ORIGINAL ARTICLE

CT Findings in patients with Chief Complaint of Headache in a Tertiary Care Hospital

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ABSTRACT

Background: Headache complaints are required to be evaluated on the basis of neuroimaging. Studies were carried out in other countries to evaluate the usefulness of CT and MR Neuroimaging among patients of primary complaint of headache.
Aim: To determine frequency of definitive diagnosis and its types in patients who are referred to radiology for CT scan with chief complaint of headache.
Study Design: Descriptive, Cross-sectional study.
Settings: Department of Radiology, Combined Military Hospital, Lahore
Study Period: 10th February 2018 to 9th July 2018
Methods: About 303 cases of age 16-80 years of either gender referred to CT scan with primary complaint of headache were included. Patients with pathology in addition to headache including but not limited to bleeding, head injury and pregnant females were excluded. Demographic information including name, age, gender, CT findings and consultant's opinion was noted.
Results: Mean age was 40.18 ± 16.72 years. There were more patient 205 (66.66%) patient of aged 16-45 years. There were 178 (58.75%) males and 125 (41.25%) females with male-to-female ratio as 1.4:1. Frequency of definitive diagnosis in patients who are referred to radiology for CT scan with chief complaint of headache was found in 89 (29.37%) cases.
Conclusion: The frequency of definitive diagnosis in patients who are referred to radiology for CT scan with chief complaint of headache is 29.37% patients which showed the insignificant success ratio of neuroimaging in patients with headache.
Keywords: Computed Tomography, Headache, Magnetic Resonance Neuroimaging, Radiology

INTRODUCTION

Headache is common health problem in general population. Based on geographic area and age groups incidence of sporadic and chronic headache was reported 40% and 15% respectively.[1] Headache is a nonspecific symptom which means it has many possible causes. It is broadly classified as primary and secondary. Primary headaches include migraine and tension-type which accounts for 90%. Secondary headaches are caused by problems elsewhere in head and neck which also include headache associated with refractive errors[2].

Headache is one of the most common complaints in patients of all ages and genders in outpatient departments across the country. Headache complaints are required to be evaluated on the basis of neuroimaging. Studies were carried out in other countries to evaluate the usefulness of CT and MR Neuroimaging among patients of primary complaint of headache. A similar study was done in central India in February 2016. The research study concluded that CT or MRI in patients deprived of red flag or clinical warning criterion sign producesa very low percentage of clinically substantial positive results on neuroimaging.[3]

Another study was conducted in 2013 by Dagny Holle and Mark Obermann.[4] The study concluded that headache was a common feature in neurological patients and those in migraine and tension type headache not require neuroimaging. Probability of such patients generally presenting a cerebral pathology was conducted to be relatively lower. Neuroimaging was, however, considered appropriate to be performed in order to satisfy the patients that they were not suffering from severe illness. Further, it concluded that 'red flags' in neurological examinations conclude a secondary cause of headache which needs to be investigated through further neuroimaging for detection of causes.

The study conducted by Nepal, et al.,[5] in 2013, titled "Evaluation of CT scan findings in patients presenting with headache" to ascertain the findings of CT scans of patients presenting with headache. Prospective observational study was performed andbrain parenchymal pathology was detected in 10.15% patients only. Other findings were recorded as sinusitis 28(11%), which was located in the maxillary sinus followed by bone pathology[10 (3.9%)] and mastoiditis [6 (2.3%).

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Study conducted by Hawasli, et al.,[6] in 2014 proposed careful and sensible use of neuroimaging when the physicians pose better clinical judgment so as to keep the medical cost in check. Although the study did not recommend routine neuroimaging of general population, it also did not rule out the possibility that a significant number of patients with headaches may reduce the global economic burden in shape of medical errors, delayed diagnoses and inferior outcomes in patients with brain tumor, however, the study stressed on conducting further research for development of validated and testes clinical decision benchmarks on neuroimaging for headaches.

