

## Association of lipid profile in migraine and non- migraine patients: an observational study

Anchal Bana<sup>1\*</sup>, Suman Bhartiya<sup>2</sup>, Prachi Shukla<sup>3</sup>, Swati Agarwal<sup>4</sup>, Vijay Pratap Singh<sup>5</sup>

<sup>1</sup>Post Graduate Student, Department Of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, U.P, India.

<sup>2</sup>Professor and Head, Department Of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, U.P, India.

<sup>3</sup>Associate Professor, Department Of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, U.P, India.

<sup>4</sup>Assistant Professor, Department Of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, U.P, India.

<sup>5</sup>Assistant Professor, Department Of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, U.P, India.

Received: 01-12-2020 / Revised: 10-12-2020 / Accepted: 02-01-2021

### Abstract

**Introduction:** Migraine is one of the commonly encountered conditions in medical practice. It is a complex syndrome with many symptoms and manifestations. Migraine is defined as a moderate to severe headache lasting four to 72 hours, usually preceded by a prodromal period of depression, irritability, restlessness, anorexia and often associated with an aura. It may be visual, somatosensory and motor in nature. It is of special interest to ophthalmologists because migraine is often associated with visual symptoms and at times can even be alarming. Dyslipidemia is one of the possible risk factor in patients of migraine and having increase risk of coronary vascular disease. Due to the high prevalence of migraine in India, studies should be performed to turn attention to this issue, which has been neglected so far. **Materials and Methods:** The present study was conducted in the Department of Ophthalmology at Muzaffarnagar Medical College and Hospital from October 2018 to April 2020. A total of 525 patients were included in this study, out of which 325 patients were taken as control having no significant complain under group A and 200 patients having migraine were taken as cases under group B. **Results:** Serum Total cholesterol (>170mg/dL), LDL (>100mg/dL), HDL (<45mg/dL) and Triglyceride (>150mg/dL) was reported among 68.5%, 61.5%, 25.5% and 21% of the subjects respectively in group B, while the same was revealed in 9.54%, 6.77%, 5.23% and 3.69% of the subjects respectively in group A. **Conclusion:** This study found a significant association between migraine and deranged lipid profile.

**Keywords:** Migraine, Lipid profile, Cholesterol, Dyslipidemia, Stroke

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### Introduction

Migraine is one of the commonly encountered conditions in medical practice. It is a complex syndrome with many symptoms and manifestations. Migraine is defined as a moderate to severe headache lasting four to 72 hours, usually preceded by a prodromal period of depression, irritability, restlessness, anorexia and often associated with an aura. It may be visual, somatosensory and motor in nature. It is of special interest to ophthalmologists because migraine is often associated with visual symptoms and at times can even be alarming. There

are several reports of research and novel data on the prevalence, pathophysiology, clinical presentation and treatment of migraine. The complexity and diversity of migraine is not always well appreciated by many ophthalmologists[1,2]. The clear understanding of underlying mechanisms of migraine initiation and symptoms are unfortunately complicated by various presentations. Other neurotransmitters such as dopamine, noradrenaline and nitric oxide in different regions of the brain have also been implicated in migraine genesis. Migraine symptoms can be initiated by dopaminergic stimulation and dopamine receptor antagonist are therapeutically effective. There is still more scope to understand about underlying events in migraine pathogenesis and new treatments for better management[3,4]. A number of studies have shown that high levels of cholesterol may occur even in more than 50% of patients with migraine[5,6]. The fundamental problem in the proper diagnosis of dyslipidemia is related to its intrinsic and silent

\*Correspondence

**Dr. Anchal Bana**

Post Graduate Student, Department Of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, U.P, India.

E-mail: [anchalbana@gmail.com](mailto:anchalbana@gmail.com)

nature, which can lead to major and destructive complications such as stroke, heart attacks and even death[7]. Some studies have suggested that the frequency and severity of migraine attacks may be related to the higher level of serum lipids. Other studies also show that dyslipidemia is one of the possible risk factor in patients of migraine and may lead to increased risk of coronary vascular disease. Due to the high prevalence of migraine in India, studies should be performed to draw attention to this issue, which has been neglected so far[8,9]. The significant disability caused by hyperlipidemia and also due to its social and economic disadvantages, emphasis should be paid to exacerbating factors and long-term complications of the disease[10].

