



A CORRELATIONAL STUDY OF HEADACHE AND INTRACRANIAL CALCIFICATIONS

Jatin P V	Neurology Resident, Institute of Neurology, Madras Medical College, Chennai, Tamil Nadu, India.
Jawahar Marimuthu*	Professor of Neurology, Institute of Neurology, Madras Medical College, Chennai, Tamil Nadu, India. *Corresponding Author
Lakshmi Narasimhan Ranganathan	Professor and Head of Neurology, Institute of Neurology, Madras Medical College, Chennai, Tamil Nadu, India.

ABSTRACT **INTRODUCTION & AIM** - An association between intracranial calcifications and headache characteristics has scarcely been studied previously. Here we aim to study this association which may help in defining further characteristics to the headache. **PATIENTS & METHODS** - In this study, computed tomography images of patients coming to the headache clinic of Rajiv Gandhi Govt General Hospital were assessed from December 2018 to May 2019. Headache type was classified according to ICHD-3 classification criteria. Clinical phenotype was determined using a headache questionnaire. Statistical analysis was done using SPSS software. **RESULTS** - 88 subjects with calcifications (study group) and a control group of 79 subjects without calcification were assessed. Demographic data revealed 8 males and 80 female patients in the study group and 12 male, 67 female patients in the control group. 86.4% and 92.4% of above mentioned study groups were in the age group of 20-60 years. Migraine without Aura (60% & 54%) was the most common type headache among the respective groups. Headache severity was more in the study group (78.4%) in comparison to the control group (25.3%), the difference was statistically significant ($p < 0.001$). Headache frequency of more than 15 days per month did not show a significant statistical difference ($p = 0.195$). Within the study group, headache severity was found to be more in those with calcification size of 7.5mm or greater, with a significant statistical difference ($p < 0.001$) when compared with those with calcification size less than 7.5mm. Calcification number and headache severity did not show a significant statistical difference ($p = 0.2689$). Headache location and site of calcification showed a significant statistical difference with Unilateral right sided ($p < 0.001$) and left sided ($p < 0.001$) headache. Bilateral headache and Unilateral headache with alternating sides did not show a significant statistical difference. **CONCLUSION** - There was a statistically significant correlation between the severity of headache and intracranial calcification both in its presence and size of calcification. In those with Unilateral headache, location of headache correlated with the site of calcification. Headache frequency and severity in relation to number of calcifications did not show a significant association. Further studies are required to yield a more accurate study result.

KEYWORDS : Headache, Intracranial-calcification, Primary headache, Migraine, Tension type headache

INTRODUCTION –

Headache is one among the most common complaints in neurological practice. It itself is a painful and disabling feature of a small number of primary headache disorders, namely migraine, tension-type headache, and cluster headache. Headache can be caused by or occur secondarily to a long list of conditions, the most common of which is medication-overuse headache.¹ Majority of the patients with chronic or recurrent headache have no significant intracranial abnormalities detected on neuroimaging.²

Intracranial calcifications have been incidentally found in patients with complaints of headache. There is limited data in the current literature about the association of intracranial calcification and headache type & characteristics. Such association has scarcely been studied previously. In this study we aim evaluate this association which may help in defining further characteristics to the headache.

PATIENTS & METHODS –

It is a cross-sectional study where computed tomography images of patients coming to the headache clinic of Rajiv Gandhi Govt General Hospital were assessed from December 2018 to May 2019. Headache type was classified according to International Classification of Headache disorders -3 classification criteria.³ Clinical phenotype was determined using a headache questionnaire. All patients greater than 13 years of age presenting to the headache clinic during the study time period were included in the study except for those diagnosed as having secondary headache.

A total of 168 subjects were assessed and 88 of those had calcifications which was labelled as the study group, and 79 subjects did not have calcifications on neuroimaging and was labelled as the control group. Within the study group subjects, different headache characteristics such as headache severity, frequency in relation to calcification size (<7.5 mm vs 7.5 mm), number (<2 vs 2) and location were assessed for any statistical significance.

deviation, categorical variables, percentages and numbers. The parametric variables were evaluated with the Student t test in independent groups and the categorical variables with the Pearson chi-square test. $P < 0.05$ was considered as the limit of statistical significance. All statistical procedures were performed using the Statistical Package for Social Sciences (SPSS) software.

