

SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

DEPARTMENT OF RADIOLOGY



**Evaluation of Brain Magnetic Resonance Imaging Findings And Its
Associated Factors IN Patients With Chronic Headache In Saint Paul
Hospital Millennium Medical College Addis Ababa-Ethiopia 2019**

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Abbreviations

- CT..... Computed Tomography
- ICSOL.....Intracranial Space Occupying Lesions
- MRI..... Magnetic Resonance Imaging
- SPHMMC.....Saint Paul Hospital Millennium Medical Collage
- RIS..... Radiology Information System

Abstract

Background; Headache is one of the most common complaints that leads patients to seek medical service. Although the majority of patients who present with chronic or recurrent headache have no neurologic abnormality, many undergo evaluation with computed tomography and, more recently, magnetic resonance imaging to exclude important abnormalities.

Objective; To evaluate the prevalence of brain Magnetic Resonance Imaging findings of patients with chronic headache and its associated factors in Saint Paul Hospital Millenium medical college.

Methods; cross sectional study with retrospective data was conducted on 138 brain Magnetic Resonance Imaging reports done for clinical impression of headache in Saint Paul Hospital Millenium medical college in the period of one year between January 2018- december 2018. Data was collected using data extraction sheet from Saint Paul Hospital Millenium medical college radiology information system and the collected data was analyzed using statistical programs Epi info, Excel and SPSS.

Result: Out of 138 patients 89(64.5%) were females and 49 (35.5%) were males. The age group ranged from 15 years to 82 years with the mean of 37 years. About 45% of the patients demonstrated normal MRI findings and 65 % showed some pathology of which 31% are white matter change and 28% has some form of sinusitis (6% have both).

Among brain parenchymal pathologies one patient has tectal glioma and one had chronic superior sagittal sinus thrombosis. Choroid fissure cyst, paraital lobe gliosis, cavernous angioma and idiopathic intracranial hypertension were also found each in one patient.

Conclusions: - MRI of patients with chronic headache yields a low percentage of clinically significant positive findings. In the absence of clinical warning criteria of secondary headache, the only reason for MRI scan seems to be reassuring the patients.

1. Introduction

1.1. Back Ground

Headache is a common disorder with many potential causes. Globally, it has been estimated that prevalence among adults of current headache disorder (symptomatic at least once within the last year) is about 50% (1). It is also the commonest neurological disorder in Ethiopia.(2)

A classification system developed by the International Headache Society characterizes headache as primary or secondary (3). Primary headaches are those in which headache and its associated features are the disorder in itself, no organic cause identified, whereas secondary headaches are those caused by exogenous disorders (3,4). Only about 10% of patients with recurrent headache have secondary cause.(4)

Primary headache, which include migraine, tension headache and cluster headache are benign in nature. These types of headache are usually recurrent in nature and have no underlying organic disease in their root (3).

Secondary headache is always caused by underlying organic diseases ranging from extra cranial benign condition such as sinusitis or mastoiditis to life threatening intracranial pathology like sub arachnoid hemorrhage or brain tumors(5).

Primary headache is the most common cause of recurrent headaches and does not require any neuroimaging because no such underlying disease process exists, which can be picked up by neuroimaging(6).

1.2. Statement of the Problem

Headache is one of the commonest reasons of patients to seek medical care. Primary headache disorders, mainly migraine and tension type headache, account for the majority of headaches (7) .and only about 10% of patients with recurrent headache have secondary cause(4). It has been contended that most of the patients suffering from primary headache can be managed with primary care and no need of neuroimaging in most of the cases (6)

Primary headache often results in considerable disability and a decrease in the patient's quality of life. Mild secondary headache, such as that seen in association with upper respiratory tract infections, is common but rarely worrisome. Life-threatening headache is relatively uncommon, but vigilance is required in order to recognize and appropriately treat such patients.(4,6)

Many patients and physicians are concerned that an intracranial lesion may be responsible for the headache. The main reason for obtaining a neuroimaging study is to detect a treatable lesion such as a tumor or a vascular malformation(8). Neuroimaging may also be done to reassure the patients. Medico-legal concerns and the patient's request are other reasons that may also influence the physician's decision to perform a neuroimaging study. (9)

Literatures revealed that MR imaging is an unrewarding technique in the evaluation of patients with chronic or recurrent headache and normal neurologic findings (4,9).

