

## **C-REACTIVE PROTEIN IN PATIENTS WITH OPEN ANGLE GLAUCOMA**

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### **Abstract**

This study aimed to evaluate the C-reactive protein (CRP) levels in patients with open angle glaucoma. This cross sectional study included 36 patients diagnosed with glaucoma compared to 36 healthy controls. Each patient went through a complete ophthalmic examination and blood sampling for CRP.

A thirty six cases (23 males, 13 females, mean age  $60 \pm 11.7$  years) with glaucoma and 36 age-matched controls (18 males, 18 females, mean age  $58.25 \pm 10.45$  years) were evaluated. Serum CRP levels were significantly higher in glaucoma cases than in controls (median 3.43, range 0.2-8.47 mg/dL) compared to 0.97, 0.17-6.30,  $P < 0.002$ . The mean serum CRP levels were significantly elevated in the glaucoma cases compared with the controls ( $3.27 \pm 2.79$  mg/dL and  $1.50 \pm 1.56$  mg/dL respectively).

Conclusion: The findings of this study suggest that higher CRP levels are associated with glaucoma. It is possible that there is a link between vascular inflammatory process and glaucoma.

### **Introduction**

Glaucoma which is a disturbance of structural or functional integrity of the optic nerve due to intraocular pressure effect can usually be diminished by an adequate lowering of intraocular pressure (IOP)<sup>1</sup>. Glaucoma is the second important cause of visual field loss worldwide<sup>2</sup>. Glaucoma is characterized by particular pattern of visual field loss which is associated with a continuous thinning of the retinal nerve fiber layer<sup>3</sup>. It is estimated that glaucoma has affected over 60.5 million people's globally<sup>4</sup>.

C-reactive protein (CRP) is an early acute stage marker of inflammation that rises in response to acute inflammatory process or active infection, for that reason it can be used as an indicator for acute tissue injury which resulted from infection, and or inflammation<sup>5</sup>.

Although the diagnostic specificity of CRP is low, frequent and serial measurements of this protein in order to detect any change or fluctuation can be helpful in clinical management. It is a

powerful screening test for organic, infectious or inflammatory diseases and their response to therapy<sup>6</sup>.

The CRP levels vary in different age groups and races. Woloshin et al reported the CRP levels in American adults increase from 1.4mg/L at age 20-30 to 2.7 mg/L at age >80, while Anand et al reported in Canada, the CRP level is highest among the original Americans, followed by South Asians, Europeans, and lowest in Chinese<sup>7,8</sup>.

### **Material and methods**

A 72 subjects underwent a detailed ophthalmic examination including visual acuity, slit lamp, angle of the anterior chamber, optic nerve head and visual field at the ophthalmic unit in Al-Sader Teaching Hospital and Basrah General Hospital, South Iraq, together with blood sampling for CRP. Patients were subdivided randomly into two groups: group 1; patients with open angle glaucoma (36 cases) and group 2;

individuals with normal ophthalmic examination (36 subjects). C-reactive protein was analyzed using Maglumi CRP (CLIA) kit supplied from Snibe Company London, UK. The test principle was based on quantitative determination of CRP in serum using sandwich immunometric assay with final flash chemiluminescent reaction. All tests were performed using instrument Maglumi 1000 from Snibe Company. This article is approved by

ethical committee of Basrah Medical College. Data were analyzed statistically using SPSS program & T-Test. A P-value of <0.05 was considered as significant.

**Results**

There was no statistical difference between the 2 groups in regard to age. There was significant rise in CRP in glaucoma patients compared with the controls as shown in Table I.

**Table I: Comparison of biochemical parameters in glaucoma and healthy controls.**

Groups Statistics					
Variables	Group	N	Mean	Std. Deviation	Std. Error Mean
Age	Case	36	60.00	11.706	1.951
	control	36	58.25	10.459	1.743
CRP	Case	36	3.2700	2.79095	0.46516
	control	36	1.5081	1.56700	0.26117*

\*Significant result

There was no significant difference in the means of C-reactive protein regarding gender in glaucoma and control cases (p-value >0.05) as demonstrated in Table II.

**Table II (A): Biochemical profile in glaucoma patients according to gender**

Groups Statistics					
Variables	Gender	N	Mean	Std. Deviation	P-value
Gender	Male	23	59.70	12.815	0.8
	female	13	60.54	9.905	
CRP	Male	23	3.6939	2.78000	0.2
	female	13	2.5200	2.75620	

**Table II (B): Biochemical profile in healthy control group according to gender**

Groups Statistics					
Variables	Gender	N	Mean	Std. Deviation	p-value
Age	Male	18	57.78	12.173	0.7
	female	18	58.72	8.750	
CRP	male	18	1.3433	1.38911	0.5
	female	18	1.6728	1.75166	

**Discussion**

Our data showed that mean CRP levels were higher in glaucoma patients compared with normal controls (3.27±0.5 mg/dL and 1.50±0.3 mg/dL respectively, p value=0.002). These results goes with those published by Leibovitch et al<sup>9</sup> in which the mean plasma CRP level was significantly elevated in glaucoma cases

compared with the controls (3.21±0.6 mg/dL and 0.85±0.17 mg/dL respectively, P <0.05). Our results also goes with those of Stefan et al<sup>10</sup> in which the plasma CRP level reveals important differences (p <0.0001) in the two groups: 3.87±0.8 mg/dl in glaucoma group and 0.68±0.13 mg/dl in the control group. However, our

data is dissimilar to the results found by Su et al which showed no increased level of CRP in glaucoma patients when compared with non-glaucoma controls which may be due to the fact that they excluded patients with systemic diseases like cerebrovascular accidents, diabetes mellitus, hypercholesterolemia, ischemic heart disease and hypertension. Their finding suggested that the previously reported CRP elevation in the glaucoma patients could possibly be a confounded result<sup>11,12</sup>. Data from the Korean population reported by Choi et al also supported this finding, their results showed no statistical differences in lipid profiles and CRP between either the glaucoma patients and non-glaucoma controls individuals ( $p>0.05$ ) after exclusion of patients with risk factors of cardiovascular disorders<sup>13</sup>.

In this study, we included all patients with glaucoma regardless of the having any medical systemic disorders such as hypertension, hypercholesterolemia, ischemic heart disease, and cerebrovascular incidents that can affect the level of CRP, which may result in the high level of CRP in glaucoma patients compared with non-glaucoma controls group.

Many studies suggested that atherosclerosis may result from the effects of inflammation and inflammatory changes, and as we know, CRP is a potent marker

for inflammation so our results in agreements of the others which found that CRP act as proxy for atherosclerosis in the vessels, and CRP level gives an indication of its severity and progression.

Regarding the biochemical parameters which had been included in this study: we did not find any differences between glaucoma patients and non-glaucoma controls groups: this is in contrary with the results found by Kellogg researchers who found that actually the risk for developing the disease is reduced by 5 percent in presence of hyperlipidemia<sup>14</sup>.

However, each disease has different stages of development and different types in each stage of the inflammatory process and the progression of the disease differs so the level of C-reactive protein may also vary according to the stages of glaucoma. Further investigations are needed to reveal the association of CRP and lipid profiles with glaucoma patients according to types and stages of glaucoma.

In conclusion, our positive findings suggest that increased level of CRP might be a risk factor for the development and progression of glaucoma.

The range of the variation of CRP level is wide and can be influenced by many systemic diseases or drugs. Thus the application of using the systemic CRP level to evaluate patients with glaucoma requires more verification.

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