25:195–202.

How to cite this article: Vithalrao NS, Kalyani D. A Case Series of Mycetoma. Int J Sci Stud 2023;10(10):14-17.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Morphometric Study of Femoral Neck in Dried Adult Human Femurs of Punjab Population with its Clinical Aspect

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Abstract

Introduction: Femoral neck (FN) shaft axis length and FN width collectively influence the risk of fracture especially in women apart from bone mineral density. The shape of the proximal femur is known to be an important risk factor for hip fracture of the FN, regardless of bone mass or bone strength. There are substantial variations in hip fracture incidence rates worldwide, which suggest the existence of important occurrence. This substantial variation may be related to genetic factors and environmental conditions bone mass index, bone mineral density, and the morphometry of the proximal femur.

Objectives: The present study aimed to record the FN parameters that were carried out which would be of help to the orthopedicians while carrying out surgical repairs around the hip joint especially in fracture of the neck of femur.

Materials and Methods: A total of 100 North Indian unpaired dry adult human femora (right-50, left-50) of unknown sex were studied. FN parameters of the femur were measured with the help of measuring thread and vernier caliper was recorded in millimeters. The raw data obtained were statistically analyzed. Range, mean, standard deviation, and standard error of mean were determined.

Results: The mean femoral length on anterior aspect of femur was found to be 29.58 mm (right 29.64 mm and left 29.52 mm), mean femoral length on posterior aspect was 39.45 mm (right-39.22 mm and left-39.68 mm), mean femoral neck width was 27.09 mm (right-27.54 mm and left-26.64 mm), and mean neck thickness was 21.66 mm (right-21.72 mm and left-21.60 mm). No significant difference in values of FN parameters was found in the right and left femur.

Conclusion: This study will enlighten the biomechanical engineers to take a revolutionary step towards altering the implant designs to suit our Indian needs and thus change the concept of orthopedic surgeries in our country.

Key words: Femora, Orthopedicians, Morphometry

INTRODUCTION

Femur is the longest and strongest bone of the human body. Its length is associated with a striding gait, its strength with weight and muscular forces. It comprises of an upper end, shaft, and lower end. Proximal part of femur includes head, neck, greater, and lesser trochanters.[1] The femoral neck (FN), which connects the head to the shaft, passes downward, backward, and laterally and make an angle of about 125° (slightly less in the females) with long axis of shaft. It is about 5 cm in length with two surfaces, anterior and posterior.[2]

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

FN shaft axis length and FN width collectively influence the risk of fracture especially in women apart from bone mineral density.[3,4] The shape of the proximal femur is known to be an important risk factor for hip fracture of the FN, regardless of bone mass or bone strength.[5] There are substantial variations in hip fracture incidence rates worldwide, which suggest the existence of important occurrence. This substantial variation may be related to genetic factors and environmental conditions bone mass index, bone mineral density, and the morphometry of the

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proximal femur.[5,6] Undersized or overhanging femoral implants could lead to altered soft-tissue tensioning and altered patella femoral stresses.[7] Bony marking such as the head and neck of femur can be used in determination the femoral length when only one fragment of proximal femur is available and the required size of length of neck can be determined to design prosthesis for restoration of normal neck shaft angle.[8]

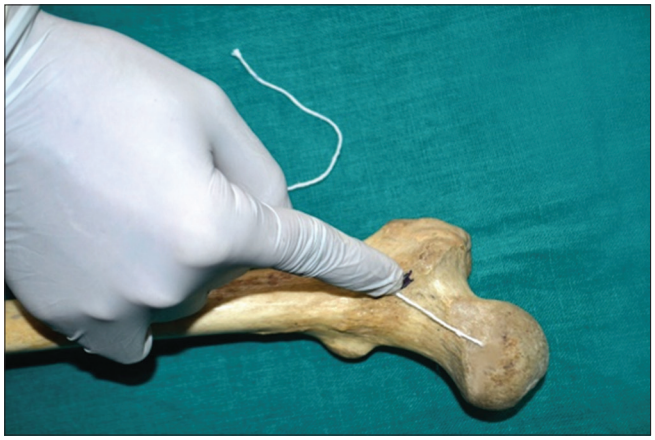

Figure 1: The measurement of femoral neck length on anterior aspect with the help of non-elastic cotton thread

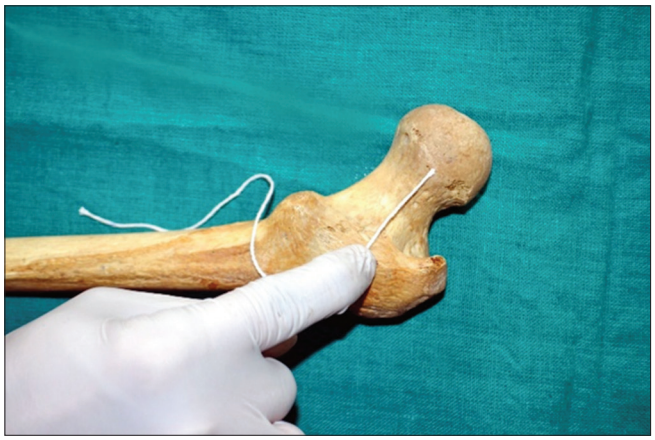

Figure 2: The measurement of femoral neck length on posterior aspect with the help of non-elastic cotton thread

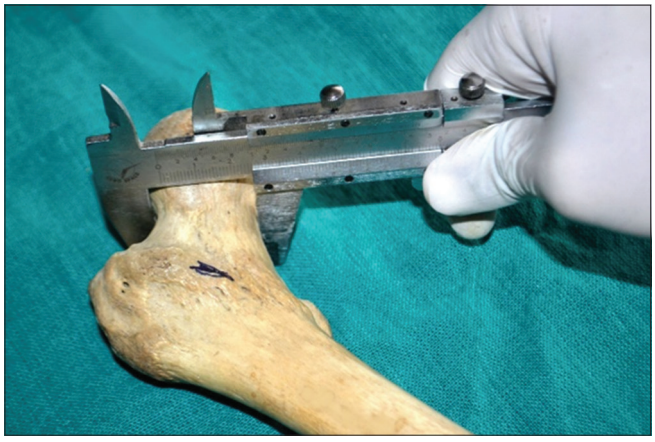

Figure 3: The measurement of femoral neck width with the help of venier caliper

Most of the Indian orthopedic surgeons have currently felt the need for the modification in implant sizes suitable for Indian population.[9] Thus, the present study to record the femoral length, FN was carried out which would be of help to the orthopedicians while carrying out surgical repairs around the hip joint especially in fracture of the neck of femur. In addition to the orthopedic surgeons, this study will be of great help to the anatomists, anthropologists, forensic experts, and radiologist also. Moreover, not much study has been done on femoral length, FN in North Indian population.

MATERIALS AND METHODS

A total of 100 North Indian unpaired right and left dry adult human femora of unknown sex were studied from teaching collection of the Anatomy department, Guru Gobind Singh Medical College, Faridkot. Out of the total of 100 femora, 50 were of the right side and 50 were of the left side. All the femora was complete and showed normal anatomical features. Bones with any gross abnormality or broken bones were excluded from the study.

FN Length on Anterior Aspect

It is the distance between the base of the head and intertrochanteric line [Figure 1]. It will be measured along the line that is perpendicular to intertrochantric line, which divides anterior part of neck into two equal halves. It will be measured with the help of non-elastic cotton thread and the readings will be taken using a measuring scale in millimeters (mm).

FN Length on Posterior Aspect

It is the distance between the base of head and intertrochantric crest [Figure 2]. It will be measured along the line that is perpendicular to intertrochantric crest which divide posterior

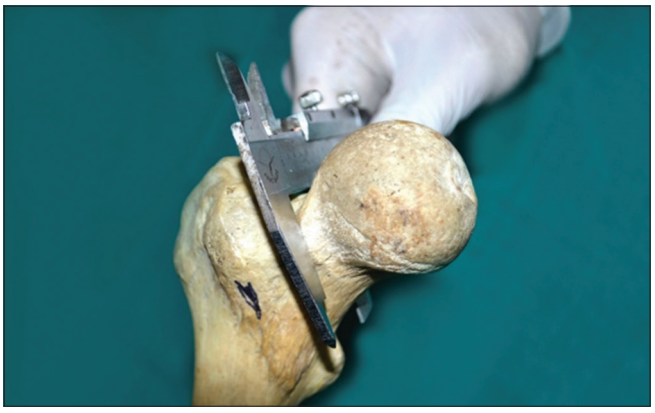

Figure 4: The measurement of femoral neck thickness with the help of venier caliper

part of neck into two equal halves. It will be measured with the help of non-elastic thread and the readings will be taken using a measuring scale in millimeters (mm).

FN Width

Width of the neck is measured at its narrowest part in superoinferior direction using vernier caliper [Figure 3]. It will be recorded in millimeters (mm).

FN Thickness

It is the thickness of femur from at midpoint of the line joining upper region of femoral head with the base of greater trochanter of femur [Figure 4]. It will be measured with the help of vernier caliper and recorded in millimeter (mm).

OBSERVATION AND RESULTS

A total of 100 femora (50 right and 50 left) were studied. Overall range, mean, standard deviation, and standard error of mean and distribution on the right and left side of parameters are given in Tables 1-4.

Table 1: Parameter of anterior femoral neck length of the right and left femur (mm)

Side	Range	Mean	SD	SEM
Right	21–43	29.64	5.58	0.78
Left	20–46	29.52	5.61	0.79
Total	20–46	29.58	5.56	0.78

SD: Standard deviation, SEM: Standard error of mean

Table 2: Parameter of posterior femoral neck length of the right and left femur (mm)

Side	Range	Mean	S.D	SEM
Right	26–55	39.22	5.94	0.84
Left	29–52	39.68	4.72	0.66
Total	26–55	39.45	5.34	0.75

SD: Standard deviation, SEM: Standard error of mean

Table 3: Parameter of femoral neck width of the right and left femur (mm)

Side	Range	Mean	S.D	SEM
Right	19–34	27.54	3.1	0.44
Left	19–33	26.64	3.5	0.58
Total	19–34	27.09	3.3	0.51

SD: Standard deviation, SEM: Standard error of mean

Table 4: Parameter of femoral neck thickness of the right and left femur (mm)

Side	Range	Mean	S.D	SEM
Right	16–29	21.72	2.81	0.39
Left	15–26	21.60	3.24	0.45
Total	15–29	21.66	3.02	0.42

SD: Standard deviation, SEM: Standard error of mean

DISCUSSION

The present study was conducted on 100 dried adult human femurs in the Department of Anatomy, Guru Gobind Singh Medical College, Faridkot. Different morphometric features were noted and measurements were taken. Data were compiled and the various parameters were compared with the studies available in the literature and any deviation was noted.

Reddy and Kumar[10] analyzed length of neck anteriorly 26.51 mm (standard deviation [SD] = 3.369), length of the neck posteriorly 30.846 mm (SD = 3.9 mm), width of the neck 30.68 mm anteroposteriorly (SD = 4.359 mm), and 29.94 mm superoinferiorly (SD = 3.599). Did study on 60 dried femora the mean values for the various parameters were as follows: Length of neck – 27.5 mm, width of neck – 48.33 mm.

In a study done by Sundar and Sangeetha[11] on 250 femurs in South Indian population showed that the anterior neck length of femur was 3.07 cm (right femur-2.88 cm and left femur-3.18 cm). Dhivya and Nandhini[12] did study on 158 dry femora and calculated the anterior neck length was from 2 cm to 4 cm with mean of 3.09 cm. Lakati *et al.*[13] reported that mean FN width was found to be 29.36 mm, with mean width of the left side being 28.67 mm and that of the right being 29.36 mm, respectively

Mukhia and Poudel[14] conducted a study on 75 femur of both sex showed that average FN length was 4.12 ± 0.32 cm, FN breadth was 2.94 ± 0.30 cm, and FN thickness was 2.36 ± 0.42 cm.

Muley and Bhuiyan[15] studied neck of 150 dry adult femora in West Indian population and noted that the mean width of neck of femur was 29.38 ± 2.50 mm on the right side and 28.86 ± 3.47 mm on the left side, mean length of neck of femur on anterior aspect was 34.96 ± 7.18 mm on the right side and 33.42 ± 4.12 mm on the left side and mean length of neck of femur on posterior aspect was 39.55 ± 5.81 mm on the right side and 40.00 ± 4.60 mm on the left side.

The values of present study are in consonance with the values of Sundar and Sangeetha[11] Mukhia *et al.*[14] and Muley and Bhuiyan[15] No significant difference was found between the values of the right and left side. The difference seen between the values of the present study and those recorded by other workers could be because of contribution to growth variation among different populations such as genetic factors, nutrition, environmental condition, social condition, and cultural conditions.

CONCULSION

The overall goal of this study was to generate information that would be useful for geometric modeling of femora and collecting data which could prove useful for development of prosthetic implants. In cases, where destruction of femora is extensive, due to trauma or some disease, this study will enlighten the biomechanical engineers to take a revolutionary step towards altering the implant designs to suit our Indian needs and thus change the concept of orthopedic surgeries in our country. However, it should be kept in mind, that the present study had a smaller number of femur bones, so it is worthwhile to perform similar study on more number of bones for its theoretical and practical importance in the coming years.

REFERENCES

1. Standring S. Gray's Anatomy. Pelvic Girdle, Gluteal Region and Thigh. 41st ed., Ch. 80. London: Churchill Livingstone; 2016. p. 1348-51.
2. Snell RS. Clinical Anatomy by Regions. Lower limb. 9th ed., Ch. 10. Philadephia, PA: Lippincott Williams and Wilkins; 2012. p. 439-5.
3. Tuck SP, Rawlings DJ, Scane AC, Pande I, Summers GD, Woolf AD, *et al*. Femoral neck shaft angle in men with fragility fractures. J Osteoporosis 2011;2011:903726.
4. Shrestha A, Ranjit N, Shrestha R. Neck shaft angle of non-articulated femur bones among adults in Nepal. MJSBH Med J Shree Birendra Hosp 2015;14:1-4.
5. Gregory JS, Testi D, Stewart A, Undrill PE, Reid DM, Aspden RM. A method for assessment of the shape of the proximal femur and its relationship to osteoporotic hip fracture. Osteoporos Int 2004;15:5-11.
6. Glüer CC, Cummings SR, Pressman A, Li J, Glüer K, Faulkner KG, *et al*. Prediction of hip fractures from pelvic radiographs: The study of osteoporotic fractures. The study of osteoporotic fractures research group. J Bone Miner Res 1994;9:671-7.
7. Gnudi S, Ripamonti C, Lisi L, Fini M, Giardino R, Giavaresi G. Proximal femur geometry to detect and distinguish femoral neck fractures from trochanteric fractures in postmenopausal women. Osteoporos Int 2002;13:69-73.
8. Chowdhary S, Naushaba H, Begum J, Ahmed S, Khan LF, Parash TH, *et al*. Morphometrical and topographical anatomy of position of nutrient foramen on fully ossified left femur. Delta Med Coll J 2013;1:13-5.
9. Mahaisavariya B, Sitthiseripratip K, Tongdee T, Bohez EL, Sloten J, Oris P. Morphological study of the proximal femur: A new method of geometrical assessment using 3-dimensional reverse engineering. Med Eng Phys 2002;24:617-22.
10. Reddy KS, Kumar DA. Morphometry of proximal end of femur in population of Telangana state and its clinical application. Indian J Clin Anat and Phy, 2019;6:57-60.
11. Sundar G, Sangeetha V. Morphometric study of human femur. IJMRPS Indian J Med Res Pharm Sci 2018;5:52-5.
12. Dhivya S, Nandhini V. A study of certain femoral metrics in south Indian population and its clinical importance. Int J Sci Stud 2015;3:132-5.
13. Lakati KC, Ndeleva BM, Mouti N, Kibet J. Proximal femur geometry in the adult Kenyan femur and its implication in orthopaedic surgery. EAOJ East Afr Orthop J 2017;11:22-7.
14. Mukhia R, Poudel PP, Bhattarai C, Timsina S. Morphometric study of proximal end of femur of Nepalese people. Nepal J Med Sci 2019;4:9-14.
15. Muley M, Bhuiyan P. Morphometric study of neck of dry adult femora. Int J Anat Res 2018;5:4317-20.

How to cite this article: Singh G, Dhindsa GS, Arya G, Kahlon S, Phogat R, Asar V. Morphometric Study of Femoral Neck in Dried Adult Human Femurs of Punjab Population with its Clinical Aspect. Int J Sci Stud 2023;10(10):18-21.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Diagnostic Value of Pipelle Endometrial Sampling in Comparison with Dilatation and Curettage among Patients with Abnormal Uterine Bleeding

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Abstract

Background and Objectives: We compared endometrial sampling by Pipelle endometrial curette with conventional dilatation and curettage (D&C) in patients with abnormal uterine bleeding.

Methods: A comparative study was conducted in the Department of Obstetrics and Gynaecology at SKIMS Srinagar from September 2018 for the period of 18 months and was a time bound study. Eighty (80) cases of abnormal uterine bleeding attending the outpatient clinic were included in the study. The Pipelle was introduced without performing cervical dilatation and withdrawn outside the uterus with a rotatory movement to get sample. The patient was then transferred to the operation theater for dilatation and curettage. Thereafter, both the samples were sent to pathologist, who was blinded to methods of sampling. The histopathology reports of both samples were compared.

Results: An adequate sample was obtained in 93.8% of cases by Pipelle and in 100% of cases by D&C. Pipelle had a sensitivity, specificity, positive predictive value, and negative predictive value of 100% for diagnosing endometrial carcinoma, endometrial hyperplasia without atypia and with atypia and proliferative endometrium. Pipelle also had high diagnostic sensitivity, specificity, and negative predictive value (100%, 98.33%, and 100%, respectively) for secretory endometrium and sensitivity (100%) and positive predictive value (83.33%), but high specificity (98.67%) and negative predictive value (100%) for endometritis. Samples were labeled as inadequate for histology of polyp by pipelle.

Conclusion: Pipelle device is an easy and convenient method of getting tissue diagnosis. It can be done as an outpatient procedure without anesthesia, when compared to D&C which is done under anesthesia. The sensitivity and specificity of this procedure in detecting endometrial pathologies were comparable with the standard procedure of D&C.

Key words: Bleeding, Endometrial, Uterine

INTRODUCTION

Abnormal uterine bleeding accounts for more than 70% of all gynecological problems in the peri and post-menopausal women.[1] The bleeding could be a sign of an underlying localized condition including infection, benign, and malignant pathology. Abnormal uterine bleeding is a common reason for gynecological consultations. It occurs when women experiences a change in her menstrual blood loss or if the degree of blood loss, or vaginal bleeding pattern differs from that experienced by age-matched general female population. AUB is the overarching term used to describe any departure from normal menstrual cyclical pattern.The key characteristics are regularity, frequency, heaviness of flow, and duration of flow, but each of these may exhibit considerable variability. Endometrial sampling for histopathology is important in the assessment of abnormal uterine bleeding. The endometrial biopsy is a surgical procedure that involves taking a tissue sample of the lining the uterus. The histological evaluation of tissue aids the clinician in forming a diagnosis. The main reason for performing endometrial biopsy in women with abnormal uterine bleeding is to confirm the benign nature of the problem, by ruling out endometrial carcinoma, so that conservative surgery can be offered and unnecessary radical surgery can be avoided. Various methods of endometrial samplings

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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are used in practice. Ultrasonographic measurement of central endometrial thickness is one of the commonly used non-invasive methods although the cut of limit for endometrial thickness is still debated.[2] However, a thin and regular endometrium is reliable exclusion of endometrial carcinoma.[3] Dilatation and curettage are an invasive inpatient procedure performed under general anesthesia. Outpatient invasive methods include hysteroscopic directed biopsy or endometrial biopsy with various endometrial samplers including the pipelle device.Endometrial biopsy is an important even if hysteroscopy is normal.[4] The dilatation of the cervix and curettage of the uterine cavity under general anesthesia have long been considered the gold standard for the assessment of abnormal uterine bleeding. This method requires laboratory investigation, hospitalization, and carries the added risk of general anesthesia, infection, and perforation.[5,6] This has led to the advent of new and simple method for endometrial sampling, various devices are in the market today including pipelle curette.

MATERIALS AND METHODS

Eighty patients 35 years of age and older who presented with abnormal uterine bleeding were enrolled in this study after providing informed consent to participation. Patients with lower genital tract infections, known cervical stenosis, possibility of pregnancy, patient with coagulopathy, and central endometrial thickness of <4 mm were excluded from the study. A consecutive sampling technique was used for eligible women. A detailed clinical assessment of patients performed in the outpatient department included a history, examination, and baseline investigations, including pelvic ultrasound. The diagnostic intervention was endometrial sampling by the pipelle device and the diagnostic reference standard was endometrial sampling by D&C. First, the pipelle was introduced without performing cervical dilatation and then withdrawn outside with a rotatory movement to get the sample, which was labeled as A. The pipelle procedure was followed by the standard D&C procedure and that sample was labeled as B. Both samples were sent to a pathologist, who was blinded as to the method of sample collection, for histopathology assessment. The histopathology report of the pipelle sample was compared with that of the D&C sample and the D&C report was used as the gold standard. Histopathology reports were categorized as proliferative, secretory, and endometrial hyperplasia with atypia or without atypia and carcinoma. The primary outcome measure was the validity of the pipelle technique for determining the histopathology of the endometrium in women who presented with abnormal uterine bleeding, especially for ruling out endometrial carcinoma. The secondary outcome measure was the adequacy of the tissue for histopathology, associated complications of the procedure and its failure rate. The sample was labeled as inadequate by the histopathologist when no endometrial tissue was present in the specimen sent.

RESULTS

Of the 80 patients studied, 43 (53.8%) were perimenopausal and 37 (46.2%) were postmenopausal. Pre-menopausal women included in the study had heavy menstrual bleeding (HMB) as their main complaint. Frequent menstrual bleeding was the second most common complaint in this group. Irregular menstrual bleeding was the third most common complaint in this group. Post-menopausal bleeding was the main complaint among post-menopausal women.

Out of the 80 patients studied, 43 (53.8%) patients were having some medical illness and 37 (46.2%) were not having any significant medical illness. Hypertension was the commonest medical illness present in 24 patients (30%); followed by diabetes mellitus (DM) in 11 (13.8%) patients who were already on some form of treatment at the time of admission. Ca Breast was present in 3 (3.8%) patients, CKD and thyroidectomy were present in 1 (1.2%) patient. In 46 (57.5%) patient had bulky uterus on per vaginum examination and 34 (42.5%) had normal uterus [Table 1].

Out of 80 patients, scanty tissue was reported by the pathologist in 5 (6.2%) patients in case of pipelle sampling and adequate in 75 (93.8%) patients of pipelle sampling. However, in D&C, tissue samples were adequate in 80 (100%) patients [Tables 2 and 3].

Validity of Pipelle sampling for each endometrial condition

The sensitivity, specificity, and positive predictive value of Pipelle sampling is 100% with regards to diagnosis of proliferative endometrium, endometrial hyperplasia with or without atypia, endometrial carcinoma, and disordered proliferative endometrium. With regard to diagnosis of secretory endometrium, the sensitivity and specificity are 100% and 98.33%, respectively. Whereas positive predictive values and negative predictive value were 95.24% and 100%, respectively. Similarly, for polyp sensitivity and specificity are 3.75% and 100%, respectively.

DISCUSSION

Endometrial sampling for histopathology is important in the assessment of abnormal uterine bleeding. The endometrial biopsy is a surgical procedure that involves taking a tissue sample of the lining the uterus. The histological evaluation

Table 1: Adequacy of Sampling in Studied Subjects

Tissue sample	No of patients	Percentage
D&C		
Adequate	80	100.0
Scanty	0	0.0
Pipelle		
Adequate	75	93.8
Scanty	5	6.2

Table 2: Correlation between endometrial thickness (ET) and sufficiency of sample in the patients studied in pipelle biopsy

	Tissue sample		Total
	Sufficient	Scanty	
ET			
≤6	0	1	1
	0%	100.0%	100.0%
7–9	16	3	19
	84.21%	15.78%	100.0%
10–12	29	1	30
	96.7%	3.3%	100.0%
13–15	17	0	17
	100.0%	0.0%	100.0%
16–18	9	0	9
	100.0%	0.0%	100.0%
19+	4	0	4
	100.0%	0.0%	100.0%
Total	75	5	80
	93.8%	6.2%	100.0%

Table 3: Specific histopathological findings reported with pipelle and D&C

	HPE pipelle (#80)		HPE D&C (#80)	
	Frequency	% age	Frequency	% age
Proliferative endometrium	26	32.5	26	32.5
Secretory endometrium	21	26.25	22	27.50
Endometrial hyperplasia without atypia	10	12.5	10	12.4
Endometrial hyperplasia with atypia	7	8.7	7	8.7
Endometritis	5	6.25	6	7.6
Endometrial carcinoma	4	5.0	4	5.0
Disordered proliferative endometrium	2	2.4	2	2.4
Polyp	0	0	3	3.8
No report	5	6.25	0	0

of tissue aids the clinician in forming a diagnosis. The main reason for performing endometrial biopsy in women with abnormal uterine bleeding is to confirm the benign nature of the problem, by ruling out endometrial carcinoma, so that conservative surgery can be offered and unnecessary radical surgery can be avoided. In our study, tissue obtained for histopathology was adequate in 100% cases when the procedure was D&C, while it was adequate in 93.8% of cases by Pipelle. Thus, Pipelle had comparable tissue adequacy with D&C. Five cases were labeled as inadequate for histopathological reporting. Out of those five cases, three were having endometrial polyp, one was having secretory endometrium, and one was having endometritis.

In the study by Abdelazim *et al.*,[7] the pipelle and D&C were compared and the authors reported 100% of sufficient sample in conventional D&C and 97.7% for pipelle that is higher by both methods in comparison to our study. It may be due to different techniques and instruments and also pathologist's experience. In a study by Naderi *et al.*,[8] the sufficiency rates were 91.6% and 98.3% by pipelle and D&C, respectively. The study by Mousavifar *et al.*,[9] reported 94% of sufficiency rate for pipelle sample. The mean endometrial thickness by means of TVS was 12.05 ± −3.926 scanty tissue was obtained in one patient with ET <6 mm, in three patients with ET of 7–9 mm and in 1 patient with ET of 10–12 mm in Pipelle biopsy. However, sample was adequate for all samples in case of diagnostic D&C.

Elsandabesee and Greenwood[10] examined the factors that would affect the adequacy of endometrial samples in terms of their suitability for histopathological examination. He found that the ability to obtain an adequate endometrial sample was primarily affected by the endometrial thickness. There is only a 27% of probability of getting an adequate endometrial sample in the group of women with an endometrial thickness of <5mm. However, when the endometrial thickness is ≤4, little can be gained from endometrial sampling as the chance of getting an adequate sample is small. The analysis revealed that the procedure avoided the need for hysteroscopy in 61.5% of cases with an endometrial thickness of >4mm. No cases of endometrial cancer were missed after Pipelle sampling.

The most common endometrial pattern identified was proliferative endometrium 26 (32.5%) followed by secretory endometrium 21 (26.25%), endometrial hyperplasia without atypia 10 (12.5%), endometrial hyperplasia with atypia 7 (8.7%), endometrial carcinoma 4 (5%), and polyp 3 (3.8%). The sensitivity and specificity of pipelle biopsy and D&C in detecting proliferative endometrium, endometrial carcinoma, and endometrial hyperplasia with or without atypia are 100% and 100%, respectively. The sensitivity and specificity of pipelle biopsy in detecting secretory endometrium are 100% and 98.33%, respectively.

Fakhar *et al.*,[11] evaluated 100 patients with AUB. D&C and pipelle were chosen as a method for sampling the endometrium and histopathology report was compared taking D&C as a gold standard. In 98 of the 100 patients, the sample was adequate as compared to 100 in D&C. Diagnosis of carcinoma, hyperplasia, and secretory endometrium

with pipelle showed a sensitivity and specificity of 100%. Sensitivity and specificity for diagnosing proliferative endometrium were 94% and 93%, respectively. Two samples were inadequate by Pipelle. In both these cases, D&C report showed polyp. The conclusion derived was that hyperplasia and malignancy could be detected with high sensitivity and specificity using Pipelle technique. Our results were consistent with study of Alliratnam *et al.*,[12] who found pipelle biopsy was 100% sensitive and 100% specific in detecting secretory endometrium. It can be inferred from our study that Pipelle biopsy is reliable in acquiring adequate endometrial sample and histopathological results of Pipelle were comparable with dilatation and curettage. Pipelle biopsy is also safe, cost-effective, and an office procedure. It is also an easy and convenient method of obtaining tissue diagnosis. An additional advantage of pipelle biopsy is that it does not require anesthesia.

