

# Computed Tomography Evaluation of the Patients Presenting with Headache at Tertiary Care Hospital of Bihar

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## Abstract

**Objective:** (1) To evaluate the organic causes of headache in patients undergoing computed tomography (CT) scan of brain both with or without neurologic abnormality, (2) to know the age incidence, and (3) to know the sex incidence of the headache.

**Materials and Methods:** This study is a prospective observational study and has been done over a span of 1½ year (October 2015-March 2017) in the CT scan unit of Department of Radiodiagnosis, IGIMS, Patna. 2072 patients were enrolled in this study coming from various departments including General medicine, Neurology, Neurosurgery, Emergency, and Psychiatric department. Written consent has been taken from all the participating patients or from guardian (in case of minor patients). Patients were divided into three groups based on CT findings: (1) Those with no abnormality, (2) those with minor abnormality (not altering the patient management), and (3) those with clinically significant abnormality (altering the management protocol).

**Results:** CT detected abnormality constitute 9.84% in which major and minor abnormalities constitute 3.28% and 6.26%, respectively, that will help in further management. Headache is more common in females (59.31%). Most common age group affected is 21-40 years (51.64%).

**Conclusion:** The percentage of intracranial abnormalities detected by CT scan in this study was almost similar to previous studies provided normal neurological examinations. In the absence of neurological abnormality, CT scan did not offer any advantages.

**Key words:** Computed Tomography, Patients, Headache

## INTRODUCTION

Headache is the most common complain of most of the patients presenting to Medicine, Neuromedicine, and Psychiatry department. It leads to derangement of the normal day-to-day activity as well as alteration of the mental health of the patients.<sup>1</sup> Majority of the patients with headache does not require any imaging, especially if not accompanied with neurological deficit.<sup>2,3</sup> Neuroimaging

is useful in case of recent onset headache and headache with progressive worsening or with change in headache pattern or associated with epilepsy, change in personality or history of trauma<sup>4,5</sup> and presence of red flag signs (changes in headache pattern, new onset headache in people above 50 years of age, associated with systemic illness or personality change, raised intracranial pressure, early morning headache, or headache worsening with coughing, sneezing or straining).<sup>2</sup> In recent years, there is increasing trend of recommending neuroimaging, especially in pediatric age group, in spite of normal neurologic baseline examination to exclude the possibility of intracranial mass.

## MATERIALS AND METHODS

This study is a prospective observational study and has been done over a span of 1½ year (October 2015-March 2017)

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in the computed tomography (CT) scan unit of department of Radiodiagnosis, IGIMS, Patna. The machine used is 128-slice helical MDCT (Toshiba Aquallion) scanner, and scanning was done from base of skull to the vertex. Plain (without contrast) as well as plain and contrast-enhanced CT scans were done.

2072 patients were enrolled in this study referred from various departments including General Medicine, Neurology, Neurosurgery, Emergency, and Psychiatric department. Written consent has been taken from all the participating patients or from guardian (in case of minor patients).

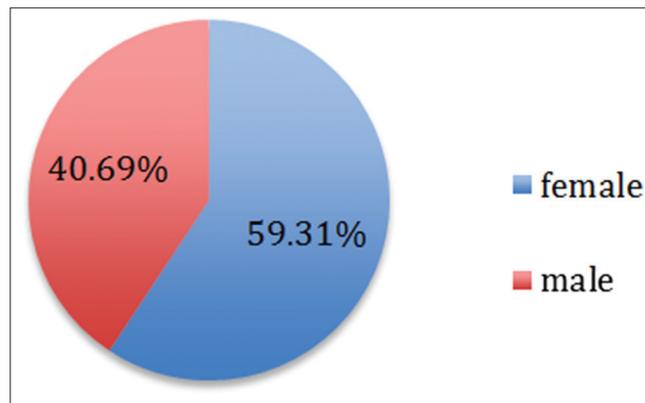
The study has been approved by the Ethical Committee of this institute (Graphs 1 and 2).

