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A COMPARATIVE STUDY ON INTRAOCULAR PRESSURE ALTERATIONS AMONG NORMAL INDIVIDUALS, SMOKERS AND ALCOHOLICS

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ABSTRACT

Background:-Alcohol and Tobacco are the most abused drugs of all ages in both developed and developing countries. These two alter the Intraocular Pressure [IOP] and hence vulnerable to cause ocular diseases.

Aims:-To know the effect of smoking and alcohol on Intraocular Pressure and to find out the IOP and compare it among controls, smokers and alcoholics.

Methods: - **Apparently** healthy 150 males aged between 40-60 years were participants of our study. Out of them 50 non smokers, non alcoholics were control group, 50 smokers, non alcoholics were smokers group and remaining 50 alcoholics but non-smokers were alcoholic group. IOP was measured by Schiotz tonometer after application of local anesthetic and 3 readings of both eyes were taken and student's "t" test was used.

Interpretation: - We observed a significant effect of cigarette smoking on intraocular pressure of both eyes [$p < 0.001$] in comparison to control group. In our study we found that IOP is decreased in alcoholic group in comparison to control group [$p < 0.001$].

Conclusion: - We observed that tobacco in the form of cigarette smoking increases the intraocular pressure and alcohol consumption decreases the intraocular pressure.

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INTRODUCTION

The tobacco and alcohol consumption is increasing in today's modern world by both sexes in all socioeconomic classes among developed and developing countries. Usually its consumption starts in teen age and continues throughout the life, as both tobacco and alcohol are dependence producing drugs. These two alter the Intraocular Pressure [IOP] and hence vulnerable to cause ocular diseases. IOP is determined by the balance between the rate of aqueous humor production of the ciliary body, resistance to the aqueous flow at the angle of anterior chamber and the level of episcleral venous pressure. Increase resistance to aqueous humor outflow cause increase in IOP which affects people of all ages producing complications leading to total blindness. Current consensus among ophthalmologists and optometrists define normal intraocular pressure as that between 10-20 mmHg (Gaucoma overview from eMedicine). The average value of intraocular pressure is 15.5 mmHg with fluctuations of about 2.75 mmHg (Janunts E.1978). Ocular Hypertension is defined by intraocular pressure being higher than normal, in the absence of optic nerve damage or visual field loss (Viera GM, et al 2006). Ocular hypotony is typically defined as intraocular pressure equal to or less than 5 mmHg. Such low intraocular pressure could indicate fluid leakage and deflation of the eyeball.

AIMS AND OBJECTIVES

To know the effect of smoking and alcohol on Intraocular Pressure and to find out the IOP and compare it among controls, smokers and alcoholics.

MATERIALS AND METHODS

The case control study was conducted in the OPD of Department of Ophthalmology, Basaweshwar teaching hospital Gulbarga, after obtaining the permission of the Ethical committee of our institution. The present study includes healthy male subjects in the age group of 40-60 years of Gulbarga city. The inclusion criteria of study subjects are as follows.

Group A [control group] n=50 non alcoholic, non smokers.

Group B [Smokers group] n=50, subjects who smoke more than 10 cigarettes for more than 2 years and non-alcoholic subjects. The smoking index was calculated by for the smokers group. Smoking index is equal to multiplication of the average number of cigarettes/ beedis smoked per day and duration (in years) of tobacco smoking.

Group C [Alcoholic group] n=50 alcoholic, non smokers who consumes more than 60ml of alcohol daily for more than 2 years.

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The exclusion criteria of our study are females, subjects below 40yrs and above 60yrs of age, persons with previous eye surgery, with severe ocular trauma in the past and Diabetics

Due care was taken to ensure that All participants belong to same socioeconomic status. The information was collected in the pre-designed and pre-tested semi structured interview schedule. Detailed history, on name, age, sex, occupation, and personal history, personal habits of the subjects were taken. Smoking and alcohol intake history were taken in detail. Family history of hypertension, diabetes, refractive errors and Glaucoma were enquired. These were noted in a personal Performa and the following parameters concerned with the study were recorded after taking the participants consent.

1. IOP of both the eyes of both groups
2. Smoking Index [SI] calculated.

Procedure:-With the subject in supine position the cornea of both the eyes were anaesthetized with 4% topical Xylocaine. Then the lids were separated with the left hand and by keeping the foot plates of the Schiottz tonometer vertically on the centre of the cornea, the reading on the scale was recorded. A conversion table was used to derive the IOP in mm Hg from scale reading and the plunger weight. IOP was measured in both the eyes. IOP recorded first in the right eye and than in the left eye. 3 consecutive readings were taken in both right and left eye. The mean of 3 readings was computed separately for each eye. To test whether there was any significant difference between controls, smokers and alcoholics with reference to IOP, unpaired “t” test was applied.

Results-Out of 50 controls 56% were in the age group of 40- 50 years and 44% were in age group of 50 – 60yrs and Out of 50 smokers 32% were in the age group of 40- 50 years and 68% were in age group of 50 – 60yrs. The percentage distribution of smoking index indicated that the maximum percentage (46%) of smokers have smoking index < 300, followed by (44% and 10%) of smokers have smoking index 301- 500 and >500 respectively .

Table 1 Comparison of IOP in both control and smoker groups

IOP	control group	Smokers group	P value
Right side	18.36±2.48	23.89±2.77	<0.001
Left side	18.55±2.01	23.65±2.07	<0.001

Results are presented in Mean ± SD, P value obtained by student t test.