Fakhar *et al.*[11] reported the cost per case was £39.46 for dilatation and curettage as compared to £4.74 for the Pipelle. The cost included the procedure, anesthesia, surgery, and inpatient charges. The cost of Pipelle sampling was Rs.450, compared to Rs.2000 for D&C, which was done under anesthesia. Although the higher inadequate tissue rate of Pipelle sampling was taken into consideration, Pipelle was certainly more cost effective than D&C.

CONCLUSION

Pipelle device is an easy and convenient method of getting tissue diagnosis. It can be done as an outpatient procedure without anesthesia, when compared to D&C which is done under anesthesia. The sensitivity and specificity of this procedure in detecting endometrial pathologies were comparable with the standard procedure of D&C.

REFERENCES

1. Spencer CP, Whitehead MI. Endometrial assessment revisited. Br J Obstet Gynaecol 1999;106:623-32.
2. Opmeer BC, van Doorn HC, Heintz AP, Burger CW, Bossuyt PM, Mol BW. Improving the existing diagnostic strategy by accounting for characteristics of the women in the diagnostic work up for postmenopausal bleeding. BJOG 2007;114:51-8.
3. Van Den Bosch T, Van Schoubroeck D, Domali E, Vergote I, Moerman P, Amant F, *et al*. A thin and regular endometrium on ultrasound is very unlikely in patients with endometrial malignancy. Ultrasound Obstet Gynecol 2007;29:674-9.
4. Royal College of Obstetricians and Gynaecologists. Guidelines. The Management of Menorrhagia in Secondary Care. Vol. 19. United Kingdom: Royal College of Obstetricians and Gynaecologists; 1999.
5. Schenk LM, Coddington CC. Laparascopy and hysteroscopy service. Curr Obstet Gynecol Clin North Am 1999;26:1-22.
6. O'Conell LP, Fries MH, Zeringue E, Brehm W. Triage of abnormal postmenopausal bleeding: A comparison of endometrial biopsy and transvaginal sonohysterography verses fractional curettage with hysteroscopy. Am J Obstet Gynecol 1998;178:956-61.
7. Abdelazim IA, Aboelezz A, Abdulkareem AF. Pipelle endometrial sampling versus conventional dilatation & curettage in patients with abnormal uterine bleeding. J Turk German Gynecol Assoc 2013;14:1-5.
8. Naderi T, Asharaf-Ganjooie T, Bahrampoor A, Mehrimahani I. Comparison of the diagnostic accuracy of pipelle biopsy, dilatation and curettage and hysrectomy in detection of endometrial lesions. J Kerman Univ Med Sci 2006;13:159-63.
9. Mousavifar N, Delavari M, Talaei-Khoei M. Accuracy of pipelle sampler for endometrial assessment. J Babol Univ Med Sci 2005;8:53-8.
10. Elsandabesee D, Greenwood P. The performance of pipelle endometrial sampling in postmenopausal bleeding clinic. J Obstet Gynaecol 2005;25:32-4.
11. Fakhar S, Saeed G, Khan AH, Alam AY. Validity of pipelle endometrial sampling in patients with abnormal uterine bleeding. Ann Saudi Med 2008;28:188-91.
12. Alliratnam AS, Priya S, Shankar R. Diagnostic value of pipelle endometrial sampling in comparison with dilatation and curettage among patients with abnormal uterine bleeding. Int J Reprod Contracept Obstet Gynecol 2016;5:864-7.

How to cite this article: Tabasum H, Khursheed R, Qayoom M. Diagnostic Value of Pipelle Endometrial Sampling in Comparison with Dilatation and Curettage among Patients with Abnormal Uterine Bleeding. Int J Sci Stud 2023;10(10):22-25.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

MRI in Contrary to Conventional Imaging Techniques in Evaluation of Anorectal Malformation

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Abstract

Introduction: Anorectal malformations represent a complex group of congenital anomalies which results in abnormal development of the hindgut. To accomplish a successful post-operative outcome, an accurate preoperative imaging assessment is required.

Purpose: The purpose of this study was to compare the sensitivity of magnetic resonance imaging (MRI) and conventional imaging technique in terms of detection of type of anorectal malformation, type of fistula, development of puborectalis muscle, and external sphincter and associated anomalies taking surgery as reference standard.

Methods: Patients underwent MRI and pressure colostography/fistulography. All patients underwent corrective surgery. The results of MR and conventional techniques were compared using surgery as reference standard.

Results: MRI and colostography/fistulography were able to correctly identify type of ARM in 28 out of 30 patients (93.3%). The sensitivity of MRI and colostography/fistulographyfor detection of presence of fistula was 100% and 37.03%, respectively. MRI and colostography correctly identified type of fistula in 22 out of 27 (81.48%) and 10 out of 27 patients (37%), respectively. Colostography failed to identify 16 surgically proven fistula out of 27 (59.25%). It was possible to clearly visualize and evaluate the bulk of muscles the levatorani and pubo-rectalis muscle in all the patients with MRI. The incidence of associated anomalies in present study was 43.3%.

Conclusion: MRI proved to be better imaging technique than conventional imaging techniques (colostography/fistulography) for pre-operative workup of anorectal malformation.

Key words: Anorectal malformation, Magnetic resonance imaging, Pressure colostography/fistulography

INTRODUCTION

Anorectal malformations comprise a complex group of congenital anomalies that results from abnormal development of the hindgut, allantois, and Mullerianduct resulting in incomplete or partial urorectal septal malformations. ARM is a relatively uncommon congenital cause of intestinal obstruction in the newborn, occurring in approximately one out of every 4000–5000 births (4.05/10,000 births).[1] Approximately 36.4% of cases occur as isolated lesions and 63.6% are associated with other congenital anomalies.[2-6] High lesions are more common among boys (34.5% vs. 13.3%) and low lesions more common among girls (70.9% vs. 47.6%).[7] The male female ratio associated with ARM is almost equal, with a ratio of 56:44.[1,7-9] Associated anomalies are 13 times more common in high type in comparison to low type.[7,10] Several classification systems have been proposed for ARM; however, the Krickenbeck classification is widely accepted today, which is based on the presence or absence of fistula and its location.[11-13] The final stage corrective surgery for anorectal malformation depends on the level of the fistula in reference to pelvic floor. Thus, accurate recognition of different subtypes of ARM is essential for operative management.[11]

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

Since the introduction of various imaging modalities for anorectal malformation such as invertogram, contrast enemas, distal high-pressure colostography, voiding cysto-urethrograms, and recently accepted cross-sectional modalities such as ultrasound, computed

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tomography, and magnetic resource imaging (MRI), all the diagnostic imaging have helped surgeon a lot with the information needed to correct the malformation. To achieve a successful post-operative outcome, a proper pre-operative imaging assessment is required which includes assessment of the presence of a fistula, level and type of anorectal malformation, developmental state of the sphincter muscle complex, and presence of any other associated anomalies.[14] MRI fulfills these requirements because of its excellent intrinsic contrast resolution, multi-planar imaging capabilities, and lack of ionizing radiation. Disadvantages of MRI include the need for sedation, high cost, and limited availability. Despite of all these disadvantages, MRI is increasingly being used for the pre-operative work-up of ARM patients.[15] Conventional imaging techniques such as colostography/fistulography have many disadvantages such as operator dependency, perforation, false impression of lower anomaly, troublesome, and radiation exposure.

In our study, we have evaluated 30 patients with anorectal malformation using MRI and conventional imaging techniques (colostography/fistulography) and these results were compared using surgery as the reference standard.

MATERIALS AND METHODS

All the patients were examined using 3-Tesla MR system (siemens, magnetomskyra), after taking consent from their parents as all the patients are children and infants. Scanning was done under sedation using midazoloam or ketamin as anesthetic agent. Body coil or head coil (infants) was used. Images of the pelvis to assess the level and type of ARM as well as the bulk of the sphincter muscle complex were acquired in the axial, coronal, and sagittal plane using T1 and T2-weighted Turbo Spin-Echo (T2W TSE) sequences (repetition time ms/echo time ms - 5000/132; field of view-130–150; section thickness-1.5 mm; gap-1 mm; number of signals acquired-2; flip angle-90; matrix-512 X 512; acquisition time). In the coronal and axial section, orientation was parallel and perpendicular to the plane of the anal canal, respectively. STIR images were also taken in three orthogonal planes whichever required. Total scanning time was 20–25 min.

Pressure colostography was performed by inserting a Foley catheter in the distal rectal pouch and by injecting water-soluble non-ionic contrast media (Iohexol) into it and then subsequent images were taken in AP and lateral view using computed radiography system. When the neonate did not have a colostomy stoma, the distal fistula was injected with non-ionic contrast agent and images were taken in AP and lateral view.

Analysis of the MR images was based on the following criteria. The location of the transition of the normal rectal mucosa into the fistula was evaluated. Pubococcygeal line is the line extending from the lower border of the pubic symphysis to the coccyx. It corresponds with the attachment of levatorani muscle to the pelvic wall. It separates high type of ARM from other types with high-type lying above this line.[16] I-plane (Ischeal plane)passes through the lowest point of the ischial tuberosity parallel to the above line. It separates intermediate type from low type (lying above and below this line, respectively).[16] Since no pressure was applied during MRI to dilate the bowel loop, differentiation between normal colon and fistula was based on the layered pattern of the bowel segment. If the different layers of bowel wall (mucosa, submucosa. and muscle layer) were visualized, it was classified as normal bowel and if no layer was visible, it was classified as a fistula [Figures 1 and 2]. The presence of fistula and its type was based on Krickenbeck's classification. The degree of development of the puborectalis and external sphincter muscle complexis assessed in the coronal and axial planes. If RWPR <0.18 and RWEAS <0.15, it is termed as poor development of muscles.[17-19] RWPR is defined as the total width of puborectalis muscle/half distance of ischial tuberosities. Similarly, RWEAS is defined as total width of external anal sphincter/half distance of ischial tuberosity. Other associated anomalies involving the vertebrae, spinal cord, and/or the genitourinary system anomalies are evaluated. An ectopic anus is described as an anal index of <0.34 in girls and <0.46 in boys. The anal index is defined as the ratio of the scrotal – anal distance to the scrotal–coccygeal distance in males, and the ratio of the fourchette–anal distance to the fourchette–coccygeal distance in females.[20]

Krickenbeck's International Classification

Major clinical groups
Perineal fistula
Recto-urethral fistula
Bulbar
Prostatic
Recto-vesical fistula
Vestibular fistula
Cloaca
No fistula anal stenosis
Regional/rare variants-Pouch colon
Rectal atresia/stenosis
Recto-vaginal fistula
H-type fistula
Others

Interpretation of cologram findings were done on the basis of termination of the distal opacified bowel loop in reference to the pubococcygeal line and ischial-plane. The presence of some abnormal tract suggesting fistulous communication [Figure 1]. The presence of any associated anomaly in spine is also documented. Deficiency of the

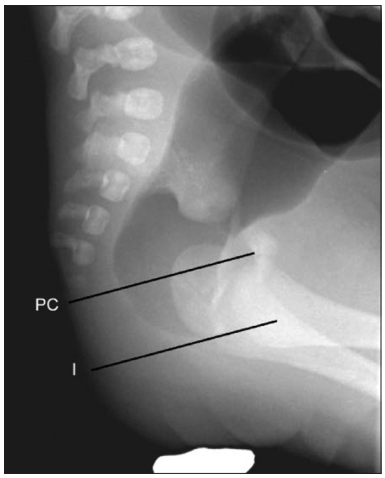

Figure 1: Prone, cross-table lateral radiograph of a pelvis demonstrating the pubococcygeal (PC) line between the pubic symphysis and coccyx, and the ischial (I) line running parallel to the PC line at the inferior aspect of the ischium. In the this example the terminal bowel gas extends to the I point in a child with a rectoprostatic urethral fistula

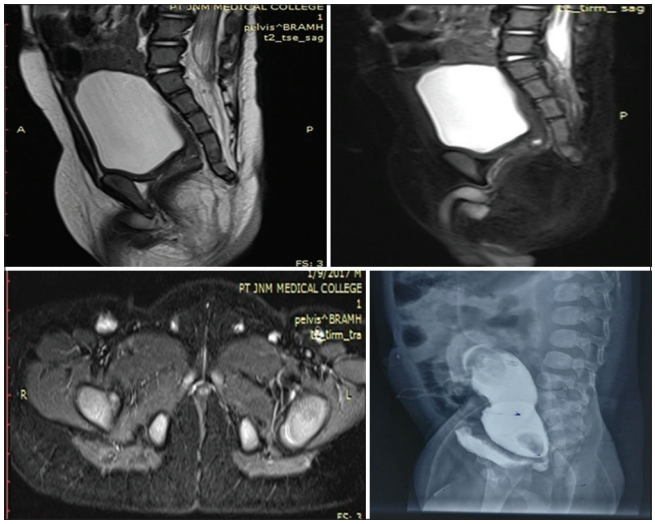

Figure 2: 8 month old male child with no external anal opening. He had undergone colostomy soon after his birth. Pressure colostography and MRI was performed[A]. (T2-weighted sagittal image)- Distal anal canal not visualized and proximal anal canal and rectum is displaced anteriorly and is terminating just below the pubo-coccygeal line communicating anteriorly with bulbar urethra. [B] STIR sagittal image- anal canal is displaced anteriorly and is communicating with bulbar urethra.[C]. (STIR Axial images)- Common channel for urethra and anal canal can be seen. [D]. (Pressure colostography – lateral images- normally opacified and dilated rectum with recto-bulbar fistula can be seen.

fourth and fifth sacral vertebrae usually allows normal innervation of the bladder and levatorani and adequate development of the levator. Deficiency of the third, fourth, and fifth sacral vertebrae is usually accompanied by variable abnormal nerve and muscle development, and most patients are incontinent. Deficiencies involving the first or second sacral segments are always associated with incontinence and poorly developed and innervated levatorani and pelvic floor musculature.[20]

RESULTS

The study included 30 patients with anorectal malformation who underwent MRI and colostography/fistulography. Age of the patients varies from 8 months to 5 years. Out of the 30 patients, 24 underwent pressure colostography and six underwent fistulography, while all patients underwent MRI examination. All patients underwent corrective surgery and the results of the MRI and colostography and fistulography were correlated with the surgical findings.

MRI was able to correctly identify type of ARM in 28 out of 30 patients (93.3%). It was able to identify all the patients with high type, 7 out of 7 (100%), 15 out of 16 patients (93.8%) with intermediate type, and 6 out of 7 patients (85.7%) with low type. However, one intermediate type was falsely identified as high type and one low type was identified as intermediate type. Colostography correctly identified the type of ARM in 28 out of 30 patients (93.3%). One high type was falsely identified as intermediate type and one low type was identified as intermediate type [Table 1].

MRI was able to correctly identify type of fistula in 27 out of 27 patients (81.48%). MRI was able to correctly identify 10 out of 12 patients (83.3%) with recto-bulbar fistula, 5 out of 7 patients (71.4%) with recto-prostatic fistula, 2 out of 2 patients (100%) with perineal fistula, 2 out of 2 patients (100%) with recto-vaginal fistula, and 3 out of 4 patients (75%) of recto-vestibular fistula. On MRI, two recto-prostatic fistula were mis-interpretated as recto-bulbar fistula, two recto-bulbar fistula were mis-interpretated as recto-prostatic fistula, and one recto-vaginal fistula was mis-interpretated as recto-vestibular fistula.

Table 1: Type of ARM on different investigations

Type of ARM	MRI		Colostography/fistulography		Surgery	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
High	8	26.7	6	20.0	7	23.3
Intermediate	16	53.3	18	60.0	16	53.3
Low	6	20.0	6	20.0	7	23.3
Total	30	100.0	30	100.0	30	100.0

MRI: Magnetic resource imaging

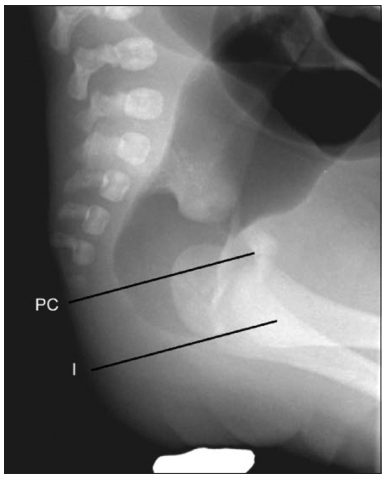

Figure 3: 2 Year old boy came with no external anal opening. He had undergone colostomy soon after birth. Pressure colostography and MRI pelvis was performed. [A]. (T2-weighted sagittal image)- Distal anal canal not visualized and proximal anal canal and rectum is displaced anteriorly and is terminating just below the pubo-coccygeal line communicating anteriorly with prostatic urethra. [B].T2 wieghted axial images- anal canal is displaced anteriorly and is lying just behind the prostatic urethra.[C]. (T2 wighted axial images)- Common channel for urethra and anal canal can be seen. [D]. (T2 wighted coronal images)- Normally developed levator ani and puborectalis muscle can be seen.

Colostography/fistulography correctly identified the presence of fistula in 10 out of 27 patients (37%). It failed to identify 16 out of 27 patients (59.25%) of surgically proven fistula. Colostography/fistulography failed to achieve significant association with surgery (*P*-value 0.197) for detection of presence of fistula [Tables 2 and 3].

It was possible to clearly visualize and evaluate the bulk of muscles the levatorani, pubo-rectalis muscle, and external sphincter in all the patients with MRI. On MRI, out of 30 patients, 18 (60%) patients were identified with normal muscle development and 12 (40%) patients with poor muscle development.

On colostography/fistulography, the development of muscles was predicted on the basis of development of sacral vertebrae. In our study, 11 patients had complete or partial absence of sacral vertebrae, out of which, eight patients had absence of three or >three vertebrae and were designated with poorly developed muscles. Twenty-two patients (73.3%) were identified with normal muscle development and 8 patients (26.7%) with poorly developed muscles. Seven patients who were identified with normal muscle development on conventional techniques (colostography/fistulography) showed poor muscle development on MRI. Three patients who were identified with normal muscle development on MRI were diagnosed as poorly developed on conventional techniques (colostography/fistulography). However, this difference was not statistically significant [Table 4].

In the present study, the incidence of associated anomalies was 43.3%. The most common associated anomaly was vertebral anomaly followed by spinal cord anomalies and genito-urinary anomalies. MRI showed genito-urinary anomaly in two out of 30 (6.67%) patients which included hydronephrosis in one patient and ambiguous genitalia in one patient, isolated vertebral anomaly in 5 out of 30 patient (26.67%), caudal regression syndrome in 2 out of 30 patients (6.67%), and vertebral agenesis with tethered cord in 1 out of 30 patients (3.33%). There was significant correlation between MRI and colostography and fistulography for detecting the vertebral anomaly.

Table 2: Presence of fistula on different investigations

Presence of fistula	Frequency	Percent	*P* value
MRI	27	90.0	<0.0001
colostography/fistulography	10	33.3	
Surgery	27	90.0	

DISCUSSION

In the present study, we compared high-resolution MRI findings with that of the colostography/fistulography, taking surgical findings as reference standard. We found that MRI is better diagnostic tool than colostography/fistulography for evaluation of anorectal malformation in

Table 3: Type of fistula on different investigations

Type of fistula	MRI		Colostography/fistulography		Surgery	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
None	3	10.0	19	63.3	3	10.0
Perineal fistula	2	6.7	2	6.7	2	6.7
Recto-bulbar	12	40.0	5	16.7	12	40.0
Recto-prostatic	7	23.3	0	0	7	23.3
Recto-vaginal	3	10.0	2	6.7	2	6.7
Recto-vestibular	3	10.0	1	3.3	4	13.3
Total	30	100.0	30	100.0	30	100.0

MRI: Magnetic resource imaging

Table 4: Comparison of muscle development as detected by MRI and conventional investigation

Muscle development on MRI	Muscle development on conventional investigation		Total
	Normal	Poor	
Normal	15	3	18
	68.2%	37.5%	60.0%
Poor	7	5	12
	31.8%	62.5%	40.0%
Total	22	8	30
	100.0%	100.0%	100.0%

MRI: Magnetic resource imaging

terms of detection of fistula, type of fistula, development of pelvic floor muscles, and presence of associated anomalies. MRI is equally sensitive to conventional techniques in determination of type of anorectal malformation.

The most common type of anorectal malformation was intermediate type followed by high type then low type. The result of this study correlated with the result of the study done by Abdulkadir *et al.*[21] and another study done by Tang *et al.*[22] The sensitivity and specificity of MRI for detection of high type of ARM were 85.6% and 100%, for intermediate type 100% and 85.7% and for low type 85.7% and 85.6%, respectively. The sensitivity and specificity of colostography/fistulography for identification of high type of ARM were 85.6% and 100%, for intermediate type – 100% and 85.7% and for low type 85.7% and 95.6%, respectively. Significant association was noted between colostography/fistulography for identification of type of ARM. Thus, it can be concluded that MRI and conventional imaging (colostography/fistulography) are nearly equal sensitive for the detection of type of ARM (high, intermediate, and low).The result of this study does not matches with a similar study done by Thomer *et al.*[23]

We found the sensitivity of MRI for detection of presence of fistula was 100%. The most common type of fistula was recto-bulbar fistula. Colostography identified presence of fistula in 37% cases. There was 56.7% increase in detection of fistulae with MRI in comparison to conventional imaging techniques (colostography/fistulography). The difference was found to be highly significant ($P < 0.0001$). This study result matches with the similar study done by Elsayed *et al.*[24] and Thomer *et al.*[23]

MRI was also able to delineate the pelvic floor muscles and helped in evaluation of their bulk, thus making it possible to predict the post-operative anal continence. On MRI, out of 30 patients, 18 patients (60%) were identified with normal muscle development and 12(40%) patients with poor muscle development. On colostography/fistulography, the development of muscles was predicted on the basis of development of sacral vertebrae. Twenty-two (73.3%) patients were identified with normal muscle development and 8 patients (26.7%) with poorly developed muscles on colostography. Seven patients who were identified with normal muscle development on conventional techniques (colostography/fistulography) showed poor muscle development on MRI. Three patients who were identified with normal muscle development on MRI were diagnosed as poorly developed on conventional techniques (colostography/fistulography). However, this difference was not statistically significant.

In the present study, the incidence of associated anomalies according to our MRI protocol and conventional techniques was 43.3%. The most common associated anomaly was vertebral anomaly followed by spinal cord anomalies and genito-urinary anomalies. MRI showed genito-urinary anomaly in 2/30 (6.67%) patients which included hydronephrosis in one patient and ambiguous genitalia in one patient, isolated vertebral anomaly in 5 out of 30 patient (26.67%), caudal regression syndrome in 2 out of 30 patients (6.67%), and vertebral agenesis with tethered cord in 1 out of 30 patients (3.33%). The results of this study do not matches with the result of a similar study done by Balanescu[25] and McHugh[26] likely because of limited sample size in the present study. The prevalence of associated anomalies was most common among high type (57.14%) followed by intermediate type and low type. The results match with the result of the study done by Elsayed *et al.* and Shrivastava *et al.*[27] Gross *et al.* stated that a posterior sagittal approach should never be attempted without a technically adequate high-pressure distal colostogram to determine the exact positions of the rectum and the fistula.[28] The local anatomy required for surgical planning is more precisely delineated with MRI in comparison to colostography/fistulography. There is no need for the use of intravenous contrast or local instillation of fluids into the orifices thus making the MRI non-invasive procedure.

MRI is suited for pre-operative assessment of anorectal malformation because of its excellent intrinsic contrast resolution, multi-planar imaging capabilities, and lack of ionizing radiation. Disadvantages of MRI include the need for sedation, high cost, limited availability, and relative lack of expertise. Since MRI examination is static (non-operator dependent) and images can always be re-evaluated and discussed with different physicians, MRI can produce more consistent results. Conventional imaging techniques such as colostography/fistulography have many disadvantages such as operator dependence, perforation, false impression of lower anomaly, troublesome, and radiation exposure. MRI also demonstrated other associated anomalies which are common cause of morbidity in patients with anorectal malformation.

CONCLUSION

MRI is a non-invasive and non-hazardous modality for the pre-operative work-up of anorectal malformation. Since an MRI examination is static (non-operator dependent), images can always be re-evaluated and discussed with different physicians. MRI can produce more consistent results. In the present study, MRI proved to be a better imaging technique than conventional imaging techniques (colostography/fistulography) for the detection of fistula and determination of type of fistula. It is equally sensitive to conventional techniques for detection of type of ARM. Bulk of the pelvic floor muscles can be evaluated with MRI and thus the post-operative anal continence can be predicted, which is not possible by conventional imaging techniques (colostography/fistulography) where we predict the anal continence on the basis of presence or absence of sacral vertebrae. Other anomalies which are common cause of morbidity in patients of ARM can be easily evaluated on MRI. Thus, MRI is a better imaging technique than conventional imaging techniques (colostography/fistulography) for complete pre-operative workup of anorectal malformation.

REFERENCES

1. Cuschieri A, EUROCAT Working Group. Descriptive epidemiology of isolated anal anomalies: A survey of 4.6 million births in Europe. Am J Med Genet 2001;103:207-15.
2. Boocock GR, Donnai D. Anorectal malformation: Familial aspects and associated anomalies. Arch Dis Child 1987;62:576-9.
3. Kluth D, Hillen M, Lambrecht W. The principles of normal and abnormal hindgut development. J Pediatr Surg 1995;30:1143-7.
4. N'Guessan G, Stephens FD. Covered anus with anocutaneous fistula: The muscular sphincters. J Pediatr Surg 1986;21:33-5.
5. Cho S, Moore SP, Fangman T. One hundred three consecutive patients with anorectal malformations and their associated anomalies. Arch Pediatr Adolesc Med 2001;155:587-91.
6. Smith ED. Incidence, frequency of types, and etiology of anorectal malformations. Birth Defects Orig Artic Ser 1988;24:231–246
7. Cuschieri A. Anorectal anomalies associated with or as part of other anomalies. Am J Med Genet 2002;110:122-30.
8. Bradham RR. Imperforate anus; report of 130 cases. Surgery 1958;44:578-84.
9. Endo M, Hayashi A, Ishihara M, Maie M, Nagasaki A, Nishi T, Saeki M. Analysis of 1,992 patients with anorectal malformations over the past two decades in Japan. Steering Committee of Japanese Study Group of Anorectal Anomalies. J Pediatr Surg 1999;34:435-41.
10. Ratan SK, Rattan KN, Pandey RM, Mittal A, Magu S, Sodhi PK. Associated congenital anomalies in patients with anorectal malformations-a need for developing a uniform practical approach. J Pediatr Surg 2004;39:1706-11.
11. Alamo L, Meyrat BJ, Meuwly JY, Meuli RA, Gudinchet F. Anorectal malformations: Finding the pathway out of the labyrinth. Radiographics 2013;33:491-512.
12. Holschneider A, Hutson J, Pena A, Beket E, Chatterjee S, Coran A, et al. Preliminary report on the international conference for the development of standards for the treatment of anorectal malformations. J Pediatr Surg 2005;40:1521-6.
13. Pena A. Posterior sagittal approach for the correction of anorectal malformations. Adv Surg 1986;19:69-100.
14. Thomeer MG, Devos A, Lequin M, De Graaf N, Meeussen CJ, Meradji M, et al. High resolution MRI for preoperative work-up of neonates with an anorectal malformation: A direct comparison with distal pressure colostography/fistulography. Eur Radiol 2015;25:3472-9.
15. Podberesky DJ, Towbin AJ, Eltomey MA, Levitt MA. Magnetic resonance imaging of anorectal malformations. Magn Reson Imaging Clin N Am 2013;21:791-812.
16. Holschneider A, Hutson J, Pena A, Beket E, Chatterjee S, Coran A, et al. Preliminary report on the international conference for the development of standards for the treatment of anorectal malformations. J Pediatr Surg 2005;40:1521-6.
17. Nievelstein RA, Vos A, Valk J. MR imaging of anorectal malformations and associated anomalies. Eur Radiol 1998;8:573-81.
18. Levitt MA, Pena A. Outcomes from the correction of anorectal malformations. Curr Opin Pediatr 2005;17:394-401.
19. de Medina VH, Mellstam L, Amark P, Frenckner B. Neurovesical dysfunction in children after surgery for high or intermediate anorectal malformations. Acta Paediatr 2004;93:43-6.
20. Holschneider AM, Hutson JM. Holschneider's Anorectal Malformation in Children. Berlin Heidelberg: Springer-Verlag; 2006. p. 178.
21. Jones FW. The nature of malformations of the rectum and the urogenital passages. Br Med J 1904;2:1630-4.
22. Fritsch H, Brenner E, Lienemann A, Ludwikowski B. Anal sphincter complex. Reinterpreted morphology and its clinical relevance. Dis Colon Rectum 2002;45:188-94.
23. Holschneider AM, Hutson JM. Holschnieder Anorectal Malformation. Berlin Heidelberg: Springer-Verlag; 2012. p. 195.
24. Fritsch H, Lienemann A, Brenner E, Ludwikowski B. Clinical anatomy of the pelvic floor. Adv Anat Embryol Cell Biol 2004;175:1-64.
25. Aigner F, Zbar AP, Ludwikowski B, Kreczy A, Kovacs P, Fritsch H. The rectogenital septum: Morphology, function, and clinical relevance. Dis Colon Rectum 2004;47:131-40.
26. Ludwikowski B, Oesch-Hayward I, Fritsch H. Rectovaginal fascia: An important structure in pelvic visceral surgery? About its development, structure, and function. J Pediatr Surg 2002;37:634-8.
27. Amussat JJ. Observation sur une operation d'anus artifical pratiquee avec success par un nouveau procede. Gaz Med Paris 1835;3:753-8.
28. Stephens FD, Smith ED. Anorectal Malformation in Children. Chicago: Year Book Medical Publications; 1971.
29. Ladd WE, Gross RE. Congenital malformations of rectum and anus: Report of 162 cases. Am J Surg 1964;23:167-83.
30. Wangensteen OH, Rice CO. Imperforate anus. A method of determining the surgical approach. Ann Surg 1930;92:77-81.
31. Santulli TV, Schullinger JN, Amoury RA. Malformations of the anus and rectum. Surg Clin North Am 1964;45:1253-71.
32. Nixon H, O'Donnell B. The Essentials of Paediatric Surgery. 3rd ed. London: William Heinemann, Medical Books Ltd.; 1976. p. 28-36
33. Peña A. Imperforate anus and cloacal anomalies. In: Ashcraft MD, editor. Pediatric Surgery. 3rd ed. London: WB Saunders; 2000. p. 473-92.
34. Louw JH. Congenital abnormalities of rectum and anus. Curr Probl Surg 1965;31:1-64.
35. Endo M, Hayashi A, Ishihara M, Maie M, Nagasaki A, Nishi T, et al. Analysis of 1,992 patients with anorectal malformations over the past two decades in Japan. Steering Committee of Japanese Study Group of Anorectal Anomalies. J Pediatr Surg 1999;34:435-41.
36. Nazer J, Hubner ME, Valenzuela P, Cifuentes L. Anorectal congenital malformations and their preferential associations. Experience of the Clinical Hospital of the University of Chile. Period 1979-1999. Rev Med Chil 2000;128:519-25.
37. Endo M, Hayashi A, Ishihara M, Maie M, Nagasaki A, Nishi T, et al. Analysis of 1,992 patients with anorectal malformations over the past two decades in Japan. Steering Committee of Japanese Study Group of Anorectal Anomalies. J Pediatr Surg 1999;34:435-41.
38. Belman AB, King LR. Urinary tract abnormalities associated with imperforate anus. J Urol 1972;108:823-4.
39. Hoekstra WJ, Scholtmeijer RJ, Molenaar JC, Schreeve RH, Schroeder FH. Urogenital tract abnormalities associated with congenital anorectal anomalies. J Urol 1983;130:962-3.
40. Munn R, Schillinger JF. Urologic abnormalities found with imperforate anus. Urology 1983;21:260-4.
41. Parrott TS. Urologic implications of anorectal malformations. Urol Clin North Am 1985;12:13-21.