The study conducted in United States of America, concluded that neuroimaging is prescribed in high as 12% of cases presenting with headache which in total costs about USS1 billion per anum. Magnitude of per visit neuroimaging use suggests considerable overuse. It was suggested since headache neuroimaging is costly, common and likely substantially overused, interventions to reduce these are expected to reduce the health care expenditures while improving while improving guidelines concordance.[7]

A cross-sectional study therefore is required to be carried out in order to evaluate effectiveness of CT scan in patients with primary complaint of headache. This would be achieved by comparing the number of patients with headache referred to neuroimaging against the total number of cases diagnosed with pathology through neuroimaging. This success ratio of neuroimaging in cases presented with headache against the total number of cases referred would be highly beneficial to 'diagnostic radiology' as it would assist in establishing a cost- benefit relationship of neuroimaging results. In case this success ratio of neuroimaging in patients with headache is found to be significant, it would mean that in order to rule out the possibility of existence of a positive pathology, patients must be referred to neuroimaging. In case this ratio is positive but insignificant, it could possibly be concluded that other examination methods must be applied before exposing the patients to neuroimaging in order to prevent the patients from unnecessary exposure to radiation and from unnecessary cost burden. An identification of trend of neuroimaging utilization of patients presented with headache, would be beneficial to 'Diagnostic Radiology' as it would give a clear understanding, in order of priority, of relationship between the identification forms of pathologies and number of cases referred for CT scan.

The objective of the study was to determine frequency of definitive diagnosis and its types in patients who are referred to radiology for CT scan with chief complaint of headache.

MATERIAL& METHODS

This descriptive, Cross sectional study conducted in the Department of Radiology, Combined Military Hospital, Lahore from 10th February 2018 to 9th July 2018. Sample size of n = 303 wasestimated by using 95% confidence level, 5% margin of error and percentage of brain pathology 27%[5]among patients with primary complaint of headache and diagnosed with some pathology as a result of CT scan. Sampling technique used was non-probability, consecutive sampling. Patients of age 16-80 years of either gender referred to CT scan with primary complaint of headache were included in the study while patients with pathology in addition to headache including but not limited to bleeding, head injury and pregnant females were excluded from the study.

Data collection procedure: Total 300 patients fulfilling inclusion criterion were enrolled in the study referred for CT scan. Informed consent was obtained from all patients. Demographic information including name, age, gender, CT findings and consultant's opinion was noted. All this information was recorded through the attached proforma. Outcome variable i.e. definitive diagnosis and its types were recorded. All CT scan were reported by the same consultant.

Data analysis: Collected data was entered and analyzed through the SPSS version 21. Mean & standard deviation were calculated for age and duration of headache. Frequency & percentage were calculated for gender, definitive diagnosis and its types.

RESULTS

The mean age of patients was 40.18 ± 16.72 years. There weremore patients [205 (66.66%)] of age range 16 to 45 years. There were 178 (58.75%) males and 125 (41.25%) were females. The male to female ratio of patients was 1.4: 1. The mean duration of headache was 4.07 ± 1.96 months. Frequency of definitive diagnosis in patients who are referred to radiology for CT scan with chief complaint of headache was found in 89 (29.37%) patients (Table 1).

Table-I: Age distribution of patients (n= 303)

Age (in years)	40.18 ± 16.72
16-45	205 (66.7%)
46-80	98 (32.3%)
Gender	
Male	178 (58.8%)
Female	125 (41.2%)
Duration of headache (months)	4.07 ± 1.96
≤3 months	134 (44.2%)
>3 months	169 (55.8%)
Definitive diagnosis	89 (29.37%)

Table-II: Types of diagnosis (n=89).

Types	**F (%)**
Sinusitis	32 (36%)
Dental pathology	18 (20.2%)
Orbital pathologies	12 (13.5%)
Bone pathology	11 (12.4%)
Brain abscess	06 (6.7%)
Chronic suppurative otitis media	02 (2.3%)
Subarachnoid hemorrhage	02 (2.3%)
Meningitis	02 (2.3%)
Cerebral tumor / metastasis	02 (2.2%)
Other intracranial hemorrhage (epidural hematoma, subdural hematoma and intraventricular hemorrhage)	01 (1.1%)
Infarct	01 (1.1%)
Cerebral palsy	00 (0%)
Dural venous thrombosis	00 (0%)
Arteriovenous malformation	00 (0%)
Aneurysm	00 (0%)
Hydrocephalus	00 (0%)

The most common diagnosis was sinusitis that was detected on 32 (36%) cases, followed by dental pathology 18 (20.2%)], Orbital pathologies 12(13.5%), bone pathology 11(12.4%), brain abscess 6(6.7%), and others. Details are given in table II.

