Research Paper

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A Comparative Study of Serum Total Protein and Fractions Between Normotensive, Non-Diabetic Glaucoma Patients with Healthy Non-Glaucoma Individuals

Medical Science

KEYWORDS : Glaucoma, Intra ocular pressure (IOP), Albumin, Normotensive

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ABSTRACT

Glaucoma is a chronic, progressive optic neuropathy caused by a group of ocular conditions which leads to damage of the optic nerve with loss of visual function. Glaucoma is a leading cause of irreversible blindness throughout the world. World Health Organization statistics, published in 1995, indicate that glaucoma accounts for 13.5% of global blindness. This study was done to asses and compares the serum totals protein concentration with special reference to albumin between normotensive, non-diabetic glaucoma patients and healthy controls. The mean total protein value in cases and controls were (7.08 ± 0.54) gm/dl and (7.89 ± 0.33) gm/dl and respectively which is a significant differences ($p < 0.01$). Mean albumin value in cases and controls were (3.23 ± 0.31) gm/dl and (4.09 ± 0.34) gm/dl respectively which is also statistically significant ($p < 0.01$). It was observed that both the total proteins and serum albumin were decreased in the patients group in comparison to controls group of the study population.

INTRODUCTION

Glaucoma is a chronic, progressive optic neuropathy caused by a group of ocular conditions which leads to damage of the optic nerve with loss of visual function. The most common risk factor known is a raised intraocular pressure.[1]

Glaucoma is a leading cause of irreversible blindness throughout the world. World Health Organization statistics, published in 1995, indicate that glaucoma accounts for blindness in 5.1 million persons, or 13.5% of global blindness (behind cataract and trachoma at 15.8 million and 5.9 million persons, or 41.8% and 15.5% of global blindness, respectively).**2**

Many studies have shown association between glaucoma and biochemical parameters like serum lipid profile and serum total protein and fractions in recent years. Similarly, both mean serum total protein and albumin levels were lower in patients compared with controls but only that of albumin was found to be significant**3**.

"Negative" acute-phase proteins decrease in inflammation. Examples include Transthyretin (Prealbumin), Albumin and Transferrin. The decrease of such proteins may be used as markers of inflammation. The physiological role of decreased synthesis of such proteins is generally to provide amino acids in order to produce "positive" acute-phase proteins more efficiently. Theoretically, a decrease in transferrin could additionally be decreased by an upregulation of transferrin receptors, but the latter do not appear to change with inflammation. Chronic inflammation can cause elevated IOP by sort of clogging up the drain with debris.**4**

In order to appreciate the above observation and hypothesis, it was thought worthwhile to take up this humble piece of work for a period of one year in Assam Medical College and Hospital, Dibrugarh, which is a premiere centre of Upper Assam and the neighbouring states catering patients from different strata. It is expected that the present insightful study will help us to compare our findings and deviations if any and especially approach, in a novel way, towards the role of serum proteins in glaucoma patients. So, we have undertaken this study to evaluate the serum Total Protein and Fractions level in normotensive non-diabetic glaucoma patients coming to our hospital in upper Assam. We also want to find out the correlation of serum Total Protein and Fractions with the incidence of normotensive, non-diabetic glaucoma patients as no previous data is available regarding it in this eastern most part of the Indian subcontinent.

MATERIALS METHODS

The study was carried out in the department of Biochemistry, Assam Medical College and Hospital, Dibrugarh over a one year period amongst newly diagnosed normotensive (normal systolic blood pressure), non diabetic glaucoma patients attending Out-patient Department and also those admitted into the ward in the Department of Ophthalmology, Assam Medical College and Hospital, Dibrugarh.

Inclusion Criteria:

A total of 50 cases with established Glaucoma patients, both male and female, and aged between 30-70 years were taken up for the study. The cases were primarily selected on the basis of detailed history, clinical features, intraocular pressure and gonioscopic findings. Age and Sex matched 50 cases of control was selected from amongst the healthy individuals.