42. Fleming SE, Hall R, Gysler M, McLorie GA. Imperforate anus in females: Frequency of genital tract involvement, incidence of associated anomalies, and functional outcome. J Pediatr Surg 1986;21:146-50.
43. Botto LD, Khoury MJ, Mastroiacovo P, Castilla EE, Moore CA, Skjaerven R, et al. The spectrum of congenital anomalies of the VATER association: An international study. Am J Med Genet 1997;71:8-15.
44. Quan L, Smith DW. The VATER association. Vertebral defects, anal atresia, T-E fistula with esophageal atresia, radial and renal dysplasia: A spectrum of associated defects. J Pediatr 1973;82:104-7.
45. Kaufman RL. Birth defects and oral contraceptives. Lancet 1973;1:1396.
46. Nora AH, Nora JJ. A syndrome of multiple congenital anomalies associated with teratogenic exposure. Arch Environ Health 1975;30:17-21.
47. Martinez-Frias ML, Bermejo E, Frias JL. The VACTERL association: Lessons from the Sonic hedgehog pathway. Clin Genet 2001;60:397-8.
48. McMullen KP, Karnes PS, Moir CR, Michels VV. Familial recurrence of tracheoesophageal fistula and associated malformations. Am J Med Genet 1996;63:525-8.
49. Nezarati MM, McLeod DR. VACTERL manifestations in two generations of a family. Am J Med Genet 1993;82:40-2.
50. Smith ED, Saeki M. Associated anomalies. Birth Defects Orig Artic Ser 1988;24:501-49.
51. Smith ED, Saeki M. Associated anomalies. Birth Defects Orig Artic Ser 1988;24:501-49.
52. Mahajan JK, Kumar D, Chowdhary SK, Rao KL. Anorectal malformation with malrotation of gut. Eur J Pediatr Surg 2003;13:63-5.
53. Haynes JH, Bagwell CE. Hirschprung's disease and imperforate anus in Pallister-Hall syndrome: A new association. J Pediatr Surg 2003;38:1411-2.
54. Baltogiannis N, Mavridis G, Soutis M, Keramidas D. Currarino triad associated with Hirschsprung's disease. J Pediatr Surg 2003;38:1086-9.
55. Hartman EE, Oort FJ, Aronson DC, Hanneman MJ, van der Zee DC, Rieu PN, et al. Critical factors affecting quality of life of adult patients with anorectal malformations or Hirschsprung's disease. Am J Gastroenterol 2004;99:907-13.
56. Shanske A, Ferreira JC, Leonard JC, Fuller P, Marion RW. Hirschsprung disease in an infant with a contiguous gene syndrome of chromosome 13. Am J Med Genet 2001;102:231-6.
57. Wang J, Shi C, Yu S, Wu Y, Xu C. A rare association of rectal and genitourinary duplication and anorectal malformation. Chin Med J (Engl) 2003;116:1955-7.
58. Smith ED, Saeki M. Associated anomalies. Birth Defects Orig Artic Ser 1988;24:501-49.
59. Qi BQ, Beasley SW, Frizelle FA. Evidence that the notochord may be pivotal in the development of sacral and anorectal malformations. J Pediatr Surg 2003;38:1310-6.
60. Narasimharao KL, Prasad GR, Katariya S, Yadav K, Mitra SK, Pathak IC. Prone cross-table lateral view: An alternative to the invertogram in imperforate anus. AJR Am J Roentgenol 1983;140:227-9.
61. Cremin BJ, Cywes S, Louw JH. A rational radiological approach to the surgical correction of anorectal anomalies. Surgery 1972;71:801-6.
62. Lernau OZ, Jancu J, Nissan S. Demonstration of rectourinary fistulas by pressure gastrografin enema. J Pediatr Surg 1978;13:497-8.
63. Han TI, Kim IO, Kim WS. Imperforate anus: US determination of the type with infracoccygeal approach. Radiology 2003;228:226-9.
64. Ikawa H, Yokoyama J, Sanbonmatsu T, Hagane K, Endo M, Katsumata K, et al. The use of computerized tomography to evaluate anorectal anomalies. J Pediatr Surg 1985;20:640-4.
65. Kohda E, Fujioka M, Ikawa H, Yokoyama J. Congenital anorectal anomaly: CT evaluation. Radiology 1985;157:349-52.
66. McHugh K, Dudley NE, Tam P. Pre-operative MRI of anorectal anomalies in the newborn period. Pediatr Radiol 1995;25 Suppl 1:S33-6.
67. AA Shah, Kothari MR, Bhattacharjee N, Shah AJ, Shah AV. Magnetic resonance imaging in anorectal malformation. J Indian Assoc Pediatric Surg 2001;6:4-13.
68. Tang ST, Wang Y, Mao YZ, Tong QS, Li SW, Cao ZQ, et al. MRI of anorectal malformations and relationship of the developmental state of the sphincter muscle complex with fecal continence. World J Pediatr 2006;3:223-30.
69. Boemers TM, Ludwikowski B, Forstner R, Schimke C, Ardelean MA. Dynamic magnetic resonance imaging of the pelvic floor in children and adolescents with vesical and anorectal malformations. J Pediatr Surg 2006;41:1267-71.
70. Abdulkadir AY, Abdur-Rahman LO, Adesiyun OM. Nonfluoroscopic pressure colostohraphy in the evaluation of genitourinary fistula of anorectal malformation: Experience in a resource-poor environment. Pediatr Radiol 2009;39:132-6.
71. Mohammada SA, AbouZeid AA. MRI of persistent cloaca: Can it substitute conventional imaging? Eur J Radiol 2012;82:241-51.
72. Podberesky DJ, Towbin AJ, Eltomey MA, Levitt MA. Magnetic resonance imaging of anorectal malformations. Magn Reson Imaging Clin N Am 2013;21:791-812.
73. Yang F, Sheng M, Wang J, Guo W, Wang Q, Han X.Clinical application of magnetic resonance imaging in congenital anorectal malformation. Zhonghua Er Ke Za Zhi 2014;52:41-5.
74. Thommer MG, Devos A, Lequin M, De Graff N, Meeussen CJ, Meradji M, et al. High resolution MRI for preoperative work-up of neonates with an anorectal malformation: A direct comparison with distal pressure colostography/fistulography. Eur Radiol 2015;25:3472-9.
75. Elsayed RF, Kamal HA, El-Liethy NE. Recent advances in MRI in the preoperative assessment of anorectal malformations. Egypt J Radiol Nucl Med 2016;47:711-2.
76. Sachs TM, Applebaum H, Touran T, Taber P, Darakjian A, Colleti P. Use of MRI in evaluation of anorectal anomalies. J Pediatric Surg 1990;25:817-21.
77. McHugh K. The role of radiology in children with anorectal anomalies; with particular emphasis on MRI. Eur J Radiol 1998;26:194-9.
78. Balanescu RN, Topor L, Moga A. Anomalies associated with anorectal malformation. Chirurgia (Bucur) 2013;108:38-42.
79. Nah SA, Ong CC, Lakshmi NK, Yap TL, Jacobsen AS, Yee Low. Anomalies associated with anorectal malformations according to the Krickenbeck anatomic classification. J Pediatric Surg 2012;47:2273-8.
80. Shrivastava V, Ray AK, Patra R, Basu KS, Samanta N, Saha K. Urogenital anomalies associated with anorectal malformation. 2005;10:44-7.

How to cite this article: Kapoor MR. MRI in Contrary to Conventional Imaging Techniques in Evaluation of Anorectal Malformation. Int J Sci Stud 2023;10(10):26-32.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Ultrasonography and Ultrasound-guided Fine-Needle Aspiration Cytology Correlation of Thyroid Lesions

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Abstract

Introduction: The thyroid gland is the largest of all endocrine glands and is the only one which is amenable to direct physical examination due to its superficial location. Superficial location of the thyroid gland allows excellent visualization and evaluation of its normal anatomy and pathologic condition by high-resolution real-time gray scale sonography. The aim of this study is to assess the role of high-resolution real-time gray scale ultrasonography in evaluating patient with thyroid enlargement.

Materials and Methods: This prospective study was carried out on 100 patients who came our department from period of February 2022 to November 2022. Gray scale ultrasound of neck followed by ultrasound-guided (USG) fine-needle aspiration cytology of thyroid swelling in 100 patients aged 10 to 80 years was done.

Results: Out of 100 cases, 8% were malignant, 66% were benign, and 26% were indeterminate lesions on gray scale ultrasound. All the eight malignant cases were correctly diagnosed as malignant on pathology. Out of 66 benign cases, two benign cases proved to be malignant on pathology as papillary carcinoma. Both cases on USG presented as a hypoechoic lesion with well-defined margin and coarse calcification. Due to coarse calcification, they were diagnosed as benign on ultrasonography but turned out to be malignant on pathology as papillary carcinoma. Out of 26 indeterminate cases, two cases proved to be malignant and 24 cases benign on pathology.

Conclusion: High-resolution gray scale ultrasound has emerged as an initial imaging modality of choice for the evaluation of patients with thyroid enlargement ultrasound can detect solitary nodule, multiple nodules, and diffuse thyroid enlargement. It can also differentiate solid and cystic lesions.

Key words: Fine-needle aspiration cytology, Thyroid, Ultrasound-guided

INTRODUCTION

The thyroid gland is the largest of all endocrine glands and is the only one which is amenable to direct physical examination due to its superficial location. Superficial location of the thyroid gland allows excellent visualization and evaluation of its normal anatomy and pathologic condition by high-resolution real-time gray scale sonography.[1-4]

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www.ijss-sn.com

Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

Ultrasound is generally the first choice for the evaluation of thyroid morphology due to its high sensitivity for small nodule detection. The spatial resolution achieved by ultrasound is of the order of 0.7–1 mm, not achieved by any other imaging method.[5] The advantages of sign and symptoms suggestive of thyroid disorder ultrasound are that it is an easily accessible, inexpensive, non-invasive, and highly sensitive imaging modality for distinguishing cystic from solid lesion. Color Doppler study helps in assessment of blood flow in addition to depiction of the morphology.

The aim of this study is to prove ultrasound-guided (USG) as the best first-line investigation for thyroid lesions supported by fine-needle aspiration cytology (FNAC) correlation.

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MATERIALS AND METHODS

This prospective study was carried out on 100 patients who attended the various OPD and/or IPD of in Sukh Sagar Medical College and Hospital, Jabalpur MP., from February 2022 to November 2022.

Gray scale ultrasound of neck followed by USG FNAC of thyroid swelling in 100 patients aged 10–80 years was done.

Patient Selection

It was based on following criteria:

Physical examination suggestive of palpable thyroid swelling in lower neck in midline or on either side(hyper/hypothyroidism).

Exclusion Criteria

The patient already diagnosed and treated for thyroid lesion. FNAC showing inadequate aspirated material.

RESULTS

Out of 100 cases, 8% were malignant, 66% were benign, and 26% were indeterminate lesions on gray scale ultrasound. All the eight malignant cases were correctly diagnosed as malignant on pathology. Out of 66 benign cases, two benign cases proved to be malignant on pathology as papillary carcinoma. Both cases on USG presented as a hypoechoic lesion with well-defined margin and coarse calcification. Due to coarse calcification, they were diagnosed as benign on ultrasonography but turned out to be malignant on pathology as papillary carcinoma. Out of 26 indeterminate cases, two cases proved to be malignant and 24 cases benign on pathology [Figures 1-5 and Tables 1-9].

DISCUSSION

Age Distribution

In the present study, most of the patients (30%) were in 30–39 years age group, the youngest being 18 years old and the eldest 74 years old. The mean age was 39 years. In a similar study by Goong *et al.*, the age range was 26–75 years with mean age of 51 years.

Gender Distribution

In the present study, 72% patients were female and 28% were male. The male-to-female ratio was 1:2.5. Hence, females are more commonly affected than males. In a study by Goong *et al.,* 78% patients were females and 22% males.

Clinical Presentation

All the 100 patients presented with clinical thyroid enlargement, either in the mid line or on the lateral aspect. About 94% patients presented with gradual onset and 6% presented with sudden onset of thyroid swelling. Pressure Leopold *et al.* out of 73 solitary nodule 36 effects from thyroid swelling (Dyspnea, dysphagia, and hoarseness of voice) was seen in 13 (13%), signs of thyrotoxicosis (loss of weight in spite of good appetite, insomnia, tremors, irritability, exophthalmos, menstrual irregularities, dry skin, hair loss, lethargy, hoarseness of voice, and failing memory) was present in 6%, pain in 15% fever 10%, pathological fracture due to metastases from thyroid malignancy seen in 2%, and convulsion in 1% from CNS metastases. Clinically, 56 (56%) presented with solitary thyroid nodule, out of which 8 (14.2%) had multiple nodules on ultrasound. In a study by William Scheible and (48.6%) showed multiple nodules on USG.

Thus, USG is helpful in finding other nodules in cases of clinically suspected solitary thyroid nodule, though the detection rate was lower in our study as compared to others.

Pathological Diagnosis

Out of 100 cases, 88% were benign and 12% were malignant. Out of 12 malignant cases, 5 (41.6%) seen in male and 7 (58.4%) seen in female with wide age distribution between 30 and 79 years. Percentage of malignancy in male is 5 (17.85%) out of 28 and female is 7 (9.72%) out of 72. Papillary carcinoma seen in (50%) cases, follicular carcinoma in 4 (33.37%) and anaplastic carcinoma in 2 (16.7%) of cases. In a study by Simeone *et al.* in 1985, 87.2% cases were benign and 12.7% cases were malignant. Out of 17 malignant cases, 9 (52.9%) had papillary carcinoma, 2 (11.7%) had medullary carcinoma, 2 (11.7%) had follicular carcinoma, 2 (11.7%) had anaplastic carcinoma, and 2 (11.7%) had metastases.

Most common benign pathology in the present study was benign goiter seen in 72% cases. Follicular adenoma was found in 10% and thyroiditis in 6% of patients.

Benign Thyroid Lesion (88 Cases)

Ratio (male: female)

In the present study, ratio of male: female was 1:2.7, While in study by Kim in 2002, the ratio of male-to-female and 12 (10.34%) was diagnosed to be thyroiditis.

Goitre (72 Cases)

In the present study, maximum 30.5% lesions were anechoic, 25% each were hyperechoic and hypoechoic, 11.1% were isoechoic, and 8.3% showed mixed echogenicity.

Table 1: Age incidence

Age group (years)	Number of patients	Percentage
10–19	4	4
20–29	24	24
30–39	30	30
40–49	18	18
50–59	12	12
60–69	8	8
70–89	4	4
Total	100	

Table 2: Clinical symptomatology

S. No.	Clinical symptoms	Patients	Percentage
1.	Thyroid enlargement	100	100
2.	Pressure effects	13	13
3.	Signs of Hyperthyroidism	6	6
4.	Pain	15	15
5.	Fever	10	10
6.	Fracture Bone	2	2
7	Convulsion	1	1

Table 3: Clinical diagnosis

Clinical diagnosis	Number of patients	Percentage
Solitary thyroid nodule	56	56
Diffuse thyroid swelling	32	32
Multinodular goiter	6	6
Cystic lesion	6	6
Total	100	100

Perilesional halo was seen in 27% cases, calcification in 30.5% cases and comet-tail artifacts in cystic lesion due to cholesterol crystal were seen in 16.6% cases.

Single nodule noted in 72.2% cases, multiple nodules in 22.2%, and diffuse thyroid enlargement in 5.5% cases. Margin was well-defined in 77.7% and ill-defined in 22.3%.

Out of 72 cases, 41.6% were solid, 33.3% were cystic, and 25% had solid-cystic components.

In a study by Ahuja *et al.*, all 100% patients with comet-tail artifact proved to be benign by FNAC.

Follicular Adenoma Ten Cases

Out of ten cases, 8 (80%) were isoechoic and 2 (20%) were anechoic. Perilesional halo was seen in 80% cases which help to identify isoechoic lesion surrounded by peripheral sonolucentrim. In a study by Simeone *et al.*,[56] 81% of follicular adenoma showed decreased echogenicity relative to normal thyroid gland, 12.6% showed increased echogenicity, and 6.4% were isoechoric. A cystic lesion was seen in 1.$% cases. Perilesional halo was seen in 54.4% cases.

Thyroiditis Six Cases

Two were seen in male and four in female patients. The ratio of male-to-female being 1:2. All the 6 (100%) cases

Table 4: Distribution of various thyroid pathologies in relation to age and sex

Age group (in years)	Benign			Malignant				Total
	Goiter	Thyroiditis	Follicular adenoma	Follicular	Papillary	Anaplastic	Medullary	
10–19								
M	0	0	0	0	0	0	0	0
F	4	0	0	0	0	0	0	4
20–29								
M	2	1	2	0	0	0	0	5
F	16	1	2	0	0	0	0	19
30–39								
M	5	1	2	2	0	0	0	10
F	19	1	0	0	0	0	0	20
40–49								
M	2	0	0	0	0	0	0	2
F	8	2	4	0	2	0	0	16
50–59								
M	3	0	0	0	1	0	0	4
F	5	0	0	0	2	1	0	8
60–69								
M	4	0	0	0	2	0	0	6
F	2	0	0	0	0	0	0	2
70–79								
M	1	0	0	0	0	0	0	1
F	1	0	0	0	0	2	0	3
Total								
M	19	2	2	2	3	0	0	28
F	53	4	8	2	3	2	0	72
	72	6	10	4	6	2	0	100

were diffusely enlarged hypoechoic thyroid with ill-defined margin. In a study by Simeone *et al.* all 100% patients showed diffusely abnormal echo-pattern consisted of multiple small low-level echoes with a decrease in overall echogenicity.

Malignant Thyroid Lesions (12 Cases)

In present study, our of 12 cases, 66.6% were in the age group of 30–60 years and 33.3% patients were more than 60 years of age. Mary *et al.* showed that malignancy was more common in patients who were younger than 20 years or older than 60 years of age; than in patients between 20 and 60 years of age.

Percentage of malignancy in male was 17.85% and in female, it was 9.72% in the present study.

Table 5: Pathological diagnosis of thyroid lesions

Pathological diagnosis	Number of patients	Percentage
Goiter	72	57
Thyroiditis		6
Follicular adenoma	10	10
Carcinoma	12	12
Total	100	100

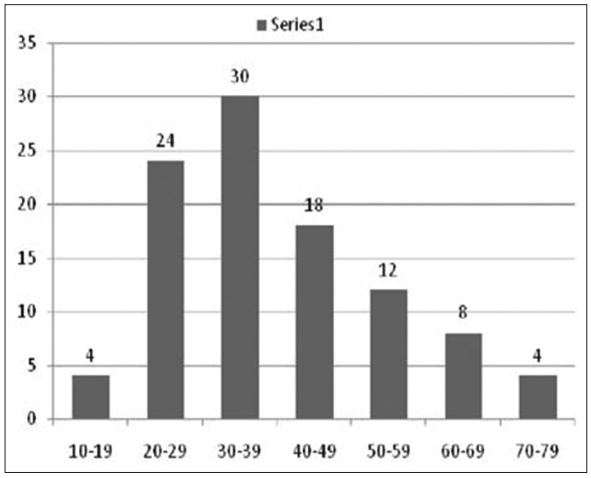

Figure 1: Incidence – Age group (years)

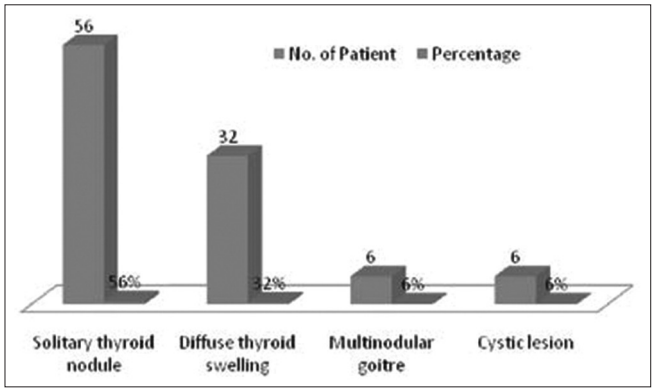

Figure 2: Sex distribution: Thyroid lesion

In a study by Kim *et al.*, the rate of malignancy was significantly higher in women than in men (23.6% in women and 11.9% in men).

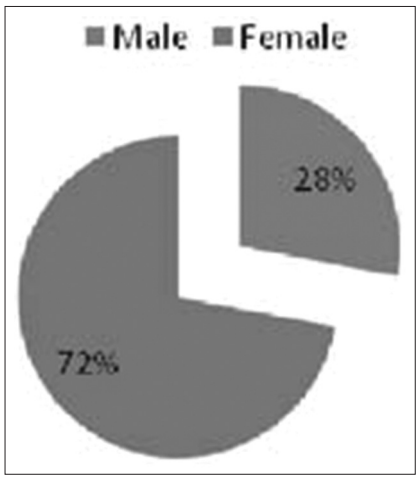

Figure 3: Clinical diagnosis

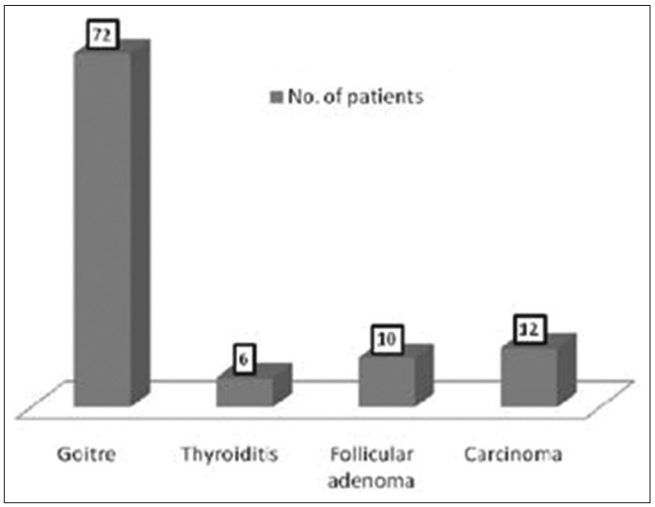

Figure 4: Pathological diagnosis of thyroid lesion

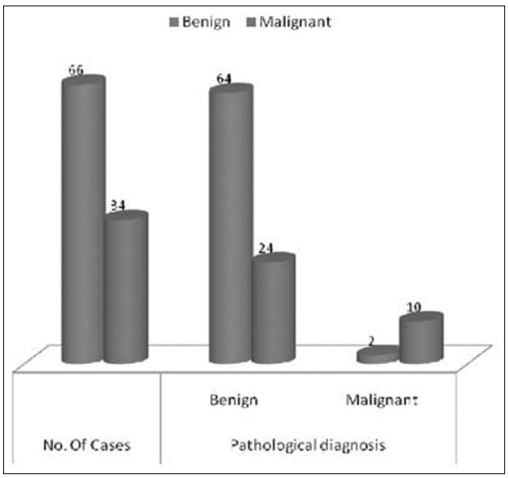

Figure 5: Correlation of radiological diagnosis with pathological diagnosis

Table 6: Sonographic features of various thyroid lesions

Sonographic Features	Benign			Malignant				Total
	Goiter	Thyroiditis	Follicular Adenoma	Follicular	Papillary	Anaplastic	Medullary	
Hyperechoic	18	0	0	0	0	0	0	18
Hypoechoic	18	6	0	0	6	0	0	30
Anechoic	22	0	2	0	0	0	0	24
Isoechoic	8	0	8	2	0	0	0	18
Mixed echo	6	0	0	2	0	2	0	10
Single nodule	52	0	10	2	6	2	0	72
Multiple nodules	16	0	0	2	0	0	0	18
Diffuse	4	6	0	0	0	0	0	10
Peri-lesional halo	20	0	8	0	0	0	0	28
Calcification	22	0	2	2	6	2	0	34
Comet-tail artifact	12	0	0	0	0	0	0	12
Well-defined margin	56	0	8	2	4	0	0	70
Ill-defined margin	16	6	2	2	2	2	0	30
Solid	30	6	8	2	6	2	0	54
Cystic	24	0	2	0	0	0	0	26
Solid+cystic	18	0	0	2	0	0	0	20

Table 7: Radiological diagnosis of thyroid lesions

Radiological diagnosis	No. of patients	Percentage
Benign thyroid lesion	30	30
Goiter	26	26
Diffuse thyroid enlargement	10	10
Malignancy	8	8
Indeterminate lesion	26	26
Total	100	100

Table 8: Correlation of radiological diagnosis with pathological diagnosis

Radiological Diagnosis	Number of Cases	Pathological diagnosis	
		Benign	Malignant
Benign	66	64	2
Malignant	34	24	10
Total	100	88	12

In the present study, 50% malignant lesions were hypoechoic, 33.3% were mixed echogenic, and 16.7% were isoechoic.

In our study, 10 (83.3%) malignant lesions had single nodule and 2 (16.7%) had multiple nodules.

In the present study, 83.3% malignant cases had calcification within nodules.

Study done by Mary *et al.* noted that the presence of any calcification within nodule raises the likelihood of malignancy. In particular, microcalcification in a predominantly solid nodule is associated with approximately three-fold increase in cancer risk as compared with solid nodule without calcification.

Table 9: Correlation of sonographic findings with pathological diagnosis

Sonographic findings	Histopathology			
	Benign		Malignant	
	Reading	%	Reading	%
(a) Single/multiple nodules				
Single	62	62	10	10
Multiple	16	16	2	2
Diffuse	10	10	0	0
(b) Echogenicity				
Hyperechoic	18	18	0	0
Hypoechoic	24	24	6	6
Anechoic	24	24	0	0
Isochoric	16	16	2	2
Mixed echoic	6	6	4	4
(c) Halo				
Present	28	28	0	0
Absent	60	60	12	12
(d) Calcification				
Present	24	24	10	10
Absent	64	64	2	2
(e) Comet-tail artifact				
Present	12	12	0	0
Absent	76	76	12	12
(f) Margin				
Well defined	64	64	6	6
Ill-defined	24	24	6	6
(g) Component				
Solid	44	44	10	10
Cystic	26	26	0	0
Solid+cystic	18	18	2	2

Margin of lesion was well-defined in 50% and ill-defined in 50% of cases in the present study.