#### Materials and Methods

The present study was conducted in the Department of Ophthalmology at Muzaffarnagar Medical College and Hospital from October 2018 to April 2020. A total of 525 patients were included in this study, out of which 325 patients were taken as control having no significant complain

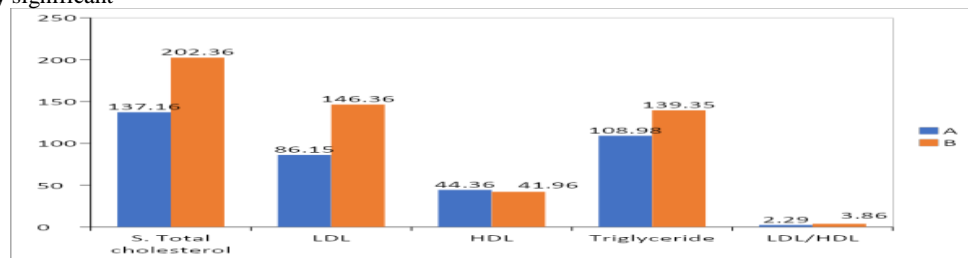
under group A and 200 patients having migraine were taken as cases under group B. All the patients were enrolled in the study after obtaining written informed consent and approval from Institutional Ethical Committee. Detailed history regarding patients name, age, sex, occupation, address, presenting symptoms, duration, progression and associated conditions were recorded. Detailed history regarding migraine such as type of migraine, symptoms related to aura, duration, type of treatment, if he /she has taken in the past and lipid profile including LDL, HDL, Serum triglycerides, total cholesterol were recorded. Migraine assessment for patients was done. Diagnosis of migraine and categorization of migraine was based on the second International Classification of Headache Disorders (ICHD II). We distinguished 'migraine' and non-migraine' headache by applying the ICHD II criteria for 'probable migraine' (fulfilment of all but one criteria for migraine without aura), which is used in many population-based studies to define migraine headache[1].

#### Results

**Table 1: Comparison of lipid profile among the study groups**

Group		S. Total cholesterol	LDL	HDL	Triglyceride	LDL/HDL
A	Mean	137.16	86.15	44.36	108.98	2.29
	N	325	325	325	325	325
	SD	6.35	6.19	5.16	5.97	.19
B	Mean	202.36	146.36	41.96	139.35	3.86
	N	200	200	200	200	200
	SD	5.17	5.82	5.61	5.88	.37
t test		15.01	13.71	0.72	18.05	42.48
p value		<0.01*	<0.01*	0.39	<0.01*	<0.01*

\*: statistically significant



**Fig 1: Comparison of lipid profile among the study groups**

Table 1, Fig 1 show the comparison of lipid profile among the study groups.

- Mean serum total cholesterol was comparatively higher in group B (202.36) as compared to group A (137.16).
- Mean LDL in group A was  $86.15 \pm 6.19$  and  $146.36 \pm 5.82$  in group B.
- Mean HDL was lower in group B as compared to group A.
- Mean triglyceride level was 139.35 and 108.98 in group B and A respectively.
- Mean LDL/HDL was  $2.29 \pm 0.17$  and  $3.86 \pm 0.37$  in group A and B respectively.

When mean serum total cholesterol, LDL, HDL, triglyceride level and LDL/HDL was compared statistically among group

A and B, the difference was found to be statistically significant in all the parameters as  $p < 0.05$  except mean serum HDL level which was found to be statistically insignificant having  $p > 0.05$ .

#### Discussion

Total Serum Cholesterol ( $>170\text{mg/dL}$ ), LDL ( $>100\text{mg/dL}$ ), HDL ( $<45\text{mg/dL}$ ) and Triglyceride ( $>150\text{mg/dL}$ ) was reported among 68.5%, 61.5%, 25.5% and 21% of the subjects respectively in group B, while the same was revealed in 9.54%, 6.77%, 5.23% and 3.69% of the subjects respectively in group A. In our study, mean serum total cholesterol and Mean LDL was reported in 137.16 and  $86.15 \pm 6.19$  in group A while the same was revealed in