RESULTS

A Total of 88 subjects with calcifications and 79 subjects without calcifications were included in the study. Demographic data revealed 8(9%) males and 80(91%) females in those with intracranial calcifications constituting the study group and 12(15%) males, 67(85%) females in the control group. Mean age was 39.63 12.92 years and 39.88 12.93 years in the study and control group respectively. 86.4% and 92.4% of above mentioned study groups were in the age group of 20-60 years. There was no statistically significant difference between the two groups by the way of mean age and gender.

Migraine without aura was the most common type of headache type in both the groups with 60(68.1%) and 54(67.5%) subjects in study and control groups respectively. This was followed by Tension type headache in 20(22.7%) and 18(22.5%) subjects, Migraine with aura in 7(7.9%) and 6(7.5) subjects, Autonomic cephalalgias in 1(1.2%) subject of study and control groups respectively.

Headache severity was more in the study group with 78.4% patients in comparison with the control group with 25.3% patients presenting with severe intensity headache. This difference was found to be statistically significant ($p < 0.001$).

Headache frequency of more than 15 days per month did not show a significant statistical difference between the two groups. ($p = 0.195$)

Laterality of the headache did not show a significant statistical difference between the two groups with 32% and 29% showing bilateral headache and 68% and 71% subjects showing unilateral headache in the study and control groups respectively.

The parametric variables were expressed in terms of mean + standard

Within the study group, headache severity was found to be more in those with calcification of size 7.5mm or greater, with a significant statistical difference ($p < 0.001$) when compared to those with calcification size less than 7.5mm.

Number of calcifications, those with less than 2 in comparison to those with 2 within the study group, and headache severity did not show a significant statistical difference ($p = 0.2689$).

Headache location and site of calcification showed a significant statistical difference with Unilateral right sided ($p < 0.001$) and left sided ($p < 0.001$) headache. There were a total of 16 patients who had right sided headache and among them 11 had right sided calcification. There were a total of 19 patients who had left sided headache and among them 14 had left sided calcifications. Bilateral headache and Unilateral headache with alternating sides in relation to the calcification location did not show a significant statistical difference.

DISCUSSION

In this study, there was a statistically significant correlation between the severity of headache and intracranial calcification both in its presence and size of calcification. In those with Unilateral headache, location of headache correlated with the site of calcification. Headache frequency and severity in relation to number of calcifications did not show a significant association.

In a study done by H.K. Ozlece et al, a statistically significant higher levels of pineal gland calcifications were detected in patients with Migraine headache. It was claimed that the grade of pineal calcification could be used as an indicator of melatonin levels.⁴ Liebrich et al⁵ underlined the fact that non calcified pineal gland volume was positively correlated with the melatonin levels. The reduction in the endogenous melatonin levels and impairment of the melatonin release patterns have also been detected in the studies of migraine patients.⁶

A case series of two patients with migraine like symptoms and bilateral cerebro parietooccipital calcifications, reported by Dr. Pier Antonio Battistella et al⁷, suggested the possibility of cerebral calcifications acting as a cofactor in causing or precipitating a migraine like headache.

A case report by Dr. Maria Carola Narbone⁸, suggested a correlation of midline intracranial calcified lesion and cluster like headache.

In a study done by H. Forstl et al⁹, they concluded that in patient with basal ganglia calcifications, there was no significant increased risk of headache among other neurological complications when compared with a population without intracranial complications.

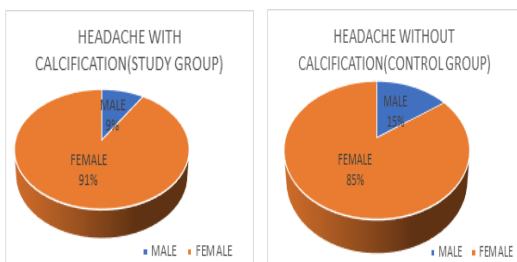
In conclusion, this study showed a statistically significant correlation of intracranial calcifications and certain headache characteristics such as headache severity and location of pain in relation to the intracranial calcification. There was no significant statistical difference in headache frequency in association with or without intracranial calcification and also number of calcifications did not show a statistically significant correlation with headache severity.