Solbiati *et al.,* in 1985, showed that margin was ill-defined and irregular in 69.7% and well-define in 30.3%. Thyroid lesion with well-defined margin suggests benign pathology. However, results are equivocal in our study.

None of the malignant lesions showed perilesional halo or comet-tail artifacts due to cholesterol crystal.

Sensitivity/specificity of ultrasound for detecting malignant thyroid Lesion

In our study for detection of malignancy, ultrasound had sensitivity of 83.3%, specificity 72.7%, positive predictive value 29.4%, negative predictive value 96.9%, and accuracy of 74%. In study by Koike *et al.*, the sensitivity was 81.8% and specificity was 91%.[6-10]

CONCLUSION

High-resolution gray scale ultrasound has emerged as an initial imaging modality of choice for the evaluation of patients with thyroid enlargement. Ultrasound can detect solitary nodule, multiple nodules, and diffuse thyroid enlargement. It can also differentiate solid and cystic lesions.

Ultrasound has detected additional occult nodules in eight patients out of 56 presented with solitary thyroid nodule clinically.

Various sonographic features such as number, echogenicity, solid/cystic component, margin, peripheral halo, calcification, and comet tail artifact help to characterize the thyroid lesion which is not possible on any other imaging modality.

Neck masses can be differentiated whether they are arising from thyroid or extrathyroidal tissue. Thyroid lesions with capsular invasion, displacement of adjacent structure, and cervical lymph nodes enlargement can also be detected.

Thyroid malignancy cannot be diagnosed on ultrasonography, but various sonographic features in combination can be used to predict malignancy in thyroid lesions. Using these multiple features, gray scale ultrasound has accuracy of 74% with sensitivity of 83.3% and specificity of 72.7% for detecting thyroid malignancy, considering USG guided FNAC as a standard. FNAC is always suggested for the final confirmation of diagnosis in sonographically detected suspicious thyroid nodule.

Real-time sonography is a valuable tool to guide the needle for FNAC, especially for the small size thyroid nodule (<1.5 cm) as well as for the aspiration of cysts.

REFERENCES

1. Tessler FN, Tublin ME. Thyroid sonography: Current applications and future directions. AJR Am J Roentgen 1999;173:437-43.
2. Damascelli B, Cascinelli N, Livraghi T, Veronesi U. Preoperative approach to thyroid tumors by a two dimensional pulsed echo technique. Ultrasonics 1968;6:242-3.
3. Fujimato Y, Oka A, Omoto R, Hirose M. Ultrasound scanning of the thyroid gland as a new diagnostic approach. Ultrasonics 1967;5:177-80.
4. Blum M. Enhanced clinical diagnosis of thyroid disease using echography. Am J Med 1975;59(3):301-37.
5. Solbiati L, Charboneau JW, Osti V, James EM, Hay ID. The thyroid gland. In: Rumack CM, Wilson SR, Charboneau JW, editors. Diagnostic Ultrasound. 3rd ed., Vol. 1. St. Louis, Missouri: Elsevier Mosby; 2004. p. 735-70.
6. Iannuccilli JD, Cronan JJ, Monchik JM. Risk for malignancy of thyroid nodules as assessed by sonographic criteria: The need for biopsy. J Ultrasound Med 2004;23:1455-64.
7. Papini E, Guglielmi R, Bianchini A, Crescenzi A, Taccogna S, Nardi F, *et al.* Risk of malignancy in nonpalpable thyroid nodules: Predictive value of ultrasound and Colo-Doppler features. J Clin Endocrinol Metab 2002;87:1941-6.
8. Kim EK, Park CS, Chung WY, Oh KK, Kim DI, Lee JT, *et al.* New sonographic criteria for recommending fine-needle aspiration biopsy of non-palpable solid nodule of the thyroid. AJR Am J Roentgen 2002;178:687-91.
9. Frates MC, Benson CB, Doubilet PM, Charboneau JW, Cibas ES, Clark OH, *et al.* Management of thyroid nodules detected at us: Society of radiologists in ultrasound consensus conference statement. Radiology 2005;237:794-800.
10. Kang HW, No JH, Chung JH, Min YK, Lee MS, Lee MK, *et al.* Prevalence, clinical and ultrasonogrpahic characteristics of thyroid incidentalomas. Thyroid 2004;14:29-33.

How to cite this article: Gupta KP, Gupta S. Ultrasonography and Ultrasound-guided Fine-Needle Aspiration Cytology Correlation of Thyroid Lesions. Int J Sci Stud 2023;10(10):33-38.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Patterns and Risk Factors of Cerebral Microbleeds and Cognitive Impairment in Patients Incidentally Detected with Cerebral Microbleeds on M.R.I. Brain

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Abstract

Background: Cerebral microbleeds (CMBs) act as markers of small vessel disease. Specific topographic patterns of microbleeds are representative of particular underlying vasculopathies mainly hypertensive vasculopathy and cerebral amyloid angiopathy. Mortality has also been strongly predicted by microbleeds. Deep and infratentorial microbleeds have been found to be associated with cardiovascular mortality whereas lobar microbleeds are associated with stroke related mortality.

Aim: The aim is to estimate the prevalence of CMBs in patients undergoing magnetic resonance imaging (MRI) brain for suspicious neurological symptoms, to find the risk factors of CMBs and association of cognitive impairment with the number and location of microbleeds.

Methods: This was a cross-sectional and observational study of 200 patients (>50 years of age) undergoing MRI brain for suspicious neurological symptoms. Cardiovascular risk factors (hypertension, smoking, diabetes, and dyslipidemia) were examined by interview and laboratory and physical examination. MRI examinations were assessed for the presence of CMBs. Subsequently, the patients detected with CMBs were evaluated for the presence of cognitive impairment.

Results: Overall prevalence of CMBs was 26%. A high prevalence of CMBs was found in patients with ischemic cerebrovascular disease with a higher prevalence found in patients with intracerebral hemorrhage. Increasing age was associated with higher prevalence of CMBs. Hypertension, smoking, and diabetes turned out to be important cardiovascular risk factors of CMBs. CMBs were associated with cognitive impairment with increase in number of microbleeds related to lower cognitive assessment scores.

Conclusion: CMBs act as markers of small-vessel disease and their topographical patterns are suggestive of underlying vasculopathies such as hypertensive vasculopathy, with cognitive impairment being one of the clinical manifestations of CMBs.

Key words: Cerebral microbleeds, Magnetic resonance imaging brain, Neurological symptoms

INTRODUCTION

Cerebral microbleeds (CMBs), also referred to as cerebral microhemorrhages, are small hypointense foci with maximum size up to 5 mm or even up to 10 mm detected using susceptibility-weighted magnetic resonance imaging (MRI).[1-5] Histopathologically, CMBs are tiny deposits of blood degradation products (mainly hemosiderin) contained within macrophages and lying in close spatial relationship with structurally abnormal vessels. Hemosiderin being a strong paramagnetic material allows its detection when a magnetic field is applied.[6] This phenomenon, called susceptibility effect, is the basis of T2*-gradient recalled echo (GRE) imaging.[7] Further sequences have been developed over time which include three dimensional T*-GRE[8] and the most sensitive one to date is susceptibility-weighted imaging (SWI).[9] Susceptibility effects scale

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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linearly with field strength; hence, the detection rate of CMBs at MRI increases markedly even between 1.5 T and 3.0 T.[10,11]

Microbleeds might cause acute transient focal neurological episodes[12,13] which may resemble TIA or seizures depending on negative or positive character of symptoms. Cumulative microbleeds highlight the progression of underlying small vessel disease. Mortality has also been strongly predicted by microbleeds. Deep and infratentorial microbleeds have been found to be associated with cardiovascular mortality whereas lobar microbleeds are associated with stroke related mortality.[14] Other main neurological outcomes that have been associated with microbleeds are gait disturbances and cognitive impairment.[15]

Aims and Objectives

The objectives of the study are as follows:

- To estimate the prevalence of CMBs in patients undergoing MRI brain for suspicious neurological symptoms (headache, vertigo, dizziness, numbness, subjective memory impairment, syncope).
- To find the risk factors of CMBs and association of cognitive impairment with the number and location of microbleeds.

MATERIALS AND METHODS

This study was carried out in the postgraduate Department of Radiodiagnosis and Imaging, Government Medical College, Srinagar, over a period of 18 months (2020-2021), after obtaining clearance from the ethical committee of the college. After explaining the study details, written informed consent was taken. Patients aged more than 50 years were selected. Patients (aged ≥50 years) undergoing MRI brain for suspicious neurological symptoms (headache, dizziness, vertigo, numbness, syncope, and subjective memory impairment) were included in the study. Patients with contraindications for MRI, brain trauma, acute CNS infection, and intracranial space occupying lesion were excluded for the study. The risk factors included in our analysis were age, hypertension, smoking, diabetes, and dyslipidemia. Cardiovascular risk factors (hypertension, smoking, diabetes, and dyslipidemia) were examined by interview and laboratory and physical examination. Hypertension was diagnosed if, when it was measured on 2 different days, the systolic blood pressure readings on both days was ≥140 mmHg and/or the diastolic blood pressure readings on both days was ≥90 mmHg.[16] The diagnosis of diabetes mellitus was based on repeated pathological blood tests indicating fasting values ≥126 mg/dl or value loads ≥200 mg/dl 2 h after oral glucose administration or HbA1c level of ≥6.5%.[17] Dyslipidemia was determined when total cholesterol was ≥200 mg/dl or when low-density lipoprotein cholesterol was ≥130 mg/dl.[18]

A history of smoking was noted if the patient smoked during 3 months before the most recent neurological event. The patients were then subjected to MRI brain. On MRI brain, the patients were assessed for the presence of CMBs. CMBs were identified using Greenberg's criteria.[1] All the patients then subsequently detected with CMBs on MRI brain were assessed for the presence of cognitive impairment. Cognitive impairment was evaluated using Montreal Cognitive Assessment (MOCA) scale. A MOCA score of ≥26 was considered to be normal and MOCA <26 was suggestive of cognitive impairment. MRI examination was done on 3 TESLA equipment (MAGNETOM SKYRA 3T). For brain following sequences and slice thickness were obtained: (i) T1-weighted axial sequence-3mm, (ii) T2-weighted axial sequence-3mm, (iii) Fluid-attenuated inversion recovery axial sequence-4mm, (iv) Diffusion-weighted imaging sequence-5 mm, and (v) SWI sequence The SWI sequence used in our study was a 3-dimensional, T2*-weighted, GRE sequence with a high resolution used for microbleed detection. The parameters of SWI were as follows TR/TE 28/20 ms, flip angle 15®, matrix 448 × 364, number of excitations 1, field of view 18.68 × 23.0 cm, and slice thickness 2.0 mm.

Statistical Methods

The recorded data were compiled and entered in a spread sheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean ± SD and categorical variables were summarized as frequencies and percentages. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. $P<0.05$ was considered statistically significant. All P-values were two tailed.

RESULTS AND DISCUSSION

This study included 200 patients undergoing MRI brain for suspicious neurological symptoms. Out of 200 subjects, 111 were males while as 89 were females. The mean age of our study subjects was 63 years. Out of 200 patients, 11 were detected with intracerebral hemorrhage (ICH), among which three patients had lobar hemorrhage and eight patients had hemorrhage in deep and infratentorial location. Thirty-one patients were detected with ischemic cerebrovascular disease (acute and chronic lacunar infarcts and large vessel infarcts). Out of 200 study subjects, 94 were diagnosed with hypertension, 26 had diabetes, 44 were smokers, and 26 were suffering from dyslipidemia [Tables 1-6].

Table 1: Prevalence of microbleeds in study subjects

Status and Location of Microbleeds	Number	Prevalence (%)
Prevalence of microbleeds		
Present	52	26
Absent	148	74
Total	200	100
Location of Microbleeds		
Present	45	86.5
Absent	7	13.5
Total	52	100

Overall prevalence of CMBs=26%, Percentage of patients with deep and infratentorial microbleeds=86.5%, Percentage of patients with strictly lobar microbleeds=13.5%

Table 2: Prevalence of microbleeds as per gender

Gender	Microbleeds		No Microbleeds		*P*-value
	No.	age%	No.	age%	
Male	29	26.1	82	73.9	0.964
Female	23	25.8	66	74.2	
Total	52	26.0	148	74.0	

Prevalence of microbleeds in males=26.1%, Prevalence of microbleeds in females=25.8%

Table 3: Prevalence of microbleeds in patients with ischemic cerebrovascular disease and intracerebral hemorrhage (ICH)

Microbleeds	Number of patients with ischemic cerebrovascular disease	Prevalence (%)
Ischemic cerebrovascular disease		
Present	11	35.5
Absent	20	64.5
Total	31	100
Intracerebral hemorrhage		
Present	8	72.7
Absent	3	27.3
Total	11	100

Prevalence of microbleeds in patients with ischemic cerebrovascular disease=35.5%, Prevalence of microbleeds in patients with ICH=72.7%

Prevalence of CMBs

Microbleeds were detected in 52 with an overall prevalence of CMBs found to be 26%. According to Rotterdam scan study (performed by using 1.5T MRI), the prevalence of CMBs in healthy older individuals can be as high as 23.5%.[19] The higher prevalence of CMBs detected in our study can be attributed to higher field strength MRI (3T) used to perform the study (apart from the differences in the study populations which may be present). This finding has also been seen by Stehling *et al.*[11] who have reported that the detection rate and visibility of CMBs benefit from the higher field strength, resulting in a significantly improved depiction of iron-containing brain structures (CMBs) at 3.0T compared to that at 1.5T.

In our study, the prevalence of CMBs among males was found to be 26.1%, while as the prevalence of microbleeds among females was found to be 25.8%. No significant difference in CMBs prevalence between males and females

Table 4: Age, hypertension, smoking, dyslipidemia, and diabetes in relation to cerebral microbleeds among study patients

Relation with cerebral microbleeds	Microbleeds		No Microbleeds		*P*-value
	No.	%age	No.	%age	
Age in years					
<60	17	13.8	106	86.2	<0.001*
≥60	35	45.5	42	54.5	
Hypertension					
Present	46	48.9	48	51.1	<0.001*
Absent	6	5.7	100	94.3	
Smoking					
Smoker	19	43.2	25	56.8	<0.003*
Non smoker	33	21.2	123	78.8	
Dyslipidemia					
Present	8	30.8	18	69.2	<0.723
Absent	44	25.3	130	74.7	
Diabetes					
Present	11	42.3	15	57.7	0.042*
Absent	41	23.6	133	76.4	

*Statistically Significant (*P*-value<0.05), Increase in age was associated with increase in prevalence of microbleeds, Hypertension turned out to be an important risk factor of CMBs, Smoking was a risk factor of CMBs, No association was found between dyslipidemia and occurrence of CMBs, Diabetes was a risk factor of CMBs

Table 5: Association of location of microbleeds with hypertension, diabetes, and smoking

Correlation	Deep and infratentorial		Lobar		*P*-value
	No.	Age%	No.	Age%	
Hypertension					
Present	42	93.3	4	57.1	0.031*
Absent	3	6.7	3	42.9	
Diabetes					
Present	10	22.2	1	14.3	0.632
Absent	35	77.8	6	85.7	
Smoking					
Smoker	17	37.8	2	28.6	0.631
Non smoker	28	62.2	5	71.4	

*Statistically Significant (*P*-value<0.05), Hypertension, diabetes and smoking was associated with deep and infratentorial microbleeds

Table 6: Association of cognitive assessment score (MOCA) with number and location, of microbleeds

Association of MOCA with number and location of microbleeds	18≤ MOCA ≤22		26> MOCA >22		*P*-value
	No.	%age	No.	%age	
Number of bleeds					
Few (<5)	4	15.4	16	61.5	0.002*
Multiple (≥5)	22	84.6	10	38.5	
Total	26	100	26	100	
Location of bleeds					
Deep and infratentorial	23	88.5	22	84.6	0.685
Lobar	3	11.5	4	15.4	
Total	26	100	26	100	

*Statistically Significant (*P*-value<0.05), Increase in number of CMBs was associated with lower cognitive assessment scores, Both deep and infratentorial microbleeds and lobar microbleeds were associated with lower cognitive assessment score

was found. Similar findings were reported by Poels *et al.*[20] in the update of Rotterdam scan study. The prevalence of cerebral microbleeds in patients with ischemic cerebrovascular disease (like acute and chronic lacunar infarcts and large vessel infarcts) was found to be 35.5%. Similar results were found by Naka *et al.*[21] and Tsushima *et al.*[22] The prevalence of microbleeds in patients having suffered from ICH was found to be 72.7% which was in concordance with the finding reported by Jeong *et al.*[23] evaluated 102 patients with deep and lobar ICH (27% lobar, 73% deep) and found that 70% had microhemorrhages and they were frequently multiple. A wide range in the prevalence of CMBs in different clinical conditions like ischemic stroke and ICH has also been reported by Naka *et al.*,[21] Lee *et al.*[24] and Kato *et al.*[25]

Risk Factors

In our study, age was found to be an important risk factor of CMBs as increase in age was associated with increase in the prevalence of CMBs. In the age group of 50–60 years 13.8% of the study subjects had microbleeds, while as in the age group of ≥60 years, 45.5% had CMBs. Similar findings were seen by Poels *et al.*[20] in the update of Rotterdam scan study wherein it was reported that increasing age was associated with a higher prevalence of CMBs, as well as presence of multiple microbleeds.

In our study, hypertension was found to be an important risk factor of CMBs. Among the hypertensive patients presenting with microbleeds, it was found that about 93% had microbleeds in deep and infratentorial location. Thus, the presence of hypertension was found to be related to deep and infratentorial microbleeds. Similar findings were reported by Poels *et al.*[20] and Vernooij *et al.*[19] These cross-sectional studies found the association between cardiovascular risk factors such as systolic blood pressure, hypertension, smoking, and microbleeds in a deep or infratentorial region. In another study conducted by Jia *et al.*,[26] it was found that hypertension increases the risk of CMBs in the deep and infratentorial locations and also in the territory of the posterior cerebral artery.

Smoking was also found to be an important cardiovascular risk factor of CMBs in the present study. Among the smokers who presented with microbleeds, about 89% had microbleeds in deep and infratentorial location; however, a statistically significant relation between smoking and presence of microbleeds in deep and infratentorial location could not be established possibly because of a smaller sample size. Smoking was also reported to be an important cardiovascular risk factor of CMBs by Poels *et al.*[20] They also found a strong association between smoking and microbleeds in deep or infratentorial region. Smoking was also found to be a risk factor of CMBs by Tsushima *et al.*[27] who performed a study on neurologically healthy adults and found that microbleeds detected among these subjects were strongly related to hypertension and heavy smoking.

Diabetes also turned out to be a risk factor of CMBs. Out of 26 diabetics in our study, 11 (43%) had CMBs. Out of 11 diabetics who presented with CMBs, 10 had microbleeds located in deep and infratentorial location in comparison to one with strictly lobar microbleeds. Diabetes was reported as a cardiovascular risk factor of CMBs in the update of Rotterdam scan study by Poels *et al.*[20] who also found cardiovascular risk factors such as diabetes related to deep and infratentorial microbleeds.

In our study, no association was found between dyslipidemia and occurrence of CMBs.

CMBs and Effect on Cognition

In this study, it was found that majority of the subjects who were detected with multiple CMBs (22 out of 32/85%) scored lower on MOCA scale (MOCA). Thus, 85% of the subjects with multiple CMBs had lower cognitive assessment score (MOCA ≤22) in comparison to 4 subjects (15%) with multiple microbleeds who scored relatively better (MOCA >22). Further it was found that majority of the subjects who had few microbleeds (16 out of 20/62%) performed better on MOCA scale in comparison to 4 subjects who scored poorer. Thus, in our study, it was revealed that the presence of multiple CMBs (≥5) was associated with the lower MOCA total scores. Similar findings were reported by Zhang *et al.*[28] who performed a study on patients with essential hypertension and found that the presence of and a greater number of CMBs independently correlate with mild cognitive impairment in these patients without a history of transient ischemic attack or stroke. In another study performed by Yakushiji *et al.*,[29] presence and number of CMBs were related to reduced Mini-Mental State Examination scores (MMSE cognitive assessment scale).

In our study, while assessing cognitive scores in subjects with cerebral microbleeds, it was found that subjects with deep and infratentorial microbleeds (with or without lobar microbleeds) as well as those subjects with strictly lobar microbleeds had mild cognitive impairment. No statistically significant difference in the cognitive impairment score was seen between those with deep and infratentorial microbleeds and those with strictly lobar microbleeds. Similar findings were reported by Zhang *et al.*[28] They also found that both lobar microbleeds and deep and infratentorial microbleeds were related to mild cognitive impairment.

CONCLUSION

There was no significant gender-based difference in CMBs prevalence. The prevalence of microbleeds in patients with ischemic cerebrovascular disease was high (35.5%) with even higher prevalence seen in patients of ICH (72.7%). A larger proportion of patients presented with deep and infratentorial microbleeds (86.5%) in comparison to those with strictly lobar microbleeds (13.5%). Increasing age was associated with higher prevalence of CMBs. Hypertension, smoking, and diabetes turned out to be important cardiovascular risk factors of CMBs. CMBs were associated with cognitive impairment with increase in number of microbleeds related to lower cognitive assessment scores.

Inference of this study is that CMBs may act as markers of small-vessel disease and their topographical patterns are suggestive of underlying vasculopathies such as hypertensive vasculopathy, with cognitive impairment being one of the clinical manifestations of CMBs.

REFERENCES

1. Greenberg SM, Vernooij MW, Cordonnier C, Viswanathan A, Salman RA, Warach S, *et al*. Cerebral microbleeds: A guide to detection and interpretation. Lancet Neurol 2009;8:165-74.
2. Goos JD, Flier WM, Knol DL, Pouwels JW, Scheltens P, Wattjes MP, *et al*. Clinical relevance of improved microbleed detection by susceptibility-weighted magnetic resonance imaging. Stroke 2011;42:1894-900.
3. Cordonnier C, Flier WM, Sluimer JD, Leys D, Barkhof F, Scheltens P. Prevalence and severity of microbleeds in a memory clinic setting. Neurology 2006;66:1356-60.
4. Cordonnier C, Salman RA, Wardlaw J. Spontaneous brain microbleeds: Systematic review, subgroup analyses and standards for study design and reporting. Brain 2007;130:1988-2003.
5. Greenberg SM, Nandigam RN, Delgado P, Betensky RA, Rosand J, Smith EE, *et al*. Microbleeds versus macrobleeds: Evidence for distinct entities. Stroke 2009;40:2382-6.
6. Roberts TP, Mikulis D. Neuro MR: Principles. J Magn Reson Imaging 2007;26:823-37.
7. Offenbacher H, Fazekas F, Schmidt R, Koch M, Fazekas G, Kapeller P. MR of cerebral abnormalities concomitant with primary intracerebral hematomas. AJNR Am J Neuroradiol 1996;17:573-8.
8. Vernooij MW, Ikram MA, Wielopolski PA, Krestin GP, Breteler MM, Lugt AV. Cerebral microbleeds: Accelerated 3D T2*-weighted GRE MR imaging versus conventional 2D T2*-weighted GRE MR imaging for detection. Radiology 2008;248:272-7.
9. Haacke EM, Xu Y, Cheng YC, Reichenbach JR. Susceptibility weighted imaging (SWI). Magn Reson Med 2004;52:612-8.
10. Nandigam RN, Viswanathan A, Delgado P, Skehan ME, Smith EE, Rosand J, *et al*. MR imaging detection of cerebral microbleeds: Effect of susceptibility-weighted imaging, section thickness, and field strength. AJNR Am J Neuroradiol 2009;30:338-43.
11. Stehling C, Wersching H, Kloska SP, Kirchhof P, Ring J, Nassenstein I, *et al*. Detection of asymptomatic cerebral microbleeds: A comparative study at 1.5 and 3.0 T. Acad Radiol 2008;15:895-900.
12. Greenberg SM, Vonsattel JP, Stakes JW, Gruber M, Finklestein SP. The clinical spectrum of cerebral amyloid angiopathy: Presentations without lobar hemorrhage. Neurology 1993;43:2073-9.
13. Roch JA, Nighoghossian N, Hermier M, Cakmak S, Picot M, Honnorat J, *et al*. Transient neurologic symptoms related to cerebral amyloid angiopathy: Usefulness of T2*-weighted imaging. Cerebrovasc Dis 2005;20:412-4.
14. Altmann-Schneider I, Trompet S, de Craen AJ, van Es AC, Jukema JW, Stott DJ, *et al*. Cerebral microbleeds are predictive of mortality in the elderly. Stroke 2011;42:638-44.
15. Poels MM, Ikram MA, Lugt AV, Hofman A, Niessan WJ, Krestin GP, *et al*. Cerebral microbleeds are associated with worse cognitive function: The Rotterdam scan study. Neurology 2012;78:326-33.
16. World Health Organization. Hypertension. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension.
17. Understanding A1C. American Diabetes Association. Available from: https://diabetes.org/diabetes/a1c/diagnosis
18. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). National Cholesterol Education Program. Available from: https://www.nhlbi.nih.gov/files/docs/guidelines/atp3xsum.pdf
19. Vernooij MW, Lugt AV, Ikram MA, Wielopolski PA, Niessen WJ, Hofman A, *et al*. Prevalence and risk factors of cerebral microbleeds: The Rotterdam scan study. Neurology 2008:70:1208-14.
20. Poels MM, Vernooij MW, Ikram MA, Hofman A, Krestin GP, Lugt AV, *et al*. Prevalence and risk factors of cerebral microbleeds: An update of the Rotterdam scan study. Stroke 2010;41:S103-6.
21. Naka H, Nomura E, Wakabayashi S, Kajikawa H, Kohriyama T, Mimori Y, *et al*. Frequency of asymptomatic microbleeds on T2*-weighted MR images of patients with recurrent stroke: Association with combination of stroke subtypes and leukoaraiosis. AJNR Am J Neuroradiol 2004;25:714-9.
22. Tsushima Y, Aoki J, Endo K. Brain haemorrhages detected on T2*-weighted gradient-echo MR images. AJNR Am J Neuroradiol 2003;24:88-96.
23. Jeong SW, Jung KH, Chu K, Bae HJ, Lee SH, Roh JK, *et al*. Clinical and radiologic differences between primary intracerebral hemorrhage with and without microbleeds on gradient-echo magnetic resonance images. Arch Neurol 2004;61:905-9.
24. Lee SH, Bae HJ, Kwon SJ, Kim H, Kim YH, Yoon BW, *et al*. Cerebral microbleeds are regionally associated with intracerebral hemorrhage. Neurology 2004;62:72-6.
25. Kato H, Izumiyama M, Izumiyama K, Takahashi A, Itoyama Y. Silent cerebral microbleeds on T2*-weighted MRI: Correlation with stroke subtype, stroke recurrence, and leukoaraiosis. Stroke 2002;33:1536-40.
26. Jia Z, Mohammed W, Qiu Y, Hong X, Shi H. Hypertension increases the risk of cerebral microbleed in the territory of posterior cerebral artery: A study of the association of microbleeds categorized on a basis of vascular territories and cardiovascular risk factors. J Stroke Cerebrovasc Dis 2014;23:e5-11.
27. Tsushima Y, Tanizaki Y, Aoki J, Endo K. MR detection of microhemorrhages in neurologically healthy adults. Neuroradiology 2002;44:31-6.
28. Zhang J, Liu L, Sun H, Liu M, Li Y, Zhao J, *et al*. Cerebral microbleeds are associated with mild cognitive impairment in patients with hypertension. J Am Heart Assoc 2018;7:e008453.
29. Yakushiji Y, Nishiyama M, Yakushiji S, Hirotsu T, UchinoA, Nakajima J, *et al*. Brain microbleeds and global cognitive function in adults without neurological disorder. Stroke 2008;39:3323-8.

How to cite this article: Massarat Y, Nisar S, Bhat SA, Rashid M. Patterns and Risk Factors of Cerebral Microbleeds and Cognitive Impairment in Patients Incidentally Detected with Cerebral Microbleeds on M.R.I. Brain. Int J Sci Stud 2022;10(10):39-43.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Electrocardiographic Findings of Patients with Chronic Obstructive Pulmonary Disease: A Case–control Study

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Abstract

Background: Chronic obstructive pulmonary disease (COPD), a common respiratory condition, causes significant obstruction of airflow, ongoing oxygen demand, functional impairments, frequent hospitalizations, and increased morbidity. Significant alterations in cardiac function are brought on by this condition. Information on COPD and the related electrocardiogram (ECG) symptoms is scarce. Our objective is to look into the various electrocardiographic abnormalities among COPD patients in the northeastern part of India in order to start early diagnosis and therapy, increase patient survival, and improve the quality of life for COPD patients.