As MRI is accessible in few Ethiopian health facilities, 0% in 2011 (10) and currently not more than ten MRIs present in the government hospitals in the whole country, it demands responsible decision to request this imaging. In Addis Ababa, the capital city of Ethiopia, MRI is found only in two governmental hospitals, Tikur Anbessa hospital and SPHMMC. Hence this causes long appointments to get the study. Beside the lack of availability of MRI machine it is also costly which most of our patients can't afford.

1.3. Significance of the study

This study aims to assess brain MRI findings performed for clinical data of headache in SPHMMC in one year period from January 1 2018-December 30 2018, and observe the prevalence of significant findings and forward possible suggestions based on the results. It also will serve as base line study for further researches in this area as there is no previous research in Ethiopia.

2. Literature review

Most studies provide lower number of clinically significant Brain MRI findings in patients with chronic headache(4,8,9). Published researches in this topic in Africa are few and none found in Ethiopia.

In a study involving 1800 patients in two neurology clinics,Spain, neuroimaging studies detected significant lesions in 17 patients [1.2%, 95% confidence interval. The diagnoses in these 17 patients were: pituitary adenoma (n = 3), large arachnoid cyst (n= 2), meningioma (n = 2), hydrocephalus (n= 2), Chiari type I malformation, ischaemic stroke, cavernous angioma, arteriovenous malformation, low-grade astrocytoma, brain stem glioma, colloid cyst, posterior fossa papilloma. Of these 17 patients, eight were treated surgically. (8)

A total of 306 patients with normal neurologic findings and chronic or recurrent headache were examined with MR imaging in Motojima General Hospital;Japan. Result revealed 169 patients (55.2%) were with no abnormality , 135 (44.1%) were those with minor abnormality, and two (0.7%) with clinically important intracranial abnormality, which may result in chronic or recurrent headache.(9)

From retrospective observational study carried out in 500 selected patients, who underwent CT or MRI scan of head in Peoples College of Medical Sciences and Research centre, Bhopal, MP, India, only 29 cases (5.8%) revealed some form of brain parenchymal pathology whereas other associated findings were seen in 97 cases e.g. sinusitis in 58 (11.6%), bone related pathology in 26 (5.2%) and chronic suppurative otitis media (CSOM) in 13 (2.6%).(4)

In Southern Nigerian Tertiary Hospital; Seventy-four (74) cases with complaints of chronic and recurrent headaches without focal neurological deficit that had CT scan after being evaluated by neurologist in Neurology clinic were reviewed. Intracranial pathologies was found in 47% of the cases.(9) Of the cases with demonstrable cranial lesions (47.3%), relatively benign conditions like mastoiditis, sinusitis, nasal polyps, and cerebral atrophy accounted for 21.7% ,while surgically correctable causes of headaches like space occupying lesions, subdural hematoma,and hydrocephalus accounted for 25.6%. The relatively high yield of cases with identifiable cranial

lesions (47.3%) may have been influenced by the method of selection, in which all the cases reviewed were referred for CT after assessment by a specialist Neurologist.(11)

There are no published research studies regarding the spectrum of brain MRI findings in patients with chronic headache in Ethiopia.

Conceptual framework

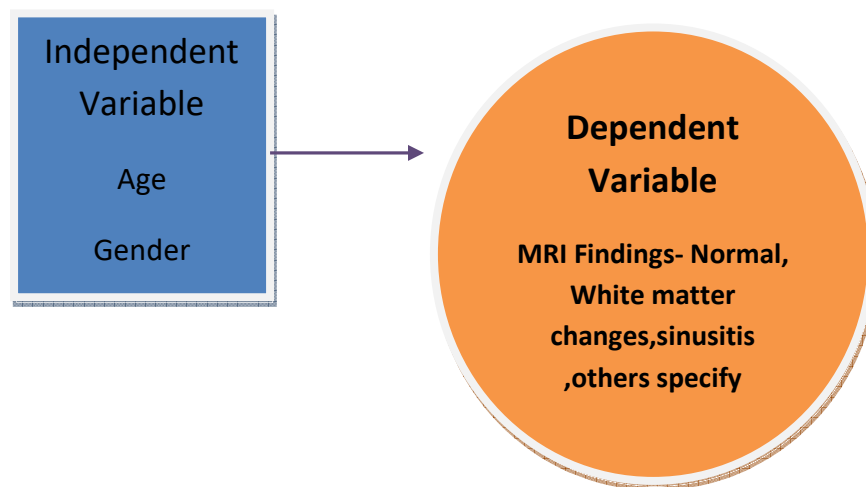


Figure 1:- Conceptual framwork

3. Objectives

3.1 General objective

- To evaluate the brain MRI findings(done from January1 to December 30 2018 GC) of patients with chronic headache and their associated factors in SPHMMC.

