The Role of Lipid Profile and Intraocular Pressure Lowering Medications in Patients Diagnosed with Primary Open Angle Glaucoma

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Objective: To evaluate the relation between blood lipid profile and intraocular pressure in patients taking medication for primary open angle glaucoma and compare patients on monotherapy with those taking polytherapy.

Design: A Retrospective Study.

Setting: Salmaniya Medical Complex, Bahrain.

Method: Patients who were diagnosed as open angle glaucoma and have never had any previous eye surgery were included in the study from 1 August 2019 to 30 January 2020. Patients were divided into three groups based on the number of eye drops they were using to control their intraocular pressure (IOP). The group on monotherapy was compared with those on three medications regarding intraocular pressure and cup to disc ratio. Blood lipid profile was compared in the three medications group between patients who are meeting the target IOP and those above 18 mmHg.

Result: The mean cup-to-disc ratio (CDR) in the group of monotherapy (n=21) was (0.75 +/- 0.1 SD) and the mean CDR in the group taking three kinds of drops for glaucoma (n=20) was (0.6 +/- 0.2 SD); the difference was significant, P-value was 0.0028. However, the difference in (IOP) was not statistically significant, P-value=0.967. Triglycerides mean levels in the uncontrolled IOP with three anti-glaucoma drops group mean was 2.7 and triglyceride mean levels in the controlled group of IOP (below 18 mmHg) was 1.2, P-value=0.0035.

Conclusion: Patients on polytherapy and advanced cupping may not benefit from reducing the only modifiable risk factor of intraocular pressure compared to those taking monotherapy. Non-compliance and drug interactions may play a significant role. Early glaucoma surgery for open angle glaucoma may be more beneficial in lowering IOP than adding more drops.

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Primary open angle glaucoma (POAG) has been identified as the second leading cause of blindness; an estimated 76 million people worldwide are affected in 2020[1]. Up to now, medications that lower intraocular pressure, the only modifiable risk factor known for POAG, are the main treatment given to patients. Non-compliance among glaucoma patients is one of the major causes of deterioration and progression of the disease[1]. The association between glaucoma and dyslipidemia has been investigated in several studies[2].

Using multiple drops for controlling advanced glaucoma conditions has been associated with failure due to non-compliance[3]. A new trend in treating glaucoma with surgery is advised after failure to respond to IOP lowering medications[4]. The association of dyslipidemia with glaucoma has been investigated in several previous studies[5].

The aim of this study is to evaluate the difference of polytherapy with monotherapy in treating open angle glaucoma patients with advanced cupping.

METHOD

Patients with confirmed diagnosis of primary open angle

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glaucoma and patients being followed up in the glaucoma clinic were included in the study from 1 August 2019 to 30 January 2. The patients were divided into three groups based on how many IOP lowering medications are used: Group 1 (20) using only one IOP lowering drop regardless of the component combined or single, Group 2 (20) using two different IOP lowering drops, Group 3 (20) using three different IOP lowering drops. Patients who had eye surgery were excluded.

Student unpaired T test was used to evaluate the cup-to-disc ratio by both clinical examination, optical coherence tomography. Evaluation of total cholesterol level and triglyceride level in patients taking three medications with advanced cupping whom intraocular pressure is below 18 mmHg with those with IOP equal or above 18 mmHg in the same group of patients was performed.

RESULT

The mean cup to disc ratio (CDR) in the group taking single anti-glaucoma drops (n=21) was (0.75 +/- 0.1 SD) and the mean CDR in the group taking three kind of drops (n=20) was (0.6 +/- 0.2 SD), the difference was significant, P-value was 0.0028. However, the difference in intraocular pressure (IOP) was not statistically significant between both groups (P-value=0.967). The mean IOP in the monotherapy group was 15.3 mmHg +/- 3.5 SD and in the three mediations group was 15.3 mmHg +/- 4.2 SD.

Patients on multiple anti-glaucoma drops (three medications) showed variation in their IOP reading, 5 showed IOP above 18 mmHg and 17 patients showed IOP reading below 18 mmHg. Our cut-off value for IOP was 18 mmHg in the advanced glaucoma group on poly-therapy[6]. IOP is the only known modifiable risk factor for glaucoma and studies showed that metabolic profile adjustment can play a major role in the control of IOP[2].

Total cholesterol level showed a mean of 5.3 in the group on three anti-glaucoma drops and high IOP (above 18) compared to a mean of 4.4 in those who had their IOP controlled (under 18) by the same three medications, P-value=0.227. Triglycerides levels in the uncontrolled IOP group mean were 2.7 and Triglyceride levels in the controlled group of IOP below 18 mmHg were 1.2, P-value=0.0035.

DISCUSSION

In our study, patients on monotherapy had statistically significant CDR (0.6) compared to those taking polytherapy (0.75). But CDR alone cannot be used as a single indicator for glaucoma progression as has been reported in previous studies[6].

Using multi-modal approach including optical coherence tomography assessment for nerve fiber loss and static Humphrey visual field with low threshold and age adapted parameters will be more accurate.

Taking more drops did not show statistically significant reduction in IOP in both groups. Those patients who had higher IOP reading in the polytherapy group showed significant higher triglyceride reading compared to those who have lower IOP in the same group.

Early surgical options for open angle glaucoma not controlled on single drop should be considered, especially in patients with high triglyceride levels.

CONCLUSION

Using three medications in patients who have significant cupping was not adding significant difference regarding IOP measures compared to patient taking monotherapy. Those results may be related to non-compliance, tolerance to medications and other health conditions. Triglyceride showed significant association with the IOP level and its successful control by medications in the advanced POAG patients.

Ophthalmologists and internist should evaluate patient's TGDs level in patient uncontrolled on three medications.

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