Methods: The case–control study included 112 chronic COPD patients and 112 controls with similar age and gender. Each COPD patient underwent an electrocardiography evaluation using standard 12-lead ECG equipment. The data were examined using basic statistical methods.

Results: In the present study, the P-pulmonale was present in 52.67% of the participants with COPD. The percentages of patients with Rt axis deviation, Rt bundle branch block, and Rt ventricular hypertrophy were 48.21%, 50.89%, and 27.67%, respectively. Atrial fibrillation affects 12.50% of COPD patients, and ischemic heart disease affects 24.10% of them.

Conclusion: This study emphasizes the importance of early cardiac screening by ECG of all COPD patients to determine the prognosis and further aid in identifying individuals who are likely to have greater mortality and morbidity.

Key words: Airflow, Electrocardiography, Obstructive, Pulmonary

INTRODUCTION

Chronic obstructive pulmonary disease (COPD), a common respiratory condition, causes significant obstructive airflow limitation, ongoing oxygen dependence, functional impairments, frequent hospitalizations, and increased morbidity. In addition to reducing morbidity and death, prompt identification and treatment can prevent the condition from worsening. Therefore, even if the patient is being assessed for another cause, it is crucial for doctors to accurately identify this illness. COPD is the fourth leading cause of death globally, but it is expected to move to third place in the following years. Significant alterations in cardiac function, including in the right and left ventricles as well as the pulmonary arteries, are brought on by this condition.[1,2]

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

Numerous thoracic morphological and hemodynamic alterations that occur by COPD may affect several electrocardiographic parameters. The electrocardiographic changes seen in COPD patients are primarily caused by changes in body mass index that are correlated with clockwise rotation of the frontal QRS-vector, increased airway obstruction, right ventricular afterload, diaphragmatic displacement brought on by hyperinflation, right heart rotation, and diaphragmatic rotation caused by hyperinflation. A 12-lead electrocardiogram (ECG), which is frequently included in regular examinations in many clinical settings, can provide helpful diagnostic hints, can be used as an initial screening tool, and can also help with subsequent evaluation and management of COPD or

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emphysema. Nevertheless, some ECG alterations seen in patients with established COPD or emphysema may have independent prognostic significance.[3-5]

Compared to individuals without COPD, patients with COPD have a higher risk of dying from an arrhythmia, a myocardial infarction, or congestive heart failure. Increased cardiovascular mortality was found in a study involving a sizable patient population, particularly in COPD patients under the age of 65.[6-8]

There is a dearth of information about COPD and associated ECG symptoms. Therefore, to begin early diagnosis and therapy, extend patient survival, and enhance the quality of life for COPD patients, our objective is to examine the various electrocardiographic alterations among COPD patients in the northeastern region of India.

METHODS

Study Setting

The study was conducted in the in-patient and outpatient department of Medicine at MGM Medical College, Kishanganj, Bihar.

Study Type

The study was a case–control study.

A Number of Participants

The study included 112 patients with chronic COPD and 112 age- and gender-matched controls.

Inclusion Criteria

Those patients who were suffering from chronic COPD and given consent were included in the study.

Exclusion Criteria

Those with chronic COPD who were suffering from other co-morbid diseases were excluded from the study.

Study Period

The study period was from June 2021 to May 2022.

Data Collection and Analysis

All COPD patients who met the study's requirements underwent complete examinations. Postgraduate MD students in the department of medicine conducted clinical examinations. They took note of the patients' complete demographic information. Patients with COPD underwent pulmonary function testing to determine their diagnosis and level of severity. A typical 12-lead ECG equipment was used to conduct an Electrocardiography study on each COPD patient. Simple statistical techniques were employed to analyse the data.

Electrocardiography

After 10 min of supine rest, a 12-lead ECG was recorded using the default filter settings, a paper speed of 50 mm/s, and a gain of 10 mm/mV. About 20% of the ECGs were randomly chosen for manual reading by one investigator, and all ECGs with ambiguous interpretations were read by two investigators. Measures were set by consensus. P-wave amplitude 2.5 mm in II, III, and avF or 1.5 mm in V1 was considered right-atrium enlargement. Right ventricular hypertrophy and Left ventricular hypertrophy were defined by using standard criteria. Counter-clockwise rotation was medial to V3, while clockwise QRS-axis rotation (delayed transition) needed R/S transition at or lateral to V4. Axis deviations and low voltage were both defined under the Minnesota Code. A normal ECG required a heart rate of 60–80 beats/min, PR interval duration of 0.12–0.20 s, P-amplitude in V1 <1.5 mm and in II, III, and aVF <2.5, P-axis <75°, QRS duration 0.07–0.10 s, at least one QRS amplitude in limb leads ≥5 mm and ≥10 mm in precordial leads, frontal QRS-axis −30° to 90°, and transition zone at V3.[9-11]

RESULTS

The study comprised 112 COPD patients and 112 controls who were matched for age and gender. The COPD patients' mean age was 62.84 ± 7.29 years, while the controls' mean age was 63.14 ± 7.46 years. In the study, 82% of the male patients were smoker. The exposure to biomass fuel affected all females (16%). The average amount of time people smoked was 24.6 + 4.21 years. A history of smoking for more than 20 pack years was present in 54% of smokers. The disease lasted an average of 6.12 + 3.48 years, ranging from 1 to 26 years. The majority of patients (64%) had symptoms that had lasted 1 to 12 years, whereas just 18% had symptoms that had lasted more than ten years. The majority of the patients (90%) had sputum-producing coughs, while 94% also experienced dyspnea, foot edema (28%), fever (18%), and decreased urine production (7%).

The present study's mean heart rate of the COPD patients was recorded as 94.14 per min compared to 76.36 per min obtained by the control group. Normal sinus rhythm was recorded in 56.4% of COPD cases as compared to 68.6% of the controls. Sinus tachycardia was present in 26.8% of COPD cases as compared to 18.6% of the controls.

Rt atrial enlargement (p pulmonale) was found in 52.67% of COPD patients compared to 10.71% of controls. Rt ventricular hypertrophy was seen in 48.21% of COPD patients compared to 9.82% of controls. Rt axis deviation was detected in 50.89% of COPD patients compared to 9.82% of controls. In contrast to 13.39% of controls,

Rt bundle branch block was found in 27.67% of COPD patients [Table 1]. In contrast to 22.32% of controls, 24.10% of COPD patients had ischemic heart disease. Compared to 6.25% of controls, 20.53% of COPD patients had low voltage complexes found in their ECG. Atrial fibrillation was observed in 12.50% of COPD patients as opposed to 4.46% of controls. Compared to 12.50% of the control group, 9.82% of COPD patients had ischemic heart disease [Figure 1].

DISCUSSION

Air trapping, persistent hypoxemia, increased work of breathing, and alveolar and pulmonary capillary damage are all features of COPD. In an effort to increase blood oxygenation, the pulmonary vessels beside under-ventilated alveoli have a tendency to constrict (hypoxic reflex pulmonary vasoconstriction), which increases pulmonary vascular resistance and the work of the right heart, causing cor-pulmonale. COPD puts a chronic strain on the right side of the heart.

Our emphasis on the fact that our COPD population was drawn from clinically stable outpatients, where LV dysfunction as well as other comorbidities that can alter the ECG, had been completely excluded, distinguishes the current study from past COPD studies.

The mean heart rate of the COPD patients in the current study was 94.14 beats per minute, compared to the control group's 76 beats per minute. The study confirms that COPD patients have higher heart rates than controls.[12] In COPD patients 56.4% and 68.6% of controls had normal sinus rhythms, respectively. In COPD cases, the prevalence of sinus tachycardia was 26.8%, compared to 18.6% in controls. These findings are consistent with the research conducted by Agarwal *et al.* in 2008 and Pal *et al.* in 2020.[13,14]

In the current study, 52.67% of the subjects with COPD had peaked P-waves, defined as amplitude >2.5 mm. Rt axis deviation, Rt bundle branch block, and Rt ventricular hypertrophy were all reported in 48.21%, 50.89%, and 27.67% of COPD patients, respectively. In addition, these findings are in accordance with the 2008 study by Agarwal *et al.*[13] Emphysema, which reduces the QRS amplitudes, may be the cause of the low voltage complexes reported in the ECG of 20.53% of COPD patients in the current study. All these findings of P-pulmonale, rightward QRS axis deviation, right ventricular hypertrophy, and Rt bundle branch block increase with the longer duration of the disease.[14-16]

In the current study, ischemic heart disease was present in 24.10% of COPD patients and 12.50% have atrial fibrillation. This study's increasing percentage of atrial

Table 1: ECG changes of COPD patients

ECG changes	No. of patients (*n*=112 Cases)	Percentage	No. of patients (*n*=112 controls)	Percentage
Rt atrial enlargement (p pulmonale)	59	52.67	12	10.71
Rt ventricular hypertrophy	54	48.21	11	9.82
Rt axis deviation	57	50.89	11	9.82
Rt bundle branch block	31	27.67	15	13.39
Ischemic heart disease	27	24.10	25	22.32
Low voltage complexes	23	20.53	7	6.25
Atrial fibrillation	14	12.50	5	4.46
Non-specific ST-T changes	11	9.82	14	12.50

ECG: Electrocardiogram, COPD: Chronic obstructive pulmonary disease

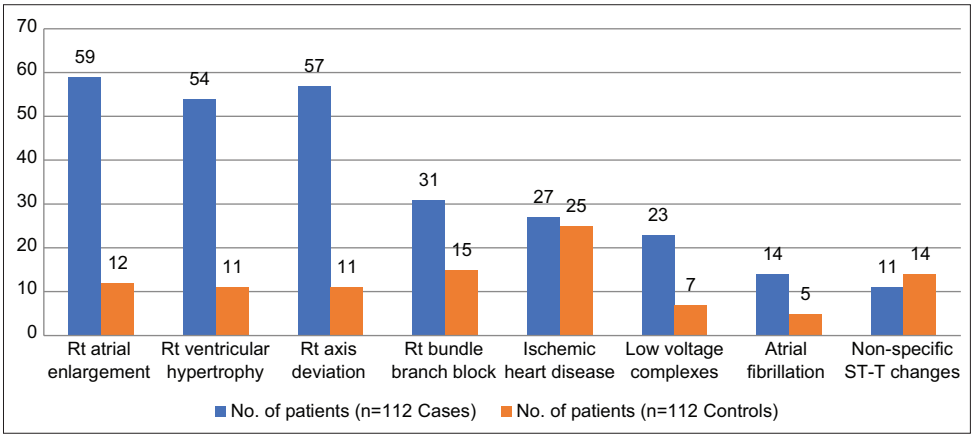

Figure 1: Electrocardiogram changes in chronic obstructive pulmonary disease patients

fibrillation and ischemic heart disease is due to the increased number of patients with advanced disease.[17,18]

ECG anomalies of better knowledge in COPD can progress the findings of ECG interpretation and assist identify the main pathophysiology of diseases that affect the airways. Therefore, it is essential to highlight early cardiac screening to evaluate the prognosis and risk of morbidity and death in COPD patients.

Study Limitations

The study had a very small sample size and was done over a short period of time.

Future Directions of the Study

To determine whether patients with COPD experienced any significant changes in their cardiovascular functions, future directions of the study should involve a larger sample size and a longer study period using equipment such as cardiac catheterizations, echocardiography, and other contemporary instruments.

CONCLUSION

Most parameters can be observed when screening COPD patients with an ECG. However, compared to ECG, echocardiography may be a more effective modality for detecting cardiac dysfunction. To assess the prognosis and further help identify those who are likely to experience increased morbidity and mortality, this study emphasizes early cardiac screening by ECG of all COPD patients.

REFERENCES

1. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, *et al*. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the global burden of disease study 2010. Lancet 2012;380:2095-128.
2. Lee-Chiong TL, Matthay RA. The heart in the stable COPD patient. In: Similowski T, Whitelaw WA, Derenne JP, editors. Clinical Management of Chronic Obstructive Pulmonary Disease. New York: Marcel Dekker; 2002. p. 475-532.
3. Sin DD, Anthonisen NR, Soriano JB, Agusti AG. Mortality in COPD: Role of comorbidities. Eur Respir J 2006;28:1245-57.
4. Hunninghake D. Cardiovascular disease in chronic obstructive pulmonary disease. Proc Am Thorac Soc 2005;2:44-9.
5. Morgan AD, Zakeri R, Quint JK. Defining the relationship between COPD and CVD: What are the implications for clinical practice? Ther Adv Respir Dis 2018;12:1-10.
6. Alkukhun L, Baumgartner M, Budev M, Dweik RA, Tonelli AR. Electrocardiographic differences between COPD patients evaluated for lung transplantation with and without pulmonary hypertension. COPD 2014;11:670-80.
7. Holtzman D, Aronow WS, Mellana WM, Sharma M, Mehta N, Lim J, *et al*. Electrocardiographic abnormalities in patients with severe versus mild or moderate chronic obstructive pulmonary disease followed in an academic outpatient pulmonary clinic. Ann Noninvasive Electrocardiol 2011;16:30-2.
8. Thomas AJ, Apiyasawat S, Spodick DH. Electrocardiographic detection of emphysema. Am J Cardiol 2011;107:1090-2.
9. Dahlöf B, Devereux RB, Kjeldsen SE, Julius S, Beevers G, de Faire U, *et al*. Cardiovascular morbidity and mortality in the Losartan intervention for endpoint reduction in hypertension study (LIFE): A randomized trial against atenolol. Lancet 2002;359:995-1003.
10. Kumar W, Shaikh W, Kp S, Bhatty S, Hassan S. Electrocardiographic abnormalities in patients with acute exacerbation of chronic obstructive pulmonary disease. Cureus 2021;13:e20820.
11. Rijnbeek PR, van Herpen G, Bots ML, Man S, Verweij N, Hofman A, *et al*. Normal values of the electrocardiogram for ages 16-90 years. J Electrocardiol 2014;47:914-21.
12. Warnier MJ, Rutten FH, Numans ME, Kors JA, Tan HL, de Boer A, *et al*. Electrocardiographic characteristics of patients with chronic obstructive pulmonary disease. COPD 2013;10:62-71.
13. Agarwal RL, Kumar D, Gurpreet, Agarwal DK, Chabra GS. Diagnostic values of electrocardiogram in chronic obstructive pulmonary disease (COPD). Lung India 2008;25:78-81.
14. Pal A, Das A, Thakuria J. Electrocardiographic changes in chronic obstructive pulmonary disease-An observational study from North-East of India. J Commun Dis 2020;52;32-7.
15. Hilde JM, Skjorten I, Grotta OJ, Hansteen V, Melsom MN, Hisdal J, *et al*. Right ventricular dysfunction and remodeling in chronic obstructive pulmonary disease without pulmonary hypertension. J Am Coll Cardiol 2013;62:1103-11.
16. Larssen MS, Steine K, Hilde JM, Skjorten I, Hodnesdal C, Liestol K, *et al*. Mechanisms of ECG signs in chronic obstructive pulmonary disease. Open Heart 2017;4:e000552.
17. Buch P, Friberg J, Scharling H, Lange P, Prescott E. Reduced lung function and risk of atrial fibrillation in the Copenhagen city heart study. Eur Respir J 2003;21:1012-6.
18. Simons SO, Elliott A, Sastry M, Hendriks JM, Arzt M, Rienstra M, *et al*. Chronic obstructive pulmonary disease and atrial fibrillation: An interdisciplinary perspective. Eur Heart J 2021;42:532-40.

How to cite this article: Krishnakant SR, Pandey N, Gangwar A, Baid A, Kumar T, Paul UK. Electrocardiographic Findings of Patients with Chronic Obstructive Pulmonary Disease: A Case-control Study. Int J Sci Stud 2023;10(10):44-47.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Is Anemia a Risk Factor for COVID-19 Infection – A Cross-Sectional Survey

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Abstract

Background: The SARS-CoV-2 virus affects primarily the respiratory system, from nasopharyngeal symptoms to full blown pneumonia. In general, these infections can cause more severe symptoms in people with weakened immune systems, older people, and those with chronic conditions such as diabetes, cancer, and chronic lung disease. So far, very little clinical experience of infected patients with anemia has been recorded. Hence, this study was done to estimate the prevalence of anemia in hospitalized patients with COVID-19 infection.

Methods: This was a retrospective cross-sectional study involving COVID-19 in patients at Sree Balaji Medical College and Hospital. We evaluated hemoglobin, transferrin, and ferritin. Data were analyzed by descriptive statistics and results were reported as mean and SD or median and interquartile range, depending on each variable value distribution; differences between groups were tested by the student's *t*-test.

Results: We included 266 patients, 176 (66%) of whom were male. The mean age was 37.0 ± 10.7 years. In this study, 94% of them are anemic, but while comparing males and females and there was no significant difference observed. Ferritin level was increased among COVID-19 positive patients.

Conclusions: COVID-19 cases most commonly manifest with anemia. The prevalence of anemia was high among COVID-19 patients irrespective of gender.

Key words: COVID-19, Anemia, Body mass index

INTRODUCTION

Coronavirus is the causative organism of COVID-19. Most people who infected with COVID-19 will experience mild to moderate symptoms and recover without special treatment or hospitalization. With the second-largest population in the world, India is brutally affected by the COVID-19 disease. It is well known that coronaviruses exhibit mutant and recombined behavior, resulting in respiratory, hepatic, neurologic, and intestinal illnesses. Seven different coronavirus strains have been identified, including HKU1, NL63, 229E, OC43, SARS-CoV, MERS-CoV, and SARS-CoV-19 (COVID-19), the most recent of which only had a minor effect on the infected person's moderate respiratory illness. Since December 2019, the COVID-19 pandemic has had a significant negative impact on society and the global economy, while the other three had a disastrous effect on humanity.[1,2] Clinical signs of COVID-19 include fever (not always), wheezing, coughing, fatigue, headache, myalgia, sore throat, and conjunctivitis (also in some cases). It is also persistent. No effective antiviral treatment or vaccine for COVID-19 is currently available. Immediate oxygen therapy is needed in patients with a serious acute respiratory infection, respiratory failure, hypoxemia, or shock.[3,4]

Usually, anemia is not related to respiratory problems. Complications affecting the heart, lungs, and immune system can, however, occur in these patients, and very severe complications can be caused in a SARS-CoV-2-positive patient. The severity of respiratory diseases is commonly aggravated by anemia, and several studies have shown that the prevalence of anemia is associated with poor results and increased mortality in patients with

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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community-acquired pneumococcal pneumonia.[5,6] Latest findings suggest that patients with COVID-19 appear to have reduced levels of hemoglobin, suggesting anemia, and pathologically elevated levels of ferritin.[7]

Hence, this study was undertaken to evaluate the anemia status among COVID-19-positive cases. We mainly focused on the differences between anemic patients and non-anemic patients. We aim to reveal the relationship between anemia and the severity of COVID-19 cases, with the aim to understand of anemia in COVID-19 patients.

MATERIALS AND METHODS

This study was conducted retrospectively for a period from June 2020 to December 2020 in Balaji Medical College, Chennai, Tamil Nadu. This study consisted of 266 COVID-19 patients confirmed by reverse transcription-polymerase chain reaction, who were randomly selected. The inclusion criteria were confirmed COVID-19 patients, no current chronic disease such as tuberculosis, diabetes, cancer, or any other chronic disease. Comorbid conditions of the patients were also recorded. Blood samples were collected from all of the studied population, including blood hemoglobin concentration <130 g/L or hematocrit (hct) <39% in adult males and Hb <120 g/L or HCT <37% in adult females. Patients' characteristics of interest included: Demographic: Sex, age, and hematological parameters like hemoglobin concentration (Hb) which was measured by the cyanmethemoglobin method.

Statistical Analysis

Data were analyzed by descriptive statistics and results were reported as mean and SD or median and interquartile range, depending on each variable value distribution; differences between groups were tested by the Student's *t*-test. $P < 0.05$ was considered statistically significant. The Statistical Package for the Social Sciences (SPSS 24.0 version, IBN. Chicago, USA) was used for data analysis.

Ethical Consideration

This study was approved Ethical Review Committee (ERC) at Sree Balaji Medical College and written informed consent was obtained from all the patients.

RESULTS

A total of 266 patients were enrolled to this study; out of which 176 (66%) were male.

The majority of the patients fall under the age group of 50 years and above followed which 41–50 years. The mean age was 37.0 ± 10.7 years. Males are affected more than females. Around 78% of them were from urban communities, and 92% of them were married. Around 78% were non-vegetarian (Table 1).

Majority of the patients had sore throat, headache, and nasal congestion followed which loss of taste and smell irrespective of sex (Figure 1).

The severity of anemia was established based on the WHO definitions. Among the 266 patients in our study, 41 patients were classified as having mild anemia, whereas 201 and eight patients were classified as having moderate and severe anemia, respectively (Table 2).

In this study, 94% of them are anemic but while comparing males and females and there was no significant difference observed (Table 3).

Table 1: Demographic characteristics of the patients

Characteristics of the patients	Frequency (%)
Gender	
Male	176 (66%)
Female	90 (34%)
Demographic data	
Urban	208 (78%)
Rural	58 (22%)
Marital status	
Married	21 (7.8%)
Unmarried	245 (92%)
Age group in years	
20–30	12 (4.5%)
31–40	15 (5.6%)
41–50	43 (16.1%)
51–60	94 (35.3%)
60 and above	103 (38.7)
Mean age	37.0±10.7 (SD)
Type of food	
Vegetarian	60 (22.5)
Non-vegetarian	206 (77.5)

SD: Standard deviation

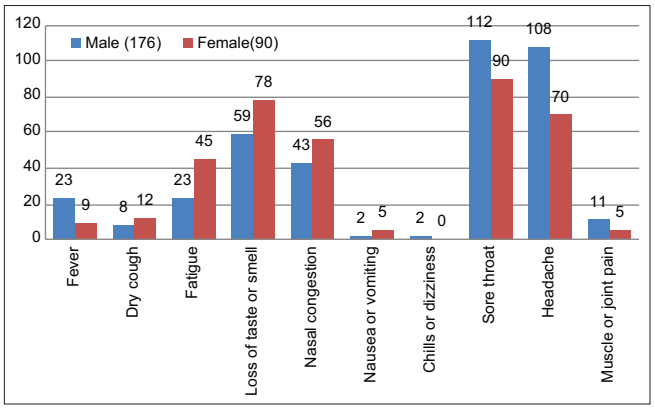

Figure 1: Clinical symptoms

Table 2: Distribution of anemia among gender

Hb concentration (g/dL)	Male (176)	Female (90)
6–7	0	1 (1.1%)
7.1–8	2 (1.13%)	5 (5.5%)
8.1–9	7 (3.9%)	52 (58%)
9.1–10	81 (46%)	10 (11.1%)
10.1–11	42 (23.8%)	9 (10%)
11.1–12	33 (18.75%)	8 (8.8%)
12.1–13	11 (6.25%)	5 (6%)

Table 3: Prevalence of anemia

Anemia status	Male	Female	*P*-value
Anemic	165 (93.75)	85 (94%)	0.92
Non-anemic	11 (6.25)	5 (6%)	

Around 85 patients were diabetic and 24% were hypertensive. Only 1 (0.4%) had chronic obstructive pulmonary disease. Most of the anemic patients had comorbid conditions such as diabetes and hypertension (Tables 4 and 5).

DISCUSSION

We screened 266 patients with COVID‑19 in this retrospective cohort. The clinical and laboratory features of COVID‑19 patients were similar to those in other studies.[8] In this cohort study, we mainly identified that the prevalence of anemia was high among COVID‑19 patients irrespective of age and sex. In multiple diseases, including pneumonia, stroke, and heart failure, anemia has become an independent risk factor for adverse outcomes.[9] In community-acquired pneumonia and influenza A, pneumonia patients with anemia have been shown to be at greater risk of poor results and nosocomial infections.[6]

In a study done by Zhou *et al*.,[10] COVID-19 patients with anemia were more vulnerable to death when paired with the survival group, the non-survival group displayed a greater proportion of patients with anemia (26% vs. 11%, $P = 0.0094$). While comparing with previous observations, anemia in our sample was an independent risk factor linked to extreme COVID-19 disease. Comorbidities (e.g., diabetes, hypertension, and old age) have been shown to be important predictors of bad COVID-19 outcomes. It should be noted that anemia also had a major adverse effect on the clinical course of COVID-1919 after controlling for these risk factors. In 38.2% of hospitalized COVID-19 patients, Huang *et al*.[11] registered decreases in hemoglobin levels but did not define the concept of decreased hemoglobin.

Table 4: Comorbidities

Type of comorbidity	Anemic (250)	Non-anemic (16)	*P*-value
Diabetes	80 (32%)	5 (31%)	0.872
Hypertension	56 (22%)	4 (1.6%)	0.04
COPD	1 (0.4%)	Nil	

COPD: Chronic obstructive pulmonary disease

Table 5: Serum ferritin levels in patients

Ferritin level	Male	Female	*P*-value
Ferritin, mcg/L (IQR)	650 (300–1348)	638 (250–1358)	0.432
Transferrin saturation, % (IQR)	12 (7–21)	12 (8–20)	0.986

IQR: Interquartile range

Although Wang *et al*.[12] reported lower levels of hemoglobin (<110 g/L) in 19.23% of the hospitalized study population. Xu *et al*.[13], on the other hand, examined asymptomatic patients and confirmed that none of the cases had decreased hemoglobin levels, although the cutoff of decreased levels was not established. Based on retrospective data from 245 COVID-19 individuals, Liu *et al*.[14] found that there was no important unadjusted association between baseline hemoglobin levels and all-cause mortality during hospitalization. Therefore, an issue that merits further analysis is whether COVID-19 deterioration occurs along with persistently decreased anemia.

CONCLUSIONS

Our data show that anemia during hospitalization outside of the ICU is the most common finding in COVID-19. Anemia is highly prevalent, especially in older individuals. In selected populations, anemia has been reported to be associated with impaired survival and health-related quality of life. Due to high costs, side effects, and the lack of blood supply, an issue that became more severe during the pandemic, blood transfusions in COVID-19 should be used according to appropriate strategies for blood control and efforts must be made to minimize the prevalence, and severity of anemia. If confirmed, for the more than 1.62 billion individuals reported to have anemia worldwide, this has significant consequences. The effect of anemia and the pathophysiology, prognosis, and treatment of COVID-19 should be discussed in future studies.

REFERENCES

1. Singhal T. A review of coronavirus disease-2019 (COVID-19). Indian J Pediatr 2020;87:281-6.
2. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, *et al*. World health organization declares global emergency: A review of the 2019 novel

coronavirus (COVID-19) Int J Surg 2020;76:71-6.
3. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al*. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet 2020;395:507-13.
4. Xu XW, Wu XX, Jiang XG, Xu KJ, Ying LJ, Ma CL, *et al*. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: Retrospective case series. BMJ 2020;368:m606.
5. Reade MC, Weissfeld L, Angus DC, Kellum JA, Milbrandt EB. The prevalence of anemia and its association with 90-day mortality in hospitalized community-acquired pneumonia. BMC Pulm Med 2010;10:15.
6. Doshi SM, Rueda AM, Corrales-Medina VF, Musher DM. Anemia and community-acquired pneumococcal pneumonia. Infection 2011;39:379-83.
7. Fan BE, Chong VC, Chan SS, Lim GH, Lim KG, Tan GB, *et al*. Hematologic parameters in patients with COVID-19 infection. Am J Hematol 2020;95:E131-4.
8. Zhang JJ, Dong X, Cao YY, Yuan YD, Yang YB, Yan YQ, *et al*. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. Allergy 2020;75:1730-41.
9. Wei CC, Zhang ST, Tan G, Zhang SH, Liu M. Impact of anemia on in-hospital complications after ischemic stroke. Eur J Neurol 2018;25:768-74.
10. Zhou F, Yu T, Du RH, Fan G, Liu Y, Xiang J, *et al*. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet 2020;395:1054-62.
11. Huang Y, Tu M, Wang S, Chen S, Zhou W, Chen D, *et al*. Clinical characteristics of laboratory confirmed positive cases of SARS-CoV-2 infection in Wuhan, China: A retrospective single-center analysis. Travel Med Infect Dis 2020;36:101606.
12. Wang L, Duan Y, Zhang W, Liang J, Xu J, Zhang Y, *et al*. Epidemiologic and clinical characteristics of 26 cases of Covid-19 arising from patient-to-patient transmission in Liaocheng. China. Clin Epidemiol 2020;12:387-91.
13. Xu T, Huang R, Zhu L, Wang J, Cheng J, Zhang B, *et al*. Epidemiological and clinical features of asymptomatic patients with SARS-CoV-2 infection. J Med Virol 2020;92:1884-9.
14. Liu Y, Du X, Chen J, Jin Y, Peng L, Wang HH, *et al*. Neutrophil-to-lymphocyte ratio as an independent risk factor for mortality in hospitalized patients with COVID-19. J Infect 2020;81:e6-12.

