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Correlation of Body Mass Index and Intraocular Pressure in Same Age Group

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Abstract

Introduction: Obesity is the one of most worried non communicable diseases. Changing life style, changing food habits, stressful life are risk factors for obesity. Obesity is risk factor for many diseases like hypertension, ischemic heart diseases, stroke and diabetes mellitus. Obesity also increases risk of raised intraocular pressure and glaucoma. *Objective*: To study correlation between body mass index and intraocular pressure in same age group subjects. *Materials and Method*: Study included healthy male and female subjects of same age between 45 years to 55 years. Total 150 healthy subjects were included in study and were divided into three groups according the body mass index. Group I- Body Mass Index (BMI): 18 to 24.9 Kg/m^2, Group II-Body Mass Index (BMI) 25 to 29.9 Kg/$m^2$and Group III- Body Mass Index (BMI): 30 and > 30 Kg/m^2. Intraocular Pressure (IOP) was measured in right eye and left eye separately using Perkin's tonometer between 10 am to 11 am to avoid diurnal variations. *Statistical Analysis*: A nonparametric test, Kruskal-Wallis test, was used to compare groups. In addition, Pearson correlation test was used to find out the correlations between parameters. SPSS 18.0 statistical package was used for statistical analysis. *P* values of less than 0.05 were considered to be statistically significant. *Result:* Our study showed statistically significant increase in intraocular pressure with increase in Body Mass Index (BMI) in all three groups. *Conclusion:* There is significant increase in intraocular pressure with increase in Body Mass Index (BMI) in all three groups. Raised Intraocular Pressure (IOP) is risk factor for glaucoma so obese patient should have regular eye check up and regular trained exercise to avoid complications like glaucoma.

Keywords: BMI; Intraocular Pressure; Glaucoma.

Introduction

Obesity is the one of most worried non communicable diseases. Changing life style, changing food habits, stressful life are risk factors for obesity. Obesity is risk factor for many diseases like hypertension, stroke & diabetes mellitus. Obesity also increases risk of raised intraocular pressure which is risk factor for glaucoma. The mean intraocular pressure (IOP) varies between 10 and 21 mm Hg (mean 16±2.5). Any abnormalities in the IOP results in dysfunction of the eye and affects the vision [1]. IOP is affected by various systemic parameters like age, sex, body mass index and blood pressure. Many Indian studies [2-6] and foreign studies [7,8] have shown positive correlation between body mass index and IOP. So this study was conducted to study correlation between body mass index and intraocular pressure in same age group subjects.

Materials and Methods

Study was conducted at Ophthalmology department, Navodaya Medical College and Hospital after getting Institutional ethical clearance and written consent from all participants individually. Study included healthy male and female subjects of same age between 45 years to 55 years. Subjects taking treatment for any systemic and ocular disease, subjects with any surgery, smokers and alcoholics were excluded.

Total 150 healthy subjects were included in study. Height in meters and weight in kilograms measured in light clothing without shoes. BMI was calculated using Quetelet's index i.e weight in Kg / Height in m^2. Subjects were divided according to BMI. Each group included 50 participants. Group I: BMI -18 to 24.9 Kg/m^2, Group II: BMI- 25 to 29.9 Kg/m^2, and

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Group III: BMI - 30 and > 30 Kg/m^2. IOP was measured for right eye and left eye separately using Perkin's tonometer between 10 am to 11am to avoid diurnal variations.

Average of three readings was taken. As IOP in right eye and left eye was same for all subjects, values of right eye were taken for statistical analysis.

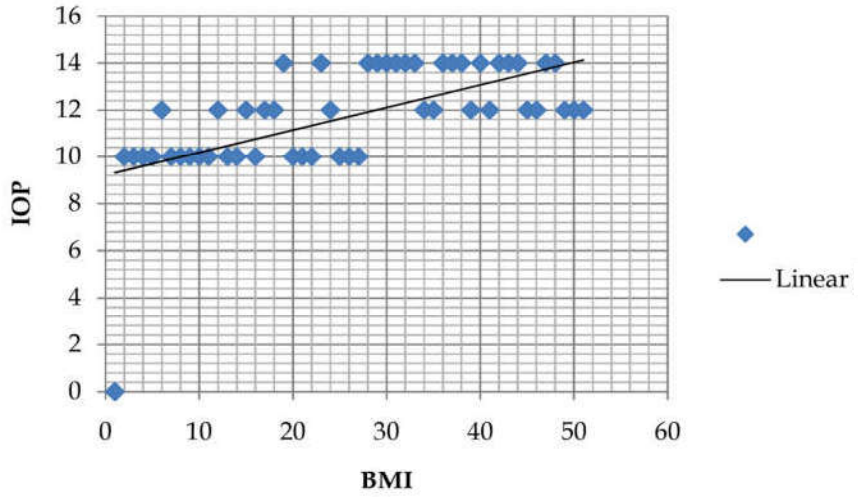
Statistical Analysis

A nonparametric test, Kruskal-Wallis test, was used to compare groups. In addition, Pearson correlation test was used to find out the correlations between parameters. SPSS 18.0 statistical package was used for statistical analysis. *P* values of less than 0.05 were considered to be significant.

