ABSTRACT

Background: Migraine is a primary headache disorder causing social and economic impact worldwide. Many studies have suggested an association between migraine and various comorbidities, including cardiovascular disorders and lipid abnormalities. However, there is limited research on lipid abnormalities in migraineurs in Nepal. Therefore, this study was aimed to assess lipid abnormalities in migraine sufferers attending the outpatient clinic at a tertiary care hospital of Nepal.

Methods: This observational study was conducted in the outpatient departments of Chitwan Medical College & Hospital from August 15, 2021, to February 15, 2022. A total of 309 patients diagnosed with migraine were involved in the study. The patients' body weight, height, blood pressure was measured and BMI calculated. Fasting lipid, such as total cholesterol, triglycerides, and LDL-C, were obtained.

Results: Out of the 309 participants, 79.9% were females, and 20.1% were males. The mean age of the participants was 34.48±10.97 years. The majority of the participants (65.3%) had a normal BMI, while 22.3% were overweight, and 12.4% were obese. 32.7% of the participants had hypertension. 61.16% patient had normal cholesterol level and only 26(8.41%) had high cholesterol level. Similarly, more than 50% of patient had normal TG level and 24.59% patient had high TG level.

Conclusions: The study found that most of the migraineurs attending our center had normal levels of Cholesterol, Triglycerides, and LDL-C suggesting that migraine patients may not have an increased risk of developing cardiovascular disorders.

INTRODUCTION

Headache is one of the most prevalent conditions for disability worldwide. Headaches may be classified into: Primary and Secondary. Primary, such as Migraine, occur singly and Secondary are caused by medical condition.

Migraine, a neurovascular disorder, causes recurrent disabling episodes of headache. It is the leading cause in individuals under 50 years hence have a significant social and economic impact. Due to hormonal effects, females suffers twice than males, effective age is from 25 to 55. According to International Headache Society, Migraine is classified as either episodic or chronic.4

Migraine activates brainstem, triggers, sustains and concludes the migraine attack, leading to severe headache. It can be precipitated by caffeine consumption, sleep patterns, smoking and drug use. Studies have shown an association between migraines with cardiovascular disorders. This implies the incidence cardiovascular events are higher in migraineurs. Also, in women with migraine, studies revealed high cholesterol and triglyceride levels.1

A study on lipid abnormalities in migraineurs was done who attended our clinic. The goal was to assess the prevalence of abnormal levels of Cholesterol, Triglycerides, and LDL-C suggesting that migraine patients may not have an increased risk of developing cardiovascular disorders.

METHODS

This prospective observational study was carried out in medicine outpatient department of Chitwan Medical College (CMC), Bharatpur, and Chitwan from 15th August 2021 to 15th February 2022. Chitwan Medical College (CMC), being a tertiary multidisciplinary hospital, people with headache of varying severity come for definitive diagnosis and proper treatment. The approval for the research was taken from the Ethical Review Committee of CMC (078 / 078 / -007).

All patients aged 19 to 60 years with the diagnosis of migraine were included in the study. Patients under 19 years of age or over 60 years of age, those having a known structural brain disease, pregnant females’ history of seizures, inflammatory disorders, on oral contraceptives, or taking lipid-lowering drugs
were excluded from the study.

With a prevalence of migraine of 25%, the minimum sample size required was 289 which was calculated using the formula of

\[ n = \frac{Z^2 \times pq}{e^2} \]

where \( q = 1 - p \), \( Z = 1.96 \), Prevalence of migraine: 25% \( e \) = margin of error = 5%

\[ n = \frac{(1.96)^2 \times 0.25 \times 0.75}{0.05^2} = 289 \]

After taking informed consent, a total of 309 patients, meeting inclusion and exclusion criteria, were included in this study by convenient sampling method.