How to cite this article: Kanmani P, Sankar A, Umashankar R, Padmalatha K. Is Anemia a Risk Factor for COVID-19 Infection – A Cross-Sectional Survey. Int J Sci Stud 2023;10(10):48-51.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Feto-maternal Outcome in 3rd Trimester Pregnant Patients with Severe Anaemia and Associated Risk Factors

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Abstract

Background: The global prevalence of anemia during pregnancy is estimated by World Health Organisation to be 47.4%. The relative risk of maternal mortality associated with moderate anemia was 1.35% and for severe anemia was 3.51%. The maternal mortality risk increases 8–10 fold when Hb falls <5 g/dL. The prevalence of anemia among all age groups is high in India. Every second woman is anemic (55%).

Objectives: To assess feto-maternal outcome in 3rd trimester pregnant patients with severe anaemia and associated risk factors.

Materials and Methods: A total of 400 pregnant patients in third trimester with severe anemia were enrolled for the study after obtaining the proper informed consent. The study population included all admitted pregnant women beyond 28 weeks with Hb between 4 and 6.9 g/dL. The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of Statistical Package for Social Sciences (SPSS) Version 20.0 (SPSS Inc., Chicago, Illinois, United States of America).

Results: Majority of study women were severely anaemic 188 (90.8%) while 19 (9.2%) had very severe anaemia. The most common age group affected was 30–34 years in 84 (40.6%) with a mean age of 28.6 ± 3.98 years. Inter pregnancy interval of <2 was seen in 113 (64.9%) patients while 62 (35.4%) had >2 years inter pregnancy interval. In first and second stage of labour maternal exhaustion was observed in 10 (4.8%) patients, 9 (4.3%) had congestive heart failure (CHF), 8 (3.9%) had precipitate labour and 6 (2.9%) experienced prolonged second stage. Primary postpartum hemorrhage was seen in 68 (32.9%) patients in the third stage of labour, CHF in 7 (3.4%) patients and retained placenta in 5 (2.4%) patients. The mode of delivery was normal vaginal delivery in 94 (45.4%) patients followed by caesarean section in 86 (41.5%) patients while 27 (13%) women having instrumental vaginal delivery.

Conclusion: Anemia control program should be executed more resourcefully in this vital segment of population.

Key words: Feto-maternal, Inter-pregnancy interval, Severe anemia

INTRODUCTION

The World Health Organisation (WHO) defined anemia in pregnancy as haemoglobin concentration of <11 g/dL.[1] Anemia is the commonest hematological disorder that occurs in pregnancy. The Centres for Disease Control recommends that haemoglobin in pregnant women should not be allowed to fall below 10.5 g/dL in the second trimester taking into account the physiological changes of pregnancy.[2] The global prevalence of anemia during pregnancy is estimated by WHO to be 47.4%.[3] According to recent analysis by WHO India is included in the list of countries with high prevalence of anemia in pregnant women (>40%).[3] The relative risk of maternal mortality associated with moderate anemia was 1.35% and for severe anemia was 3.51%.[4] The maternal mortality risk increases 8–10 fold when Hb falls <5 g/dL.[5] The prevalence of anemia among all age groups is high in India. Every second woman is anemic (55%).[6]

Margaret Balfour was credited as the first to draw the attention to anaemia in pregnancy in India.[7] The weight of evidence supports advisability of routine iron supplementation during pregnancy.[8] Absorption of

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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exogenous iron is regulated by the state of body store. In women entering pregnancy with adequate iron stores, there is little absorption of iron in the first trimester. The stores are exhausted in late pregnancy due to increased demand, and accordingly the iron absorption increases from 7.2% in the first trimester to 66.1% in the third trimester.[9]

WHO recommends daily administration of 200 mg of ferrous sulfate (containing 60 mg of elemental iron) along with 400 μg of folic acid starting in second trimester of pregnancy. The National Nutritional Anemia Control Programme of India recommends 100 mg of elemental iron 500 μg of folic acid for prophylaxis for minimum of 100 days starting in second trimester and double this dose for the treatment i.e. 200 mg of elemental iron plus 1mg of folic acid.[6]

Aims and Objectives

- To study the fetomaternal outcome in pregnant patients in third trimester with severe anemia (Hb <7 g/dL)
- To determine the risk factors associated with severe anemia in third trimester patients.

MATERIALS AND METHODS

After obtaining the ethical clearance from the Institutional Ethical Committee, a prospective, cross sectional, observational study was conducted in Postgraduate Department of Obstetrics and Gynaecology at Government Lalla Ded hospital Srinagar over a period of 18 months. A total of 400 pregnant patients in third trimester with severe anemia were enrolled for the study after obtaining the proper informed consent. The study population included all admitted pregnant women beyond 28 weeks with Hb between 4 and 6.9 g/dL. The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of Statistical Package for Social Sciences (SPSS) Version 20.0 (SPSS Inc., Chicago, Illinois, United States of America). Continuous variables were expressed as Mean ± SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar and pie diagrams.

RESULTS

Majority of study women were severely anaemic 188 (90.8%) while 19 (9.2%) had very severe anaemia. The most common age group affected was 30–34 years in 84 (40.6%) patients followed by 25–29 years in 74 (35.7%) patients, 38 (18.4%) patients were 20–24 years while >35 years was the age of 11 (5.3%) patients. Mean age of the patients was 28.6 ± 3.98 years. 135 (65.2%) were multigravida, 40 (19.3%) were grand multi gravid a while 32 (15.5%) were primigravida. 135 (65.2%) patients belonged to joint family while 72 (34.8%) were from nuclear family.

Inter pregnancy interval of <2 was seen in 113 (64.9%) patients while 62 (35.4%) had >2 years inter pregnancy interval. Underlying comorbidities were seen in 49 patients including 26 (12.6%) hypertensives, 17 (8.2%) hypothyroids while 6 (2.9%) patients had SLE. Outcomes like preterm labour was seen in 59 (28.5%) patients followed by fetal growth restriction in 30 (14.5%) patients, placenta previa in 17 (8.2%) patients, abruption placenta was seen in 14 (6.8%) women, pre-eclampsia in 11 (5.3%) patients while 7 (3.4%) patients had CHF. In first and second stage of labour maternal exhaustion was observed in 10 (4.8%) patients, 9 (4.3%) had CHF, 8 (3.9%) had precipitate labour and 6 (2.9%) experienced prolonged second stage. Primary postpartum hemorrhage (PPH) was seen in 68 (32.9%) patients in the third stage of labour, CHF in 7 (3.4%) patients and retained placenta in 5 (2.4%) patients. The mode of delivery was normal vaginal delivery in 94 (45.4%) patients followed by caesarean section in 86 (41.5%) patients while 27 (13%) women having instrumental vaginal delivery.

During puerperium maternal outcomes include sepsis in 55 (26.6%) women, delayed lactation in 14 (6.8%) women, secondary PPH in 11 (5.3%) women, wound gaping in 6 (2.9%) patients and 4 (1.9%) women in intensive care admission. Neonatal intensive care (NICU) admission was observed in 65 (31.4%) women while intrauterine growth restriction was the final outcome in 30 (14.5%) patients. Need for blood transfusion was seen in 182 (87.9%) women during intrapartum period, 168 (81.2%) during antenatal period and 117 (56.5%) women during puerperium. Majority of women 187 (90.3%) had blood transfusion once, followed by twice in 148 (71.5%) women, 76 (36.7%) women needed it thrice while >3 blood transfusion was required in 28 (13.5%) women. Hemoglobin levels (g/dL) at hospital discharge were 7–8 g/dL in majority of patients 136 (65.7%). There were 37 (17.9%) patients having 6–7 g/dL while 34 (16.4%) had 8–9 g/dL of hemoglobin at discharge [Tables 1 and 2].

DISCUSSION

The prevalence of anaemia among pregnant women in a study by Tomar *et al.*,[10] was 82.9%, although similar to other studies like Toteja *et al.*,[11] 84.9%, Gautam *et al.*,[12] in 96.5%. Kapil and Sareen[13] found 78.8%. However, lower prevalence of anaemia was reported by Ritu and Pinky[14] observed it in 51.0%. Number of studies have been done

Table 1: Distribution of study patients as per anemia grading, age, gravida, type of family, inter pregnancy interval and iron/folic acid supplementation and obstetric outcome

Patient characteristics	Number	Percentage
Anemia Grade		
Severe anemia	188	90.8
Very severe anemia	19	9.2
Age distribution		
20–24	38	18.4
25–29	74	35.7
30–34	84	40.6
≥35	11	5.3
20–24	38	18.4
Mean±SD (Range)=28.6±3.98 (20–37 years)		
Gravida		
Primigravida	32	15.5
Multigravida	135	65.2
Grand multigravida	40	19.3
Type of family		
Nuclear family	72	34.8
Joint family	135	65.2
Inter pregnancy interval		
≤2 years	113	64.6
>2 years	62	35.4
Comorbid illnesses		
Hypertension	26	12.6
Hypothyroidism	17	8.2
Obstetric Outcome		
Placenta previa	17	8.2
Pre eclampsia	11	5.3
Fetal growth restriction	30	14.5
Premature rupture of membranes	14	6.8
Preterm labour	59	28.5
Congestive heart failure	7	3.4
Abruptio placenta	14	6.8

Table 2: Maternal outcome, fetal outcome and blood transfusion, number of blood transfusion and haemoglobin levels

Patient characteristics	Number	Percentage
Maternal outcome in 1st and 2nd stage of labour		
CHF	9	4.3
Maternal exhaustion	10	4.8
Prolonged second stage	6	2.9
Precipitate labour	8	3.9
Maternal outcome in 3rd stage of labour		
Primary PPH	68	32.9
CHF	7	3.4
Retained placenta	5	2.4
Mode of delivery		
Normal vaginal delivery	94	45.4
Instrumental vaginal delivery	27	13.0
Caesarean section	86	41.5
Maternal outcomes during puerperium		
Secondary PPH	11	5.3
Sepsis	55	26.6
Wound gaping	6	2.9
ICU admission	4	1.9
Delayed lactation	14	6.8
Fetal outcome		
IUGR (Low birth weight)	30	14.5
NICU admissions	65	31.4
IUD (still birth)	17	8.2
Blood transfusion		
During antenatal period*	168	81.2
During intrapartum period	182	87.9
During puerperium	117	56.5
No. of Transfusions		
1	187	90.3
2	148	71.5
3	76	36.7
>3	28	13.5
Haemoglobin Levels		
6–7	37	17.9
7–8	136	65.7
8–9	34	16.4

*Third trimester. NICU: Neonatal intensive care, ICU: Intensive care, PPH: Postpartum hemorrhage

on anemia in pregnancy worldwide. The aim of this study is to determine the risk factors associated with severe anemia in third trimester pregnant patients in our set up and its effect on feto-maternal outcome. In our study 207 Kashmiri pregnant women in their 3rd trimester with severe anemia admitted in our hospital were taken. Majority of study women were severely anemic 188 (90.8%) while 19 (9.2%) had very severe anemia. Severity of anemia was also reported in 42.7% by Nonterah *et al.*[15]

In our study, most common age group affected was 30–34 years in 84 (40.6%) patients followed by 25–29 years in 74 (35.7%) patients, 38 (18.4%) patients were 20–24 years while >35 years was the age of 11 (5.3%) patients. Mean age of the patients was 28.6 ± 3.98 years with a range of 20–37 years. This is in agreement with previous studies, Nonterah *et al.*,[15] also confirmed that most common age group affected was 20–34 years in 80.2% (n = 406), 35–49 years in 13.2% (n = 67) while 6.6 (n = 33) patients age was <20 years. Mirzaie *et al.*,[16] in their study found 20–29 years as the most common age group affected in 62.7% followed by 28.9% patients in the age group of 30–39 years. Tomar *et al.*,[10] also confirmed that most common age group affected with anaemia was 22–25 years (44.7%) followed by 44.7% women who belonged to 18–21 years. Shridevi[17] evaluated the prevalence of anemia in 600 women in which majority i.e. 58.3% (n = 350) belonged to 20–25 years, 20.8% (n = 125) were aged between 26 and 30 years, 12.5% (n = 75) were aged 31–35 years while 8.3% (n = 50) aged between 18 and 19 years.

In our study, the risk factors encountered were dietary habits, parity, type of family, interpregnancy interval, iron folic acid supplementation, socio-economic status and education level. Low dietary intake of iron was seen in (96.1%), multi parity (65.2%), joint family type (65.2%), short inter-pregnancy interval <2 years (64.9%), non-consumption of iron/foic acid 64.7%, low socioeconomic status (63.8%), illiterates combining 35.7%.

139 (67.1%) patients belonged to rural areas while 68 (32.9%) were from urban areas. Similar results were also reported in literature 72.4% (Nigar and Ahmad, 2014)[18] and 61.8%, (Tulu *et al.*, 2019).[19]

In our study Multigravida women were 65.2% which corresponds well with a study done by Ali *et al.*,[20] (75.2%). Joint family status is the risk factor in severe anaemia in our study and corresponds well with the literature 66.6% (Shridevi, 2018),[17] 46.9% (Tomar *et al.*,[10] 24.6% (Sumitra and Kumar, 2017),[21] short inter-pregnancy interval <2 years as the causative factor of severe anaemia confirmed by literature (Tomar *et al.*, 2017[10]; Okube *et al.*, 2016).[22] Iron/Folic acid supplementation was not taken by 21.9% followed by 44.70% women who took the iron/folic acid tablets for <2 months only (Tomar *et al.*, 2017).[10] Lower middle class socioeconomic status is another risk factor for severe anaemia as is seen by Tomar *et al.*,[10] As in other studies, severity of anaemia was inversely related to educational status,[12,23,24] socio-economic status.[12]

A study by Chowdhury *et al.*[25] in Bangladesh also found that education of women was significantly associated with anemia in pregnancy, whereas in a study by Singh *et al.*[26] observed an insignificant association between anemia and parity. In a similar study conducted by Obse *et al.*[27] in Ethiopia parity >5 has a significant association with anemia. In a similar study conducted by Bekele *et al.*[28] Ethiopia birth interval was significantly associated with anemia with an odds ratio of 3.

Underlying comorbidities were seen in 49 patients including 26 (12.6%) hypertensives, 17 (8.2%) hypothyroids while 6 (2.9%) patients had SLE. It closely correlated with a study conducted by Turner *et al.*,[29] where the prevalence of anemia in subjects with hypertension, diabetes, and hypothyroidism was 8.1%, 4.1%, and 3%, respectively.

Anemia in pregnancy has bearing on fetal outcome as well.in our study 65 (31.4%) babies were admitted in NICU mostly because of prematurity, 30 (14.5%) were low birth weight (LBW) and 17 (8.2%) were still births. There is a substantial amount of evidence showing that maternal iron deficiency anemia in early pregnancy can result in LBW subsequent to preterm delivery (Abu-Ouf, 2015).[30] A study by Sangeetha and Pushpalatha[31] in Bangalore reported highest (63%) prevalence of LBW among pregnant women, whereas Marahatta observed least (16.6%) (Marahatta, 2007[32] and Sangeetha and Pushpalatha[31] The other fetal complications among pregnant women in the present study include premature delivery (0.2%) and birth asphyxia (0.5%).

Maternal anemia is considered as risk factor for poor pregnancy outcomes and it threatens the life of fetus. Available data from India indicate that maternal morbidity rates are higher in anemic women (Kalaivani, 2009;[5] Ivan and Mangaiarkkarasi, 2013;[33] Singh *et al.*,).[34] About 35.6% of the women had maternal and fetal morbidity lower segment cesarean section (LSCS), abortions, obstructed labor, PPH, preeclampsia, prolonged labor, LBW, and birth asphyxia were commonly seen among anemic pregnant women.

Suryanarayana *et al.*,[35] did a study in which majority of the fetal and maternal complicationswere observed in anemic women. Out of 15 participants who underwent LSCS and 60% were anemic. Similarly, 80% of participants who had abortions, 40% of obstructed labor, 86% of PPH, 71.4% of preeclampsia, and all the women with prolonged labor were anemic. Around 25% of women delivered low birth babies, 57% of LBW babies, 69% of abortions/stillbirths, and all the newborn with birth asphyxia occurred in mothers who were anemic.

Studies in India demonstrated that the high proportion maternal deaths are due to anemia in pregnant women (Iyengar, 2012).[36]

Studies have reported 100% women in severe anemia group received blood transfusion (Kaul *et al.*, 2017;[37] Batar *et al.*, 2015;[38] Yadav, 2018).[39]

Hinderaker SG *et al.*, (2001)[40] has reported an incidence of pre-eclampsia and eclampsia as 8.2% and 3.3% respectively in severe anemia. Other studies have reported Pre eclampsia in 20%, 22.3% anemic women respectively (Yadav, 2018[39] and Batar *et al.*, 2015).[38]

The susceptibility of women with severe anaemia to preeclampsia could be explained by a deficiency of micronutrients and antioxidants. A reduction in serum levels of calcium, magnesium and zinc during pregnancy might be possible contributors to the development of preeclampsia (Singla *et al.*, 1997).[41]

Besides pre-eclampsia, the effect of maternal anaemia on intrauterine growth is attributed to chronic deprivation of oxygen to the developing fetus. Severe maternal anaemia, if present from early gestation, may be associated with reduced placental weight and surface area of peripheral villi which, is a determinant of nutrient transport from the mother to the fetus (Kozuki *et al.*, 2012).[42] FGR was seen in 10% cases in our study, however, Yadav, 2018)[39] has reported its incidence as 20%.

NICU admissions were significantly more in group A compared to group B (36% vs. 8%) in a study by Singh *et al.*,[43] Batar *et al.*, (2015)[38] also has observed high NICU

admissions of 43.08% in babies of anemic women. Thus, a higher rate of neonatal complications has been observed in neonates of severely anemic women probably due to chronic deprivation of oxygen from maternal blood.

CONCLUSION

Socioeconomic determinants constitute most of the anemia cases and, hence, should be considered as major risk factors of anemia in women attending for delivery. To improve maternal and fetal outcome, it is recommended that the primary health care has to be strengthened, prevention, early diagnosis, and treatment of anemia in pregnancy to be given priority. Prevalence of anemia among pregnant women was high, spacing between pregnancies will have a significant impact on hemoglobin status of pregnant women. Iron-folic acid supplementation is available under the national health program, it is important to consider and address other risk factors when designing and implementing target interventions for anemia.

They concluded that anemia control program should be executed more resourcefully in this vital segment of population. Awareness of above said factors is more important to prevent anemia rather than early diagnosis and treatment.

REFERENCES

1. World Health Organization. The Prevalence of Anemia in Women: A Tabulation of Information. Geneva: World Health Organization; 1992.
2. Centres for Disease Control (CDC). CDC criteria for anaemia in children and childbearing aged women. MMWR Morb Mortal Wkly Rep 1989;38:400-4.
3. De Benoist B, McLean E, Egli I, Cogswell M. Worldwide prevalence of anemia 1993-2005. In: WHO Global Database on Anemia. Geneva: World Health Organisation; 2008.
4. Brabin B, Prinsen-Geerligs P, Verhoeff F, Kazembe P. Anemia prevention for reduction of mortality in mothers and children. Trans R Soc Trop Med Hyg 2003;97:36-8.
5. Kalaivani K. Prevalence and consequences of anemia in pregnancy. Indian J Med Res 2009;130:627-33.
6. Adressing India's Nutrition Challenges. Report of the Multi-stake-Holder Retreat Planning Commission Government of India; 2010.
7. Reddaiah VP, Raj PP, Ramchandran K, Nath LM, Sood SK, Madan N, *et al*. Supplementary iron dose in pregnancy anaemia prophylaxis. Indian J Pediatr 1989;56:109-14.
8. Allen LH. Anemia and iron deficiency: Effects on pregnancy outcome. Am J Clin Nutr 2000;71(5 Suppl):S1280-4.
9. Koller O. The clinical significance of hemodilution during pregnancy. Obstet Gynecol Surv 1982;37:649-52.
10. Tomar GS, Singhal S, Shukla A. Anemia in pregnancy: Epidemiology and it's determinants. Int J Med Health Res 2017;3:5-9.
11. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP, *et al*. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull 2006;27:311-5.
12. Gautam VP, Bansal Y, Taneja DK, Saha R. Prevalence of anemia amongst pregnant women and its socio-demographic associates in a rural area of Delhi. Indian J Community Med 2010;27:157-60.
13. Kapil U, Sareen N. Prevalence of anemia amongst overweight and obese children in NCT of Delhi. Indian J Community Med 2014;26:295-7.
14. Ritu P, Pinky B. Prevalence of anemia among pregnant women of low income group of Hisar district of Haryana. J Dairying Foods Home Sci 2010;29:112-5.
15. Nonterah EA, Adomolga E, Yidana A, Kagura J, Agorinya I, Ayamba EY, *et al*. Descriptive epidemiology of anaemia among pregnant women initiating antenatal care in rural Northern Ghana. Afr J Prim Health Care Fam Med 2019;11:e1-7.
16. Mirzaie F, Eftekhari N, Goldozeian S, Mahdavinia J. Prevalence of anemia risk factors in pregnant women in Kerman, Iran. Iran J Reprod Med 2010;8:66-9.
17. Shridevi S. Study of prevalence of anemia among pregnant women attending antenatal checkup in a rural teaching hospital in Telangana, India. Int J Reprod Contracept Obstet Gynecol 2018;7:2612-6.
18. Nigar A, Ahmad A. Prevalence of anemia in pregnancy at booking: A retrospective study at a tertiary care centre in Lucknow India. Int J Reprod Contracept Obstet Gynecol 2020;9:4585-9.
19. Tulu BD, Atomssa EM, Mengist HM. Determinants of anemia among pregnant women attending antenatal care in Horo Guduru Wollega Zone, West Ethiopia: Unmatched casecontrol study. PLoS One 2019;14:e0224514.
20. Ali MM, Ngowi AF, Gibore NS. Prevalence and obstetric factors associated with anaemia among pregnant women, attending antenatal care in Unguja Island, Tanzania. Int J Community Med Public Health 2019;6:950-7.
21. Sumitra M, Kumari CT. Determinants of anemia among pregnant women attending in a tertiary level hospital, Kathmandu. Med PHoenix 2017;2:24-33.
22. Okube OT, Mirie W, Odhiambo E, Sabina W, Habtu M. Prevalence and factors associated with anaemia among pregnant women attending antenatal clinic in the second and third trimesters at Pumwani maternity hospital, Kenya. Open J Obstet Gynecol 2016;6:16-27.
23. Jin L, Yeung LF, Cogswell ME, Ye R, Berry RJ, Liu J, *et al*. Prevalence of anaemia among pregnant women in South-East China. Public Health Nutr 2010;13:1511-8.
24. Thangaleela T, Vijayalakshmi P. Prevalence of anemia in pregnancy. Indian J Nutr Diet 1994;31:26-9.
25. Chowdhury HA, Ahmed KR, Jebunessa F, Akter J, Hossain S, Shahjahan M. Factors associated with maternal anaemia among pregnant women in Dhaka city. BMC Women Health 2015;15:77.
26. Singh R, Singh AK, Gupta SC, Singh HK. Correlates of anaemia in pregnant women. Indian J Community Health 2015;27:351-5.
27. Obse N, Mossie A, Gobena T. Magnitude of anaemia and associated risk factors among pregnant women attending antenatal care in Shalla Woreda, West Arsi Zone, Oromia Region, Ethiopia. Ethiop J Health Sci 2013;23:165-73.
28. Bekele A, Tilahun M, Mekuria A. Prevalence of anemia and its associated factors among pregnant women attending antenatal care in health institutions of Arba Minch town, Gamo Gofa Zone, Ethiopia: A Cross-sectional study. Anemia 2016;2016:1073192.
29. Turner S, Seybold D, William D, Celestine C. Incidence of anemia among obstetric patients in an Appalachian teaching clinic. Mil Med 2012;177:1212-6.
30. Abu-Ouf NM, Jan MM. The impact of maternal iron deficiency and iron deficiency anemia on child's health. Saudi Med J. 2015;36:146-9.
31. Sangeetha VB, Pushpalatha S. Severe maternal anemia and neonatal outcome. Sch J Appl Med Sci 2014;2:303-9.
32. Marahatta R. Study of anaemia in pregnancy and its outcome in Nepal medical college teaching hospital, Kathmandu, Nepal. Nepal Med Coll J 2007;9:270-4.
33. Ivan EA, Mangaiarkkarasi A. Evaluation of anaemia in booked antenatal mothers during the last trimester. J Clin Diagn Res 2013;7:2487-90.
34. Singh R, Chauhan R, Nandan D, Singh H, Gupata SC, Bhatnagar M. Morbidity profile of women during pregnancy: A hospital record based study in Western UP. IJCH 2012;24:342-6.
35. Suryanarayana R, Chandrappa M, Santhuram AN, Prathima S, Sheela SR. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. J Family Med Prim Care 2017;6:739-43.
36. Iyengar K. Early postpartum maternal morbidity among rural women of Rajasthan, India: A communitybased study. J Health Popul Nutr 2012;30:21325.
37. Kaul I, Sunil I, Gupta A. Maternal haemoglobin and perinatal outcome in a tertiary care hospital in Jammu city, India. Int J Reprod Contracept Obstet

Gynecol 2017;6:5060.
38. Batar A, Salvi A, Saini L, Agarwal S, Rajoria L, Mital P. Maternal and perinatal outcome of pregnancy with severe anaemia. Int J Biomed Adv Res 2015;6:611-6.
39. Yadav P. Severe anemia and adverse pregnancy outcome in a tertiary care hospital in North India. Int J Reprod Contracept Obstet Gynecol 2018;7:483-6.
40. Hinderaker SG, Oslen BE, Bergsjo P, Lie RT, Gasheka P, Kvåle G, *et al*. Anemia in pregnancy in the highlands of Tanzania. Acta Obstet Gynecol Scand 2001;80:18-26.
41. Singla PN, Tyagi M, Kumar A, Dash D, Shankar R. Fetal growth in maternal anaemia. J Trop Pediatr 1997;43:89-92.
42. Kozuki N, Lee AC, Katz J. Child Health Epidemiology Reference Group. Moderate to severe, but not mild, maternal anemia is associated with increased risk of small-for-gestational-age outcomes. J Nutr 2012;142:358-62.
43. Singh R, Gupta M, Saini V. Women with severe anemia in labor: Adverse clinical outcomes. Int J Innov Res Med Sci 2019;4:33-9.

How to cite this article: Tabasum H, Gull H, Rather S. Feto-maternal Outcome in 3rd Trimester Pregnant Patients with Severe Anaemia and Associated Risk Factors. Int J Sci Stud 2023;10(10):52-57.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Iron Sucrose versus Ferric Carboxymaltose in Pregnancy with Anemia

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Abstract

Introduction: Iron deficiency anemia is the most common nutritional deficiency. Approximately 1.6 billion patients are affected from iron deficiency anemia. The prevalence of anemia among pregnant women in developed and developing countries was 14% and 51%, respectively. Iron prophylaxis is recommended as first-line treatment for pregnant women. Intravenous iron is the best iron supplementation for replenishing the iron and the iron sucrose was the most common use preparation used to treat iron deficiency anemia, whereas, the ferric carboxymaltose (FCM) is the latest iron preparation used at high doses and also allows rapid administration.

Materials and Methods: This prospective and comparative study was conducted in the department of obstetrics and gynecology over the period of 1 year to compare the efficacy of iron sucrose and FCM in 100 pregnant women with anemia.

Results: It was found that in the present study that most of the pregnant women had moderate anemia (54% in Group-A and 57% in Group-B). A significant increase in the ferritin level in both the groups (P = 0.05) was observed after the therapy. The ferritin mean difference before and after 3 weeks of therapy in Group-A was 49.75 ± 6.02 and before and after 6 weeks was 71.72 ± 10.68. Similarly, ferritin mean difference before and after 3 weeks of therapy in Group-B was 73.47 ± 7.86 and before and after 6 weeks was 88.21 ± 4.19.

Conclusion: The study concluded that the use of ferric carboxy maltose to treat iron deficiency anemia in pregnant women was more effective and safer than iron sucrose.

