

## Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: [www.jamdsr.com](http://www.jamdsr.com)

doi: 10.21276/jamdsr

ICV = 82.06

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

## Original Research

### Evaluation of Magnetic resonance imaging findings in cluster headache patients

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#### ABSTRACT

**Background:** Cluster headache is an excruciating pain syndrome characterized by unilateral head pain attacks, lasting between 15 and 180 min, accompanied by marked ipsilateral cranial autonomic symptoms, such as lacrimation and conjunctival injection. Hence; the present study was undertaken for assessing Magnetic resonance imaging findings in cluster headache patients. **Materials & methods:** A total of 20 cluster headache patients were enrolled in the present study. Complete demographic and clinical details of all the patients were obtained. MRI scanning of all the patients was done and analysis was done by experienced and registered radiologists. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. **Results:** Abnormal MRI findings were found to be present in 1 patient. Patient with cluster headache with significant abnormal MRI findings showed T2 and T2 flair hyperintensities in periventricular, subcortical and deep white matter of bilateral cerebral hemispheres. **Conclusion:** Magnetic resonance imaging plays a significant role in detecting neural abnormalities in cluster headache patients.

**Key words:** Cluster headache, Magnetic resonance imaging

Received: 25 January, 2020

Accepted: 26 February, 2020

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**This article may be cited as:** Dubey SK, Parasar DS. Evaluation of Magnetic resonance imaging findings in cluster headache patients. J Adv Med Dent Scie Res 2020;8(3):154-156.

#### INTRODUCTION

Primary headaches such as migraine and cluster headache (CH) were described as vasomotor headaches. Cluster headache is an excruciating pain syndrome characterized by unilateral head pain attacks, lasting between 15 and 180 min, accompanied by marked ipsilateral cranial autonomic symptoms, such as lacrimation and conjunctival injection.<sup>1-3</sup>

Patients with cluster type headache have been reported to exhibit significant increment of the mean, axial and perpendicular diffusivity in widespread white matter regions in the frontal, parietal, temporal and occipital lobes. Reduced fractional anisotropy has also been reported in the corpus callosum and some frontal and parietal white matter tracts mainly in the contralateral side of the pain. MRI studies have reported grey as well as white matter alterations in Cluster headache similar to those found in migraine.<sup>4-6</sup> Hence; the present study was undertaken to evaluate assessing Magnetic resonance imaging findings in cluster headache patients

#### MATERIALS & METHODS

The present study was planned in the department of radio-diagnosis to evaluate Magnetic resonance imaging findings in cluster headache patients. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 20 cluster headache patients were enrolled in the present study. Complete demographic and clinical details of all the patients were obtained. Patients with history of any other systemic illness, any form of malignancy or drug allergy were excluded from study.

MRI scanning of all the patients was done and analysis was carried out by experienced and registered radiologists. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

**RESULTS**

In the present study, a total of 20 cluster headache patients were enrolled. Mean age of the patients was 46.5 years. 40 percent of the patients belonged to the age group of less than 30 years. Another 40 percent belonged to the age group of 30 to 50 years while remaining 20 percent of the patients belonged to the

age group of more than 50 years. 60 percent of the patients were males.

Abnormal MRI findings were found to be present in 1 patient. Patient with cluster headache with significant abnormal MRI findings showed T2 and T2 flair hyperintensities in periventricular, subcortical and deep white matter of bilateral cerebral hemispheres.

**Table 1:** Demographic data

Parameter		Number of patients	Percentage of patients
Age group (years)	Less than 30	4	40
	30 to 50	4	40
	More than 50	2	20
Gender	Males	6	60
	Females	4	40

**Table 2:** MRI findings

Parameter	T1	T2	T2 FLAIR	DWI	SWI
Patient	-	Hyperintensities in bilateral Peri-ventricular, subcortical and deep white matter	Hyperintensities in bilateral Peri-ventricular, subcortical and deep white matter	-	-

