# Study of lipid profile in migraine patients

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## ABSTRACT

**Background:** Migraine is a common condition in medical practice and is characterized by moderate-to-severe headaches lasting 4–72 hours. Dyslipidemia is a potential risk factor for migraines and can increase the risk of coronary vascular disease. Given the high prevalence of migraine in India, further studies are required to address this issue. The current study aimed to explore the lipid profile characteristics of patients with migraine and assess any potential differences based on the type of migraine, particularly focusing on those with and without aura.

**Methods:** This cross-sectional study included 50 patients of both sexes with migraines. A comprehensive history was obtained for each patient, including age, sex, weight, height, and associated conditions. A detailed migraine history was recorded, including the migraine type, aura symptoms, and duration. Additionally, lipid profiles, including low-density lipoprotein (LDL), high-density lipoprotein (HDL), serum triglycerides, and total cholesterol levels, were documented.

**Results:** The study included 50 patients with migraines, predominantly female. The majority were aged between 21 and 50 years, and 64% had normal BMI. Most of the patients (88%) had no comorbidities. Migraines with aura were more common (72%) than those without (28%). Lipid profiles revealed significant differences between patients with migraine with and without aura. Patients with aura were more likely to have high total cholesterol and triglyceride levels and normal HDL levels, whereas patients without aura had lower HDL and VLDL levels. There was no significant difference in LDL levels between the two groups.

**Conclusion:** This study found a significant association between lipid profiles and migraine types, with elevated total cholesterol and triglycerides and lower HDL levels more common in patients with migraine with aura.

**Keywords:** headache, migraine, lipid profile, cholesterol, dyslipidemia

## INTRODUCTION

Migraine is a common condition in medical practice and is characterized by moderate to severe headaches lasting from 4 to 72 hours. Approximately 91% of men and 96% of women experience headaches, with approximately 6% of men and 18% of women suffering from migraines (one-year prevalence) [1]. It is often preceded by symptoms such as depression, irritability, restlessness, and anorexia and is frequently associated with visual, somatosensory, or motor auras [2,3].

The pathogenesis of migraine involves several neurotransmitters, including dopamine, noradrenaline, and nitric oxide [4,5]. Dopaminergic stimulation can trigger migraine symptoms and dopamine receptor antagonists are effective treatments. However, further research is needed to fully understand the underlying mechanisms and improve management strategies [5–7].

Studies have shown that high cholesterol levels are present in over 50% of migraine patients. Dyslipidemia, a silent condition, poses a diagnostic challenge but is associated with serious complications, such as stroke, heart attack, and even death [8,9]. Some studies suggest a link between elevated lipid levels and the frequency and severity of migraine attacks. Dyslipidemia is also regarded as a potential risk factor for coronary vascular disease in patients with migraines [10,11].

Given the high prevalence of migraine in India, further studies are required to address this issue. Additionally, attention should be paid to the exacerbating factors and long-term complications of hyperlipidemia owing to its significant social and economic impact.

The current study aimed to explore the lipid profile characteristics of patients with migraine and assess any potential differences based on the type of migraine, particularly focusing on those with and without aura.

## MATERIALS AND METHODS

This cross-sectional study was conducted on 50 migraine patients of both sexes.

### Ethics Statement

The study was approved by the institutional ethics committee. We explained the purpose of the study, procedures, and potential risks associated with the study. Written informed consent was obtained from all the participants. All patient data were kept confidential in compliance with ethical standards and regulations.

### Inclusion criteria

Male and female patients aged 18 years or older diagnosed with migraines (both with and without aura), whose condition was confirmed based on the guidelines of the International Association of Headaches, were included.

### Exclusion criteria

Patients with secondary headaches or other significant neurological disorders, individuals with a history of major systemic illnesses that could affect lipid profiles (e.g., uncontrolled diabetes and chronic kidney disease), those who were pregnant or breastfeeding, and those currently taking medications that significantly alter lipid profiles or migraine treatment were excluded.