**Inclusion Criteria**

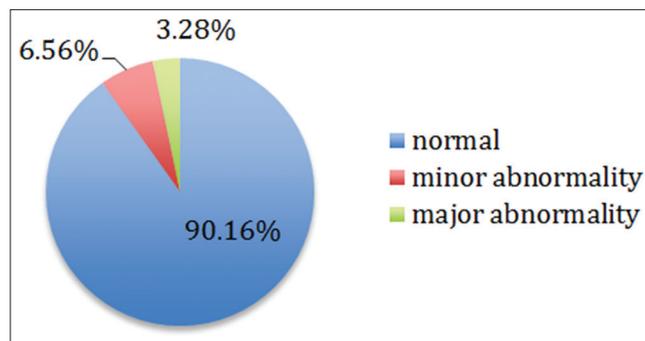
1. All patients above 5 years of age having headache coming first time for treatment.
2. Both male and female.

**Exclusion Criteria**

1. Patients below 5 years of age
2. Already diagnosed cases of intracranial abnormality



**Graph 1: Sex distribution out of these 2072 patients, 1229 (59.31%) were female patients and 843 (40.69%) were male patients**



**Graph 2: Computed tomography findings distribution**

3. Those who are not willing for participate in this study
4. Pregnancy.

Two radiologists interpreted all the images.

Patients were divided into three groups based on CT findings: (1) Those with no abnormality, (2) those with minor abnormality (not altering the patient management), for example, calcified neurocysticercosis, midline calcification of falx, persistentcavum septum pellucidum and verga, senile degenerative changes and lacunar infarct/ gliosis, and (3) those with clinically significant abnormality (altering the management protocol), for example, single or multiple ring or nodular enhancing lesion (either neurocysticercosis or tuberculoma), neoplastic mass, hydrocephalus, and focal edema (Figures 1-3).

**DISCUSSION**

In this study, we found that a total of 9.8% patients show some abnormalities in CT scan (Tables 1 and 2). Of these 6.56% of patients had minor abnormality, not requiring change in management, and 3.28% had major abnormality

**Table 1: Spectrum of CT detected abnormalities**

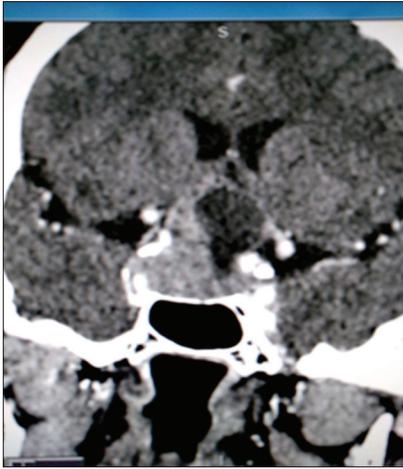
Parameter	Values	Values
Major abnormality		
Active granuloma	14	68
Neoplastic lesion	17	
Intracranial hematoma	16	
Hydrocephalus	5	
Edema	3	
Infarct	7	
Extracranial cause (sinusitis, deviated nasal septum with bony spur, sinus osteoma, pseudotumor, etc.)	6	
Minor abnormality		
Calcified granuloma	43	136
Falx calcification	15	
Persistent cavum septum pellucidum	9	
Prominent cisterna magna	12	
Senile degenerative changes	32	
Gliosis/old infarct	16	
Others (skull fracture, burr hole defect, leukomalacia, etc.)	9	

CT: Computed tomography

**Table 2: Age distribution**

Age (in years)	Number of patients (%)
5-20	457 (22.06)
21-40	1070 (51.64)
41-60	452 (21.81)
61-80	87 (4.20)
>80	6 (0.29)

The age group ranged from 5 to 85 year with mean of 32.27 year ( $\pm 14.65$  SD). Mean ages in male and female patient are 31.38 year ( $\pm 16.12$  SD) and 34.56 ( $\pm 13.42$  SD), SD: Standard deviation



