

Effect of Dialysis on Upper Gastrointestinal Symptoms and Endoscopic Findings Along with Biochemical Parameters in Patients of Chronic Renal Failure: A Cross-sectional Study in Tertiary Care Settings in North India

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Abstract

Introduction: Chronic kidney disease (CKD) is defined as the presence of objective kidney damage or glomerular filtration rate (GFR) <60 ml/min/1.73 m² or less for at least 3 months, irrespective of the underlying etiology of kidney damage. It affects almost every organ of body. GI manifestations of CKD present in as various symptoms and endoscopic findings are mostly inflammatory in nature.

Materials and Methods: The present study Group 1 included 80 patients of chronic renal failure (28 patients of Stage 4 with estimated GFR [eGFR] of 15–29 ml/min/1.73m²) and 52 patients of Stage 5 with eGFR <15 ml/min/1.73 m². Biochemical parameters and upper GI endoscopy were performed in all 80 patients, but 52 patients of Stage 5 were put on the active treatment of hemodialysis for 1–2 times/week for a period of varying from 1 month to as long as 1 year in the nephrology department. After dialysis, patients were subjected to endoscopic re-evaluation.

Result: There were 80 patients Stages 4 and 5 of chronic renal disease. Mean age of patients was 56.73 ± 14.02 with a range of 18–80 years M: F = 1.42 (58.75%):1 (41.25%). There was a significant decrease in GI symptoms such as nausea and vomiting after dialysis ($P < 0.05$). Endoscopic findings when compared before and after dialysis, there was no significant change observed in abnormalities of esophagus, stomach, and duodenum on endoscope. However, biochemical analysis revealed that after dialysis, there was a significant improvement in the mean serum levels of urea, creatinine, potassium, calcium, phosphorus, and magnesium ($P = 0.05$).

Conclusion: GI symptoms are common in CKD patients and constitute an important cause of morbidity and mortality. There was an improvement in few of upper GI symptoms/biochemical profile but no significant change in endoscopic findings following the hemodialysis therapy.

Key words: Biochemical profile, Chronic kidney disease, Endoscopic findings, Hemodialysis

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INTRODUCTION

Chronic kidney disease (CKD) is a silent epidemic of the 21st century. Surveys have suggested that as many as 16% of adult population have CKD. Its occurrence is not confined to developed countries, but it is universal. Every year, over 1 lakh people in India are diagnosed with CKD necessitating a kidney transplant or continual dialysis.^[1,2]

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Prevalence of gastrointestinal (GI) symptoms in patients of CKD ranges from 70% to 79% CKD.^[3] Chronic renal disease (CKD) leads to disturbance in virtually in every organ of body and GI complications include anorexia, nausea, vomiting, hiccups, stomatitis, esophagitis (with/without fungal/viral infection) and abnormalities in esophageal motility, gastritis, duodenitis, peptic ulcer, hiatus hernia, colonic diseases in the form of angiodysplasia, perforation, obstruction/pseudo-obstruction, diverticulitis, idiopathic ascites, and peritonitis.^[4] Patients with CKD also suffer from recurrent GI bleeding episodes with superficial mucosal inflammatory lesions as the underlying cause along with effects of uremia on the GI mucosa, platelet adhesiveness and effect of heparin used in dialysis.^[5] Bleeding can originate from upper or lower tract, with a predominance of gastritis from upper tract and angiodysplasia and diverticula from the lower; in every case, the bleeding is favored by uremic hemostatic defects.^[6] The etiology of upper GI disorders is multifactorial and include hypergastremia, helicobacter pylori infection, psychological stress, effects of uremia on GI mucosa, endocrine disturbances of CKD, gastroparesis, and miscellaneous causes such as acidosis, hypocalcaemia/hypercalcemia, hypokalemia/hyperkalemia, and hyperparathyroidism (Kang *et al.*, 1998, Muto *et al.*, 1985 and Monnikes *et al.*, 2001).^[6-9]

GI disorders contribute to malnutrition and latter is associated with high morbidity and mortality in CKD patients (Spiegel *et al.*, 1993, Marcén *et al.*, 1997, Price and Mitch 1994, Nesor and Holley, 1992, Hammer *et al.*, 1998, and Van Velm *et al.*, 2000).^[10-15] Most of GI symptoms are reversed by hemodialysis (Zelnick and Goyal).^[16] The aim of the present study was to evaluate upper GI disorders in patients and observe the effects of hemodialysis on symptomatology/abnormalities of upper GI tract and biochemical profile.

MATERIALS AND METHODS

The present study was conducted in the Departments of General Medicine and Nephrology, Government Medical College, and Associated Hospitals, a Tertiary Care Hospital in Jammu (Jammu and Kashmir), North India, for a period of 1 year (2014-1015). It was approved by Institute Ethics Committee.

