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Effect Of Exercise On Intraocular Pressure

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Abstract

The eyes are a complex sense organs that gather information about the environment (4) Intraocular pressure is the pressure created by the continuous renewal of fluids within the eye. Intraocular pressure results from a dynamic balance between the aqueous humor formation and outflow which are nearly equal under normal conditions(12). Exercise influence various physiological system. The study was done after ethical approval IEC/GMC/2020/64/ date 26-10-21. The study was done on 1oo subjects attending OPD of Ophthalmology dept of GMC Jammu after taking their consent and expanding the procedure their Intra ocular pressure was recorded before and after exercise on treadmill for 15 minutes. RESULTS-there is decrease in IOP after exercise.

Keywords: NIL

Introduction

The eyes are complex sense organs that have evolved from primitive light sensitive spots on the surface of invertebrates. They gather information about the environment; the brain interprets this information to form an image of what appears within the field of vision.[(4,6,7)] Intraocular pressure results from a dynamic balance between the aqueous humor formation and outflow which are nearly equal under normal conditions**[(2)].** Autonomic nervous system has been seen to have an effect on intraocular pressure. Stimulation of sympathetic nerves decreases intraocular pressure due to decrease in rate of secretion of aqueous humor. The parasympathetic nerves increases the intraocular pressure due to increase secretion of aqueous humor.**[(2)]**

Review: MYERS KJ (1974)[11]:-Studied the effect of moderate to severe aerobic exercise on the intraocular pressure using calibrated ergometry exercise.

SHAPIRO A *et al.,* (1983)[13]:- Found significant decrease in the intraocular pressure while performing study on the twelve patients suffering from simple open angle glaucoma.It concluded that there is no ocular restriction for simple open angle glaucoma patients in performing physical activity.

MAXWELL AND FEENEY L (2012)[10]:-Found in their study that on walking for a short distance at a brisk pace reduce IOP by clinically significant amount.

Aims & Objective:

1. To determine the effect of exercise on the intraocular pressure.
2. To determine the association of BMI with IOP.

Material & Method

The proposed study involved a minimum of 100 cases. The subjects were taken from OPD of Ophthalmology Department of GMC Jammu. Participants were explained about the procedure and purpose of the study in a vernacular language.

Inclusion Criteria:

1. The study was done on subjects of both the sexes in age group of 20-50 years.
2. Voluntary subjects attending Ophthalmology OPD in GMC Jammu.
3. Healthy subjects not suffering from any infectious diseases of eye.

Exclusion Criteria:

1. Subjects above 50 years and below 20 years of age.
2. Individuals with the infectious eye disease.
3. History of diabetes mellitus/Hypertension.
4. Past history of glaucoma, macular diseases, retinitis pigmentosa etc.
5. Subjects on various medications affecting IOP such as adrenergic agonists, cholinergics, anticholinergics, selective serotonin reuptake inhibitors, tricyclic antidepressants, histamine H(1) & H(2) receptor antagonists.

Statistical Analysis:

The data gathered from study proforma was compiled and presented in the form of tables and statistical analysis was done using computer software SPSS (version V27) on the WINDOWS platform. ANOVA analysis method was then utilized. Results were expressed in terms of mean and standard deviation. P value of <0.05 was considered as statistically significant. (Wiley stats, 2014).

Methods:

The subjects on study were tested for intraocular pressure in Ophthalmology OPD. They were subjected to 15 mins of exercise on treadmill and IOP was measured again after exercise. The weight and height (4) was calculated. The subjects were in the age group of 20-50 years and they were divided into two groups. One group having BMI more than 25 and other group with BMI less than 25. Blood pressure was also measured before and after the exercise using a Sphygmomanometer. Blood pressure was found to be increased after performing exercise for 15mins on treadmill.

Results:

Table-1 Age distribution of study patients

Age (years)	Number	Percentage
20-29	39	39%
30-39	22	22%
40-50	39	39%

Table No 1:Shows that majority of the patient's i.e., 39 were in the age group of 20-29 years and 40-50 years, 22 patients were in the age group of 30-39 years.The mean age in the study group was 34.01 ± 10.25 years (20-50yrs). The groups were thus found to be age matched and hence comparable.

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Figure-1 Showing Age distribution of the subjects studied.