202.36 and 146.36±5.82 in group B respectively. Mean HDL was lower in group B as compared to group A with statistically insignificant difference. Mean triglyceride level was 108.98 and 139.35 group A and B respectively. Mean LDL/HDL was 2.29±0.17 and 3.86±0.37 in group A and B respectively. When mean total serum cholesterol, LDL, triglyceride level and LDL/HDL was compared statistically among group A and B, it was found to be statistically significant as  $p < 0.05$ . Farhad Assarzadegan et al[11] in their study found that out of 50 migraine patients, 21 patients (42%) revealed high levels of cholesterol and 22 revealed high levels of LDL (44%); Their findings were similar to our study showing 137 (68.5%) and 123 (61.5%) migraine patients having high level of cholesterol and LDL respectively. The disparity in results is expected due to the difference in the sample size taken in both the studies. Gruber HJ[12] et al in their case-control study among normal weighted individuals found that migraineurs had increased levels of cholesterol, LDL-C and oxidized LDL-C compared to non-migraineurs controls. Those in the highest quartile of oxidized LDL-C had 7.93 times the odds of experiencing migraine compared those in the lowest quartile of oxidized LDL-C. However, they did not see any differences in the levels of oxidized LDL-C among migraineurs with and without aura[1]. In our study, oxidized LDL-C was not taken as a parameter for comparison between cases and control study group so we can not comment on this survey. Pamel a M. Rist et al[13] in their study found that elevated levels of total cholesterol and triglycerides were associated with migraine but did not see a difference in risk between migraineurs with and without aura. Elevated levels of serum total cholesterol and triglycerides in migraine patients in our study was also found which was comparable to the above study. In a population-based study from the Netherlands, subjects aged 20–65 years, increased total cholesterol and the total cholesterol to high-density lipoprotein cholesterol (HDL-C) ratio have been associated with migraine with aura ; In another study by Scher et al[14] indicated that migraine patients with aura were more likely to show an unsatisfactory level of cholesterol profile i.e. the mean total cholesterol was higher in migraineurs with aura when compared with normal population. Alia et al[15] reported that hyper-triglyceridemia and hypercholesterolemia were more frequent in patient with migraine. All studies sited above concluded that hypertriglyceridemia and hypercholesterolemia were more frequent in migraine patients as increase total cholesterol was found in our study too, which was comparable to the mentioned studies showing the same result. Hence it can be concluded by our study that there is a significant association between migraine and visual function defect as well as deranged lipid profile. As our study had a cross-sectional observational design and small sample size so lipid profile derangement in migraine patients has not been studied in detail on all the parameters like VLDL and oxidized LDL cholesterol, total cholesterol and total cholesterol to HDL ratio. Hence the authors

**Conflict of Interest: Nil**

**Source of support: Nil**

recommend further longitudinal studies in future with greater sample size.

#### References

1. Gutteridge IF, Cole BL. The prevalence and symptoms of migraine in a consecutive series of patients attending an optometric practice. *Optom Vis Sci* 2000; 77: 402-411.
2. Beers MH, Berkow R, eds. *The Merck Manual of Diagnosis and Therapy*, 17th ed. Whitehouse Station: NJ Merck and Co, 1999.
3. Olesen J, Iaxir B, Laiiritzen M. Focal hyperaemia followed by spreading oligoemia and impaired activation of rCBF in classic migraine. *Ann Neurol* 1981; 9: 344-352.
4. Olesen, Friberg L, Olsen Lassen NA, Andersen AR, Karle A. Timing and topography of cerebral blood flow, aura and headache during migraine attacks. *Ann Neurol* 1990; 28: 791-798.
5. Hadj-Taieb S, Elasmı M, Hammami MB et al. Dyslipidemia in the Greater Tunis population: prevalence and determinants. *Clin Lab* 2012; 58: 763-70.
6. Ford ES, Li C, Pearson WS et al. Trends in hypercholesterolemia, treatment and control among United States adults. *Int J Cardiol* 2010; 140: 226-35.
7. Ko M, Kim MT, Nam JJ. Assessing risk factors of coronary heart disease and its risk prediction among Korean adults: The 2001 Korea National Health and Nutrition Examination Survey. *Int J Cardiol* 2006; 110: 184-90.
8. Gruber HJ, Bernecker C, Pailer S et al. Lipid profile in normal weight migraineurs –Evidence for cardiovascular risk. *Eur J Neurol* 2010; 17: 419-25.
9. Tana C, Santilli F, Martelletti P et al. Correlation between migraine severity and cholesterol levels. *Pain Pract* 2015; 15: 662-70.
10. Bigal ME, Kurth T, Hu H et al. Migraine and cardiovascular disease in the population. The American Migraine Prevalence and Prevention Study. *Neurology* 2009; 72: 1864-71.
11. Assarzadegan F, Hosseinpanahi SP, Hesami O et al. Frequency of dyslipidemia in migraineurs in comparison to control group. *J Family Med Prim Care* 2019; 8: 950-4.
12. Gruber HJ, Bernecker C, Pailer S et al. Lipid profile in normal weight migraineurs- evidence for cardiovascular risk. *Eur J Neurol*. 2010; 17: 419–25.
13. Rist PM, Tzourio C, Kurth T. Associations between Lipid Levels and Migraine: Cross-sectional Analysis in the EVA Study. *Cephalalgia* 2011; 31(14): 1459–1465.
14. Scher AI, Terwindt GM, Picavet HS et al. Cardiovascular risk factors and migraine: The GEM population-based study. *Neurology* 2005; 64: 614-20.
15. Saberi A, Hatamian HR, Kazemnezad et al. Hyperlipidaemia in migraine: is it more frequent in migraineurs? *Iran J Neurology* 2011; 10(4): 46–50.