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RELATIONSHIP BETWEEN MIGRAINE HEADACHE AND REFRACTIVE ERRORS

Ophthalmology

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ABSTRACT

Headache is a public health problem. This study is to evaluate refractive errors among subjects with migraine headache and to compare it with healthy subjects. This is a prospective cross-sectional study of 188 subjects with migraine headache, aged between 20 and 40 years and 180 subjects without headache of same age group as control group. Retinoscopy and subjective refraction was done to find out anisometropia and type of refractive errors; myopia, hypermetropia and astigmatism. Forty-nine (26.06%) subjects with migraine headache had refractive errors, out of which 29(59.18%) had astigmatism, 15(30.62%) had hypermetropia and 05(10.20%) had myopia. Out of 26(14.44%) cases in control group with refractive errors, 16(61.54%) had myopia, 07(26.92%) had astigmatism and 03(11.54%) had hypermetropia. Anisometropia was found in 14(7.45%) patients with migraine headache and in 07(3.89%) healthy subjects. In this study, we observed that refractive error is a risk factor for migraine headache in comparison to control group.

KEYWORDS

Migraine Headache, Refractive Errors, Myopia, Hypermetropia, Astigmatism.

Introduction

Headache is known as the pain located above orbitomeatal line [1]. It is an universal experience and lifetime prevalence [2]. Most of the patients of headache are underdiagnosed. Headaches are associated with significant drop in the quality of life [3]. Due to high prevalence and negative impact on life, headaches are currently considered as a public health problem [4]. The management of headache in a patient is challenging. An accurate assessment is essential for its diagnosis and treatment.

Headache can be divided into primary and secondary type. Primary headaches are further divided into migraine and tension–type headache. Secondary headaches include conditions of other etiologies. The patients with primary headaches don't have any structural, metabolic or other lesion of the body whereas secondary headaches have some exogenous disorders.

The migraine headache has been ranked as third most prevalent disorder and placed seventh among the top ten causes of disability worldwide in the Global Burden of Disease Survey 2010 (GBD2010). According to third edition of International Classification of Headache Disorders (ICHD-3) [1] the migraine headaches are of two subtypes–

A. Migraine without aura, a clinical syndrome characterized by headache with specific features and associated symptoms
B. Migraine with aura characterized by transient focal neurological symptoms which precede or sometimes accompany the headache.

The prevalence of primary headache varies 9-11% in India, and uncorrected refractive errors among population vary from 2.63 % to 25.0% [3,5,6]. Refractive error is considered to be a possible cause for headache in some previous reports [7,8,9]. The uncorrected refractive errors are often associated with frontal and /or occipital headache [10,11].

Headache and refractive errors are common health related complaints to seek medical consultations by the patients of all age. Uncorrected refractive errors have a considerable impact on one's physical and mental development. So, corrective measures have to be taken at the earliest. Proper refractive correction can improve headache with refractive error in over 70% cases [12]. Thomas et al [13] observed that 21% of patients with headache consult ophthalmologist and Whittington et al [14] reported that 45% patients who were attending refraction clinics had complaint of headache. Gordon et al [15] had observed that minor refractive errors often cause more headache and symptoms of eye strain than major errors.

On review of literature, association between migraine headache and refractive errors have been found to be of equivocal results [16]. Chronicle and Mulleners had documented an inconclusive evidence on the involvement of refractive error in the etiology of migraine headache in their studies [17]. But Harle et al [18] in his study concluded that there is strong association between higher degrees of astigmatism in the patients with migraine headache.

Therefore, considering migraine headache, a serious burden to a clinician, this study was aimed to determine the relationship between refractive errors and migraine headache among subjects referred to the ophthalmology outpatient department (OPD) in a tertiary care hospital.

Material and Methods

This is a cross-sectional study of 188 patients diagnosed to have migraine headache between 20 and 40 years in the medicine department.Age, gender matched 180 healthy subjects without headache from ophthalmology department were included in the study as control group. The study was conducted from January 2015 to December 2017 in the ophthalmology outpatient department (OPD). We included consecutive patients referred from the medical OPD with diagnosis of migraine headache. This research protocol was approved by the Institutional ethics committee. All the investigations were done according to Helsinki declaration. The full informed consent was taken from all participants after explanation of the study procedures and participants were allowed to abstain or withdraw from the research at any point without having to give any reason. The identity of the study group and those excluded from the study were masked so that all the tests can be performed with equal emphasis to every patient.