Exclusion Criteria:

The following patients were excluded from the study:

1. Patients with diabetes mellitus.
2. All hypertensive patients with blood pressure more than 120/80 mm Hg (according to JNC 7 classification).
3. Congenital glaucoma
4. Patients on lipid lowering drugs and anti-glaucoma medication (e.g. topical beta blockers)
5. Patients with any other systemic disease affecting serum total protein and its fractions.

The venepuncture was done in the cubital fossa. About 2 ml of blood was transferred to sterile empty vials and samples were centrifuged at 5,000 rpm for 10 minutes as soon as after formation of the clot. The supernatant clear serum was then pipetted out using dry piston pipettes with disposable tips. The samples were analysed on the same day. Serum total protein and fractions were estimated in Semi-auto analyzer from the study sample.

Estimation of Total Protein.[5]

Principle: Proteins, in an alkaline medium, bind with the cupric ions present in the biuret reagent to form a blue-violet coloured complex. The intensity of the colour formed is directly proportional to the amount of proteins present in the sample.

Estimation of Albumin.[6]

Principle: Albumin binds with the dye Bromocresol green in a buffered medium to form a green coloured complex. The intensity of the colour formed is directly proportional to the amount of albumin present in the sample.

RESULTS AND DISCUSSION

The present study is a randomized case control study and results are analysed by using unpaired students t-test. 50 patients of normotensive, non-diabetic glaucoma patients and 50 healthy persons (controls) were included in the present study.

Serum Total Protein and fractions were estimated for both cases and controls and the results were compared between the two groups. In the present study, 50 patients of glaucoma were included. On decade wise grouping, it was found that maximum numbers of patients were between the age group of 51—60 years (34%). Among the 50 glaucoma patients included in the study, 31 patients were male which was higher than the number of female patients (19).

The mean age for total number of patients was: 51.76 ± 11.19

Mean age for male patients was : 51.84± 0.14

Mean age for female patients was : 51.63±13.01

Table–1: Total Protein, Albumin and Globulin in Glaucoma patients and Controls

Parameters	Glaucoma patients (mg/dl)		Controls (mg/dl)		
	Mean	SD	Mean	SD	
Total Protein	7.08	0.54	7.89	0.33	<0.01
Albumin	3.23	0.31	4.09	0.34	<0.01
Globulin	3.81	0.65	3.79	0.40	>0.05

*SD: Standard Deviation

In Table–1 mean total protein value in cases and controls were (7.08 ± 0.54) gm/dl and (7.89 ± 0.33) gm/dl and respectively which is a significant differences ($p < 0.01$). Mean albumin value in cases and controls were (3.23 ± 0.31) gm/dl and (4.09 ± 0.34) gm/dl respectively which is also statistically significant ($p < 0.01$). Mean globulin value in cases and controls were (3.81 ± 0.65) gm/dl and (3.79 ± 0.40) gm/dl and respectively. However this difference is not statistically significant ($p > 0.05$).

In the present study, serum total proteins as well as serum albumins were decreased significantly in glaucoma patients compared to healthy controls. Albumin is the most abundant plasma protein accounting for approximately one half of the plasma protein mass. Albumin is also known as negative acute phase reactant (APR) which has levels decreasing with inflammation. Associated disorders include surgery, trauma, bacterial infection etc. Presumably the APR all play a part in the very complex defensive process of inflammation, particularly complement activation and in control of enzyme activity. However, acute phase reaction is a non-specific reaction to inflammation and is not diagnostic for any given disease. High levels of albumin are partially protective against atherosclerosis, probably because of its promotion of cholesterol efflux from fibroblast and other cells.[7]

Adekunle B Okesina, Joshua FA *et al* (2011) conducted a study in Nigerian population and found that serum albumin level was significantly lower in patients with glaucoma than the controls**8**.

CONCLUSION

In this study, serum total protein and fractions were studied in normotensive non diabetic glaucoma patients and healthy controls to find any association of biochemical alteration with disease process of glaucoma. It was observed that both the total proteins and the serum albumin were decreased in the patients group in comparison to control group of the study population. So decrease level of serum total proteins and the albumin may contribute towards the pathogenesis of glaucoma.

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