3.2 Specific objectives

- To evaluate the frequency of clinically significant brain MRI findings in patients with chronic headache in SPHMMC.
- To evaluate associated factors with brain MRI findings.

4. Methods

4.1 Study area

The study is conducted in SPHMMC, which is found in Addis Ababa and is the 2nd largest hospital in the country. It was built by Emperor Haile Selassie I in 1969 with the help of the German Evangelical Church. The hospital has giant training center for undergraduate and a wide spectrum of postgraduate studies. This study was done in those patients reported MRI; done for clinical impression of headache in SPHMMC in the last one year January1- december 30 2018 (12)

4.2 Study design

A facility based cross sectional study with retrospective data.

4.3 Study population

All patients who underwent MRI for headache in SPHMMC from january 2018 to December 30 2018 and fulfill the inclusion criteria.

Inclusion criteria

- All reported brain MRI studies done for clinical data of headache.
- Patient age >15yrs.

Exclusion criteria

- Post traumatic headache
- Patients with intracranial surgery
- Incomplete demographic information

4.4. Sample size

$$n = \frac{(z_{\alpha/2})^2 \cdot pq}{d^2}$$

Using the above formula, $P=10\%$ from a study done in, Madrid, Spain.

$d=0.05$ the sample size is 138

Sampling procedure

Systemic random sampling technique was used to select subjects from the sample frame.

4.5. Data collection procedure.

-Data collection started by selecting those reported Brain MRI cases done for headache from all Brain MRI studies reported in the last one year in the the Radiology Information System.

- Using appropriate data extraction sheet the required data was collected from the data base.

-The conclusions from final reports recorded in the Radiology Information System was taken with-out image revision.

4.6. Data Analysis method

- The collected data was entered in the Epiinfo program from CDC from which extracted to excel to make it friendly with SPSS. Multiple analysis were done using the SPSS statistics data editor.

4.7. Operational Definitions

Significant findings- Intracranial space occupying lesions.

Intracranial infections

Non significant findings- Sinusitis, Nonspecific White matter changes.

Data quality control

There was one day training on data collection for the data collectors.

Well-structured data extraction sheet was used in the data collection.

4.8. Variables of the study

Dependent variables -Brain MRI findings grouped as clinically significant and non significant.

Independent variables- Socio demographic data

4.9 Ethical considerations

- I have obtained ethical clearance from Institutional review board of SPHMMC.

4.10. Dissemination of results

The final research paper will be delivered to the SPHMMC radiology department,for the collage academic provost office and for the hospital medical director office.

5. Results

The data obtained from reported MRI of the 138 patients was analyzed by using SPSS program and results prepared in form of tables and figures. This retrospective observational study is conducted among 138 selected patients who underwent MRI of head from January 2018 to December 2018.

Out of 138 patients 89(64.5%) were females and 49 (35.5%) were males. The age group ranged from 15 years to 82 years with the mean of 37 years and standard deviation 14.1 (fig 2). Patients less than 15 year of age is not included in the study because reliable history taking is difficult in this age group. About 45% of the patients included in the study demonstrated normal MRI findings.