**Figure 1: Contrast-enhanced computed tomography brain (coronal section) 5x5x3 cm size well-circumscribed solid cystic enhancing soft tissue at sellar region with suprasellar extension causing compression over the 3<sup>rd</sup> ventricle - craniopharyngioma with obstructive hydrocephalus**



**Figure 2: NCCT brain showing large hyperdense hematoma with mild perilesional edema in the right occipital lobe with effaced sulci - right occipital lobe hematoma with mass effect**



**Figure 3: Persistent cavum septum pellucidum**

requiring change in the management protocol. In a study, only 10% of patient's organic causes were detected in CT scan imaging. According to a meta-analysis, major abnormalities detected in patients with unspecified headache ranged from 0.0% to 6.7% in ten studies.<sup>6</sup> In a study conducted by Subedee also showed that minor and major abnormality was 7.14% and 3.57%, respectively.<sup>7</sup> Observations in this study are close to other studies. There is limitation in our study because we did not have complete neurological evaluation record of all patients.

Headache was more common in females in our study and was similar finding in various other studies. It is having multifactorial etiology including tension, genetic factor, and fluctuating estrogen level during reproductive age groups.<sup>8</sup>

The most common age group affected was 21-40 years. 1070 (51.64%) patients came under this age group only. It is followed by 5-20 years and 41-60 years that include 457 (22.06%) and 452 (21.81%) patients, respectively. Jain *et al.* also found that headache was the most common in 21-40 years (68.3%) of age followed by age under 20 years (16.3%), and then, 41-60 years (12.4%)<sup>9</sup> and hence supporting our findings.

Major abnormalities detected on CT scan were granuloma (either tuberculoma or neurocysticercosis), intracranial tumor (craniopharyngioma, cystic dermoid, central neurocytoma), colloid cyst, hydrocephalus, parenchymal hematoma, etc. Minor abnormalities include midline calcification, senile atrophic changes, calcified granuloma, persistent cavum, septum pellucidum and verga, gliosis, cisterna magna, etc. In six patients (0.29%), extracranial abnormalities were responsible for headache. They are deviated nasal septum with bony spur, sinusitis, retrobulbar pseudotumor, osteoma of ethmoid sinus, etc.

2072 patients were included in this study having headache. Of these 1868 (90.16%) patients showed no abnormality on CT images, while 204 (9.84%) patients showed some abnormalities. Of these 204 patients, 68 patients (3.28%) showed abnormalities that changed their management and 136 (6.56%) patients showed abnormalities that did not alter their management.

## CONCLUSION

The study included 2072 patients with headache in age range between 5 and 85 years, with mean age of presentation in male and female is 31.38 years and 34.56 years, respectively.

The study showed that 9.84% patients showed some abnormalities in CT scan imaging. 3.28% and 6.56%

patients showed major and minor abnormalities, respectively. The most common major abnormalities were intracranial mass and were followed by intracranial hematoma, and then, active granuloma. Among minor findings the most common finding was calcified granuloma (including both tuberculoma and neurocysticercosis). It was followed by senile degenerative changes and benign calcification of midline falx.

The most common age group affected was 21-40 years. It included 51.64% of patient among the studied group.

Female were affected more than male patients. Male to female ratio is 2:3.

Sometimes, despite the absence of red flag sign, CT scan of head is requested to relieve the anxiety of the patients and their relatives. However, this increases the radiation dose to the patients, especially in pediatrics population. Hence, the use of CT scan has to be balanced against the radiation dose. Although CT scan is very useful for the evaluation, it should never be allowed to replace the proper clinical history taking and detailed clinical examination.

## RECOMMENDATION

When symptoms persist despite all the investigations and CT scan evaluation, an alternative imaging modality such as magnetic resonance imaging brain should be considered.

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