ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Study of Intra Ocular Pressure Changes after Isometric Leg Press Exercise Test in Young Adults.

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ABSTRACT

To Study the effect of isometric leg press exercise test on Intra ocular pressure in young adults. Healthy young male adults in the age group of 18-22 years were selected among MBBS phase I students of a Medical college .Sample size was 40. Heart rate and IOP were recorded at rest and after isometric leg press test**.** Right eye IOP has decreased significantly from resting 16.28±1.55 to 9.30±1.79($p<0.001$)immediately after leg press exercise IOP Left eye IOP has decreased significantly from resting 16.15±1.69 to 13.04±1.19 ($p<0.001$) immediately after handgrip exercise IOP. Isometric leg press exercise lowers IOP which were significant. Hence may prove useful in normotensive glaucomatous patients

Key words: Intraocular pressure, Leg press dynamometer

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ISSN: 0975-8585

INTRODUCTION

Glaucoma is chronic progressive optic neuropathy caused by a group of ocular conditions which lead to damage to optic nerve with loss of visual function.Most common risk factor is raised intraocular pressure [1,4,5]. Relationship between isokinetic exercise &IOP showed significant lowering of IOP after exercise. [2,3] Study of IOP after isometric exercise of large bulky muscles of leg has not yet been carried out.

AIMS &OBJECTIVE

To correlate the heart rate changes to intraocular pressure before and after leg press exercise.

MATERIALS AND METHODS

Healthy young male adults in the age group of 18-22 years with BMI of 18-22.9kg/m^2 were selected among MBBS phase I students of a Medical college .Sample size was 40. Heart rate and IOP were recorded at rest and after isometric leg press test.

Inclusion Criteria

- Young healthy adults in the age group of 18-21yrs of both sexes.
- Non obese BMI 18 – 22.9 kg/ m2.
- Normotensive < 130/80mm Hg.
- Non smoker
- Non alcoholic

Subjects with Pre-existing refractive error, acute and chronic Conjunctivitis, Glaucoma, Migraine were excluded from study.(7)

Materials

- Schiotz tonometer
- Back - Leg lift dynamometer
- Power lab ECG.

Parameters

Study was carried out in physiology department

- Intraocular pressure in mm hg in supine position using standard steps.
- Weight in kilogram. & Height in meters were measured. BMI=Weight in kg/height in $meter^2$ was calculated to group them as normal weight.
- Heart rate
- Maximum voluntary contractions(MVC) was assessed and subjects were asked to carry out endurance isometric exercise at 40% of their MVC

Study method

Prospective study

Ethical clearance was obtained from our institution Ethical committee. Prior to the procedure written and informed consent was obtained from all the subjects. The exercise was performed in a well-ventilated room. Participants were instructed not to consume beverages or a heavy meal in previous 4hours or participate in any vigorous activities 24 hour before test. Isometric endurance contraction at 40% of the individuals MVC was executed with Back-leg lift dynamometer

ISSN: 0975-8585

In order to minimize the bias of diurnal variations of IOP and other parameters, the studies were made between 3pm to 4pm. At the reporting time subjects were asked to relax in supine position for 5min. Baseline IOP was recorded . Subjects executed MVC contractions of 1second duration at 1 minute interval for 3times .Maximum of these is considered as their MVC .Then endurance contraction at 40% of their MVC is made. Intraocular pressure and Heart rate were measured in supine position immediately (within 30 sec), at five, at ten, at fifteen minutes after exercise.

Statistical Analysis

Mean and Standard deviation was calculated for isometric leg press exercise test in young adults. Paired t-test was applied at 5% level to test the significance of changes in above parameters(Using Epi-Info) Microsoft Excel and EPI-INFO package were used for data entry and statistical analyses respectively.