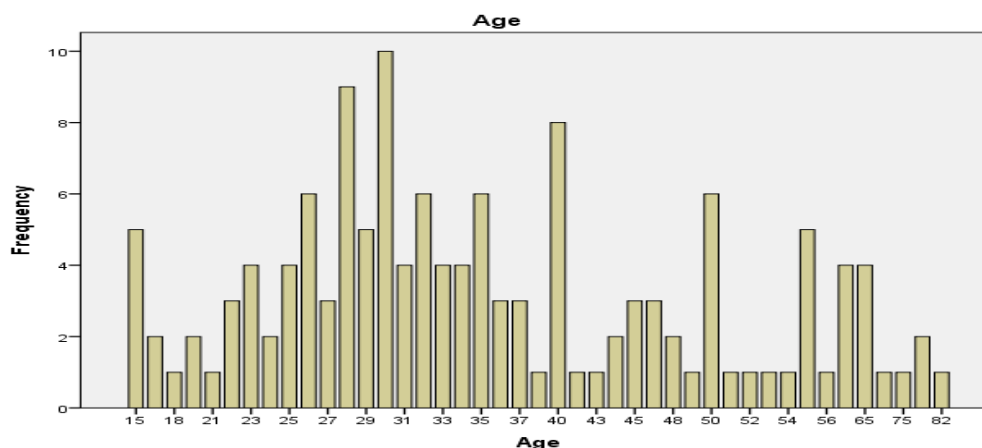


Figure 2 :- Age distribution bar chart

Out of the 138 patients 65 % showed brain parenchymal or Paranasal sinus pathology[of which 31% shows white matter change and 28% some form of sinusitis . Among brain parenchymal pathologies one patient has tectal glioma and one had chronic superior sagittal sinus thrombosis. Choroid fissure cyst, paraital lobe gliosis, cavernous angioma and idiopathic intracranial hypertension were also found each in one patient.

Of the normal findings 67% are females which may be due to the higher number of females with chronic headache in the study.

There is strong association with age and normal findings as younger patients are more likely to have normal finding while as the age increase these decrease. $R = 1.0$

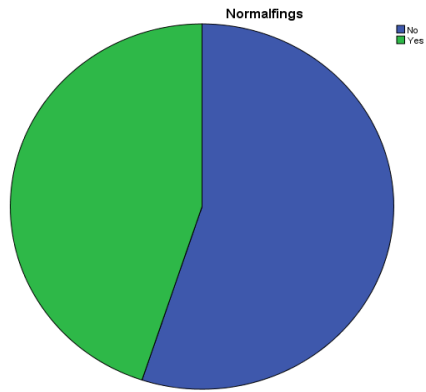


Figure 3:- Proportion of the normal findings pie chart

Overall the most frequent finding in the study is normal MRI study(45%) with white matter changes and sinusitis following(31% and 28%) ; 6% have both sinusitis and white matter changes . Significant findings like intracranial tumor and vascular malformations are found only in about 1.5% of patients.

6. Discussion

Most studies provide lower number of clinically significant Brain MRI findings in patients with chronic headache(4,8,9).

In this study significant pathologies were found in 1.5% similar with a study Spain, 1.2%, and a bit higher than a study in Motojima General Hospital;Japan which is 0.7%. on the other hand in Peoples College of Medical Sciences and Research centre, Bhopal, MP, India, only 29 cases (5.8%) revealed some form of brain parenchymal pathology. This was far from review done in Southern Nigerian Tertiary Hospital; where Seventy-four (74) cases with complaints of chronic and recurrent headaches without focal neurological deficit evaluated and surgically correctable causes of headaches like space occupying lesions, subdural hematoma, and hydrocephalus accounted for 25.6%. Relatively high yield may have been influenced by the method of selection, in which all the cases reviewed were referred for neuroimaging after assessment by a specialist Neurologist. The normal MRI findings are about 45% in the current study in a similar pattern with the study done in Japan which is 55% .

In this study out of the 138 patients 65 % showed brain parenchymal or Paranasal sinus pathology[of which 31% shows white matter change and 28% some form of sinusitis similar with research done in Motojima General Hospital;Japan where result revealed 169 patients (55.2%) were with no abnormality , 135 (44.1%) were those with minor abnormality. In the same study the diagnoses of those with significant findings were: pituitary adenoma , large arachnoid cyst , meningioma n , hydrocephalus, Chiari type I malformation, ischaemic stroke, cavernous angioma, arteriovenous malformation, low-grade astrocytoma, brain stem glioma, colloid cyst, posterior fossa papilloma. (8). Whereas in the present study among brain parenchymal pathologies one patient has tectal glioma and one had chronic superior sagittal sinus thrombosis. Choroid fissure cyst, paraital lobe gliosis, cavarnus angioma and idiopatic intracranial hypertension were also found each in one patient.

7. Limitations of this study

While radiology information system makes it easier to access reported MRI cases and their clinical data I encountered many reported MRI cases with no clinical data attached or not properly documented by the requesting health worker. The limited information in the request paper is used for the data in the study , patients chart were not revised.

8. Conclusions and Recommendation

MRI of patients with chronic headache yields a low percentage of clinically significant positive findings. In the absence of clinical warning criteria of secondary headache, the only reason for CT or MRI scan seems to be reassuring the patients and their loved. Researches shall be done in Ethiopia as MRI is emerging neuroimaging modality to utilize it effectively.

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