After the informed consent, 80 patients fulfilling inclusion and exclusion criteria reporting to indoor/outdoor Departments of General Medicine and Nephrology were included in the study. Patients aged above 18 years, diagnosed as CKD (Stages 4 and 5) and with symptoms of nausea, vomiting, anorexia, heartburn, indigestion, melena, and epigastric pain were taken in the study.

Patients (1) with encephalopathy, (2) very poor health, (3) with significant cardiac/pulmonary/hepatic disease, (4) alcoholism, (5) H/o intake of steroids, nonsteroidal anti-inflammatory drugs, and H2 blockers were excluded from the study.

CKD was diagnosed as per National Kidney Foundation (2002), i.e., Stage 4 (estimated glomerular filtration rate [eGFR] 15–29/min/1.73 m² and Stage 5 - eGFR <15/min/1.73 m²) and diabetes mellitus (DM) as per the WHO criteria. Hypertension was defined as blood pressure (BP) >140/90 or controlled BP with medication.

Profile of patients in the individual group as below:

1. Group 1: Included 80 patients of CKD Stages 4 and 5 on conservative management.

The group was further subdivided on the basis of eGFR into two subgroups.

- a. Subgroup 1a (eGFR <15) - 52
 - b. Subgroup 1b (eGFR 15–29) – 28.
2. Group 2: Included 52 patients of CKD on maintenance hemodialysis.

All relevant investigations were carried out and upper endoscopy all 80 patients was performed with FUJINON EG265 WR gastroscope using system –2200 processor and disinfected with 2% glutaraldehyde. Results of endoscopies were recorded in the performance.

All 52 (Group 2) patients were underwent active treatment of hemodialysis. After dialysis patients were subjected to endoscopic re-evaluation had undertaken dialysis treatment for 1–2 times/week for a period of varying from 1 month to as long as 1 year in the nephrology department.

Statistical Analysis

Data were compiled and entered into Microsoft Excel 2007 and analysis of results was performed using SPSS 20. The quantitative variables were described as mean and standard deviation (SD) while qualitative data were expressed as proportions. The differences in categorical variables were compared using a Chi-square test. Paired *t*-test was used to compare the mean values. *P* < 0.05 was considered to be statistically significant.

RESULTS

A total of 80 patients of CKD Stages 4 and 5 were registered for study purpose, among whom 28 patients were in Stage 4 (eGFR 15–29) and 52 in Stage 5 (eGFR <15). About one-third of patients in the study were in the age group of 51–60 years (30%), followed by 61–70 years (23.75%). Mean age ± SD of patients was 56.73 ± 14.02 with a range of 18–80 years. Male to female ratio among

the patients was 1.42:1, with male constituting 58.75% and female 41.25% of the study population. 98.75% (79) of patients had a history of hypertension while the history of DM was present in 67 (83.75%) patients.

52 patients of Stage 5 CKD were put on maintenance hemodialysis, and review endoscopy was done after they had undergone active treatment with hemodialysis and symptoms were reviewed again.

Table 1 shows that in pre-dialysis stage, all the 52 patients were symptomatic while after dialysis only 28 patients remained symptomatic. Applying Chi-square test, it was observed that there was a significant decrease in symptoms such as nausea and vomiting in a post-dialysis group of patients.

Table 2 shows that endoscopic findings when compared before and after dialysis, there was no significant change in abnormalities of esophagus, stomach, and duodenum.

Table 3 depicts that after dialysis, there was a significant improvement in the mean serum levels of urea, creatinine, potassium, calcium, phosphorus, and magnesium ($P < 0.05$).

Table 1: Effect of dialysis on the upper GI symptoms in patients with chronic renal failure

GI symptoms	Pre-dialysis n=52 (%)	Post-dialysis n=52 (%)	Statistical interpretation
Nausea	29 (55.76)	10 (19.23)	$P < 0.001$: HS
Vomiting	24 (46.15)	8 (15.38)	$P < 0.001$: HS
Indigestion	18 (34.61)	13 (25.00)	$P > 0.05$: NS
Heartburn	2 (3.84)	1 (1.92)	$P > 0.05$: NS
Loss of appetite	17 (32.69)	14 (26.92)	$P > 0.05$: NS
Epigastric pain	4 (7.69)	2 (3.84)	$P > 0.05$: NS
Malena	2 (3.84)	0 (0)	-

HS: Highly significant, NS: Non-significant, GI: Gastrointestinal

Table 2: Effect of dialysis on endoscopic findings in patients with chronic renal failure

Endoscopic findings	Pre-dialysis n=52 (%)	Post-dialysis n=52 (%)	Statistical interpretation
Esophageal			
Hiatus hernia	3 (5.76)	3 (5.76)	$P > 0.05$: NS
Gastric			
Antral gastritis	9 (17.30)	9 (17.30)	$P > 0.05$: NS
Fundal gastritis	0	2 (3.84)	-
Antral gastritis and fundal gastritis	6 (11.53)	0	-
Pan gastritis	2 (3.84)	0	-
Hiatus hernia and antral gastritis	1 (1.92)	1 (1.92)	$P > 0.05$: NS
Snakeskin appearance of gastric mucosa	3 (5.76)	0	-
Snakeskin appearance of gastric mucosa GAVE	1 (1.92)	0	-
Antral erosions	0	0	-
Fundal erosions	0	0	-
Fundal and antral erosions	1 (1.92)	0	-
GAVE	2 (3.84)	3 (5.76)	$P > 0.05$: NS
Duodenal			
Duodenitis	3 (5.76)	2 (3.84)	$P > 0.05$: NS

