Original Article

Comparison of serum sodium and potassium levels in patients with senile cataract and age-matched individuals without cataract

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Aim: The study was to analyze mean serum sodium and potassium levels in cataract patients and age-matched individuals without cataract. **Methods and Materials:** It was a prospective case-control study. Individuals more than 50 years of age who attended our ophthalmic center in the year 2007-2010 were grouped into those having cataract and those without cataract. Mean serum sodium and potassium levels in the cataract groups were calculated and compared with the control group. Statistical software SPSS14 was used for statistical analysis. **Results:** Mean serum sodium levels in cataract group was 135.1 meqv/l and 133 meqv/l in the control group. Mean potassium was 3.96 meqv/l in the case study group and 3.97 meqv/l in controls. Mean sodium levels among cases were significantly higher than control group. No difference was seen in the PSC group and control. The difference in mean potassium among the two groups was statistically insignificant. **Conclusion:** Diets with high sodium contents are a risk factor for senile cataract formation and dietary modifications can possibly reduce the rate of progression cataract.

Key words: Senile cataract, serum potassium, serum sodium

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Various studies have been done to elucidate the potential risk factors that could affect the process of cataractogenesis. Genetic factors[1,2] exposure to UV B-rays,[3] occupational, geographic, and dietary factors have been implicated. In this study we analyzed serum sodium and serum potassium levels which could in turn affect the electrolyte composition of aqueous humor and therefore alter lens metabolism and lead to cataract formation.

Materials and Methods

The study was conducted in our institution from October 2007 to October 2010. A total of 332 individuals above 50 years of age who came for ophthalmic evaluation were included in the study. They were grouped into study groups, defined as people having nuclear/cortical/posterior subcapsular cataract. Controls were age- and gender-matched individuals who had no cataract. LOCS III classification was used to grade the cataract. The cases were further subdivided into group 1- patients with nuclear cataract, group 2 -- patients with mixed cataract [nuclear and cortical both] and group 3 – patients with posterior subcapsular cataract only. Individuals having diabetes mellitus, hypertension, other systemic diseases or on medications affecting serum sodium and serum potassium levels were excluded from the study. Patients having secondary causes of cataract in the same age groups like postinflammation, steroid induced were also excluded from the study protocol. Detailed ophthalmic evaluation including slitlamp examination and fundus evaluation was done. To avoid duplication of data individuals who had both eyes cataract that fell in the same subgroup were only included as cases and those Serum sodium and serum potassium analysis was done by drawing 2 ml of blood taken under aseptic precautions and was subjected to serum sodium and potassium analysis using the principle of ion selective electrode.[4]

Normal serum sodium levels - 130-143 meq/l.

Normal serum potassium levels - 3.5-5.5 meq/l.[4]

Data were analyzed on SSPS14 software. The procedure was carried out with appropriate informed consent and ethical committee clearance. Nonparametric test – Kruskal--Wallis/ Mann--Whitney tests were used in the analysis.

Results

In this study a total of 332 eyes of 332 individuals were included, out of which 183 eyes had cataract and the rest 149 eyes were controls without cataract.

Among the 183 patients, 78 belonged to study group 1 with nuclear cataract, 82 belonged to study group 2 with mixed cataract and the rest 23 eyes having posterior subcapsular opacification belonged to study group 3. There were 91 males and 92 females in the case study group and 75 males and 74 females in control group. The mean age in cataract study group was 64.4 years old and in the noncataract age group 63.6 years and the difference was statistically insignificant (*P* value 0.30).

Comparison of mean serum sodium among cases and controls showed mean serum sodium levels to be higher in cases (135 meqv/l) compared to controls (133.1) [Table 1]. Though the means in the two groups were within the normal range the difference was statistically significant [*P* value 0.000]. Comparison of serum sodium among the study group with only nuclear cataract [group 1] and controls showed mean serum sodium levels to be higher in cases (135.1 meqv/l)

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Table 1: Mean serum levels

	Group 1	Group 2	Group 3	Total cataract group	Control
S. Sodium	135.1	135.6	134.3	135	133.1
S. Potassium	3.77	4.04	4.04	3.96	3.97

compared to controls (133.1 meqv/l). Though the means in the two groups were within the normal range the difference was statistically significant [*P* value 0.001]. Comparison of serum sodium among the study group with mixed cataract [group2] and controls showed mean serum sodium levels to be higher in cases (135.6 meqv/l) compared to controls. Though the means in the two groups were within the normal range the difference was statistically significant [*P* value 0.000]. Comparison of serum sodium among the study group with posterior subcapsular cataract [group 3] and controls showed mean serum sodium levels to be higher in cases (134.3 meqv/l) compared to controls (133.1 meqv/l). Though the means in the two groups were within the normal range the difference was not statistically significant [*P* value 0.404].

Comparison of mean serum potassium among cases and controls showed mean potassium levels among cases (3.96 meqv/l) to be lesser compared to controls (3.97 meqv/l) with no statistical significance (*P* value 0.40).

Discussion

There have been various models describing the multiple risk factors involved in cataractogenesis. Despite the complexity in identifying cataract risk factors, attempting to do so provides new hopes in dealing with morbidity and cost of disease.

The aim of this study was to find whether a significant difference exists between serum sodium and serum potassium levels in individuals with cataract and age-matched normal individuals.

Comparison of the means of serum sodium and potassium among cases and controls indicated significantly high levels of serum sodium in blood of cataract patients as compared to their controls. In subgroup analysis, the study group with nuclear cataract [group 1] and mixed cataract [group 2] were the ones which showed higher levels of serum sodium among the case population, but in the posterior subcapsular group no significant difference was noted. Previous studies on epidemiological association with various types of cataract have been done, reporting high association of age, race, and geographical factors for nuclear cataract. Age, sex, UV-B rays, and genetic factors have been implicated for cortical cataract and diabetes, hypertension for posterior subcapsular cataract.[5] Though no previous study to our knowledge associates higher levels of serum sodium with cortical and nuclear cataract though this correlation cannot be ruled out.

Previous studies have found a significantly higher levels of bilirubin, alkaline phosphatase, and glutamyl transpeptidase in senile cataract patients compared to normal individuals.[6] Few earlier studies comparing serum sodium and potassium showed similar results to our study.[7,8]

Hence alteration in cation concentration of aqueous humor which is attributed to alterations in serum cation concentration, can be known as a risk factor for cataract formation.[9] Previous studies notify the significant difference between serum sodium of those suffering from age-related cataract versus those not. It should be mentioned that this is not true about serum potassium in their study as also in ours.

To conclude, diets with high sodium contents could be a risk factor for senile cataract formation. As it seems, a high level of serum sodium in turn contributes to cataract formation.[10]

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