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RELATIONSHIP BETWEEN OCULAR PRESSURES AND ABO BLOOD GROUPS IN ADULT YOGA PRACTITIONERS

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Abstract

Background: Ocular perfusion pressure (OPP), a derivative of mean arterial pressure (MAP) and intra ocular pressure (IOP), is a dynamic biological parameter of ocular perfusion. It varies with varying Blood Pressure (BP) and IOP and determines the blood flow to the ocular tissues. Glaucoma is one of the most common causes of irreversible vision loss worldwide. Raised IOP and reduced OPP are the risk factors in the pathogenesis of glaucoma. It has been observed that Yoga has an impact on these ocular pressures. Studies carried out on different ethnic groups shows conflicting results regarding the association between glaucoma and ABO blood groups. This study was taken up since there

is paucity of literature to establish the link between glaucoma and blood groups in yoga practitioners.

Objectives: To evaluate the association of IOP and OPP values with ABO blood types in yoga practitioners.

Materials and Methods: 70 adult yoga practitioners in the age group of 18 to 25 years were recruited. Institutional ethical clearance was obtained and written informed consent was taken. Blood groups of the subjects were determined by ABO typing. IOP and BP were recorded using rebound tonometer and sphygmomanometer respectively. OPP was calculated using the formula, $OPP = (2/3) \text{ mean arterial pressure} - IOP$.

Results: There was no significant association between ABO blood groups and MAP, IOP and OPP values.

Conclusion: This study aimed at comprehending the effects of risk factors of glaucoma and ABO blood groups in yoga practitioners and it revealed the lack of association between them. This could probably be due to genetic variations in the race and ethnicity.

Key words: ABO Blood groups, Intra ocular pressure, Ocular perfusion pressure.

Introduction

Yoga is an ancient and ascetic discipline which includes breath control and adoption of specific body postures widely practiced for health and relaxation. Glaucoma is a global public health concern that remains asymptomatic until significant vision is lost. It is one of the most common causes of irreversible vision loss worldwide [1]. The risk factors of this multifactorial disease include age, race, ethnicity, body mass index, genetic inheritance, systemic hypertension, diabetes mellitus etc., [2]. These risk factors have a potential impact on the Intra ocular pressure (IOP) and ocular perfusion pressure (OPP) that plays a vital role in the pathogenesis of glaucoma. IOP is the fluid pressure of the eye that exerts mechanical stress on the retina when it is raised above the normal levels.[3]. OPP, a derivative of mean arterial pressure (MAP) and IOP, is a dynamic biological parameter of

ocular perfusion. It varies with varying BP as well as IOP and determines the blood flow to the ocular tissues. Raised IOP and reduced OPP are the significant risk factors in the onset and progression of glaucoma. Significant reduction in IOP was observed among yoga practitioners [4] as well as in glaucoma patients who practiced meditation and breathing exercises.[5]

Most recognisable genetic inheritance in humans is concerned with blood groups.[6] Associations between blood groups and different diseases has been studied and diseases like gastritis [7] and coronary heart disease [8] have shown to be significantly associated with certain ABO blood type. Conflicting results are noted in literature related to association between myopia, nuclear cataracts and convergent squint with blood groups. Some genetically determined characters are found to act as markers for glaucoma. Contradictory reports have been observed in studies carried out on different ethnic groups regarding the association between glaucoma and ABO blood groups [9]. Since there is paucity of literature to establish the link between glaucoma and blood groups in yoga practitioners , this study was taken up to analyse the factors affecting glaucoma and its association with ABO blood type.

Aim of the study

The objective of the study was to evaluate the association of IOP and OPP values with ABO blood type in adult yoga practitioners.

Materials and Methods

Seventy healthy adult yoga practitioners in the age group of 18 to 25 yrs were recruited from Government Nature Cure and Yoga Medical College, Mysuru, for this cross sectional study. Ethical clearance was taken from the Institutional Ethical Committee. Convenience sampling method was adopted based on the duration of the study and the willingness of the volunteers to participate in the study. Yoga practice was part of their curriculum and it included warming up and stretching exercises, 9 rounds of Fast pace suryanamaskar followed by standing series of asanas that included thadasana, parvathasana, trikonasana, sitting series of asanas like vajrasana, gomukhasana & baddakonasana, supine and prone

series of asanas included pavanamuktasana, setubandhanasana along with ashtangasana, bhujangasana and dhanurasana. The yoga sessions concluded with Shavasana. These yogasanas were done under the supervision of the yoga teachers of the college. The above said set of yogaasanas varied within norms daily according to the available one hour time period. After obtaining informed written consent and explaining the procedure, anthropometric measurements were recorded. Subjects with conjunctivitis, h/o glaucoma, systemic hypertension, diabetes mellitus, smoking and alcohol consumption were excluded from the study. ABO blood groups of the subjects were determined using monoclonal antiserum by agglutination method. The subjects were asked to rest for fifteen minutes following which basal IOP was recorded in sitting position using SW-500 rebound tonometer (Tianjin Suowei Electronic Technology Co., Ltd, Tianjin, China) by the ophthalmologist and BP was measured using sphygmomanometer. All the recordings were done between 4pm to 6pm by the same person to minimize the bias of examiners and diurnal variations of IOP [10].

