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Original Research Article

THE COMPARATIVE STUDY OF INTRAOCULAR PRESSURE AMONG SMOKERS AND NON-SMOKERS

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ABSTRACT

Background: Tobacco smoking is harmful habit or addiction which leads to many health problems. Smoking may be status for some, or may be recreation or way to let out their stress, despite knowingly its harmful effects on health. Health hazards of smoking have become more prevalent in present days affecting more and more young individuals. Smoking has got deleterious effects on health like COPD, Cardiovascular diseases Malignant diseases, glaucoma etc. Aim of the present study is to compare IOP between smokers & Non-Smokers.

Materials and Methods: Present cross-sectional study consists of 250 smokers & 250 non-smokers (control group) both group at par aged between 20-70 years. Intra Ocular Pressure (IOP) of both eyes was measured by rebound (I-care) tonometry in both groups.

Results: IOP of both eyes in smokers & non-smokers groups were subjected to statistical analysis was done using SPSS software. It is found that IOP of Smokers was significantly raised than the non-smokers (control group) p-value <0.001.

Conclusion: Smoking is a modifiable risk factor, early detection of rise in IOP helps in preventing further damage to eyes & vision due to glaucoma, macular degeneration or cataract.

Keywords: Glaucoma, IOP, Non - Smoker, Smoking, Tobacco.

INTRODUCTION

Tobacco (Cigarette or beedi) smoking is an important risk factor not only for cardiovascular, respiratory, and malignant diseases but also for number of common eye diseases especially glaucoma, and cataract.[1] Tobacco smoke is composed of as many as more than 4,000 active compounds, most of them toxic to ocular tissues, affecting the eye mainly through ischemic or oxidative mechanisms. Most chronic ocular diseases appear to be associated with smoking. It is reported that smoking of tobacco causes significant raise in the intraocular pressure across all ages. It is also reported that the smoking has significant effects on vasoconstriction and may lead to rise in episcleral venous pressure and thus obstructing aqueous outflow from the angle. Hence consumption of nicotine either in the form of tobacco smoking or in any other forms can cause diseases like glaucoma (Acute Open Angle Glaucoma) by elevating the intraocular pressure.[2,3]

Various modifiable lifestyle factors, such as exercise, diet and cigarette smoking, that may influence intraocular pressure Louis R. pasquale et al.[4] Tobacco smoking can cause increased intraocular pressure leading to Glaucoma Eghosasere Iyamu et al.[5] Mehra KS, Roy PN, Khare BB reported that Cigarette smoking causes vasoconstriction and may lead to rise in episcleral venous pressure and thus inhibiting aqueous outflow from the angle, causing increase in intraocular pressure.[6] Although cigarette smoking was not found to be risk factor for onset of primary open angle glaucoma, it was correlated with central corneal thickness in adult onset open angle glaucoma, and thus might still play a role in the disease course.[2] Iyamu E et al reported that even Smokeless tobacco stimulates aqueous humour formation thereby tending to raise IOP and this could

enhance the chances of developing ocular hypertension in patients that are predisposed to glaucoma.[7]

Objectives:

1. To measure & compare IOP among smokers and non-smokers.
2. To find out the relation between the tobacco smoking as a factor possibly associated with raised intraocular pressure changes leading to glaucoma.

MATERIALS AND METHODS

The present study consists of 500 apparently healthy male subjects between the age group of 20 to 70 years, who attended the outpatient in ophthalmology department, which consists of 250 smoker and 250 non-smokers.

Inclusion criteria:

Non-smokers (control group) consists of 250 apparently healthy male subjects who are non-smokers, aged between 20 to 70yrs. Smokers (study group) consists of 250 apparently healthy male subjects age at par with the non-smokers group with history of chronic smoking who smoke more than 6 cigarettes or beedi's per day for more than 2 yrs.

