ORIGINAL RESEARCH PAPER

Ophthalmology

KEY WORDS: Glucose Level, Calcium Level, Aqueous Humor, Diabetic Cataract, Non-diabetic Cataract

"CORRELATION OF GLUCOSE AND CALCIUM IN AQUEOUS HUMOR BETWEEN DIABETIC AND NON-DIABETIC CATARACT PATIENTS"

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Introduction

Cataract is defined as the loss of lens transparency because of opacification of the lens. Based on the causes, cataracts can be classified into age-related cataract, paediatric cataract and cataract due to other causes[1]. Age-related cataract is the most prevalent type in adults, with the onset between age 45 to 50 years, while in children hereditary and metabolic causes are most common[2]. Cataract occurs more frequently in low to medium socioeconomic background individuals, and therefore more common in developing countries.[3]

Aqueous humour is a dynamic intraocular fluid that is vital to the health of the eye. The precise location of production of aqueous humour is anterior portion of the pars plicata along the tips or crest of the ciliary process.[4] It is derived from plasma within the capillary network of the ciliary process. Substance which present in aqueous humour must pass through structure like capillary wall, stroma, epithelial bilayer by the process of diffusion, ultrafilteration and secretion.[5]

General characteristics of aqueous humor relative to plasma are like it is acidic with pH of 7.2 in anterior chamber, have marked excess of ascorbate (15 times more than that of arterial plasma), marked deficit of protein (0.02% in aqueous humor compare with 7% of plasma) [6]. Because of constant metabolic inter-change that occur in intraocular course there is slight excess of chloride, deficiency of bicarbonate and Co_2. The lens takes up glucose, K + , and amino acids and release lactate and pyruvate. Other molecules which also found are sodium hyaluronate, glycosaminoglycan, catecholamines, norepinephrine and nitric oxides[7,8].The lens metabolism is associated with aqueous humor and this thin fluid itself is produced from blood secretions, serum electrolytes concentration directly affects electrolytes of aqueous humor and in turn lens metabolism. Biochemical studies have shown significant difference (meaningful) in some serum electrolytes concentration in those suffering from age related cataract versus those not. [9,10] Electrolyte imbalances are common in diabetes primarily as a result of deficiency of insulin and elevated blood glucose.[11]

Material and Methods

A total group of 80 patients of cataract are studied, among which 62 patients are non-diabetic and 18 patients are having diabetes. Out of non- diabetic group 56 patients are having senile cataract and 6 patients are of presenile cataract.

Routine preparation of the case for cataract surgery with required asepsis is done. Peribulbar block is given, 0.2 cc of aqueous humor is collected from anterior chamber by an insulin syringe intraoperatively. The anterior chamber then maintained with ringer lactate and cataract surgery then continued in its regular way. Biochemistry analysis of glucose and electrolyte Ca^{2+} in aqueous humor is done.

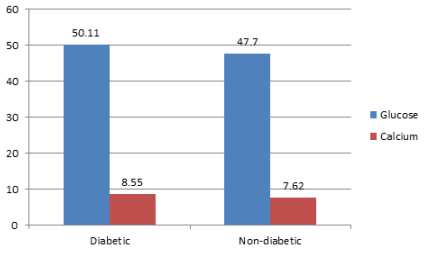
Results

In our study we found that in diabetic group the mean aqueous level of glucose and calcium are 50.11 mg/dl and 8.55 mg/dl and in non-diabetic group the mean aqueous level of glucose and calcium are 47.7 mg/dl and 7.62 mg/dl respectively. On comparison between mean aqueous level of diabetic and non-diabetic group p-value for glucose is statistical insignificant as p-value is more than 0.05 but p-value of calcium is statistically significant as p-value is less than 0.05.

Table no. 1) Mean aqueous levels b/w Diabetic and Non-diabetic group

S.N.	Variable	Diabetic group	Non-diabetic group	P value
1.	Glucose	50.11 mg/dl	47.7 mg/dl	0.2263
2.	Calcium	8.55 mg/dl	7.62 mg/dl	0.0432

Graph no.1) comparing mean aqueous level of glucose and calcium in mg/dl in diabetic and non-diabetic patients

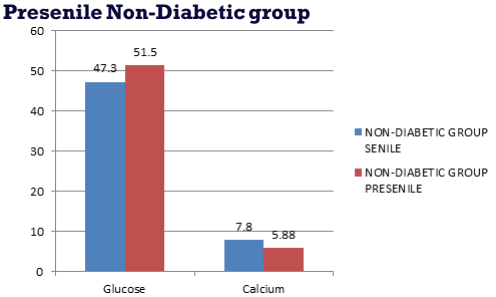


In our study , we also found that in non-diabetic senile group the mean aqueous level of glucose and calcium are 47.30 mg/dl and 7.80 mg/dl and in non-diabetic presenile group the aqueous level of glucose and calcium are 51.5mg/dl, 5.88 mg/dl respectively. On comparison between mean aqueous level of non-diabetic senile and presenile group p value for glucose is insignificant as the p-value is more than 0.05 and p-value for calcium is statistically significant and positively correlated as the p-value is less than 0.05.

Table no. 2) Mean aqueous levels in Senile & Presenile Non-Diabetic group

S.N.	Variable	NON-DIABETIC GROUP		P value
		SENILE GROUP	PRESENILE GROUP	
1.	Glucose	47.30 mg/dl	51.5 mg/dl	0.2263
2.	Calcium	7.8 mg/dl	5.88mg/dl	0.0143

Graph no. 2) Comparing Mean aqueous levels b/w Senile and Presenile Non-Diabetic group



Discussion

As in diabetic patients there is electrolytes disturbance due to hyperglycemia which cause increase in serum osmolality, that's why electrolytes concentration directly affects electrolytes of aqueous humor and in turn regulates lens

metabolism. [12] The lens metabolism is associated with aqueous humor and the aqueous humor is produced from blood secretions therefore serum electrolytes concentration directly affects electrolytes of aqueous humor and in turn lens metabolism[13], as the disturbance in electrolytes in serum are most commonly found in senile patient due to age related changes therefore electrolytes and glucose imbalance also found more commonly in senile patients[14].

Conclusion

On comparing the aqueous level of diabetic and non-diabetic cataract patients (and also senile and presenile groups) the level of calcium is found higher in diabetic patients as compared to non-diabetic cataract patients, while comparing level of glucose in both groups we do not find any significant association in both groups.

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