LIMITATIONS

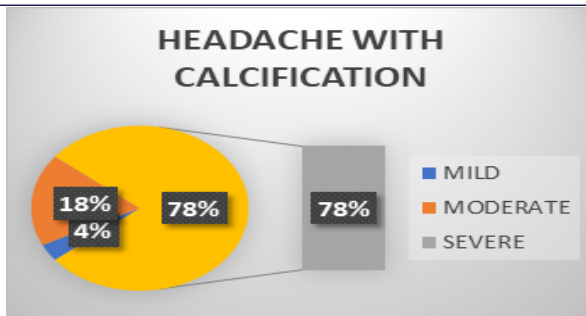
In this study, patients attending the headache clinic at Rajiv Gandhi Govt General hospital were assessed and generalization of this data to the larger population remains to be studied. Further studies are required to yield a more accurate study result.

ACKNOWLEDGEMENTS : None

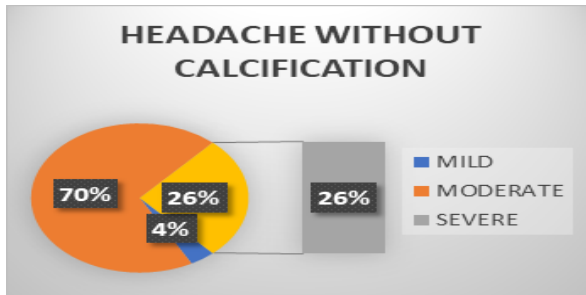
CONFLICTS OF INTEREST : None



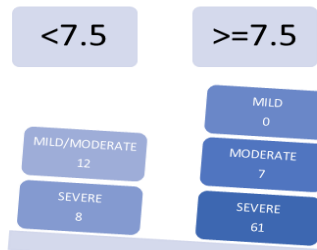
Demographic Data



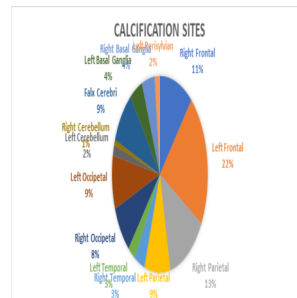
Headache Severity in Study group



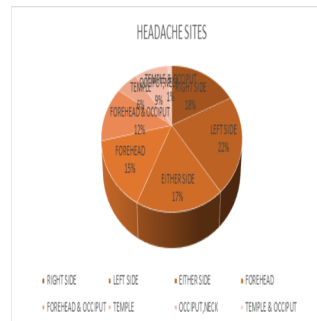
Headache Severity in Control group



Calcification size and Headache Severity



Calcification Sites



Headache Sites

REFERENCES

1. WHO/T, Pietrasik, Headache Disorders, who.int, 8th April 2016, accessed on 10/5/2020, <https://www.who.int/news-room/fact-sheets/detail/headache-disorders>
2. Rawal, Sanju, et al. "Role of Computed Tomography In Evaluation of Patients With History of Chronic Headache." Journal of Universal College of Medical Sciences 3.4 (2015): 6-9.
3. Olesen, Jes, et al. "The international classification of headache disorders, (beta version)." Cephalalgia 33.9 (2013): 629-808.
4. Ozlece, H. K., et al. "Is there a correlation between the pineal gland calcification and migraine." Eur Rev Med Pharmacol Sci 19.20 (2015): 3861-4.

5. Liebrich, Luisa Sophie, et al. "Morphology and function: MR pineal volume and melatonin level in human saliva are correlated." *Journal of Magnetic Resonance Imaging* 40.4 (2014): 966-971.
6. Giuseppe Nappi, MDe. "Plasma melatonin pattern in chronic and episodic headaches. Evaluation during sleep and waking." *Functional neurology* 23.2 (2008): 77-81.
7. Battistella, Pier Antonio, et al. "Bilateral cerebral occipital calcifications and migraine like headache." *Cephalalgia* 7.2 (1987): 125-129.
8. Narbone, Maria Carola, et al. "Cluster like headache and a median intracranial calcified lesion: case report." *Headache: The Journal of Head and Face Pain* 31.10 (1991): 684-685.
9. Förstl, H., et al. "Neurological disorders in 166 patients with basal ganglia calcification: a statistical evaluation." *Journal of neurology* 239.1 (1992): 36-38.