The study group and control group were interviewed with structured questionnaires about demographic data. Those having other types of headache were excluded from the study. The participants in the study group were then asked about any aggravating factors, family history and history of trauma, medical history, dental caries, and features of raised intracranial pressure, menstrual disturbances, previous ocular surgeries and use of medicines. The study groups with systemic diseases, pregnancy, sinusitis, and intake of medicines, dental caries that cause headache or ocular conditions like amblyopia, squint, acute glaucoma, uveitis optic neuritis were excluded from the study.

Visual acuity was measured in each eye at 6 meter distance with illuminated Snellen's chart and near vision was recorded at 33 cm with Jagger's chart under good illumination.

Refractive error was measured by subjective and objective refraction. Retinoscopy was done with steak retinoscope at the working distance of 50 cm. Subjective refraction was done with appropriate corrective lenses after three days to eliminate cycloplegic effect completely. The spherical and astigmatic deviations were measured. The axes of astigmatism were measured to the nearest five degrees. They were classified into three groups according to spherical equivalent refractive error (SERE) +0.50 diopter sphere (Dsp) or more was considered as

hypermetropia and SERE -0.50 Dsp or less was considered as myopia. Astigmatism was considered when cylindrical component of the refractive error was 0.50 diopter cylindrical (Dcyl) or more in any axis. Myopia was categorized into mild (upto -3.0 Dsp), moderate (upto -6.0 Dsp) and severe (more than -6.0 Dsp) subgroups. Hypermetropia was categorized into mild (upto +3.0 Dsp), moderate (upto +6.0 Dsp) and severe (more than +6.0 Dsp) subgroups. The children with bilateral myopia or hypermetropia were classified into subgroups according to the more myopic or hypermetropia eye respectively. The astigmatism was categorized into three groups according to the axis of corneal astigmatism as with the rule, against the rule and oblique type.

Slit lamp biomicroscopy and fundus examination were done to rule out any anterior or posterior segment ocular pathology. Ocular motor functions were evaluated in six cardinal gazes. Intraocular pressure was measured with Goldman tonometer.

Statistical analysis of headache and control groups were done by calculating t-test to compare means of two groups, chi-square test for non parametric data, odds ratio (OR) and 95% confidence intervals (CI) were calculated to compare the relative risk of the groups for categorical variables Statistical software SPSS version 20.0 was used to analyze the data of the study.

Observations

A total of 188 subjects with diagnosis of migraine headache and 180 without headache as control normal group participated in the study. It included 113(60.1%) females and 75(39.9%) males in migraine headache group, 98(54.44%) females and 82(45.56%) males in control group (Table-1).

Table-1: Age, sex and previous examination in migraine headache (n=188) and control (n=180) group

Study groups	Mean age (years)	Sex (%)		Previous examination (%)	
		Male	Female	Yes	No
Migraine headache	28.86± 7.18	75(39.9)	113(60.1)	132(70.2)	56(29.8)
Control	27.18±7.14	82(45.56)	98(54.44)	41(22.8)	139(77.2)

Minimum age of subjects with diagnosis of migraine headache was 20 years and maximum age was 40 years. Mean age of the participants was 28.86±7.18 years in headache group and 27.18±7.14 years in group without migraine headache. Two study groups were age matched with two-tailed P value 0.4486, 95% confidence interval (CI) -6.041 to 2.677 and two groups passed normality test.

All the subjects were tested with retinoscope for the refractive errors and appropriate corrections were prescribed. Most of the subjects with migraine headache had near normal visual acuity though 49 (26.06%) of them had refractive errors in comparison to 26(14.44%) in control group. Twenty nine (59.18%) patients diagnosed to have astigmatism, 15(30.62%) had hypermetropia, 05(10.20%) had myopia in the group with migraine headache. Out of 26(14.44%) subjects with refractive errors in control group, 16(61.54%) had myopia, 07(26.92%) had astigmatism and 03 (11.54%) had hypermetropia (Table-2).