**DISCUSSION**

Cluster headache is an excruciating pain syndrome characterized by unilateral head pain attacks, lasting between 15 and 180 min, accompanied by marked ipsilateral cranial autonomic symptoms, such as lacrimation and conjunctival injection. Despite important insights provided by neuroimaging studies and deep brain stimulation findings, the pathophysiology of cluster headache and its pathways of chronicization are still elusive. In this mini-review, we will provide an overview of the functional and structural neuroimaging studies in episodic and chronic cluster headache conditions conducted to clarify the underlying pathophysiology. MRI is the procedure of choice for evaluating patients with subacute or chronic headaches, a suspected brain tumor, or other space-occupying mass and hydrocephalus. Although claustrophobia was a problem for many patients with the early MRI machines, recent developments have made the units much more patient-friendly. Patients undergoing MRI examination may receive an injection of a contrast agent to help the neuroradiologist more thoroughly evaluate the brain and its associated blood vessels. Cluster headache is a less common type of primary headache. Cluster headache is sometimes referred to as a neurovascular headache, evidence now suggests that its cause may lie in the hypothalamus, a region deep in the brain that regulates, among other functions, the biologic rhythms of the body.<sup>7-9</sup> Hence; the present study was undertaken for assessing Magnetic resonance imaging findings in cluster headache patients.

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remaining 20 percent of the patients belonged to the age group of more than 50 years. 60 percent of the patients were males.

Rai GS et al evaluated the findings of computed tomography (CT) and Magnetic Resonance Imaging (MRI) among patients presented with the chief complaint of headache and to compare the findings between two groups of patients. This retrospective observational study was carried out in 500 selected patients. Siemens Somatom sensation 40 slice MDCT and Siemens magnetom 1.5T MRI scanner were used for imaging. Five hundred patients of 10 to 70 year age were selected for the study based on our criteria of selection. All 500 patients were divided in to two groups A and B based on presence or absence of red flag signs and CWC signs.

Group A consists of 48 patients having one or more red flag or CWC signs and group B consists of 452 patients those don't have any above signs. 29 cases (60.4%) out of total 48 cases of group A is suffering from chronic headache as compared to 97 cases (21.5%) out of total 452 patients of group B is having positive findings (p-value<0.05). Out of 500 patients, 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%) patients. CT/MRI in patients without red flag or CWC sign yields very low percentage of clinically significant positive findings in neuroimaging. In the absence of these, the only reason for CT or MRI scan seems to reassure the patients and their loved ones.<sup>10</sup>

In the present study, abnormal MRI findings were found to be present in 1 patient. Patient with cluster headache with significant abnormal MRI findings showed T2 and T2 flair hyperintensities in periventricular, subcortical and deep white matter of

bilateral cerebral hemispheres. Gupta V et al ascertained the frequency of normal head computed tomography (CT) scans and positive CT scan findings in patients having chronic headache as chief complaint. Head CT scans done over a period of two years were retrospectively evaluated. On the basis of CT reports, the patients were divided into two groups: Group A, having headache as the only complaint, and Group B, having headache and additional neurological signs or symptoms. A total of 2498 patient reports were evaluated. There were 1772 patients in Group A and 726 patients in Group B. In Group A, 82% (n=1453) patients had normal head CT, whereas in Group B 74.5% (n=541) patients had a normal CT scan. There were 13.22% head CT scans showing significant findings in Group B, as compared to 6.2% in Group A. Both these differences were found to be statistically significant. CT findings such as infections, neoplasm, hydrocephalus, and extra-axial collections were higher in Group B when compared to Group A. CT examination in patients with isolated chronic headache is normal in high percentage of patients.<sup>11</sup>

Despite these inconsistencies, a recent investigation showed an increased volume of the bilateral anterior hypothalamus of individuals with episodic (out-of-bout) and chronic CH but not in individuals with migraine. This study directly pointed to alterations of the suprachiasmatic nucleus, the site of the endogenous biological clock, and the paraventricular nucleus, both part of the anterior hypothalamus. Their abnormalities could explain the typical circadian rhythms of the recurrent attacks of CH, as well as some autonomic phenomena of the disease. These results confirm hypothalamic morphological alteration in episodic (in both in-bout and out-of-bout) and in chronic CH patients. It is important to note that possible dynamic morphological changes of the hypothalamus might have been underestimated due to the difficulties in investigating this relatively small structure with MRI.<sup>12</sup>

## CONCLUSION

Notwithstanding the notable number of neuroimaging studies in CH, we are still far from fully understanding the brain mechanisms of this disorder. However, some, although tentative and not conclusive considerations, can be done. Magnetic resonance imaging plays a significant role in detecting neural abnormalities in cluster headache patients.

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