Table 1 depicts the comparison of IOP in both smokers and control group. This table shows that there is difference of right eye IOP of both control group (18.36±2.48) and smokers group (23.89±2.77) with p <0.001. This table also shows that there is highly statistical significant difference of left eye IOP of both control group (18.55±2.01) and smokers group (23.65±2.07) with p <0.001.

Table 2 Comparison of Mean IOP according to Smoking Index

Smoking Index	Number of smokers	IOP levels	
		Right	Left
<300	23	22.71±1.82	23.08±2.15
301-500	22	23.89±1.46	23.83±1.79
>500	5	29.36±4.38	25.48±2.07
Total	50	23.89±2.77	23.65±2.07
Significance		F=21.998; P<0.001**	F=3.142 P=0.052*

Results are presented in Mean ± SD, P value obtained by student t test [**indicates p<0.001 and *indicates p<0.05].

Table 2 depicts the comparison of Mean IOP to smoking Index. As the smoking Index is increasing the IOP of both eyes is also increasing which is highly significant [p<0.001] for right eye IOP and just significant [p<0.05] for left eye.

Table 3 Comparison of IOP in both control and alcoholic group.

IOP	control group	Alcoholic group	P value
Right side	18.36±2.48	16.89±2.5	<0.001
Left side	18.55±2.01	16.85±2.5	<0.001

Results are presented in Mean ± SD, P value obtained by student t test.

Table 3 depicts the comparison of IOP in both control and alcoholic group. This table shows that there is difference of right eye IOP of both control group (18.36±2.48) and alcoholic group (16.89±2.5) with p <0.001. This table also shows that there is highly statistical significant difference of left eye IOP of both control group (18.55±2.01) and alcoholic group (16.85±2.5) with p <0.001.

DISCUSSION

Previous studies show conflicting effects of cigarette smoking and alcohol intake on IOP so we have taken up this study to see the effects. In our study we found IOP of smokers to be significantly elevated (p< 0.001) compared with controls. Our studies were in accordance with findings of C.O.Timothy , Yutaka Takashima , Maneli Mozaffarieh and others. In the study conducted by C.O.Timothy(2007) to determine the effects of cigarette smoking on intraocular pressure and arterial blood pressure of normotensive young male adults , their result showed an increase in IOP which is statistically significant [p<0.001]

In the study by Yutaka Takashima et.al(2002) investigated the association of smoking habits with blood pressure and IOP in smokers of 25 or more cigarettes/day with IOP. They found that heavy smoking is specifically related to high IOP. Maneli Mozaffarieh (2010)[Tan JS et al 2008, Prasad D S, et al (2009), Dhubhghaill S S. et al (2010)]observed that Smokers have on the average a higher intraocular pressure, cataract at earlier ages and a higher risk for arterial/venous occlusions as well as for age-related macular degeneration .

In a study by M.Roy.Wilson(1987) regarding the relationship between primary open angle Glaucoma and potential toxic exposures in people found that cigarette smoking was associated with Glaucoma . On the other hand, Sami.L et.al (1975) reported no relationship between cigarette smoking, elevated intraocular pressure and Glaucoma. Sami.l

conducted a study in which it was found that the 3 groups composed of smokers, ex-smokers and non smokers had the same distribution of IOP, and had no relationship to the smoking habit. Shephard. R.J et al(1978), reported no relationship between cigarette smoking, elevated intraocular pressure and Glaucoma.

Our study is in accordance with Pardianto, Leydhecker, W.Morton Grant, I.A.Qureshi. Pardianto G et al(2005). observed that alcohol consumption leads to a transient decrease in intraocular pressure I.A.Qureshi (1999) suggested that alcohol causes reduction in IOP, Leydhecker(1978) found that alcohol acts probably by a decrease of secretion of aqueous humour by central actions W.Morton.Grant(1969) also found decrease in IOP with alcohol intake. Roland .E.Houle(1967) in their study observed that IOP is lowered by alcohol through a reduction of net water movement into the eye. Reduction in IOP may be through a direct inhibitory effect of alcohol on secretion of aqueous.

CONCLUSIONS

We observed a significantly higher effect of cigarette smoking on intraocular pressure of both eyes. This increase in intraocular pressure of normotensive subjects after habituated to cigarette smoking showed that it could be an important risk factor in occurrence of Glaucoma and Ocular hypertension including other chronic ocular disease such as cataract, macular degeneration. It is concluded that cigarette smoking leads to systemic ailments and ocular disease. Among many drugs, tobacco is also included as an agent causing increasing intraocular pressure. In our study we found that alcohol consumption has been associated with decrease in intraocular pressure. Prolonged use of alcohol cause optic neuritis, Amblyopia and visual field changes

We conclude our study with the observation that Alcohol and Tobacco in the form of cigarette smoking is affecting the intraocular pressure. Further studies on a larger sample with longer follow up are needed to substantiate our findings before firm conclusion can be drawn that there is decrease in IOP in Alcoholics and an increase in IOP in smokers with prolonged use of tobacco in the form of cigarette smoking. It is important for the clinical practitioners to create awareness regarding ill effects of smoking, alcohol, intraocular pressure changes and ocular circulation in patients with ocular diseases as well as general population.

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