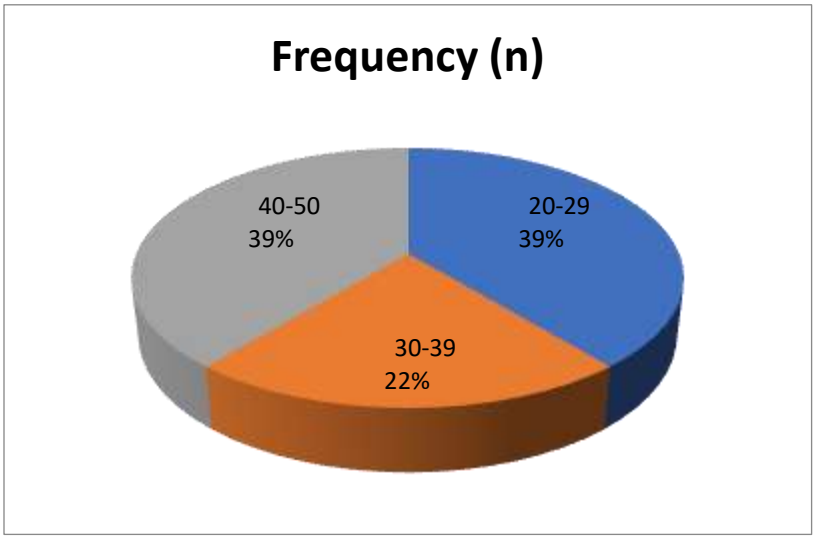

Table-2 Gender distribution of study patients

Gender	Number	Percentage
Male	60	60%
Female	40	40%
Total	100	

In the study group, 60 patients were males (60%) and 40 patients were females (40%). The groups were Gender matched and hence comparable.

Figure-2 Showing Gender wise Distribution of the subjects studied.

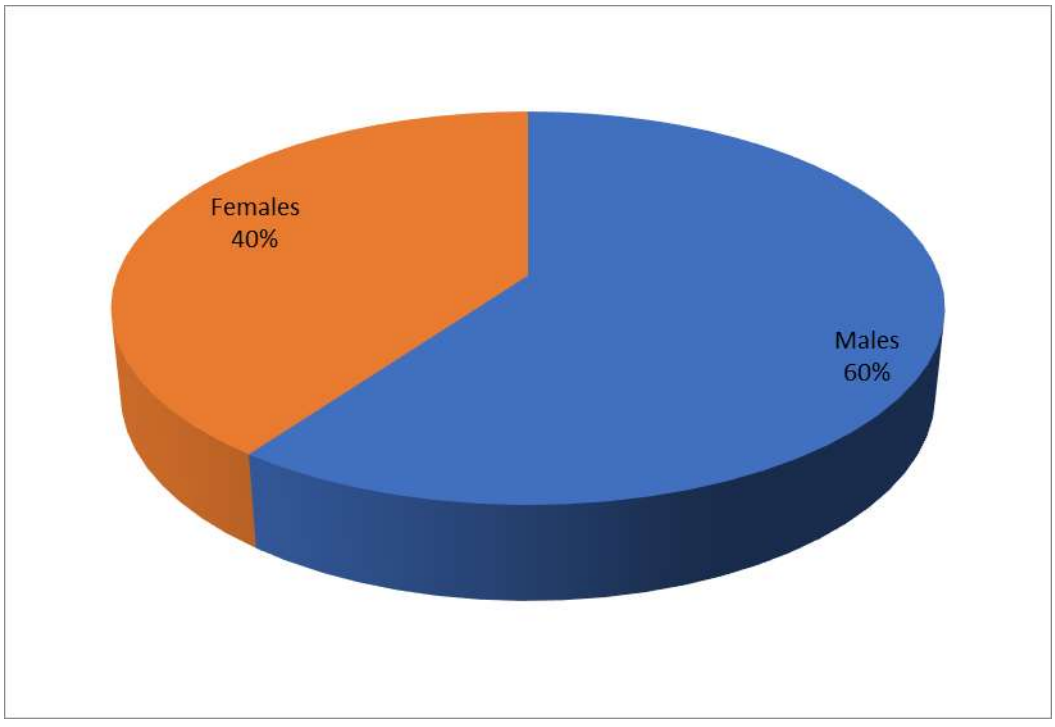

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Table-3 Comparison of the intraocular pressure in right eye before and after the exercise

IOP (RE) Before exercise	IOP (RE) After exercise	Number	t-value	p-value
14.91±3.28mmHg	13.87±3.35mmHg	100	5.056	<0.001
				p-value significant.

Table 3 (I) The comparison between the intraocular pressure before and after the exercise in the right eye shows a significant correlation as p-value <0.001.

Table 3 (ii): Comparison of the IOP (Left eye) before and after the exercise:

IOP (LE) Before exercise	IOP (LE) After exercise	Number	t-value	p-value
14.92±3.31mmHg	14.35±±3.27mmHg	100	2.540	0.013

Table 3(ii) The comparison between the IOP before and after exercise in the left eye shows a significant correlation as p-value 0.013.

