

A Comparative Study of Neuropsychiatric Manifestations and White Matter Intensities on Brain Imaging in Patients with Migraine and Tension Type Headache

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Abstract

Background: Studies in both clinical and community-based settings have demonstrated number of specific neuro psychiatric disorders in migraine. This comorbidity has not been identified with TTH. Also, migraine is an independent risk factor for deep white matter hyperintensities on MRI brain imaging. However, no general consensus has yet been established regarding neuro psychiatric comorbidities and White matter intensities on imaging among patients with migraine and TTH.

Aims and objectives: Present study aimed to know the prevalence of Neuropsychiatric Comorbidities and white matter intensities on MRI brain imaging and compare them in patients with migraine and tension type headache.

Materials and methods: All patients of migraine and TTH who were diagnosed by ICHD 3 beta version criteria, aged 18-55 years, attending neurology OP in

King George Hospital between July 2020 and January 2021 were included in study.

Scales administered by authors: International Headache Society verbal 4-point scale, Mini Mental Status Examination, Montreal Cognitive assessment scale, Neuro psychiatric inventory questionnaire, Insomnia severity scale, Epworth Sleepiness scale, Headache impact test, Fazekas’s scale

Results: Present study included 53 patients of migraine and 52 patients of TTH. 35.85% cases were seen with cognitive impairment in migraine and 44.23% in TTH group. In migraine group prevalence of insomnia was 52.83% and 39.62% cases in TTH group. In migraine group 24.52% cases were seen with WMHs whereas 7.55% cases in TTH Group. Statistically no significant difference was observed between cognitive impairment, insomnia and WMHs in both groups. Although no

statistically significant difference was observed between prevalence of psychiatric features in both groups, statistically significant correlation was observed between irritability and both groups ($p=0.023$).

Conclusion: Neuro psychiatric features and white matter intensities on MRI brain imaging are found in both migraine and TTH

Keywords: Migraine, Tension type headache, psychiatric features, White matter hyper intensities.

Introduction

Primary headaches are disorders in which headaches occur in absence of any exogenous cause. Most common are Migraine, tension type headache and TACs notably cluster headache. Tension - type headache is very common, with a lifetime prevalence ranging between 30% and 78% [1]. Migraine has a one-year prevalence of 12%, including 18% of women and 6% of men (Lipton et al. 2007). Neuro psychiatric comorbidities seen commonly in migraine are memory impairment, anxiety, mood disorders and sleep disturbances [2-6]. Neuro transmitters involved in cognition play a key role in pathophysiology of migraine⁶

Depression was associated with reduced tyramine conjugation in migraine [7]. Common subcortical structures (hypothalamus), signalling molecules and glymphatic system are associated with sleep disorders in migraine [8]. Despite high comorbidity of migraine with psychiatric features, this comorbidity has not been identified with TTH.

Kruit et al. (2004a) consider migraine as an independent risk factor for deep white matter hyperintensities on MRI brain imaging [9]. WMH found to be associated with increased risk of dementia and stroke (DeBette 2010), late onset depression (Herrmann et al. 2007) and Parkinson's disease (Beyer et al. 2006).

However, no general consensus has yet been established regarding neuropsychiatric comorbidities and White matter intensities on imaging among patients with migraine and TTH.

Materials and Methods

It was Comparative cross-sectional study conducted during the period of 18 months. Patients of migraine and tension type headache from Department of Neurology (Both Out Patient and In Patient), King George Hospital, Visakhapatnam age between 18 to 55 years who were diagnosed by ICHD beta version 3 criteria (including newly diagnosed and on treatment patients) were included in the study. Complicated migraine like migrainous infarction, primary headaches other than migraine and TTH, secondary headaches, major psychiatric illness, pregnancy with migraine and TTH, major neurocognitive disorder, patients with DM, HTN, dys lipidaemia, smoking and alcoholism were excluded from the study.