Table 1: Statistical analysis of group I

Group	Participants	Gender F/M	BMI (Kg/m^2) (Mean ± SD)	IOP mmHg (Mean ± SD)	R value	P value	Significance
I	50	20/30	23.01±1.24	11.96±1.69	0.818	P<0.01	Significant

Significant positive correlation between BMI and IOP, with r = 0.818 and p < 0.01



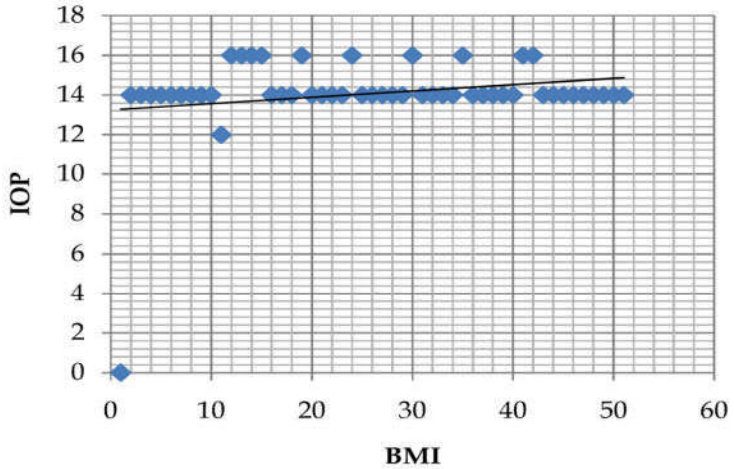
Graph 1: Correlation of BMI and IOP in Group I

In Group I mean BMI was 23.01±1.24 Kg/m^2, mean IOP was 11.96±1.69 mmHg

Table 2: Statistical analysis of group II

Group	Participants	Gender F/M	BMI (Kg/m^2) (Mean ± SD)	IOP mmHg (Mean± SD)	R value	P value	Significance
II	50	29/21	26.53±1.308	14.36±0.875	r =0.556	P<0.01	Significant

Significant positive correlation between BMI and IOP, with r = 0.556 and p < 0.01



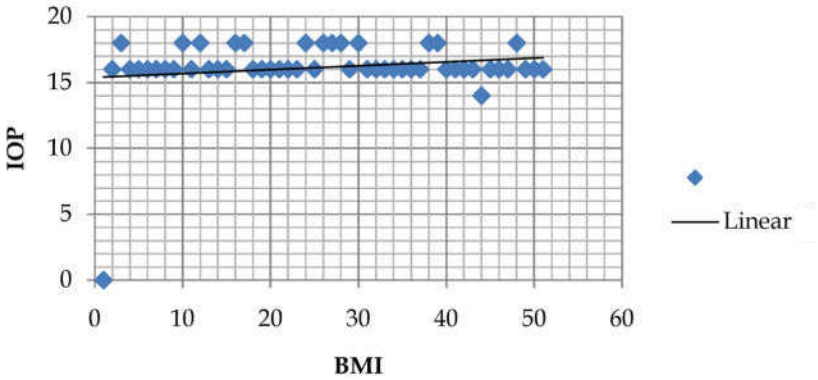
Graph 2: Correlation of BMI and IOP in group II

In group II mean BMI was 26.53±1.308 Kg/m^2, mean IOP was 14.36±0.875 mmHg

Table 3: Statistical analysis of group III

Group	Participants	Gender F/M	BMI (Kg/m²) (Mean ± SD	IOP mmHg (Mean± SD)	r value	P value	Significance
III	50	25/25	32.42±1.59	16.48±0.953	r =0.750	P < 0.01	Significant

Significant positive correlation between BMI and IOP, with r = 0.750 and p < 0.01



Graph 3: Correlation of BMI and IOP in group III

In group III mean BMI was 32.42±1.59 Kg/m² and mean IOP was 16.48±0.953 mmHg

Result

In all three groups there is significant increase in IOP with increase in BMI.

Discussion: In all three groups there is significant positive correlation between BMI and IOP like many studies in India [2-6] and other countries [7-8]. In obese person excess fat deposition is responsible for many complications. Along with increased risk for hypertension and diabetes mellitus it is also risk factor affecting vision. Hypertension and diabetes mellitus are also well known risk factors for ocular hypertension [9-13]. Excess fat also gets deposited in intraocular tissue. It leads to compression of episcleral vein and obstructs aqueous humour outflow [14]. In obese person blood viscosity is also increased due to increased red cell mass, Hb and haematocrit value. This further increases resistance in episcleral vein [15]. These factors are responsible for raised intra ocular pressure in obese person. It is also important to note that regular trained exercise for 2 to 3 months decreases both BMI and IOP [16,17].

Conclusion

As BMI increases, IOP also increases. Raised IOP is risk factor for glaucoma which can lead to dreadful complication blindness. So it is very essential that overweight and obese individual should undergo regular ophthalmic check up. They should also follow protocol for regular exercise and change in diet for losing weight. These simple measures can help to prevent complications such as glaucoma and blindness.

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