Review article:

Relation of Body Mass Index with Intraocular Pressure

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Abstract:
Intraocular pressure is pressure within the eyeball that gives it a round firm shape and is caused by the aqueous humour and vitreous body. IOP is important in maintaining the structure and function of the eye. This parameter is associated most commonly with glaucoma and glaucoma is world’s leading cause of acquired blindness. It may be of value to evaluate the physical correlates of IOP.

Obesity is one of the most prevalent disorders of the world. To conclude, BMI is a risk factor for increased IOP. This effect may be due to excess intraorbital fat tissue, an increase in epidural venous pressure and subsequent decrease in outflow facility. Obesity increases blood viscosity by increasing red cell count, Hb and hematocrit, thus increasing outflow resistance of episcleral vein. Further, obesity is also risk factor for diabetes and hypertension which also affect IOP. So weight control is important in preventing an increase in IOP. So exercise can have significant effect on keeping IOP in check. Though other factors also affect IOP but BMI is strongly associated with IOP. Most of other factors also may be directly or indirectly related to BMI. To maintain levels of IOP within normal limits and for prevention of glaucoma, a leading cause of blindness, BMI should be maintained and simple lifestyle changes like exercise, change in dietary habits, meditation, positive attitude can go a long way in achieving this goal.

Keywords: Intraocular pressure, Obesity

Introduction: Intraocular pressure is pressure within the eyeball that gives it a round firm shape and is caused by the aqueous humour and vitreous body. IOP is important in maintaining the structure and function of the eye. This parameter is associated most commonly with glaucoma and glaucoma is world’s leading cause of acquired blindness. It may be of value to evaluate the physical correlates of IOP.

Obesity is one of the most prevalent disorders of the world. It constitutes an important risk factor for several diseases such as type II diabetes, hypertension, stroke etc. and a number of eye diseases have also been reported to be associated with obesity like cataract, glaucoma etc. Obesity possesses an increased risk for both elevated IOP and systemic vascular abnormalities such as hypertension and arteriosclerosis.

Intraocular Pressure: A number of studies have attempted to identify the risk factors associated with development of elevated IOP. Some epidemiological studies examined relationship between BMI and IOP. There was a significant association between longitudinal change in IOP and change in weight. This relationship remained significant after controlling for initial BMI, initial BP, change in BP, gender and age. This study suggested that high BMI is independent risk factor for IOP in both cross sectional and longitudinal studies. Similar results were seen in studies in children also where higher IOP was observed in obese children. It was concluded that in addition to its indirect effect on IOP via blood pressure change, obesity is an...
independent risk factor for increased IOP.\(^5\) In a study done on Korean population, it was concluded that BMI had a significantly positive correlation with IOP after controlling for age, sex and mean blood pressure, only in men and not in women.\(^6\) A study conducted in Japanese residents and evaluated the association of several lifestyle-related factors with intraocular pressure. Results of the study suggested that IOP level may be affected by BMI, alcohol consumption score and cigarette consumption in both men and women. The reduction in aqueous humour outflow due to the elevation of intraorbital fat tissue and the increase in outflow resistance for the episcleral vein through the increase of blood viscosity with weight gain may lead to an increase in IOP.\(^7,8\)

**Discussion:** In a study to assess the distribution of intraocular pressure and its association with metabolic syndrome in a community, after adjusting for age, IOP of subjects with abdominal obesity in men and high blood pressure in women were significantly higher than those without abdominal obesity or higher blood pressure.\(^9\) In a pilot study IOP was compared in diabetics and non-diabetics and it was found to be higher in diabetics. When BMI was evaluated, it was found to be higher in diabetics.\(^10\) Another study observed that diabetics have higher IOP and higher BMI and BMI is associated with increased IOP in diabetics.\(^11\) If BMI is associated with a raised IOP, then a reduction in body mass index should be associated with a decrease in IOP. In a study, impact of regular physical exercise was assessed on BMI and its effect on ocular health represented as IOP. Here subjects underwent physical training programme on a stationary bicycle for 30 min, 3 times a week for 3 months. BMI and IOP were measured before exercise, immediately after exercise and after each month also. It was seen that there was a significant decrease in BMI and IOP especially after 2 and 3 months of training.\(^12\) Similar results were seen in other studies too.\(^13\)

**Conclusion:** To conclude, BMI is a risk factor for increased IOP. This effect may be due to excess intraorbital fat tissue, an increase in epidural venous pressure and subsequent decrease in outflow facility. Obesity increases blood viscosity by increasing red cell count, Hb and hematocrit, thus increasing outflow resistance of episcleral vein. Further, obesity is also risk factor for diabetes and hypertension which also have effect on IOP. So weight control is important in preventing an increase in IOP. So exercise can have significant effect on keeping IOP in check. Though other factors also affect IOP but BMI is strongly associated with IOP. Most of the other factors also may be directly or indirectly related to BMI. To maintain levels of IOP within normal limits and for prevention of glaucoma, a leading cause of blindness, BMI should be maintained and simple lifestyle changes like exercise, change in dietary habits, meditation, positive attitude can go a long way in achieving this goal.

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