Exclusion criteria:

Male subjects who are below 20 yrs and above 70 yrs of age, those with previous history of eye surgery / severe ocular injury, known cases of diabetes, hypertension, COPD, alcoholics, those with history of smoking duration less than 2 years and all female subjects were excluded from the study.

Proforma in the form of questionnaire was given to all the subjects to collect the details of their personal, medical, family history regarding health status and also the smoking history. Informed consent was taken after explaining about the study. The study protocol has been approved by Institutional Ethical committee. All the subjects were screened for smoking history with ocular problems. The instrument used for measuring IOP was Rebound (I-care) tonometer. For this testing initially 0.5%lignocaine drop is instilled in both eyes, then Rebound tonometer is placed on cornea and IOP was measured. The average of 3 readings were considered. Antibiotic eyes drops were instilled for prophylaxis.

The IOP of control group and smokers' group were subjected to statistical analysis. Statistical analysis was done by using SPSS software.

RESULTS

In this present study, in smokers' group 32 members belong to age group 20-30 years, 28 members belong to 31 -40 years & 190 members were in the age group of 41 years and above up to 70 years. In non-smokers group, 61 subjects were in 20- 30 years age group, 50 subjects were in 31-40 years, 139 were in the age group of 41years and above up to 70 years.

Table 1: Cross tabulation of age groups

Age groups			Groups		Total
			smokers	Non-smokers	
Ages	<30	Count	32	61	93
		% within groups	12.8%	24.4%	18.6%
	31-40	Count	28	50	78
		% within groups	11.2%	20.0%	15.6%
	40+	Count	190	139	329
		% within groups	76.0%	55.6%	65.8%
Total		Count	250	250	500
		% within groups	100.0%	100.0%	100.0%

Intraocular pressures of both eyes were measured and analysed separately and found raised IOP across all the age groups amongst smokers compare to non-smokers. Raise of intraocular pressure between left and right eyes in both smokers and non-smokers were almost constant with mean IOP of 18.48 and SD of 7.71 with standard error mean 0.48767 in right eye among smokers compare to Mean IOP of 16.164 and SD of 5.82 with standard error mean of 0.36811 in right eye among non- smokers (p- value <0.001). similarly, mean IOP of left eye of 18.836 and SD 7.745 with standard error mean of 0.48984 among smokers compared to mean IOP of 16.056 and SD 3.680 with standard error mean 0.23278 in non-smokers (p-value <0.001).

The following tables depicts the IOP of smokers and non-smokers in right eye and left eye who measured <11. 12-21 and > 22+. Intraocular Pressure of up to 21 is taken as upper limit of normal. Observed IOP with Pearson correlation p- values is of <0.001.

Table 2: Cross table depicting the IOP measured in Right eye among smokers and non-smokers

			Groups		Total
			Smokers	Non-smokers	
IOP of Right eye	<11	Count	51	32	83
		% within groups	20.4%	12.8%	16.6%
	12-21	Count	134	202	336
		% within groups	53.6%	80.8%	67.2%
	>22+	Count	65	16	81
		% within groups	26.0%	6.4%	16.2%
Total		Count	250	250	500
		% within groups	100.0%	100.0%	100.0%

Table 3: Cross table depicting the IOP measured in Left eye among smokers and non-smokers

			Groups		Total
			Smokers	Non-smokers	
IOP of Left eye	<11	Count	34	20	54
		% within groups	13.6%	8.0%	10.8%
	12-21	Count	151	218	369
		% within groups	60.4%	87.2%	73.8%
	>22+	Count	65	12	77
		% within groups	26.0%	4.8%	15.4%
Total		Count	250	250	500
		% within groups	100.0%	100.0%	100.0%

Sixty-five subjects among smokers (26%) recorded IOP of > 22+ compare to only 16 subjects 6.4%) among non-smokers in right eye and 65 subjects among smokers (26%) recorded IOP of >22 and only 12 subjects (4.8%) among non-smokers in the left eye. Present study also correlates the raise in IOP with relation to the numbers of cigarettes or beedis smoked per day and found that numbers of cigarettes and beedis is proportionally increases the IOP in both right and left eyes as shown in the tables below Pearsons's correlations p- value <0.001.