According to the International Classification of Headache Disorders 3rd edition, migraine is defined as recurrent headaches with unilateral location, pulsating, moderate or severe in intensity, aggravation by routine physical activity and association with nausea and/or photophobia and phonophobia lasting for 4–72 hours. Patients diagnosed with migraine attending our OPD were evaluated thoroughly and asked for the symptoms of aura like visual disturbances. Physical examinations were then performed. Blood pressure (BP) was measured using an approved blood pressure measuring device. Hypertension was defined as either the use of medications to treat hypertension, a systolic blood pressure of 130 mmHg or higher, or a diastolic blood pressure of 80 mmHg or higher. Height and weight were measured by wall mounted rod and digital scale respectively and BMI calculated. Body mass index (BMI) was calculated as weight (in kilograms) divided by the square of height (in meters) and categorized into different classes based on the World Health Organization criteria. For obesity, BMI of 30.0 kg/m² or above was considered.

Relevant blood investigations were sent in fasting status and were followed up with the reports. All the data were recorded in a predesigned proforma. The recommended or desirable levels for cholesterol are below 200 mg/dl, while the range of 200–239 mg/dl is considered borderline high, and a level of 240 mg/dl or greater is classified as high. The desirable range for the measurement is below 150, while values between 150 to 199 indicate borderline high levels. Values between 200 to 499 indicate high levels, and values equal to or greater than 500 indicate very high levels. LDL cholesterol can be classified as optimal (less than 100 mg/dl), near optimal/above optimal (100–129 mg/dl), borderline high (130–159 mg/dl), high (160–189 mg/dl), or very high (190 mg/dl or greater).

The data collected using a pre-designed Form were entered into the SPSS 16.0 (Statistical Package for Social Science) software. Continuous variables were presented as mean and standard deviation, while categorical variables were reported as frequencies and percentages.

**RESULTS**

This study analyzed 309 patients with a history of migraine headache, out of which 91.3% were female and 8.7% were male. The patients had a mean age of 39.7 years, with the highest percentage falling in the age group of 31–40 years (38.2%).

**Table 1: Age group**

<table>
<thead>
<tr>
<th>Age group(years)</th>
<th>No. of patients n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-30</td>
<td>65 (21.0)</td>
</tr>
<tr>
<td>31-40</td>
<td>118 (38.2)</td>
</tr>
<tr>
<td>41-50</td>
<td>70 (22.7)</td>
</tr>
<tr>
<td>51-60</td>
<td>56 (18.7)</td>
</tr>
<tr>
<td>Total</td>
<td>309 (100)</td>
</tr>
</tbody>
</table>

Among these patients, 250 (80.9%) had normal BP, and the mean systolic and diastolic blood pressures were 117.5 and 78.6 mmHg, respectively. The majority of patients were in the normal weight group (31.7%), followed by the overweight group (28.5%) and the combined obesity groups (27%, including class 1, class 2, and class 3). About 12% of patients were overweight. Patients with migraine with aura were predominantly in the normal weight group; while those with migraine without aura were mostly overweight (50%).

**Table 2: Patient distribution by BMI and migraine type**

<table>
<thead>
<tr>
<th>BMI</th>
<th>No. of patients n (%)</th>
<th>Migraine type</th>
<th>Total n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>With aura n%</td>
<td>Without aura n%</td>
</tr>
<tr>
<td>Underweight</td>
<td>37 (12)</td>
<td>17(5.5)</td>
<td>20(6.47)</td>
</tr>
<tr>
<td>Normal</td>
<td>98 (31.7)</td>
<td>64(20.7)</td>
<td>34(11)</td>
</tr>
<tr>
<td>Overweight</td>
<td>88 (28.5)</td>
<td>48(15.5)</td>
<td>14(4.5)</td>
</tr>
<tr>
<td>Class 1 obesity</td>
<td>62 (20.1)</td>
<td>13 (4.2)</td>
<td>5 (1.6)</td>
</tr>
<tr>
<td>Class 2 obesity</td>
<td>13 (4.2)</td>
<td>8 (2.5)</td>
<td>7 (2.26)</td>
</tr>
<tr>
<td>Class 3 obesity</td>
<td>11 (3.5)</td>
<td>4 (1.2)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>309 (100)</td>
<td>176(56.9)</td>
<td>133(43.04)</td>
</tr>
</tbody>
</table>

Of the total 309 migraine patients, 176 (56.9%) had migraine with aura and 133 (43.04%) had migraine without aura, with 154 (49.8%) patients with aura and 128 (41.4%) without aura being female.