OPP was calculated using the formula, Mean ocular perfusion pressure (MOPP) = $(2/3)$ mean arterial pressure - IOP [10].

Mean arterial pressure = diastolic BP + $(1/3)$ (Pulse pressure) ,where pulse pressure = Systolic BP - Diastolic BP.

The subjects were classified into four groups based on their ABO blood types as A, B, O and AB. Descriptive statistical measures like percentage, Arithmetic Mean and Standard Deviation was applied. Inferential statistical tests like one way ANOVA test was used to compare the parameters among the ABO blood groups.

Results

The present study was conducted on 70 subjects that included 44 females and 26 males. The mean age of subjects was 20.46 ± 1.53 yrs. The percentage of blood group A, B, O, and AB was 18.6%, 27.1%, 45.7% and 8.6% respectively. There was no significant difference in the mean arterial pressure as well as IOP among the four blood types. Also, OPP values did not show a statistically significant association with any of the four blood groups. (Table I)

Table I: Mean and SD values of blood pressure and ocular pressure values among ABO blood groups

| Parameters (mm Hg) | Blood groups (mean±SD) | | | | F value | P value |
|-----------------------|------------------------|-------------|-------------|------------|------------|------------|
| | A (n=13) | B (n=19) | O (n=32) | AB (n=06) | | |
| SBP | 114.15±6.65 | 112.84±8.75 | 114.94±8.11 | 109.33±9.2 | 0.90 | .444 |
| DBP | 77.38±5.25 | 74.00±6.14 | 77.50±6.52 | 73.33±5.75 | 1.88 | .141 |
| MAP | 89.64±4.99 | 86.94±6.36 | 89.97±6.58 | 85.33±6.46 | 1.62 | .193 |
| R-IOP | 15.54±1.56 | 15.74±1.82 | 15.97±1.57 | 16.33±2.25 | 0.38 | .763 |
| L-IOP | 16.15±2.34 | 15.58±1.12 | 15.91±1.89 | 15.50±1.87 | 0.34 | .793 |
| R-OPP | 44.22±3.91 | 42.22±4.63 | 44.01±5.20 | 40.55±3.55 | 1.41 | .247 |
| L-OPP | 43.60±4.18 | 42.38±4.21 | 44.07±5.00 | 41.38±3.21 | 0.94 | .423 |

*P<0.05 is significant

SBP: systolic blood pressure, DBP: diastolic blood pressure, MAP: Mean arterial pressure, R-IOP & L-IOP: right & left eye intra ocular pressure, R-OPP & L-OPP: right & left eye ocular perfusion pressure

Discussion

It is a well established fact that raised IOP is a potential modifiable risk factor for glaucoma. But OPP also plays a vital role in progression of glaucoma in patients without raised IOP levels [11]. Hence both the parameters should be considered as independent risk factors for onset and progression of glaucoma. It was observed in few studies that there was a reduction in IOP among yoga practitioners as well as in glaucoma patients who practiced

meditation and breathing exercises.^[4,5] Apart from the above potential risk factors, marked familial inheritance in primary glaucoma have also been observed in several studies. It has also been proved that agglutinogens of ABO blood groups are inherited as Mendelian dominants ^[12]. The relationship between these risk factors of glaucoma and ABO blood groups among yoga practitioners was analysed in our study and there was no significant association found between them.

Similar results were observed in Barbados Eye Study, which did not find any association between primary open angle glaucoma(POAG) and blood groups (ABO and Rh) ^[11]. No association was found between POAG and ABO, rhesus, Kell and Duffy blood groups in a study done on Tunisian population ^[13]. Complementing our finding is another study that also did not find any association between glaucoma and blood groups ^[14].

In contrast, a study conducted on Pakistani patient cohort, showed that blood group B was associated with all types of glaucoma but only POAG was associated with Rh - allele ^[9]. A significant association between open-angle glaucoma and rhesus D was also found in a study ^[15]. Though there was no association between blood groups (ABO and Rh) and glaucoma in an Iranian study, yet it was observed that primary congenital glaucoma was more prevalent in B blood group ^[16]. Another study states that Primary glaucoma is very common in blood group A and B, less common in group O and AB ^[12].

These contradicting results found could be due to the studies done in different racial and ethnic groups. Genetic loci for ABO blood groups and Rh is located in chromosome 9 and chromosome 1 respectively ^[16]. DNA studies and genetic mapping techniques have facilitated to identify the location of glaucoma loci on human chromosomes. Association between blood groups and glaucoma genes, if identified, will provide us better insight into the pathophysiology of glaucoma. Screening for the potential risk factors like IOP and OPP in susceptible family members and their off springs will help in preventing the onset and progression of the disease. This study can be extended to patients with different types of glaucoma and with larger sample size.

Conclusion

Our study does not show significant association between the blood groups and risk factors of glaucoma in yoga practitioners. Further genetic studies can be done to explore the complex association between the blood groups, glaucoma inheritance and yoga. This might be of clinical importance in prevention and early diagnosis of glaucoma, even before noticeable vision loss can occur.

The authors state that there is no conflict of interest.

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