Table-2: Frequency of ocular morbidity in migraine headache and control groups

Ocular morbidity	Frequency (%) in migraine headache group	Frequency (%) in control group
Refractive error	49(26,06)	26(14.44)
Myopia	05(10.20)	16(61.54)
Hypermetropia	15(30.62)	03(11.54)
Astigmatism	29(59.18)	07(26.92)
Anisometropia	14(7.45)	07(3.89)

To quantify the association between refractive errors in two groups, we had calculated OR with 95% CI as 2.088(1.23 to 3.54).The prevalence of refractive errors were higher in subjects with migraine headache group than in controls and difference was statistically significant ($p<0.05$).

Astigmatism in 29 (59.18%) subjects was significantly more prevalent in migraine headache group compared to the control group of 07(26.92%). The prevalence of myopia in migraine headache group 05 (10.20%) was less than in the control group 16(61.54%). Hypermetropia was significantly more prevalent in migraine headache group 15(30.62%) than the control group 03 (11.54%). The relative risk of these two refractive errors was significant between the two groups. The relative risk of astigmatism and myopia between two groups are statistically significant. Prevalence of different types of refractive errors in migraine headache and control groups with p value, OR are summarized in Table -3. Pearson Chi square test also showed significant association between refractive errors with migraine headache.

Table-3: Comparison of the prevalence of refractive errors between migraine headache and control groups

Refractive errors	subjects		p-value	Odds ratio
	Migraine headache group (n=188)	Control group (n=180)		
Astigmatism	29	07	0.0002	4.508
Hypermetropia	15	03	0.0064	5.116
Myopia	05	16	0.0127	0.2831

Discussion

Headache is of multifactorial origin. The subjects referred with diagnosis of migraine headache are challenging to manage because due to recurrence of the headache most of them are not satisfied with the medical treatment. Our hospital covers about five million rural population of low socio-economic status who don't have access to the well facilitated health care services.

In the present study mean age of the participants were 28.86±7.18 years in migraine headache group and 27.18±7.14 years in control group. In both the groups, number of females was more than the males. Because of psychological stress and emotional factor, 132 (70.2%) patients of migraine headache had previous eye examination within last six months than 41(22.8%) in control group.

In this study, the prevalence of refractive errors was higher in 49(26.06%) patients with migraine headache compared to 26(14.44%) patients of control group. The difference between two groups was significant and it corroborates with the previous reports. The prevalence of refractive errors in the subjects with migraine headache in our study was similar to the study of Cameron et al and Jain at al [19] .

Jain S et al [19] had reported 36% ocular etiology for headache complaints cases, of which 65% were due to refractive errors and out of which 41%, 22%, 12% was due to astigmatism, hypermetropia and myopia respectively. In our study, we also found 26.06% subjects had refractive errors with complaints of migraine headache out of which 59.18%, 30.62%, 10.20% was due to astigmatism, hypermetropia and myopia respectively. Gunes A et al 20 had also reported that migraine patients had higher degrees of astigmatic refractive error.

In our study, 05 (10.20%) subjects with migraine headache and 16 (61.54%) subjects of control group had myopia. The number of subjects with myopia in migraine headache group was lower comparing the subjects with hypermetropia and astigmatism in that group. Therefore, myopic subjects had lower headache complaints in comparison with hypermetropia and astigmatism type of refractive errors.

The prevalence of hypermetropia was more in the migraine headache group 15(30.62%) compared to control group 03(11.54%) and the difference was statistically significant.

In this study, subjects were recruited from hospital OPD. A small sample size and inadequate masking is the probability of high prevalence of refractive errors among the patients with migraine headache complaints than control group in our study. Therefore further investigations are needed to establish a definite correlation of refractive errors and migraine headache.

Summary

An ophthalmologist can play a vital role in the control of headache complaints in patients with migraine. The association between refractive error and headache found in this study indicate that refractive error might be a risk factor for migraine headache. This study enhances our understanding of the relationship of migraine headache and refractive errors to improve opportunities for its treatment and prevention. So, it can be concluded that the different types of refractive errors and migraine headache link very closely.

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