Figure-3 Showing the Distribution of the subjects studied

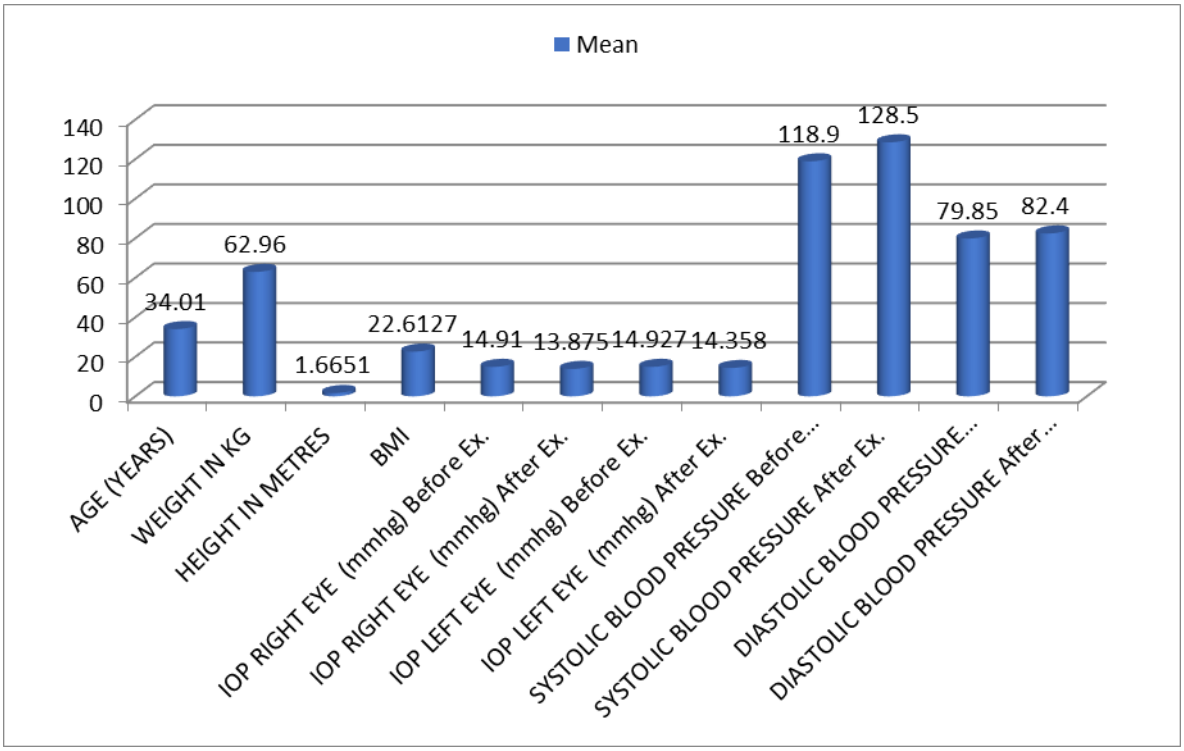

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Table-4 Comparison of the Systolic blood pressure before and after the exercise:

SBP Before exercise	SBP After exercise	Number	3t-value	p-value
118.9±14.49mm Hg	128.5±12.42mm Hg	100	-7.245	<0.001
				significant

Table 4(I) Shows that mean SBP before exercise is 118.9±14.49 and after exercise is 128.5± 12.42 mmHg

Table 4 (ii): Comparison of the DBP Before and after the exercise:

DBP Before exercise	DBP After exercise	Number	t-value	p-value
79.85±6.68mmHg	82.4±6.83mmHg	100	-3.339	0.001
				significant

Table 4 (II) Shows that mean DBP before exercise is 79.85±6.68 and after the exercise is 82.4±6.83 mmHg.

Discussion

There is a strong correlation between exercise and the intraocular pressure. Exercise is known to result in changes in the IOP. IOP is decreased following the aerobic exercise. The decrease in the IOP is correlated with the intensity and duration of the exercise accordingly, an increase in the exercise intensity and duration results in greater reduction of the IOP. Aerobic exercise could cause sympathetic nerve stimulation, consequently causing the expansion of trabecular meshwork and schlemm's canal which in turn lead to IOP reduction.[14]

In our study majority of the patients i.e., 39 were in the age group of 20-29 years and 40-50 years, 22 patients were in the age group of 30-39 years. The mean age in the study group was 34.01±10.25 years (20-50)years. The groups were thus found to be age matched and comparable.

In our study, out of 100 patients, 60 patients were males (60%) and 40 patients were females(40%). The groups were gender matched and hence comparable. This was consistent with the findings of **Joseph. A. Chromiak*et al.*, (2003)3**

In our study the mean SBP before exercise is 118.9±14.49 and after the exercise is 128.5±12.42 and the mean diastolic pressure before the exercise is 79.85±6.68 and after the exercise is 82.4±6.83. These findings are in accordance with the studies carried by **BAKKE EF *et al.*, (2009)** (1). Where transient changes in the systemic blood pressure induced by the isometric exercises affect IOP. In the Beaver Dam longitudinal Eye study of **Klein *et al.*, in 2005**, (7) the relationship between the intraocular pressure and the systemic blood pressure was investigated and studies showed that there were significant direct correlations between changes in the systemic blood pressure and changes in the intraocular pressure over five years of study.

Summary And Conclusions:

The design of the study was experimental (interventional). It was observed that there was a significant decrease in the mean intraocular pressure (Right eye) after exercise i.e., (p<0.001).The comparison between the mean intraocular pressure before and after exercise in the left eye showed a significant decrease with p-value 0.013.Mean systolic blood pressure shows significant increase after the exercise when compared with mean systolic pressure before exercise with p-value <0.001.Mean diastolic blood pressure showed an increase after exercise as compared to mean diastolic pressure before exercise.

A standard protocol should be established and subsequently used to determine the intraocular

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pressure in the glaucoma patients. This will allow for more accurate determination of any associations, and facilitate experimental studies in the future. In addition, self- care status, well being as other potential confounding factors need to be taken into account and examined in future prospective studies.

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