### Data collection

A comprehensive history including age, sex, weight, height, and associated conditions was collected for each patient. A detailed migraine history was recorded, encompassing the migraine type, aura symptoms, and duration. Lipid profiles, including low-density lipoprotein (LDL), high-density lipoprotein (HDL), serum triglycerides (TGL), and total cholesterol (TC) levels, were also documented.

### Statistical analysis

Data were analyzed using SPSS version 21 software. Categorical variables were expressed as numbers and percentages. The Chi-square test was employed to evaluate the associations between

categorical variables and to identify whether there were significant differences in their distributions across various groups. Statistical significance was set at p < 0.05.

## RESULTS

### Demographic and clinical characteristics of patients with migraine

The study included 50 migraine patients, predominantly females (86%) compared to males (14%). The age distribution was 10% under 20 years, 20% between 21-30 years, 26% between 31-40 years, 24% between 41-50 years, and 20% between 51-60 years. Regarding BMI, 6% were underweight, 64% had normal weight, 16% were overweight, and 14% were obese. Most patients (88%) had no comorbidities, 4% had diabetes, and 8% had hypertension. Migraines with aura were reported in 72% of the patients, and 28% had migraines without aura. Regarding lipid profiles, 58% had high TC, 68% had high TGL, 72% had normal LDL levels, 60% had normal HDL levels, and 54% had low VLDL levels (Table 1).

**Table 1: Demographic and clinical characteristics of migraine patients**

|  |  | Number of Patients | Percentage |
|---|---|---|---|
| Age group | <20 | 5 | 10% |
|  | 21-30 | 10 | 20% |
|  | 31-40 | 13 | 26% |
|  | 41-50 | 12 | 24% |
|  | 51-60 | 10 | 20% |
| Gender | Female | 43 | 86% |
|  | Male | 7 | 14% |
| BMI | Underweight | 3 | 6% |
|  | Normal weight | 32 | 64% |
|  | Overweight | 8 | 16% |
|  | Obese | 7 | 14% |
| Comorbidity | DM | 2 | 4% |
|  | HTN | 4 | 8% |
|  | Nil | 44 | 88% |
| Migraine type | With aura | 36 | 72% |
|  | Without aura | 14 | 28% |
| TC | Normal | 21 | 42% |
|  | High | 29 | 58% |

| | | | |
|---|---|---|---|
| TGL | Normal | 16 | 32% |
| | High | 34 | 68% |
| HDL | Low | 20 | 40% |
| | Normal | 30 | 60% |
| LDL | Low | 14 | 28% |
| | Normal | 36 | 72% |
| VLDL | Low | 27 | 54% |
| | Normal | 23 | 46% |

**Lipid profile analysis in migraine patients by migraine type**

A significant difference in lipid profiles was found between migraine patients with and without aura. Among patients with aura, 75% had high TC levels compared with 14.3% in those without aura (p < 0.0001). High TGL levels were observed in 83.3% of the patients with aura versus 28.6% of those without aura (p < 0.0001). Low HDL levels were present in 16.7% of patients with aura and 71.4% of those without aura had low HDL levels (p < 0.0001). Regarding VLDL levels, 41.7% of patients with aura had low levels compared to 85.7% in the group without aura (p = 0.005). No significant differences were observed in LDL levels between the groups (p = 0.449) (Table 2).

**Table 2: Distribution of Lipid Profile in Migraine Patients by Migraine Type**

| | | Migraine type | | P value |
|---|---|---|---|---|
| | | **With aura** | **Without aura** | |
| TC | Normal | 9 (25%) | 12 (85.7%) | <0.0001 |
| | High | 27 (75%) | 2 (14.3%) | |
| TGL | Normal | 6 (16.7%) | 10 (71.4%) | <0.0001 |
| | High | 30 (83.3%) | 4 (28.6%) | |
| HDL | Low | 6 (16.7%) | 10 (71.4%) | <0.0001 |
| | Normal | 30 (83.3%) | 4 (28.6%) | |
| LDL | Low | 9 (25%) | 5 (35.7%) | 0.449 |
| | Normal | 27 (75%) | 9 (64.3%) | |
| VLDL | Low | 15 (41.7%) | 12 (85.7%) | 0.005 |
| | Normal | 21 (58.3%) | 2 (14.3%) | |

**DISCUSSION**

The current study aimed to explore the lipid profile characteristics of migraine patients and assess any potential differences based on the type of migraine, particularly focusing on those with and without aura. Our findings revealed significant disparities in the lipid profile components between patients with and without migraine with aura.