NS: Non-significant, GAVE: Gastric antral vascular ectasias

DISCUSSION

The chronic renal disease is associated with several diseases including gastrointestinal alterations which are characterized by multiple symptoms. Further, these alterations are confirmed by endoscopy that shows a large range of pathological pictures. In the present study, besides baseline evaluation of GI symptoms and endoscopic findings, the effect of hemodialysis on these symptoms, and endoscopic findings in patients with chronic renal disease was also studied.

In the current study, in pre-dialysis stage, all the 52 patients were symptomatic and after dialysis 28 patients remained symptomatic. Nausea, vomiting, indigestion, and anorexia were the most common symptoms in both pre- and post-dialyzed patients. Similar observations have been reported by Farasakh *et al.* and Sivinovic *et al.*^[17,18].

In the pre-dialysis period, patients presented with nausea (55.76%), vomiting (46.15%), indigestion (34.61%), loss of appetite (32.69%), epigastric pain (7.69%), and melena (3.84%). In the post-dialysis period, the prevalence of all symptoms reduced with a significant reduction in nausea and vomiting ($P < 0.05$). Similar findings were reported by Nand *et al.*^[19] Improvement in symptoms of upper GI tract disease after active treatment with hemodialysis was also observed in a study by Goenka *et al.*^[20]

In our study, esophageal involvement in the form of hiatus hernia was seen in 3 out of 52 patient comprising 5.76% in both pre-dialysis and post-dialysis group. Farsakh *et al.*^[17] observed hiatus hernia to be present in 27 out of 92 patients on hemodialysis. Gastric involvement in

Table 3: Comparison of mean serum levels in pre- and post-dialysis patients with chronic renal failure using paired t-test

Parameter	Pre-dialysis (n=52) mean±SD	Post-dialysis (n=52) mean±SD	t-test	P (statistical interpretation)
Serum urea (mg/dl)	155.94±67.72	110.10±28.91	7.993	0.000 (HS)
Serum creatinine (mg/dl)	8.54±3.64	6.89±2.06	2.918	0.005 (HS)
Creatinine clearance (ml/min)	8.87±4.00	10.02±3.05	-1.729	0.09 (NS)
Serum sodium (mEq/L)	134.27±4.45	134.48±3.57	-0.300	0.766 (NS)
Serum potassium (mEq/L)	4.80±0.57	4.47±0.66	2.773	0.008 (HS)
Serum calcium (mg/dL)	7.73±0.85	8.21±0.89	-3.264	0.002 (HS)
Serum phosphorus (mg/dL)	5.51±1.66	4.61±1.46	3.066	0.003 (HS)
Serum magnesium (mg/dL)	2.04±0.59	2.27±0.49	-2.205	0.032 (Sig)
Serum uric acid (mg/dL)	5.15±1.34	5.59±1.17	-1.552	0.127 (NS)
Serum Alk. phosphate (U/L)	96.42±30.15	94.59±21.47	0.384	0.702 (NS)

SD: Standard deviation, HS: Highly significant, NS: Non-significant

the form of antral gastritis was seen in 17.30% patients in both pre- and post-dialysis group. Both hiatus hernia and antral gastritis were seen in 1.92% in pre-dialysis and none in post-dialysis group. However, no case of peptic ulcer was found in this study. Similarly, in two prospective studies, Morgalis *et al.*, and a recent study from Chennai on dialysis patients, did not find any case of peptic ulcer.^[21,22] Duodenitis was present in 5.76% in pre-dialysis and 3.84% in post-dialysis patients.

Mean values of serum urea, creatinine, potassium, calcium, phosphorus, and magnesium when compared in patients before and after dialysis, a statistically significant improvement was observed in the present study ($P < 0.05$). These findings are in collaboration with other studies.^[23-25]

CONCLUSION

Patients with CKD frequently develop different GI symptoms and lesions and an important cause of morbidity and mortality. GI symptoms tend to worsen with increasing uremia and more common in Stage 5 CKD than Stage 4. Early diagnosis and management of upper GI disorders can reduce morbidity and prevent fatal complications like massive upper GI bleed. Endoscopic examination is a useful investigation for their diagnosis.

There was an improvement in few of upper GI symptoms/biochemical profile but no significant change in endoscopic findings following adequate hemodialysis therapy.

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Bhagat, *et al.*: To Study the Effect of Dialysis on Upper GI and Endoscopic Findings in Patients of CKD

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