Key words: Anaemia, Ferritin level, Haemoglobin level, Iron deficiency, Iron sucrose and Ferric carboxy maltose, Pregnancy

INTRODUCTION

Anemia is the condition in which number of red blood cells or the hemoglobin concentration decreases than normal (<12.0 g/dl in women and <13.0 g/dl in men). Anemia is a serious public health problem globally which affects mainly young children and pregnant women. According to the World Health Organization data, 42% of children <5 years of age and 40% of pregnant women are affected with anemia globally.[1] Iron deficiency anemia is the most common nutritional deficiency. Approximately 1.6 billion patients are affected from iron deficiency anemia.[2] The prevalence of anemia among pregnant in developed and developing countries was 14% and 51%, respectively.[3]

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

It was observed that the half of the global maternal mortality is due to anemia in South Asian countries and India.[4] The physiological need for iron increases from 0.8 mg/day in the first trimester to 7.5 mg/day in the third trimester during pregnancy which results in anemia. Anemia leads to maternal and fetal complications.[5] Iron prophylaxis is recommended as first-line treatment for pregnant women. Intravenous iron administration is recommended for pregnant women with iron deficiency anemia (Hb <9.0 g/dl).[6-8] Intravenous iron is the best iron supplementation for replenishing the iron and the iron sucrose was the most common use preparation used to treat iron deficiency anemia, whereas, the ferric carboxymaltose (FCM) is the latest iron preparation used at high doses and also allows rapid administration.[9]

Thus, the present study was undertaken to compare the efficacy of iron sucrose and FCM in pregnancy with anemia.

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MATERIALS AND METHODS

This prospective and comparative study was conducted in the department of obstetrics and gynecology over the period of 1 year after obtaining ethical permission from the Institutional Ethical Committee. A total of 100 patients included in the study after taking informed consent from them.

Inclusion Criteria

The following criteria were included in the study:

- 27–30 years of age patients
- Pregnant females
- Hb level between 7 and 10 g
- Gestational age between 12 and 36 weeks.

Exclusion Criteria

The following criteria were excluded from the study:

- Patients with any comorbidity
- Anemia caused by other than iron deficiency
- Patients with a history of blood transfusion and erythropoietin treatment during pregnancy
- Hypersensitivity to iron preparation
- Bleeding tendencies
- History of iron overload disorder.

A total of 100 pregnant women were involved in the study and categorized in two groups, that is, Group-A and Group-B. Group-A consists of 50 patients who were treated with iron sucrose and Group-B consists of 50 patients who were treated with FCM. During administration of both iron preparations, the patients were observed for any side effects or anaphylactic reactions. A detailed history (medical, family, and obstetrical) was collected and physical examination was done. Hemoglobin testing and serum ferritin testing were done for all. All the findings were compared between two groups. All the patients were followed up at 3rd and 6th weeks after completion of iron replenishing therapy. Data were collected with the help of a record sheet which contains the test values and other details of all the patients. Data were tabulated, organized, analyzed, and interpreted in both descriptive and inferential statistics, that is, frequency and percentage distribution, using Statistical Package for the Social Science software version 17.0.

OBSERVATIONS AND RESULTS

Table 1 showed that in Group-A, majority (36%) of the women were of 28 years of age followed by 27 years (28%), 29 years (22 %), and 30 years (7%). In Group-B, majority (34%) women were of 27 years of age followed by 29 years (28%), 28 years (20%), and 30 years (18%).

Table 2 showed that majority of the study participants in Group-A were from rural area (54%) and in Group-B study participants were from urban area (52%).

Figure 1 showed the educational status of patients, it was observed that depicts that majority of the participants studied till secondary class (34.89%) followed by middle (28.72%), primary (18.27%), illiterate (7.74%), graduate (6.09%), and postgraduate (4.26%).

Figure 2 depicted the socioeconomic status. Majority of the study participants were from middle class (48.11%), followed by low class (37.26%) and high class (14.62%).

Table 1: Age

Age	Group-A		Group-B	
	No.	%	No.	%
27	14	28	17	34
28	18	36	10	20
29	11	22	14	28
30	7	14	9	18

Table 2: Residence

Area	Group-A		Group–B	
	No.	%	No.	%
Urban	23	46	26	52
Rural	27	54	24	48

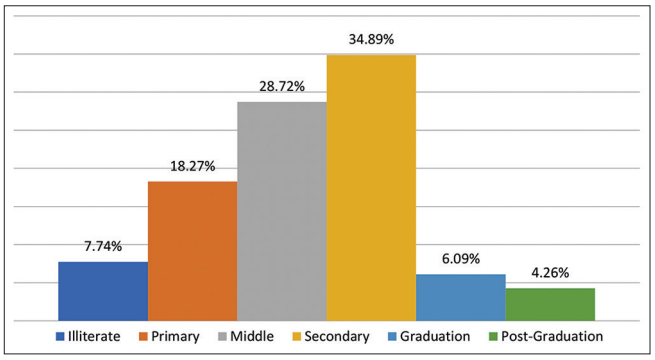

Figure 1: Educational status

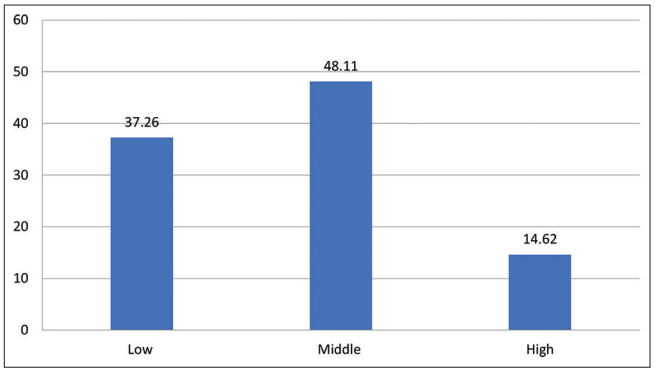

Figure 2: Socioeconomic status

Table 3 reported that the majority of the patients in Group-A and in Group-B had gestational age 20–26 and 27–32 weeks.

It was found that majority of pregnant women in Group-A and in Group-B were in multigravida (76% and 88%, respectively) as depicted in Table 4.

It was reported that 70% of pregnant women in Group-A had previous history of childbirth and in Group-B, 78% of pregnant women had previous history of childbirth as shown in Table 5.

Figure 3 showed that the majority of the pregnant women had moderate anemia in both groups.

Table 6 showed the significant increase in the Hb level in both the groups ($P = 0.05$). The Hb mean difference between before and after 3 weeks of therapy in Group-A was 1.16 ± 0.16 and before and after 6 weeks was 3.63 ± 0.63. Similarly, Hb mean difference between before and after 3 weeks of therapy in Group-B was 1.57 ± 0.62 and before and after 6 weeks was 3.53 ± 0.13.

Table 7 presented the significant increase in the ferritin level in both the groups ($P = 0.05$). The ferritin mean difference between before and after 3 weeks of therapy in Group-A was 49.75 ± 6.02 and before and after 6 weeks was 71.72 ± 10.68. Similarly, ferritin mean difference between before and after 3 weeks of therapy in Group-B was 73.47 ± 7.86 and before and after 6 weeks was 88.21 ± 4.19.

Figure 4 showed the adverse effects of iron sucrose and ferric carboxy maltose administration. It was found that in Group-A, 48% of pregnant women does not have any adverse effects and in Group-B, 68% of pregnant women does not have any adverse effect.

Table 3: Gestational age

Gestational age (weeks)	Group-A		Group-B	
	No.	%	No.	%
<20	8	16	13	26
20–26	18	36	16	32
27–32	20	40	16	32
>32	4	8	5	10

Table 4: Gravida

Gravida	Group-A		Group-B	
	No.	%	No.	%
Primi	12	24	6	12
Multi	38	76	44	88

Table 5: Parity

Parity	Group-A		Group-B	
	No.	%	No.	%
Nil	15	30	11	22
One	24	48	28	56
Two	8	16	10	20
>Two	3	6	1	2

Table 6: Hb Level (g)

Time	Group-A	Group-B
Before therapy	7.35±0.98	7.78±0.74
3 weeks after therapy	8.51±0.82	9.35±0.12
6 weeks after therapy	10.98±0.35	11.31±0.61

Table 7: Ferritin level

Time	Group-A	Group-B
Before therapy	17.40±1.87	15.68±1.48
3 weeks after therapy	67.15±7.89	89.15±9.34
6 weeks after therapy	89.12±12.55	103.89±5.67

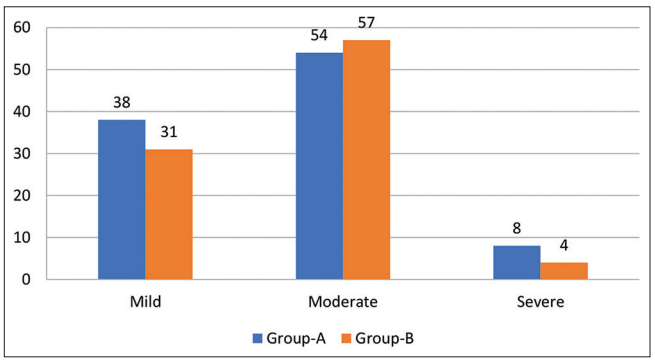

Figure 3: Severity of anemia

DISCUSSION

In the present study, among Group-A, majority (36%) of the women were of 28 years and among Group-B, majority (34%) women were of 27 years of age. Most of the study participants in Group-A were from rural area (54%) and in Group-B, study participants were from urban area (52%). Majority of the participants studied till secondary class (34.89%) and most of the study participants were from middle class (48.11%). The findings of present study are correlated with the study conducted by Khan and Gupta found that most of the pregnant women were in 25–29 years of age.[10]

It was reported that the majority of the patients in Group-A and in Group-B had gestational age 20–26 and 27–32 weeks. In Group-A and in Group-B were in multigravida (76% and 88%, respectively). It was reported that 70% of pregnant women in Group-A had

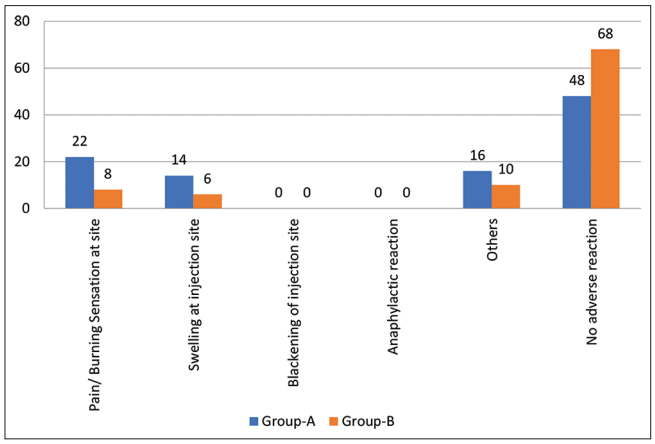

Figure 4: Adverse effects

previous history of childbirth and in Group-B, 78% of pregnant women had previous history of childbirth. In a similar study conducted by Khan and Gupta found that in both groups, majority of the pregnant women were multigravida.[10] Similarly, Khatun and Biswas observed that majority of the women were in 26–30 weeks of gestational age and had history of previous childbirth.[11]

In the present study, most of the pregnant women had moderate anemia (54% in Group-A and 57% in Group-B). A significant increase in the Hb level in both the groups ($P = 0.05$) were reported. The Hb mean difference between before and after 3 weeks of therapy in Group-A was 1.16 ± 0.16 and before and after 6 weeks was 3.63 ± 0.63. Similarly, Hb mean difference between before and after 3 weeks of therapy in Group-B was 1.57 ± 0.62 and before and after 6 weeks was 3.53 ± 0.13. Similarly, Agarwal and Parikh, found a significant increase in both groups with iron deficiency anemia and also concluded that ferric carboxy maltose is an efficient and better alternative to iron sucrose in treating iron deficiency anemia of pregnancy.[2]

A significant increase in the ferritin level in both the groups ($P = 0.05$) was observed. The ferritin mean difference between before and after 3 weeks of therapy in Group-A was 49.75 ± 6.02 and before and after 6 weeks was 71.72 ± 10.68. Similarly, ferritin mean difference between before and after 3 weeks of therapy in Group-B was 73.47 ± 7.86 and before and after 6 weeks was 88.21 ± 4.19. The findings are correlated with the study conducted by Khan and Gupta, Khatun and Biswas found a significant increase in ferritin level.[10,11]

It was found that in Group-A, 48% of pregnant women does not have any adverse effects and in Group-B, 68% of pregnant women does not have any adverse effect. Result of the present study is consistent with the study conducted by Saini *et al.*,[12] reported that group treated with iron sucrose 13.33% of pregnant women reported adverse effect and group treated with ferric carboxy maltose 3.33% of pregnant women reported adverse effect.

CONCLUSION

The present study concluded that the Hb level was improved after administration of iron sucrose and ferric carboxy maltose in pregnant women. It was observed that the use of ferric carboxy maltose to treat iron deficiency anemia in pregnant women was more effective and safe than iron sucrose.

REFERENCES

1. World Health Organization. Anaemia. Geneva: World Health Organization. Available from: https://www.who.int/health-topics/anaemia [Last accessed on 2022 Oct 25].
2. Agarwal S, Parikh A. Intravenous ferric carboxymaltose versus iron sucrose in iron deficiency anemia of pregnancy. Indian J Obstet Gynaecol Res 2022;9:10-4.
3. FOGSI General Clinical Practice Recommendations. Management of Iron Deficiency Anaemia in Pregnancy. 2016. Available from: https://www.fogsi.org/wpcontent/uploads/2016/05/The-evidence-base_IDAPregnancy-24-May-2016-Clean.pdf [Last accessed on 2022 Oct 25].
4. Ezatti M, Lopez AD, Rodgers A, Hoorn SV, Murray CJ, Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. Lancet 2002;360:1347-60.
5. Milman N, Bergholt T, Byg KE, Eriksen L, Graudal N. Iron status and iron balance during pregnancy. A critical reappraisal of iron supplementation. Acta Obstet Gynecol Scand 1999;78:749-57.
6. Breymann C, Honegger C, Holzgreve W, Surbek D. Diagnosis and treatment of iron-deficiency anemia during pregnancy and postpartum. Arch Gynecol Obstet 2010;282:577-80.
7. Milman N. Prepartum anaemia: Prevention and treatment. Ann Hematol 2008;87:949-59.
8. Beris P, Maniatis A. Guidelines on intravenous iron supplementation in surgery and obstetrics/gynecology. Transfus Altern Transfus Med 2007;9(Suppl 1):29-30.
9. Geisser P. The pharmacology and safety profile of ferric carboxymaltose (Ferinject ®): Structure/reactivity relationships of iron preparations. Portuguese J Nephrol Hypertens 2009;23:11-21.
10. Khan S, Gupta S. A comparative study of injection ferric carboxymaltose and iron sucrose in anaemia complicating pregnancy. Int J Contemp Med Res 2019;6:H6-9.
11. Khatun F, Biswas C. Comparative study of intravenous iron sucrose versus intravenous ferric carboxymaltose in the management of iron deficiency anaemia in pregnancy. Int J Reprod Contracept Obstet Gynecol 2022;11:505-12.
12. Saini K, Singh R, Agrawal D. Comparing the safety between ferrous carboxymaltose and iron sucrose therapy in iron deficiency anemia during pregnancy in obstetrics and gynecology ward at tertiary care hospital, Jaipur. Indian J Pharm Pract 2019;12:167-70.

How to cite this article: Beigh M, Gul H, Tabasum H. Iron Sucrose versus Ferric Carboxymaltose in Pregnancy with Anemia. Int J Sci Stud 2023;10(10):58-61.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Assessment of Depressive Disorder in Patients with Chronic Kidney Disease at a Tertiary Care Hospital

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Abstract

Background: Depressive disorders have a frequent association with chronic diseases. Chronic kidney disease (CKD) takes a toll on quality of life due to frequent hospital visits, interventions, and disease-related morbidity. Depression in CKD has been largely underreported. This study aims to extrapolate association of depression in patients of CKD.

Aim: The aim of this study was to assess the prevalence of depression in CKD patients.

Materials and Methods: This was a prospective, cross-sectional, and analytical study carried out in patients with CKD.

Results: Significant association (s) was seen between depression and rural background, duration of illness, primary diagnosis of diabetes mellitus, and advanced stages of CKD. Female gender had comparatively a higher association, but that was not statistically significant.

Conclusion: This study reflected a high incidence of depression symptoms among dialysis patients (more than two thirds the participants) with some patients having major depressive symptoms that necessitate urgent treatment on priority basis. There were significant associations between depression and rural background, duration of illness, primary diagnosis of diabetes mellitus, and advanced stage of CKD. Assessment of depression status should become a routine practice in patients with CKD and undergoing dialysis. Those diagnosed with depression should receive intervention in the form of psychopharmacological and psychosocial (whatever required) as early as possible.

Key words: Disease, Kidney, Patients

INTRODUCTION

The increasing incidence and prevalence of chronic kidney disease (CKD) represents a global public health problem. Depression is a very common,[1-3] mostly under-recognized and often undertreated[1,4-6] problem in patients with end-stage renal disease (ESRD) on long-term dialysis therapy. The prevalence of depression ranges from 2% to 11% in the general population.[7] However, in patients with CKD, the data for prevalence are contradictory, ranging from 0 to 100% among different studies.[8,9] Recent studies have shown prevalence rates of depression of 20–30% in dialysis patients.[1,2,10] The burden of CKD has escalated during the past few years to become an urgent matter of public health priority, resulting in a 106% increase in the prevalent ESRD population.[11,12]

CKD can be associated with a depressive symptom that may necessitate the need for intervention and support from a psychologist/psychiatrist especially during dialysis.[13] It was estimated that around 12–52% of patients on hemodialysis experience anxiety, depression, and a decrease in quality of life during dialysis, and some cases may lead to an increase in mortality.[14] This can be attributed to the fact dialysis restricts physical activity, certain foods, ability to work, interaction with family, and the ability to work.[15-17]

This study was a cross-sectional study in patients with CKD (stage 4 or stage 5) with the primary diagnosis of

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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hypertension/diabetes mellitus. The objective of the present study was to evaluate depressive symptoms in patients with stages four/five CKD on dialysis to identify a possible association between depression and CKD. Other factors such as duration of illness, sociodemographic, and association of the primary diagnosis with depression were also evaluated.

Aims and Objectives

The aims of this study were to analyze the "Prevalence of Major Depressive Disorder in patients with CKD attending Dialysis unit in a Tertiary Care Hospital."

MATERIALS AND METHODS

It was a prospective, non-randomized, and cross-sectional study conducted on a total of 50 patients including both genders, with underlying CKD attending dialysis unit of GMC Kathua. Depression was assessed using "Hamilton Rating Scale."

Cohort included both indoor as well as outdoor patients. Two departments were participants including Internal Medicine and Psychiatry departments.

Inclusion Criteria

The following criteria were included in the study:

Any patient with impairment of

1. Kidney functions more than 3 months
2. Patients with ESRD before and after dialysis
3. Nephrotic syndrome
4. Systemic lupus erythematosus.
5. Renal tubular acidosis.
6. Obstructive uropathy with impairment of kidney function
7. Persistent microscopic hematuria.

Exclusion Criteria

The following criteria were excluded from the study:

1. Anatomical brain lesion
2. Psychiatric disease before onset of renal disease
3. Family history of psychiatric disease.

The purpose of study was explained to all participants and written informed consent was taken from them.

RESULTS

Total sample size of study is 50 (25 males and 25 females) patients with CKD. Out of 50 patients, 31 were residing from rural area (14 males and 17 females) and 19 were from urban area (11 males and eight females) with the primary diagnosis of hypertension in 21 patients (13 males and eight females) and diabetes mellitus in 29 patients (12 males and 17 females). Twenty-nine patients (15 males and 14 females) were in stage 4 of CKD and 21 (ten males and 11 females) were in stage 5 of CKD with duration of illness 1 year in seven patients, 2 years in 13 patients, 3 years in 16 patients, and 4 years in 14 patients.

Out of 25 males (five were having mild, seven moderate, and three severe depression) 25 females (seven were having mild, seven moderate, and seven were having severe depression). Although more number of females were showing symptoms of depression, still result was not statistically significant with $P = 0.11$. Nineteen patients were living in urban area (five with mild, four with moderate, and two with severe depression) and 31 in rural area (seven with mild, ten with moderate, and eight with severe depression). Result was statistically significant with $P = 0.05$ indicating that patients living in rural area were more prone to depression than patients living in urban area. Twenty-one patients with the primary diagnosis of hypertension (four with mild, six with moderate, and one with severe depression) and 29 patients with the primary diagnosis of diabetes mellitus (eight with mild, eight with moderate, and nine with severe depression). Result was statistically significant with $P = 0.01$ indicating that patient with diabetes was more prone to depression that patients with hypertension. Twenty-nine patients with stage 4 of CKD (nine with mild, eight with moderate, and one with severe depression) and 21 patients with stage 5 of CKD (three with mild, six with moderate, and nine with severe depression). Result was statistically significant with $P = 0.0005$ indicating that patients in stage 5 of CKD were more prone to depression. Twenty patients with DOI ≤2 years (six with mild, three with moderate, and none with severe depression) and 30 with DOI more than 2 years (six with mild, 11 with moderate, and 10 with severe depression). Result was statistically significant with $P = 0.00006$ indicating that patients with more duration of illness were more prone to depression.

DISCUSSION

Out of 50 patients, 36 showed symptoms of depression on HAM-D scale. Although more females showed symptoms of depression than males, the difference was not statistically significant. The prevalence of depression was higher among women, a finding reflecting a trend normally seen in general population.[7] Patients living in a joint family, who generally have greater social support (living in rural areas) than those living in a nuclear family, were found to be more depressed. However, we did not analyze in detail the social support as it was perceived by the patients. Some studies

Table 1 : Clinicodemographic profile

Variable	Male	Female	Total
Sex	25	25	50
Residence			
Rural	14	17	31
Urban	11	8	19
Diagnosis			
Hypertension	13	8	21
Diabetes	12	17	29
Stage			
4	15	14	29
5	10	11	21
DOI (years)			
1	5	2	7
2	6	7	13
3	7	9	16
4	7	7	14

Table 2: HAM D scoring

Variable	>9	10–13	14–17	>17	Total	Chi square *P-value
Gender	>9	10–13	14–17	>17	Total	
Male						2.43
Female	10	5	7	3	25	*0.11
Total	4	7	7	7	25	
Residence	14	12	14	10	50	
Urban						3.58
Rural	8	5	4	2	19	*0.05
Total	6	7	10	8	31	
Diagnosis	14	12	14	10	50	
Hypertension						5.9
Diabetes	10	4	6	1	21	*0.01
Total	4	8	8	9	29	
Stage	14	12	14	10	50	
4						12.08
5	11	9	8	1	29	*0.0005
Total	3	3	6	9	21	
Duration of illness (years)						
≤2	14	12	14	10	50	16.07
≥2	11	6	3	0	20	*0.00006
Total	3	6	11	10	30	

have emphasized the importance of social support during the course of CKD, more specifically for patients with CKD on dialysis, and studies focusing on this influence during the initial stages of CKD are scarce.[18,19]

The present study indicates that the prevalence of depression was found more in patients living in rural areas, indicating poor information regarding CKD and treatment seeking behavior in them.

The present study found that patients with DM were more prone to depression and result was statistically significant with $P = 0.01$. Golden *et al.*[20] recently reported a strong association between baseline depressive symptoms and incident type 2 DM and also found that even treated patients with the primary diagnosis of DM had a greater chance of developing more depressive symptoms. Explanations for this association could be long-term psychological stress associated with diabetes management or the presence of such diabetic complications as kidney or cardiovascular disease.[21-25] Whether the prevalence of depression is high in patients with CKD mostly due to the high percentage of patients with CKD with diabetes or whether patients with diabetes who are depressed develop progressive nephropathy due to non-compliance is not a question that can be answered easily in cross-sectional studies.

The present study indicates high prevalence of depression in patients with advanced stage of CKD with a statistically significant result. Diabetes is one of the important causes of ESRD[26] and was found to be associated with depression in dialysis patients.

The present study indicates significant relation between increased duration of illness with depression with $P = 0.00006$. This result is not similar to the result of the previous study conducted in Connecticut State in the USA.[27] The possible reasons for higher depression scores in patients with more duration of illness in the present study can be attributed to delay in treatment seeking behavior commonly seen in patients from rural areas, even after confirmation of having CKD. This can be attributed mostly to trust issues of persons in rural area with modern medicine and more trust on local faith healers and non- allopathic practitioners [Tables 1 and 2].

CONCLUSION

This study reflected a high incidence of depression symptoms among dialysis patients (more than two-thirds the participants) with some patients having major depressive symptoms that necessitate urgent treatment on priority basis. There were significant associations between depression and rural background, duration of illness, primary diagnosis of diabetes mellitus, and advanced stage of CKD. Assessment of depression status should become a routine practice in patients with CKD and undergoing dialysis. Those diagnosed with depression should receive intervention in the form of psychopharmacological and psychosocial (whatever required) as early as possible.

REFERENCES

1. Hedayati SS, Bosworth HB, Kuchibhatla M, Kimmel PL, Szczech LA. The predictive value of self-report scales compared with physician diagnosis of depression in hemodialysis patients. Kidney Int 2006;69:1662-8.
2. Watnick S, Wang PL, Demadura T, Ganzini L. Validation of 2 depression screening tools in dialysis patients. Am J Kidney Dis 2005;46:919-24.
3. Craven JL, Rodin GM, Littlefield C. The BDI as a screening device for major depression in renal dialysis patients. Int J Psychiatry Med 1988;18:365-74.
4. Watnick S, Kirwin P, Mahnensmith R, Concato J. The prevalence and

treatment of depression among patients starting dialysis. Am J Kidney Dis 2003;41:105-10.
5. Lopes AA, Albert JM, Young EW, Satayathum S, Pisoni RL, Andreucci VE, *et al*. Screening for depression in hemodialysis patients: Associations with diagnosis, treatment, and outcomes in the DOPPS. Kidney Int 2004;66:2047-53.
6. Cohen SD, Norris L, Acquaviva K, Peterson RA, Kimmel PL. Screening, diagnosis, and treatment of depression in patients with end-stage renal disease. Clin J Am Soc Nephrol 2007;2:1332-42.
7. Fleck MP, Lafer B, Sougey EG, Del Porto JA, Brasil MA, Juruena MF, *et al*. Guidelines of the Brazilian Medical Association for the treatment of depression (complete version). Brazilian J Psychiatr 2003;25:114-22.
8. Smith MD, Barry AH, Robson AM. Diagnosis of depression in patients with end-stage renal disease: Comparative analysis. Am J Med 1985;79:160-6.
9. Kimmel PL. Psychosocial factors in dialysis patients. Kidney Int 2001;59:1599-613.
10. Lopes AA, Bragg J, Young E, Goodkin D, Mapes D, Combe C, *et al*. Depression as a predictor of mortality and hospitalization among hemodialysis patients in the United States and Europe. Kidney Int 2002;62:199-207.
11. US Renal Data System. USRDS 2006 Annual Report. Bethesda, MD: The National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2006.
12. National Institute of Diabetes and Digestive and Kidney Diseases. Healthy People 2010: Chronic Kidney Disease. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2000.
13. Junior GB, Barbosa AM, Sliva GB, Saliva LN, Lima GR, Saliva TG, *et al*. Depressive symptoms in chronic kidney disease: A comparison between patients on dialysis versus conservative treatment. Nefrollatinoam 2017;14:153-9.
14. Kennedy SH, Craven JL, Rodin GM. Major depression in renal dialysis patients: An open trial of antidepressant therapy. J Clin Psychiatr 1989;50:60-3.
15. Lux V, Aggen SH, Kendler KS. The DSMIV definition of severity of major depression: Interrelationship and validity. Psychol Med 2010;40:1691-701.
16. Farrokhi F, Abedi N, Beyene J, Kurdyak P, Jassal SV. Association between depression and mortality in patients receiving longterm dialysis: A systematic review and metaanalysis. Am J Kidney Dis 2014;63:623-35.
17. Li YN, Shapiro B, Kim JC, Zhang M, Porszasz J, Bross R, *et al.* Association between quality of life and anxiety, depression, physical activity and physical performance in maintenance hemodialysis patients. Chronic Dis Transl Med 2016;2:110-9.
18. Christensen AJ, Smith TW, Turner CW, Holman JM Jr., Gregory MC, Rich MA. Family support physical impairment and adherence in hemodialysis: An investigation of main and buffering effects. J Behav Med 1992;15:313-25.
19. Christensen AJ, Wiebe JS, Smith TW, Turner CW. Predictors of survival among hemodialysis patients: Effect of perceived family support. Health Psychol 1994;13:521-5.
20. Golden SH, Lazo M, Carnethon M, Bertoni AG, Schreiner PJ, Roux AV, *et al*. Examining a bidirectional association between depressive symptoms and diabetes. JAMA 2008;299:27519.
21. Talbot F, Nouwen A. A review of the relationship between depression and diabetes in adults: Is there a link? Diabetes Care 2000;23:1556-62.
22. Watkins LL, Schneiderman N, Blumenthal JA, Sheps DS, Catellier D, Taylor CB, *et al*. Cognitive and somatic symptoms of depression are associated with medical co-morbidity in patients after acute myocardial infarction. Am Heart J 2003;146:48-54.
23. Robbins J, Hirsch C, Whitmer R, Cauley J, Harris T. The association of bone mineral density and depression in an older population. J Am Geriatr Soc 2001;49:732-6.
24. Ferketich AK, Schwartzbaum JA, Frid DJ, Moeschberger ML. Depression as an antecedent to heart disease among women and men in the NHANES I study. Arch Intern Med 2000;160:1261-8.
25. Jonas BS, Mussolino ME. Symptoms of depression as a prospective risk factor for stroke. Psychosom Med 2000;62:463-71.
26. Foran E, Hannigan A, Glynn L. Prevalence of depression in patients with Type 2 diabetes mellitus in Irish primary care and the impact of depression on the control of diabetes. Irish J Med Sci 2015;184:319-22.
27. Dziubek W, Kowalska J, Kusztal M, Rogowski L, Golebiowski T, Nikifur M, *et al*. The level of anxiety and depression in dialysis patients undertaking regular physical exercise trainingA preliminary study. Kidney Blood Press Res 2016;41:86-98.