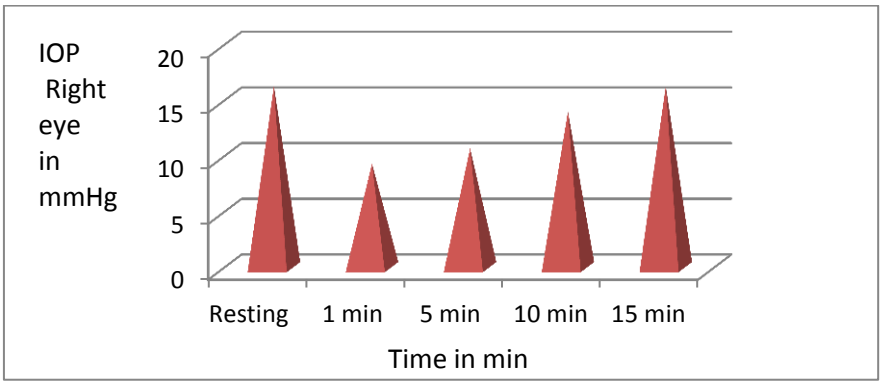
RESULTS

Mean and SD of IOP of right &left eye after Isometric leg Exercise

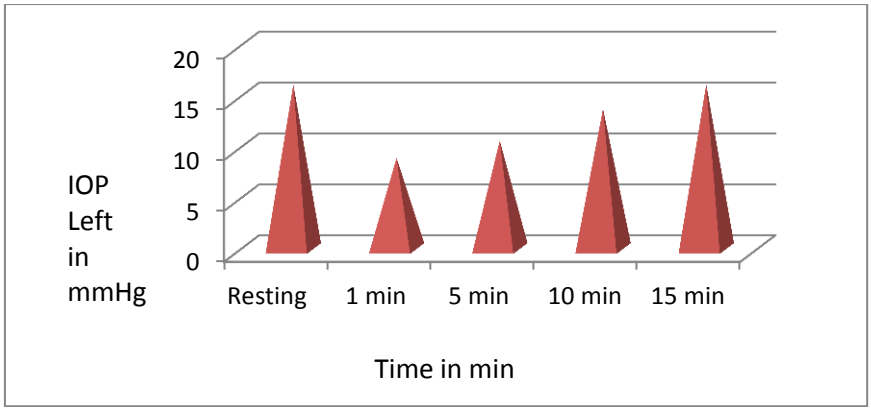
Parameter	Duration	Leg press	P value
Right eye IOP	Resting	16.28±1.55	>0.05
	1 min exercise	9.30±1.79	<0.001*
	5 min postexercise	10.67± 1.90	<0.001*
	10 mipostexercise	13.99±1.32	<0.001*
	15 min pt exercise	16.26±1.57	>0.05
Left eye IOP	Resting	16.15±1.70	>0.05
	1 min exercise	8.91±1.74	<0.001*
	5 min postexercise	10.60±1.92	<0.001*
	10 mipostexercise	13.74± 1.71	<0.001*
	15 min pt exercise	16.15±1.69	>0.05

Data presented as mean& SD
*Statistically significant p < 0.05

Right eye IOP has decreased significantly from resting 16.28±1.55 to 9.30±1.79(p<0.001)immediately after leg press exercise IOP has returned back to resting level within 15 min after exercise. Left eye IOP has decreased significantly from resting 16.15±1.69 to 13.04±1.19 (p<0.001) immediately after handgrip exercise IOP has returned back to resting level within 15 min after exercise.



ISSN: 0975-8585



DISCUSSION

- Isometric Leg press exercise stimulate ocular sympathetic nervous system to increase the facility of outflow and thus decreases IOP. Also epinephrine stimulates synthesis of cAMP. Activation of cAMP decreases IOP by decreasing aqueous humour production.[6,8]
- Also After leg press exercise there is rise in blood lactate levels. Increased Lactate levels causes outflux of water from eye which is responsible for fall in IOP [9]
- Low CO_2 tension in blood is associated with a reduction of IOP after isometric (anaerobic) exercise. In his study Harris compared the drop in IOP in 2 sets of individuals. In first set subjects were made isocapnic during exercise by giving carbon dioxide and in second set subjects were not given carbon dioxide and thus stayed hypocapnic. They observed cessation in IOP drop with blockage of exercise induced hypocapnia in first set and claimed the presence of this indirect effect of exercise of reduction in IOP by inducing hypocapnia [10]

CONCLUSION

Isometric leg press exercise induces raise in heart rate and simultaneously lowers IOP and both were significant. Hence may prove useful in normotensive glaucomatous patients.

REFERENCES

[1] Qureshi IA. Clin Exp Pharmacol Physiol 1996; 23(8):648-652.
[2] Avundak AM, Berna Y, Imaz, Nermin S. Int J Ophthalmol 1999; 213:290-294.
[3] Conte M, Scarpi M J ,Rossin RA., Beteli HR, Loopes RG. Arq Bras Ophthalmol 2009 ;72(3): 351-354.
[4] Dennis BA, David MA, Beck. J Glaucoma 1995;4:317-321.
[5] Geraldo MV, Hildeamo B, Oliveira MS, Daniel T. Archives of ophthalmology 2006; 124(9):1251-1254.
[6] Risner et al. J Glaucoma 2009;18(6) :429-436.
[7] Klein BEK, Klein R, Knudtson MD. Br J Ophthalmol. 2005; 89: 284-287.
[8] Passo MS, Goldberg L, Elliot D, Van Buskirk EM. Am J Ophthal 1987; 103(6):754-7
[9] A K Khurana. Glaucoma. 4th edition. India. New age international publishers, 2007, 208-210.
[10] Harris A. Invest Opthalmol Vis Sci 1992;33:2229-2232