Different scales used in assessing patients: IHS verbal 4-point scale for pain severity, Mini Mental Status Examination [MMSE], Montreal Cognitive assessment scale [MOCA], Neuro psychiatric inventory questionnaire, Insomnia severity scale, Epworth Sleepiness scale [ESS], Head ache impact test (version 1.1) [HIT], Fazeka's scale for white matter lesions.

Statistical analysis:

IBM SPSS Version 26 was used for statistics calculations. P value < 0.05 was set for significance. Variables were described in form of mean \pm SD and student's 't' test was used to calculate p value.

Results

Present study included 53 patients of migraine (n=53) and 52 patients of TTH (n=52). In migraine group, 18 patients were with migraine without aura (n=18), 18 patients of migraine with aura (n=18), 3 patients with chronic migraine (n=3) and 4 patients with probable

migraine (n=4). In TTH group, 38 patients were with Episodic TTH (n=38) and 14 patients with Chronic TTH (n=14). Our results from table 1 list the mean values of various clinical parameters in both groups. Table 3 demonstrates comparison of neuropsychiatric features and white matter intensities in both groups. There is statistically no significant difference in study parameters among both the groups.

Table 1: Demographic profile and clinical features

Variables	Migraine	TTH	P value
Age	34.66±8.80	35.35±9.70	0.49
Severity			
Severe	62.26%	36.76%	0.003
Moderate	38.85%	51.92%	
Mild	1.89%	11.32%	
MMSE	27.42±2.89	26.58±3.71	0.059
MOCA	25.66±3.99	24.87±4.21	0.59
ESS	2.0±1.41	1.98±1.40	0.68
ISI	8.17±6.49	6.75±6.14	0.85
HIT 6	62.13±5.37	58.25±6.89	0.016

Table 2: Neuropsychiatric Features

Variables	Migraine	TTH	P value
Agitation			
Yes	5.66%	5.76%	0.98
No	94.34%	94.24%	
Depression			
Yes	38.85%	21.15%	0.09
No	64.15%	78.85%	
Anxiety			
Yes	52.83%	38.46%	0.08
No	47.17%	61.54%	
Irritability			
Yes	83.01%	63.46%	0.02
No	16.99%	36.54%	

Table 3: Comparison of parameters

Cognitive Impairment			
Yes	35.85%	44.23%	0.39
No	64.15%	55.77%	
Insomnia			
Yes	52.83%	39.62%	0.21
No	47.17%	60.38%	
Psychiatric features			
Yes	86.79%	69.81%	0.03
No	13.21%	30.19%	
White matter hyperintensities			
Yes	24.52%	7.55%	0.01
No	75.48%	92.45%	

Discussion

With an 80% lifetime frequency, tension headaches are much more frequent than migraine. Neuropsychiatric comorbidities in migraineurs can include memory loss, mood difficulties, and sleep disturbances. Neuro transmitters associated with cognition are important in the aetiology of migraine. Despite the significant rate of overlap between migraine and neuropsychiatric features, TTH has not yet detected this overlap. The current study found that the average age of the migraine group was 34.66 years, whereas the average age of the TTH group was 35.35 years. There was no statistically significant difference between the two groups. In the migraine group, 1.89 % of cases had mild intensity, 35.6 % had moderate intensity, and 62.2 % had severe intensity headache, whereas in the TTH group, 11.3 % of cases had mild intensity, 51.9 % had moderate intensity, and 36.7 % had severe intensity headache. There was a statistically significant association between both groups and headache intensity. The average MMSE score for the migraine group was 27.41, whereas the average MMSE score for the TTH group was 26.57. There was no statistically significant difference in the MMSE scores of

these two groups. In the migraine group, the mean MOCA score was 25.66, while in the TTH group, the mean MOCA score was 24.86. In terms of MOCA score, there was no statistically significant difference between these two groups.