The study included 50 patients with migraine, predominantly female. Similarly, Shrestha et al. also observed female predominance (in their study 79.9% were females) [3]. Khan et al. also reported a predominance of females in their study, with 80% of migraine patients and 76% of non-migraine patients being females [4].

The majority were aged between 21 and 50 years, and 64% had normal BMI. Most of the patients (88%) had no comorbidities. Migraines with aura were more common (72%) than those without (28%). Shrestha et al. reported that the mean age of the participants was 34.48 years. Most participants (65.3%) had a normal BMI, with 22.3% being overweight and 12.4% being obese. Hypertension was present in 32.7% of the participants [3]. Khan et al. noted that the mean age of migraine patients was 34.20 ± 11.35 years, compared to 29.20 ± 8.80 years for non-migraine patients [4].

Lipid profiles revealed significant differences between patients with migraine with and without aura. The study found that patients with migraine, especially those with aura, had higher levels of TC and TG, which may increase the cardiovascular risk. Low HDL levels were common in patients without aura, highlighting its protective role against heart diseases. No significant differences were observed in LDL levels between the groups, suggesting that LDL may not be directly related to the migraine subtypes. Differences in VLDL levels suggest varying lipid metabolism in patients with and without aura.

Shrestha et al. reported that 61.16% of patients had normal cholesterol levels, and 8.41% had high cholesterol levels. More than half of the patients had normal TGL levels, with 24.59% having high levels [3]. Khan et al. reported that the serum TC and LDL-C levels were significantly higher in the migraine group than in the non-migraine group. HDL-C levels were low, and TGL was normal in both groups. Migraine with aura had higher TC and LDL-C levels than migraine without aura,

with lower HDL-C levels in migraine without aura being statistically significant [4]. Furthermore, Bana et al. reported a significant association between migraine and a disordered lipid profile [8].

Moreover, Uygur-Kucukseymen and Akca found that migraine patients had significantly higher levels of TC, TG, and HDL-c. After adjusting for age, LDL-c levels were higher in the migraine group. Additionally, a positive correlation was observed between age and TC, LDL-C, and TG was observed [12]. Assarzadegan et al. found that migraine is associated with higher levels of cholesterol and LDL than the control group [5].

Data from a study by Gruber et al. suggest that migraine is associated with an increased risk of cardiovascular disease and its related clinical consequences [13]. Moreover, Harder et al. observed that metabolic profiles, characterized by serum concentrations of various metabolites, such as lipids, amino acids, and glucose metabolism products, can differentiate active migraine patients from controls [14].

A cross-sectional study conducted by Putri et al. found that the mean levels of TC, TGL, and LDL were significantly higher in the migraine group than in the tension-type headache group ($p < 0.001$) [15]. Rangan et al. reported that the lipid profile of migraineurs exhibited abnormal conditions [16].

This study had some limitations that need to be addressed. The sample size was relatively small, and a larger cohort would provide more robust data and allow for more detailed subgroup analysis. Furthermore, this study had a cross-sectional design, which limits the ability to establish causal associations between migraine types and lipid profiles. Longitudinal studies would be more suitable for determining whether abnormal lipid profiles precede the onset of migraine or are a consequence of this condition.

**CONCLUSIONS**

In conclusion, this study highlights a significant association between lipid profiles and migraine types, particularly when distinguishing patients with and without aura. Elevated TC and TGL levels and lower HDL levels were more frequently observed in patients with migraine with aura, suggesting a potential link between lipid metabolism and migraine pathophysiology. These

findings highlight the importance of monitoring lipid profiles in patients with migraine, especially those with aura, as part of a comprehensive approach to manage their overall health and mitigate future cardiovascular risks. Additional research with larger sample sizes and longitudinal designs is required to verify these findings and investigate the fundamental mechanisms connecting lipid metabolism with migraine.

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