**Table 3: Migraine and gender**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Migraine type n (%)</th>
<th>Total n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With aura n%</td>
<td>Without aura n%</td>
</tr>
<tr>
<td>Male</td>
<td>22(7.11)</td>
<td>5(0.32)</td>
</tr>
<tr>
<td>Female</td>
<td>154(49.8)</td>
<td>128(41.4)</td>
</tr>
<tr>
<td>Total</td>
<td>176(56.9)</td>
<td>133(43.04)</td>
</tr>
</tbody>
</table>

The study looked at the cholesterol and triglyceride levels of patients with and without migraine with aura. The average cholesterol level was 183.79 mg/dl and the average triglyceride level was 174.65 mg/dl.
Most patients (61.2%) had normal cholesterol levels, while a smaller number had borderline high (30.4%) or high (8.4%) levels. Similarly, most patients (56.6%) had normal triglyceride levels, with only a few having very high levels.

Patients with migraine with aura had lower average cholesterol and triglyceride levels than those without aura. However, those with aura had higher levels of HDL and LDL, which are types of cholesterol.

**DISCUSSION**

In this study, we found that the majority of patients with migraine had normal cholesterol and triglyceride levels, which is consistent with the findings of Monastero et al. However, studies conducted by Alia et al. showed high levels of cholesterol and triglyceride level in migraineurs. Rist et al. did not find any differences in the levels of HDL and LDL among migraineurs with and without aura. However, our studies showed a slight rise in both HDL and LDL levels mainly in patients with migraine with aura. It is important to note that the difference in findings between our study and Rist et al.'s study may be due to differences in sample size, patient demographics, and methodology. Further, there may be genetics and lifestyle factors that play a role in the relationship between cholesterol, triglycerides, and migraine.

It is possible that the predominance of migraine in females may be attributed to the hormone Leptin. Leptin is a hormone that plays an important role in regulating food intake and body weight. High levels of leptin cause inflammation and oxidative stress in the body altering the pain pathways in brain. It has been found that the level of Leptin is generally higher in females than in males. This may be the cause of higher prevalence of migraine in women than men.

The mean age of the patients with migraine headache in this study was 39.7 years, with the most common age group being 31-40 years, which is consistent with previous studies conducted by Kelman et al. It is often thought that migraine is associated with high body mass index (BMI). However, in this study, the majority of patients with migraine had BMI ranging from normal to class 1 obesity. However, a study by Writer et al. have shown a positive correlation between increasing BMI and migraine incidence. Therefore, the relationship between BMI and migraine requires further investigation to reach a conclusive understanding.

Kristofferson et al. has reported an association of obesity with both migraine prevalence and attack frequency. The relationship between obesity and migraine is likely due to lifestyle factors like smoking, physical activity levels, sleep patterns, along with air pollution and altitude. Additionally, sex hormones may also play a role in this relationship.

We also found that patients with migraine with aura were mostly of normal weight, while those without aura were mostly overweight (50%). These findings are similar to those of Mattson, who did not find any significant association between migraine and obesity.

**CONCLUSION**

Several studies have investigated the relationship between migraine and lipid profiles like cholesterol, triglyceride, LDL and HDL and the results have been inconsistent. Some studies have suggested a positive association between migraine and abnormal lipid profiles while others have found no significant differences. In our analysis we have found cholesterol, triglycerides, LDL and HDL to be normal in migraine patients with or without aura.

**CONFLICT OF INTEREST:** None

**FINANCIAL DISCLOSURE:** None

### Table 4: Migraine and levels of cholesterol and triglyceride

<table>
<thead>
<tr>
<th>Migraine type</th>
<th>Cholesterol level</th>
<th>Triglyceride level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal n(%)</td>
<td>Borderline high n(%)</td>
</tr>
<tr>
<td>With aura</td>
<td>126(40.77)</td>
<td>40(12.94)</td>
</tr>
<tr>
<td>Without aura</td>
<td>63(20.38)</td>
<td>54(17.47)</td>
</tr>
<tr>
<td>Total</td>
<td>189(61.16)</td>
<td>94(30.42)</td>
</tr>
</tbody>
</table>

**REFERENCES:**