In the current study, 35.85% of migraine sufferers had cognitive impairment. According to Caroline Martins de Araujo et al., 65.3% of migraine sufferers have cognitive impairment.³ In the current study, the prevalence of cognitive impairment in the TTH group was 44.23%. There was no statistically significant difference in cognitive impairment between the groups. Previous studies higher prevalence may have resulted from included individuals as old as 65 years.

Migraine group average ISI score was 8.16, while TTH group average ISI score was 6.75. In migraine group prevalence of insomnia was 52.83% and 39.62% cases in TTH group. In previous study insomnia prevalence among participants with migraine, non-migraine headache, and non-headache was 25.9%, 15.1%, and 5.8%, respectively (Jiyoung Kim et al 2018) but other studies show insomnia prevalence similar to present study. Statistically no correlation was observed between insomnia and both groups.

In the migraine group, the prevalence of sleeplessness was 52.83%, while in the TTH group, it was 39.62%. There was statistically no association between either group and sleeplessness. In the migraine group, 5.66% of cases have agitation, whereas in the TTH group, 5.76% of cases have agitation. According to statistics, there was no link between agitation and either group ($p=0.981$). In the migraine group, there were 35.85% incidences of depression, compared to 21.15% in the TTH group. There was no statistically significant association between depression and any group ($p=0.097$). According to a study by Muftuoglu et al., migraine

patients had higher levels of anxiety and depression than the healthy controls. In a prior study, mood disorders were seen in 13.6% of migraine sufferers and depression in 10.40% of patients. In the migraine group, 52.83% of cases had anxiety, while 38.46% of cases in the TTH group had anxiety. There was statistically no association between anxiety with any group. In the migraine group, 83.01% of patients were found to be irritable, compared to 63.46% of cases in the TTH group. Irritability and both groups showed a statistically significant association ($p=0.023$). In the migraine group, the prevalence of psychiatric features was 86.79%, compared to 69.81% in the TTH group. According to statistics, there was no discernible difference in prevalence between the two groups and psychiatric traits. Migraine group average HIT 6 score was 62.13, while TTH group average HIT 6 score was 58.25. In terms of the HIT 6 score, there was no statistically significant difference between these two groups.

Compared to 7.55% of instances in the TTH group, 24.52% of migraine cases in the migraine group had white matter intensity. White matter intensities were shown to be statistically related to both groups. Similar findings were noted by Kim N. et al. in their study. which found that the average age of the migraine group was 31.2 years and the average age of the TTH group was 33.6 years. There was no association between these two groups. WMHs were noted in 24% of migraine patients and 28% of tension headache patients ($p=0.71$). Patient age and the number of WMHs had a positive connection ($p=0.04$).

Cognitive impairment and migraine with aura group and migraine without aura group showed statistically significant connection.

A statistically significant association between the chronic migraine group and insomnia was discovered. According

to psychiatric manifestations, white matter intensities and HIT 6 score, there was no statistically significant difference between the migraine subgroups. According to cognitive impairment, sleeplessness, psychiatric aspects, HIT6 score and white matter intensities there was no significant association between CTTH and ETTH. The present study's clinically based design, standardised diagnosis of migraine and TTH in accordance with ICHD criteria and sensitive MRI technique are its main strong characteristics. The study's limitations were a small sample size.

Conclusion

Both migraine and TTH exhibit neuropsychiatric features and white matter intensity on MRI brain imaging. There is no conclusive association between the duration of headache and neuro psychiatric characteristics. The identification of concomitant psychiatric illnesses by routine screening is of utmost clinical importance and must be included in headache clinics as the treatment of these disorders may greatly enhance quality of life in headache patients. The correlation between WMH and headache should be taken into account if future therapy plans for white matter hyperintensities.

Abbreviations

ICHD- International Classification of Headache Disorders, TTH – Tension Type Headache, CTTH -Chronic Tension Type Headache, ETTH –Episodic Tension Type Headache, WMHs - White Matter Hyperintensities

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