How to cite this article: How to cite this article: Mitla V, Kouser S, Menia A, Shivesh, Mustafa SA. Assessment of Depressive Disorder in Patients with Chronic Kidney Disease at a Tertiary Care Hospital. Int J Sci Stud 2023;10(10)::62-65.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Predictive Ability of Serum Uric Acid Levels in Assessing the Severity of Chronic Liver Disease

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Abstract

Background: Elevated serum uric acid levels are known to be associated with the progression of liver disease. However there is a paucity of literature in respect to its predictive value and its cut off scores in the current study setting. Hence the present study was conducted.

Objectives: The objectives of the study were as follows: (1) To assess the serum uric acid levels with the severity of chronic liver disease, (2) to determine the predictive ability of the serum uric acid levels in predicting the severity of chronic liver disease, and (3) to establish the cutoff uric acid levels to predict the severity of chronic liver disease in the present study setting.

Methods: This is a cross-sectional study conducted among 100 study subjects aged ≥18 years, with chronic liver disease (CLD) admitted under the Department of General Medicine, Kempegowda Institute of Medical Sciences, Bengaluru, for a period of 1 year. The data were collected, serum uric acid levels were determined, and the severity of CLD was assessed using Child-Turcotte-Pugh (CTP) scoring. Independent *t*-test and one-way ANOVA were used to find the difference in means. Receiver operating characteristic curve and Youden's index were used to assess the predictive ability of serum uric acid in detecting the severity of CLD. $P < 0.05$ was considered statistically significant.

Results: Majority, that is, 48.0% of the study subjects were in the age group of 41–60 years and 79.0% were male. About 57.0% had elevated uric acid levels. The uric acid levels were significantly higher among those with CTP Class C disease (8.74 ± 1.97 mg/dL) compared to Class A and B ($P < 0.05$). Serum uric acid levels showed very good accuracy in predicting severity of CLD (area under the ROC curve [AUC] = 0.86, $P < 0.001$). The cutoff of 7.75 mg/dL levels of uric acid showed highest specificity of 84.0% and a sensitivity of 74.0%.

Conclusion: Elevated serum uric acid levels were found in 57.0% of the study subjects and mean uric acid levels were higher among those with severe chronic liver disease. Serum uric acid levels were very good significant predictor of severity of chronic liver disease and can be used in the assessment of its severity with a specificity of 84%.

Key words: Chronic liver disease, Serum uric acid, Severe disease

INTRODUCTION

Chronic liver disease (CLD) is constituted by the continuous inflammation, destruction, and regeneration of liver parenchyma, leading to fibrosis and cirrhosis. It is associated with progressive deterioration of liver functions. The most common etiologies include alcoholic liver disease, NAFLD associated with metabolic syndrome, chronic viral hepatitis, genetic, autoimmune causes, and other miscellaneous causes.[1] In 2017, there has been an estimated 1.5 Billion cases of chronic liver disease worldwide which include 10.6 Million cases of decompensated cirrhosis.[2] It is one of the common causes of death, mainly in the developing world.[1] It alone contributed to 18.3% of the 2 million global liver disease-related deaths in 2015 and has been significant in India.[3] There are several markers that are used for assessing the severity of injury and uric acid being a product of purine metabolism, it is released following cellular deaths and deterioration of nuclear material, and in tissues, it stimulates inflammation and damages the tissues. Similarly, uric acid is released following cell injury in chronic liver disease, leading to cirrhosis.[4,5] The mechanisms for the inflammation in

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Month of Submission : 11-2022
Month of Peer Review : 12-2022
Month of Acceptance : 12-2022
Month of Publishing : 01-2023

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hyperuricemia include induction of endothelial dysfunction, insulin resistance, oxidative stress, and systemic inflammation.[6] There have been multiple scoring systems available for assessing liver function and the severity of liver injury, namely, Child-Turcotte-Pugh (CTP) score, the model for end-stage liver disease (MELD) score, and the MELD-sodium (MELD-Na) score, however, CTP scoring is commonly used to assess the severity of hepatic dysfunction in patients with cirrhosis.[7]

Literature reports significant elevation of serum uric acid level with the progression of disease and also has been suggested as an alternative marker to predict the severity of chronic liver disease and early detection of hyperuricemia could help in managing the development of liver tissue damage associated with inflammatory disorders.[4,8,9] Serum uric acid was also higher with higher CTP score which is considered an oxidative marker for liver damage.[10] Although there are many studies on this, there are no studies conducted in the present study setting, especially which suggests the cutoff scores to detect the severity. Hence, the present study was conducted to assess the serum uric acid levels with the severity of chronic liver disease, determine the predictive ability of the serum uric acid levels in predicting the severity of chronic liver disease, and also establish the cutoff uric acid levels to predict the severity of chronic liver disease in the present study setting.

METHODOLOGY

This is a cross-sectional study conducted for a period of 1 year from July 2021 to June 2022 on patients diagnosed with chronic liver disease admitted and treated in the Department of General Medicine, Kempegowda Institute of Medical Sciences, Bengaluru.

Considering a prevalence of hyperuricemia (p) as 76.0% according to a previous study by Gupta *et al*.[11], q = 100-p, that is, 24.0%, and with an absolute precision of 10% (d), z value being 1.96 at 95% confidence interval, the total sample size was estimated to be 71 based on the formula, $n = z^2 (pq/d^2)$. Considering a non-response rate of 20.0% of 71, that is, 14.2, a total of 85 were rounded off to 100.

Using a purposive sampling, the study was conducted among the subjects who were aged 18 years and above and was diagnosed as having chronic liver disease were included and the subjects with known infections and patients with a history of recent surgery or trauma, patients having malignancy, pregnant and lactating women, moribund patients, and the subjects who were on allopurinol or thiazides or febuxostat or furosemide and on chemotherapy were excluded from the study.

Ethical clearance was obtained from the Institutional Ethics Committee. After obtaining a written informed consent, the data were collected using a semi-structured questionnaire consisting of different sections on sociodemographic profile, clinical history, and examination. Further, the patients were subjected for blood investigations, namely, liver function tests, and serum uric acid level was determined on the day of admission. The severity of chronic liver disease was assessed using Child-Turcotte-Pugh scoring as follows[4]:

Statistical Analysis

Data were tabulated into Microsoft Excel and statistical analysis was done using SPSS (version 20.0 for Windows; SPSS Inc., Armonk, NY: IBM Corp). The continuous parametric data were expressed in mean and standard deviation and continuous non-parametric data were expressed in median and range. The categorical variables were expressed in proportions. The mean values of serum uric acid levels were compared among the normal and abnormal liver functioning parameters using independent *t*-test. The mean values of serum uric acid levels were compared among the severity of Class A, B, and C of CTP scoring system using one-way ANOVA and Tukey's *post hoc* test. The Pearson correlation analysis was used for eliciting the relationship between quantitative variables such as serum uric acid and CTP scores. The association between categorical variables was assessed using Chi-square or Fisher's exact test. A receiver operating characteristic (ROC) curve was plotted to assess the predictive value of serum uric acid levels and was interpreted based on area under the curve. The sensitivity and specificity were assessed using Youden's index. $P < 0.05$ was considered statistically significant.

RESULTS

In the present study, out of 100 study subjects, majority, that is, 48 (48.0%) study subjects were in the age group of 41–60 years and the mean age was 49.9 ± 12.9 years. Most

Parameter	1 point	2 points	3 points
Total bilirubin (mg/dL)	<2	2–3	>3
Serum albumin (g/L)	>3.5	2.8–3.5	<2.8
INR	<1.7	1.7–2.3	>2.3
Ascites	None	Mild or controlled by diuretics	Moderate to severe (or refractory to diuretics)
Hepatic encephalopathy	None	Grade 1–2	Grade 3–4

Class A=5–6, Class B=7–9, Class C=10–15

of them were male 79 (79.0%) and 50.0% of the study subjects belonged to CTP Class C classification, 27.0% had minimal hepatic encephalopathy, 34.0% had mild ascites, and 57.0% had elevated uric acid levels [Table 1].

The mean values of uric acid and serum albumin were 7.1 ± 2.7 mg/dL and 2.6 ± 0.6 mg/dL, respectively. The median values of serum glutamic oxaloacetic transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), bilirubin, international normalized ratio (INR), and prothrombin time (PT) were 71 IU/L (10–2069), 38 IU/L (0.9–488), 3.3 mg/dL (0.2–31.4) 1.2 (0.9–12.8), and 17.7 in seconds (12.2–187), respectively [Table 2].

Mean uric acid levels were 4.03 ± 2.14 mg/dL, 5.17 ± 2.24 mg/dL, and 8.74 ± 1.97 mg/dL among the subjects having CTP Class A, B, and C, respectively. Based on the severity of chronic liver disease, on applying Tukey's *post hoc* test, it was observed that the uric acid levels were significantly higher in the CTP Class C disease (8.74 ± 1.97 mg/dL) compared to Class A (4.62 ± 2.14 mg/dL) and B (5.91 ± 2.25 mg/dL) (F [2, 97] = 33.08, $P < 0.001$) [Graph 1].

The mean values of uric acid levels were compared among the study subjects with normal and abnormal liver function tests. It was found that mean uric acid levels were significantly ($P < 0.05$) higher among those with abnormal values of SGOT (7.5 ± 2.7), SGPT (7.7 ± 2.7), bilirubin (7.7 ± 2.5), serum albumin (7.3 ± 2.6), and INR (8.0 ± 2.3) compared to those having normal values of SGOT (5.6 ± 2.1), SGPT (6.4 ± 2.5), bilirubin (4.5 ± 1.6), serum albumin (5.4 ± 2.8), and INR (4.9 ± 2.3), respectively. Mean uric acid levels were significantly ($P<0.05$) higher in those with hepatic encephalopathy (8.4 ± 2.1) and ascites (8.1 ± 2.3) compared to those without hepatic encephalopathy (5.2 ± 2.3) and ascites (4.7 ± 1.9), respectively [Table 3].

With increase in uric acid levels, bilirubin, SGOT, and SGPT levels increased and serum albumin decreased but correlation between uric acid and SGOT and SGPT lacked the statistical significance ($P > 0.05$) [Table 4 and Graph 2a-d].

On plotting ROC curve for serum uric acid levels in predicting severity of CLD, area under the curve (AUC) was found to be significant with very good accuracy (AUC = 0.86, $P < 0.001$). The cutoff of 7.75 mg/dL levels of uric acid showed highest specificity of 84.0% and 74.0% sensitivity [Graph 3].

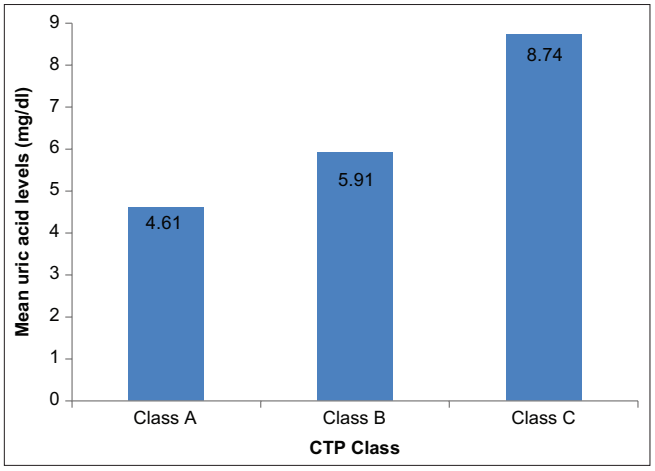
Association of uric acid with sociodemographic and clinical variables was studied. Higher proportion of the study subjects with abnormal uric acid levels were in the age

Table 1: Characteristics of the study population (*n*=100)

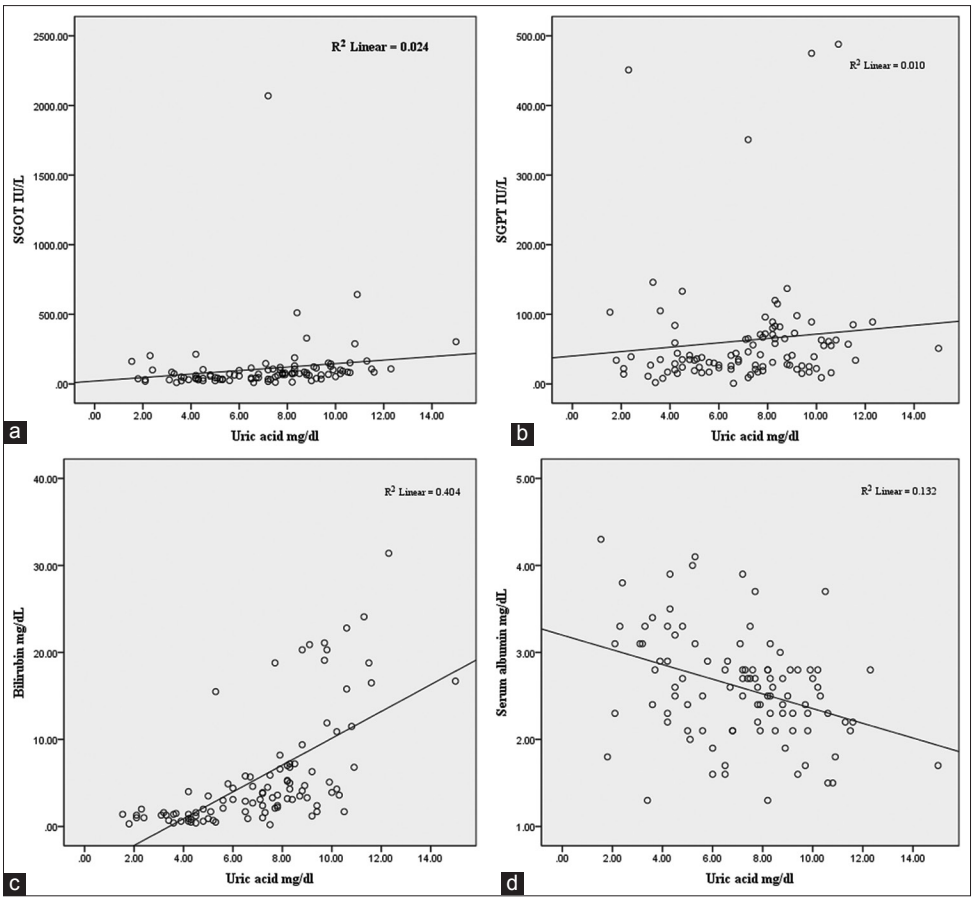
Characteristics of the study participants	
Age in years (mean±SD)	49.9±12.9
21–40	29 (29.0)
41–60	48 (48.0)
61–80	23 (23.0)
Gender (%)	
Males	79 (79.0)
Females	21 (21.0)
CTP Class	
A	18 (18.0)
B	32 (32.0)
C	50 (50.0)
Hepatic encephalopathy	
No	40 (40.0)
Minimal	27 (27.0)
Grade 1	13 (13.0)
Grade 2	15 (15.0)
Grade 3	05 (05.0)
Ascites	
No ascites	29 (29.0)
Mild	34 (34.0)
Moderate	19 (19.0)
Severe	10 (10.0)
Gross	08 (08.0)
Uric acid mg/dL	
<3.1	06 (06.0)
3.1–7	37 (37.0)
>7	57 (57.0)

Table 2: Average values of liver function test parameters

Parameters	Average values
Uric acid mg/dL (mean±SD)	7.1±2.7
SGOT IU/L (median [range])	71 (10–2069)
SGPT IU/L (median [range])	38 (0.9–488)
Bilirubin mg/dL (median [range])	3.3 (0.2–31.4)
Serum albumin mg/dL (mean±SD)	2.6±0.6
INR (median [range])	1.2 (0.9–12.8)
Prothrombin time in seconds (median [range])	17.7 (12.2–187)



Graph 1: Mean uric acid according to CTP class



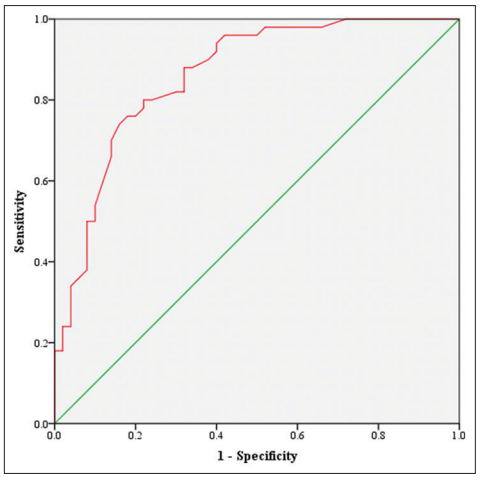
Graph 2: (a-d) Correlation of uric acid with 4A serum glutamic oxaloacetic transaminase, serum glutamate pyruvate transaminase, bilirubin, and serum albumin

Table 3: Comparison of mean uric acid levels with parameters of liver function

Liver function tests	Mean uric acid levels	t-value (95% CI)	*P*-value
SGOT IU/L			
Normal	5.6±2.1	−3.2 (−3.2 to−0.7)	0.002*
Abnormal	7.5±2.7		
SGPT IU/L			
Normal	6.4±2.5	−2.6 (−2.4 to−0.3)	0.01*
Abnormal	7.7±2.7		
Bilirubin mg/dL			
Normal	4.5±1.6	−5.1 (−4.5 to−1.9)	<0.001*
Abnormal	7.7±2.5		
Serum albumin mg/dL			
Normal	5.4±2.8	−2.0 (−3.7 to−0.04)	0.04*
Abnormal	7.3±2.6		
INR			
Normal	4.9±2.3	−6.3 (−4.1 to−2.1)	<0.001*
Abnormal	8.0±2.3		
Hepatic encephalopathy			
Absent	5.2±2.3	−7.3 (−4.1 to−2.4)	<0.001*
Present	8.4±2.1		
Ascites			
Absent	4.7±1.9	−6.9 (−4.4 to−2.4)	<0.001*
Present	8.1±2.3		

SGOT: Serum glutamic oxaloacetic transaminase, SGPT: Serum glutamate pyruvate transaminase, INR: International normalized ratio

group of 21–40 years (69.0%), were female (71.4%) but there was no statistically significant association ($P > 0.05$). Whereas significantly higher proportions of the study subjects with abnormal uric acid levels (100.0%) had



Graph 3: Receiver operating characteristic curve for serum uric acid levels in severity of chronic liver disease (area under the ROC curve = 0.86, *P* < 0.001)

Grade 2, Grade 3 hepatic encephalopathy and severe, gross ascites ($P < 0.05$) [Table 5].

DISCUSSION

Uric acid levels are found to be high in chronic liver diseases of different etiologies, and the levels have been found to correlate directly with the level of tissue damage.[5] We, therefore, undertook this study to determine the uric acid levels in patients of chronic liver disease and also to assess the predictive ability of the serum uric acid levels in predicting severity of chronic liver disease and also establish the cutoff levels.

In the present study, majority, that is, 48 (48.0%) study subjects were in the age group of 41–60 years with a male preponderance of 79 (79.0 %) similar to the study findings of Gupta *et al.*[1] About 50.0% of the study subjects belonged to CTP Class C classification whereas according to Gupta *et al.*[11] and Paul *et al.*,[12] majority of their study subjects belonged to CTP Class B classification.

About 57.0% had elevated uric acid levels and the mean values of uric acid were 7.1 ± 2.7 mg/dL in our study whereas according to Gupta *et al.*, mean uric acid (mg/dL) among the study subjects was 6.69 ± 2.92 and 76% of the subjects reported higher uric acid levels.[11]

This study reported increased uric acid levels with rise in severity of disease with mean uric acid being significantly higher in CTP Class C (8.74 ± 1.97) compared to Class A and B similar to the findings of Gupta *et al.* who also noted that mean uric acid levels were higher in CTP Class C (8.94) compared to Class A (4.03) and Class B (5.17).[11] Prakash *et al.* also noted a significant, positive correlation between uric acid level and CTP score and the finding was in line with Manomenane *et al.*[4]

Table 4: Correlation of uric acid with various parameters

Variables	*r* value	*P* value
SGOT IU/L	0.155	0.124
SGPT IU/L	0.100	0.321
Bilirubin mg/dL	0.635	<0.001*
Serum albumin mg/dL	−0.363	<0.001*

*Statistically significant

Table 5: Association of uric acid levels with various factors

Variables	Uric acid		χ^2–value (*P*-value)
	Normal (*n*=37)	Abnormal (*n*=63)	
Age group in years			
21–40	09 (31.0)	20 (69.0)	0.94 (0.63)
41–60	20 (41.7)	28 (58.3)	
61–80	08 (34.8)	15 (65.2)	
Gender			
Males	31 (39.2)	48 (60.8)	0.81 (0.37)
Females	06 (28.6)	15 (71.4)	
Hepatic encephalopathy¥			
Minimal, Grade 1	12 (30.0)	28 (70.0)	(0.005)*
Grade 2, Grade 3	00 (0.0)	20 (100.0)	
Ascites¥			
Mild, moderate	17 (32.1)	36 (67.9)	(0.004)*
Severe, gross	00 (0.0)	18 (100.0)	

¥ Fisher's exact test

Hepatic encephalopathy and ascites are the components of CTP score along with serum bilirubin, albumin, and INR which are used to assess the severity of chronic liver disease.[4] In this study, it was observed that the mean uric acid levels were significantly ($P < 0.05$) higher in those with hepatic encephalopathy (8.4 ± 2.1 mg/dL) and ascites (8.1 ± 2.3 mg/dL) compared to those without the manifestation and all the study subjects with abnormal uric acid levels (100.0%) had Grade 2, Grade 3 hepatic encephalopathy and severe, gross ascites and this association was statistically significant ($P < 0.05$) indicating higher mean serum uric acid among those with severe disease manifestation. Furthermore, the mean uric acid levels were significantly ($P < 0.05$) higher among those with abnormal values of SGOT (7.5 ± 2.7), SGPT (7.7 ± 2.7), bilirubin (7.7 ± 2.5), serum albumin (7.3 ± 2.6), and INR (8.0 ± 2.3) compared to those having normal values. This is in line with the observations of Gupta *et al.* who concluded that with the increase in uric acid level, that is, 3.1–5, 5–7, and >7 mg/dL, respectively, total bilirubin (mean values: 2.43, 2.86, and 5.21, respectively), SGOT (mean: 52.68, 59.87, and 118.41), and SGPT (mean values: 54.39, 59.96, and 119.81) also increased significantly ($P < 0.05$).[11] Afzali *et al.*

noted that a higher serum uric acid level was associated with a greater probability of elevated serum liver enzymes which are associated with the development of cirrhosis[13] similar to the present study but for the significance in terms of correlation between uric acid levels and SGOT and SGPT. Prakash *et al*., also in his study, observed a significant, positive correlation between uric acid level with total bilirubin and negative correlation with serum albumin similar to the present study findings.[4] Gupta *et al*. in his study noted a significant positive correlation between uric acid and total bilirubin, SGOT, and SGPT.[11] The difference in the findings may be due to the difference in the disease presentation and disease severities among the study subjects in different study settings.

ROC curve for serum uric acid levels showed a good accuracy (AUC = 0.86) in predicting severity of CLD and the cutoff of 7.75 mg/dL levels of uric acid showed highest specificity of 84.0% and a sensitivity of 74.0%. According to Zheng *et al*., the prevalence of fatty liver increased progressively with serum uric acid levels and the AUC for detecting mild fatty liver based on SUA was 0.70 and the AUC for detecting moderate and severe fatty liver based on SUA was 0.78.[14] Wei *et al*., in their study, have found serum uric acid to be correlated positively with NAFLD, and elevated SUA level to be an independent predictor for the incidence of NAFLD and the cutoff levels were found to be ≥288.5 μmol/L, that is, 4.85 mg/dL, that showed a sensitivity of 75.5% and specificity of 46.5% with area under the curve 0.637. The difference in the findings might be due to the fact that it was to predict the incidence of NAFLD in their study and it was to predict the severity of chronic liver disease in ours; hence, the cutoff value is higher in our study.[15] Hejazi *et al*. reported a strong correlation between the uric acid and the development of inflammatory disease, hence, early detection of hyperuricemia can serve as a predictor of inflammation.[9] Singh *et al*. also have concluded serum uric acid levels as an oxidative marker for liver damage.[10] There are not many studies eliciting the cutoff scores to predict the severity of chronic liver disease.

Since it is a cross-sectional study, serum uric acid was measured only once, further studies with larger sample size and follow-up of patients are required to generalize the study findings.

CONCLUSION

Elevated serum uric acid levels were found in 57.0% of the study subjects. Mean uric acid levels were significantly higher with severe manifestation of the disease, that is, CTP Class C disease, abnormal SGOT, SGPT, bilirubin, serum albumin, INR, and presence of Grade 2 and 3 hepatic encephalopathy and severe, gross ascites. Serum uric acid had a very good accuracy in determining the severity of the disease; hence, uric acid can be used as a marker of severity of chronic liver disease with a specificity of 84.0% and a sensitivity of 74.0%.

REFERENCES

1. Sharma A, Nagalli S. Chronic liver disease. In: StatPearls. Treasure Island: StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554597 [Last accessed on 2022 Jul 04].
2. Vento S, Cainelli F. Chronic liver diseases must be reduced worldwide: It is time to act. Lancet Global Health 2022;10:e471-2.
3. Mondal D, Das K, Chowdhury A. Epidemiology of liver diseases in India. Clin Liver Dis (Hoboken) 2022;19:114-7.
4. Prakash BC, Rai SK. Study of serum uric acid in liver cirrhosis and its correlation with child turcotte pugh, MELD and UKELD score. Int J Res Med Sci 2020;8:1-5.
5. Manomenane M, Viswanathan KN, Badrinath AK, Karthik J, Mohan R. Study of serum uric acid level in chronic liver disease and its correlation with child-turcotte-pugh score and platelet indices. J Med Sci Clin Res 2022;10:93-8.
6. Hasan R, Roy PK, Khan MM, Ahmed F, Alam MR, Gain G. Relation of serum uric acid concentrations with etiology and severity in patients with cirrhosis of liver. Banglad Med J 2021;50:46-51.
7. Shafiq S, Khan MN, Majumder B, Alam MS, Islam MS, Sultana T. Correlation of albumin-bilirubin (ALBI) score with child-turcotte-pugh (CTP) score in the evaluation of liver cirrhosis. Am J Lab Med 2019;4:60-4.
8. Choudhary J, Fiza B, Sinha M. Serum uric acid level and its association with child pugh score in chronic liver disease. Int J Med Res Prof 2019;5:13-5.
9. Hejazi AA, Tabash AM, Afana WM, Mustafa AM. Inflammatory biomarkers status and liver enzyme among hyperuricemia patients in Gaza strips. Arch Clin Case Stud 2019;1:1-4.
10. Singh MB, Singh KA, Singh MR. Study of serum uric acid levels among patients of chronic liver disease. J Evid Based Med Healthc 2019;6:2629-32.
11. Gupta PK, Agarwal H, Singhal S, Manocha K. Study of association between serum uric acid levels and chronic liver disease. Eur J Mol Clin Med 2021;8:1169-73.
12. Paul R, Chakravarti HN, Mandal SK, Chatterjee S, Choudhury PS. Study of serum uric acid in chronic liver disease and its relation with other parameters. Int Res J Pharm 2013;4:162-5.
13. Afzali A, Weiss NS, Boyko EJ, Ioannou GN. Association between serum uric acid level and chronic liver disease in the United States. Hepatology 2010;52:578-89.
14. Zheng X, Gong L, Luo R, Chen H, Peng B, Ren W, *et al*. Serum uric acid and non-alcoholic fatty liver disease in non-obesity Chinese adults. Lipids Health Dis 2017;16:202.
15. Wei F, Li J, Chen C, Zhang K, Cao L, Wang X, *et al*. Higher serum uric acid level predicts non-alcoholic fatty liver disease: A 4-year prospective cohort study. Front Endocrinol (Lausanne) 2020;11:179.

How to cite this article: Yadav NA, Pradeep C, Handral MS. Predictive Ability of Serum Uric Acid Levels in Assessing the Severity of Chronic Liver Disease. Int J Sci Stud 2023;10(10):66-71.

Source of Support: Nil, **Conflicts of Interest:** None declared.