Table 4: Cross table Showing the relation to Number of Tobacco Smoking to Raise in IOP

Smokers IOP			Number of cigarettes or beedis smoked per day					Total
			<5	6-10	11-15	16-20	20+	
IOP Right Eye	<11	Count	13	9	3	9	17	51
		% within smokers	22.8%	33.3%	9.7%	18.0%	20.0%	20.4%
	12-22	Count	38	10	21	26	39	134
		% within smokers	66.7%	37.0%	67.7%	52.0%	45.9%	53.6%
	22+	Count	6	8	7	15	29	65
		% within smokers	10.5%	29.6%	22.6%	30.0%	34.1%	26.0%
Total		Count	57	27	31	50	85	250
		% within smokers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5: Cross table Showing the relation to Number of Tobacco smoking to Raise in IOP

Smokers IOP			Number of cigarettes or beedis smoked per day					Total
			<5	6-10	11-15	16-20	20+	
IOP Left Eye	<11	Count	7	6	4	3	14	34
		% within smokers	12.3%	22.2%	12.9%	6.0%	16.5%	13.6%
	12-22	Count	41	20	22	30	38	151
		% within smokers	71.9%	74.1%	71.0%	60.0%	44.7%	60.4%
	22+	Count	9	1	5	17	33	65
		% within smokers	15.8%	3.7%	16.1%	34.0%	38.8%	26.0%
Total		Count	57	27	31	50	85	250
		% within smokers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DISCUSSION

In this present study, IOP of smokers found to be significantly elevated across all age group but it is more pronounced among the older age group when compared with controls. Compare to other studies this study included the all-age groups younger subjects being 20 years to the oldest of 70 years. In a study by Barclays found the increase in intraocular pressure and arterial blood pressure after smoking cigarette in normal intensive young male adults.[8] Many studies to determine the effects of cigarette smoking on Intraocular Pressure l & Blood Pressure of normotensive young male adults like a study by C. O. Timothy has showed significant increase in IOP,[8] likewise in another study by Yutaka Takashima et al on association of smoking habit with Blood Pressure and IOP has showed significant increase IOP in heavy smokers.[9] Okaro observed that Intraocular pressure due to cigarette smoking.[10]

Another study by Maneli Mozza Farreieh observed that the smokers have on the average a higher

intraocular pressure, cataract in earlier ages and high risk for arterial or venous occlusion as well as age related macular degeneration due to increased DNA breakdown secondary to smoking.[11] The relationship between primary angle glaucoma and potential toxic exposures in people was studied by M Roy Wilson et all found that cigarette smoking was associated with glaucoma.[3] Some studies have reported no relationship between cigarette smoking and increased intraocular pressure and glaucoma, study by Sami, Shephard, Klein et.al have found that the three groups composed of smokers, ex-smokers & non-smokers had the same distribution of IOP and no relationship to the smoking habit.[12,13] Chronic smoking not only affect IOP it also affects the Audio-visual reaction time.[14]

CONCLUSION

We found that consumption of tobacco in the form of cigarettes or beedis leads to increase in the Intraocular pressure and it is directly proportional to the number of cigarette or beedis smoked per day. Even though some of the studies states that the effect of tobacco on IOP is more among the younger age group, but in our study, it is observed that smokers in older age group are affected more than the younger age group and also longer duration of smoking has increased IOP than shorter duration of smoking habits. Smoking could be an important risk factor not only for occurrence of Glaucoma secondary to raised intraocular pressure but also for other chronic ocular disease such as cataract, macular degeneration, Amblyopia etc. It is concluded that chronic cigarette smoking leads to not only systemic ailments like cardiovascular, cerebrovascular accidents, but also leads to chronic ocular disease like cataract, glaucoma and macular degeneration etc.

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