DISCUSSION

The CT and MRI are the two main available modalities for neuroimaging to evaluate the several causes of headache in adults. CT scan is easy to use, quick, and has financial burden. In routine, CT scan is applied as a first-line diagnostic tool to investigate the cause of severe or chronic headache. In several studies, conducted earlier, found that CT scan may found to be normal in majority of patients presented with chronic headache[8-11] This problem directed to develop the guidelines as to when to apply other neuroimaging modality in such patients[12]. I have conducted this study to determine frequency of definitive diagnosis and its types in patients who are referred to radiology for CT scan with chief complaint of headache.

In this study, the mean age of patients was 40.18 ± 16.72 years. There were more males [178 (58.75%)] than females 125 (41.25%) with the male-to-female ratio as 1.4:1. Frequency of definitive diagnosis in patients who are referred to radiology for CT scan with chief complaint of headache was found in 89(29.37%) patients. The study conducted by Nepal P et al[5] and brain parenchymal pathology was found positive in 10.15% cases. The most predominant pathology detected was sinusitis (11%), which was found in maxillary sinus, followed by bone related pathology (3.9%) and mastoiditis (2.3%). In the same study, total number of pathologies detected were 27.35% on CT scan.

One similar study, done at Samsun, Turkey on 70 patients. The patients underwent CT scan to examine the presence of intracranial pathology in adult candidates who were fulfilling the Clinical Warning Criteria for subordinate headaches and to define the significance of Clinical Warning Criteria to predict the probable lesion on CT scan.[13] The Clinical Warning Criteria is comprised of abrupt onset of headache, increase in frequency and intensity of the headache, regular fluctuating characteristics of headache, not responding to the analgesics or associated with focal neurological symptoms. The findings showed that 64.3% of head CT scans were completely normal while 35.7% CT scans evident the positive findings which may be responsible for the headache. The frequency of the recognition of positive findings was fairly high in patients who were fulfilling Clinical Warning Criteria[13].

Mitchell et al., determined whether the routine CT examination is mandatory among patients who present with headache, regardless of neurological findings were present or not. They conducted study on 350 candidates and out of them 2% had positive findings on CT scan[8].

In a review study, done by Dumas et al., on 373 cases of chronic headache. About 402 CT scans were done and about 4.5% CT scans were found to be positive for any pathology, but only 0.98% had significant CT scan finding. Out of these 4 positive patients, one case had aneurysm, two had osteomas and one had low-grade glioma[9]. Later one, few other studies supported these findings[11,14].

These studies found that routine CT scan may be negative for few chronic headaches, which are without any focal neurologic signs or abnormal symptoms. Simpson et al.,detect that the positivity of CT scan was 10.5% out of 4404 CT scans during the period 1999 to 2007. Among these cases, 1.4% CT scan findings were considered to be positive or having pathology as the cause of headache while 9.1% of those pathologies were considered as incidental in nature[10].

Numerous retrospective studies have proved that there may be low yield of imaging procedure among patients of isolated headache without other neurological findings[15,16]. One prospective study conducted on CT scans detected that many of them were systematic due to the suspected tumour (49%) or subarachnoid haemorrhage (9%). About 17% were on medical request as a result of patient probability of tumor or medico-legal cases[17].

Studies, conducted before 1990's on CT or MRI among patients with complaint of chronic headache, although normal neurological examinations were studied[8,11,18,19]. Out of 897 studies on patients of migraine, only four were found positive, (three tumors and one arteriovenous malformation), while 0.4% were curable lesions. However, 2 studies were performed at tertiary care level (Mayo Clinic & Cleveland Clinic) and the 500% higher rate of clinically significant findings were observed.[8, 20] If these two studies are not included, the total possibly curable lesions would be decreased to three out of 725 studies (i.e. 0.4% only)[11].

Out of around 2000 CT scans reported in few studies, only 1% were diagnosed as curable lesions[9,21-25]. Becker et al[17] conducted a study and included 1999 patients with headache and found abnormal neurological findings on CT scan. If this study was excluded, only 0.5%candidates had curable lesions. The frequency of positive findings was also low among patients present in emergency department[26].

CONCLUSION

This study concluded that frequency of definitive diagnosis in patients who are referred to radiology for CT scan with chief complaint of headache is 29.37% patients which showed the significant success ratio of neuroimaging in patients with headache. So, we recommend that patients with headache must be referred to neuroimaging for early and proper diagnosis of any pathology which will ultimately reduce the morbidity of our population.

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