

Comparison of Epidemiological Factors Between Patients with Senile Cataract and Controls Without Cataract

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Abstract

Introduction: The aim of present study was to compare environmental factors between patients with senile cataract and individuals without cataract. **Materials and Methods:** In this case-control study, we investigated 872 participants; 436 of them with senile cataract diagnosed by an ophthalmologist. Other 436 participants were without cataract chosen as a control group. Participants were interviewed about epidemiological factors by a general practitioner using a structured questionnaire. Factors of environmental exposure were sunlight exposure during work, electric shock, head radiography, ocular trauma, high blood pressure, smoking, diabetes and the use of multivitamins and mineral supplements such as iron and zinc. We also asked the participants about their genealogy of cataract. **Results:** We observed a positive difference changes between the presence of senile cataract and control in the environmental factors of sunlight exposure during work by 49.8%, genealogy 25.4%, high blood pressure 18.2%, diabetes 14.2%, head radiography 13.7%, smoking 11%, ocular trauma 3.2%, electric shocked 2.7%. Multivitamins and mineral supplements were less commonly used by participants with cataract compared with the control group. **Conclusion:** we observed a positive correlation between the presence of senile cataract and the following factors: electric shock ($p < 0.044$), sunlight exposure during work, head radiography, smoking, ocular trauma, genealogy, high blood pressure and diabetes ($p < 0.001$). Therefore senile cataract could be avoided or delayed by controlling environmental factors and the use of vitamins.

Keywords

Senile Cataract, Sunlight, Diabetic, Smoking, Ocular trauma, Environmental Exposure, High Blood Pressure

1. Introduction

Cataract is an immense public health problem. It is the major cause of visual impairment in senior citizens worldwide. According to the data provided by the World Health Organization (WHO), cataract is responsible for nearly 50% of blindness cases globally [1]. The prevalence of cataract increases in aging rapidly. Therefore, it is crucial to identify the risk factors for senile cataract. In the past decades, researchers have conducted numerous epidemiologic studies to understand the pathogenesis of the disease [2]-[7]. One of the most common types of cataract is the senile cataract and its pathology is still unknown, but it is likely that beside biochemical changes, numerous

environmental factors can also lead to the development of the disease. Identifying the environmental risk factors responsible for the formation of senile cataract is a complicated problem. To deal with this curable form of blindness, it is necessary to know its magnitude, especially in the elderly. It is a more realistic approach to explore how multiple risk factors are involved in the etiology of cataract. Next, if we compare data obtained from participants to that from the control group, we can identify factors that may help to avoid the disease or delay its progression. Ten years of delay in progression can yield a better quality of life for the individual and more economic incomes. Previous publications suggested that factors such as radiation, smoking, and sunlight exposure during work can cause oxidative stress, which plays an important role in the generation of cataract

[8]. Therefore, it is important to know which environmental factors, are associated with cataracts. Knowledge about the magnitude of these factors, associated with the sociodemographic factors, will be useful for healthcare managers and physicians. Therefore, to investigate the environmental risk factors of cataract, we conducted a case-control study among participants with cataract and control individuals without cataract. Participants were interviewed by a general practitioner using a structured questionnaire. In the present study, we investigated prolonged exposure to sunlight, head radiography, smoking, electric shock, as well as genealogy of the disease, ocular trauma, diabetes and blood pressure in association with cataract. Also the use of vitamins, zinc and iron supplements by subjects were recorded

2. Materials and Methods

In this cross-sectional case-control study, 872 subjects aged 50 to 80 years were interviewed, including 436 cases with senile cataract diagnosed by an ophthalmologist, and 436 individuals who did not have cataract, from different part of hospital. Age, sex, and socioeconomic status were similar in two groups. They were selected randomize, between July 2013 and December 2013. All Participants were carried with the tenets of the Declaration of Helsinki (1989) of the World Medical Association. Our study was approved by the Arak medical science university ethics committee and all of the participants provided written informed consent. Participants were interviewed using a structured questionnaire by general practitioner. All subjects (case and control) were examined by the faculty members of the ophthalmology department of the Amir Kabir Hospital in Arak, Medical Sciences University, I.R.Iran. Visual acuity was tested, and the opacity of the lens was examined using a slit lamp [9]. Inclusion criteria were any type of senile cataract (grade 1 to 3) age between 50 to 80 years. Those with cataracts caused by known causes were excluded.

3. Statistical Analysis

Data was compiled and analyzed by using appropriate statistical techniques like percentages, proportions, and Chi-square test was used as test of significance. P values < 0.05 were considered as statically significant. Statistical analyses were performed using the SPSS 16.0 software package.

4. Results

In the present study, 243 patients were women (55.7%) and 193 were men (44.3%). Majority of the patients with cataract were aged between 60 and 80 years (58.5%). Cataract was significantly more common in men ($P < 0.05$); 62.8% of the patients had a lower socioeconomic status. 64.9% of the patients with senile cataract were exposed to sunlight during work, while 15.1% of the control individuals worked in the sunlight. 34.2% of the cases and 8.8% of the controls

had a history of senile cataract in the family. High blood pressure was observed in 27.1% of the cases and in 8.9% of controls. Out of 436 patients with cataract, 124 (21.3%) were diabetic, whereas in the control group 31 (7.1%) were diabetic. 6.4% of cases and 3.7% of controls had an accidental electric shock. 13.3% of patients and 2.3% of controls without cataract were smoking. Ocular trauma was present in 6.0% of the cases and in 2.8% of the controls.

Table 1. Compression of epidemiological factors between case ($N=436$) and control ($N=436$)

Parameters	Group	% percentages	% difference Change	P value
professional sunlight exposure	Case	64.9	49.8	<0.001
	Control	15.1		
Family history of senile cataract	Case	34.2	25.4	<0.001
	Control	8.8		
High blood pressure	Case	27.1	18.2	<0.001
	Control	8.9		
Diabetic	Case	21.3	14.2	<0.001
	Control	7.1		
Electric shocked	Case	6.4	2.7	<0.044
	Control	3.7		
Head radiography radiation	Case	19.7	13.7	<0.001
	Control	6.0		
Smoking	Case	13.3	11.0	<0.001
	Control	2.3		
Ocular trauma	Case	6.0	3.2	<0.001
	Control	2.8		

P value $< 0/05$ significant, -N= Number of case

Table 2. Compression of epidemiological factors between case ($N=436$) and control ($N=436$)

Parameters	Group	% percentages	% difference Change	P value
Use of vitamins supplement	Case	14.2	-5.1	<0.028
	Control	19.3		
Use of zinc supplement	Case	10.6	0.7	<0.412
	Control	9.9		
Use of iron supplement	Case	5.9	0.7	<0.390
	Control	5.2		

P value $< 0/05$ significant, -N= Number of case

5. Discussion

The present study was conducted to investigate the association between epidemiological factors and senile cataract. Our study is essential for healthcare managers and practicing physicians to understand the causes of cataract and manage patients. Present findings revealed significant positive correlation between senile cataract and the following factors; electric shock ($p < 0.044$), exposure to sunlight during work, head radiography (including computed tomography, magnetic resonance imaging, radiography), ocular trauma, family history of cataract, high blood pressure, smoking and diabetes ($p < 0.001$). However, patients with cataract used less multivitamins ($p < 0.028$) and mineral supplements (iron and zinc) ($p < 0.39$) than control individuals. The female to male ratio was 1.25 between the age of 50 and 80 years. The majority of patients were

between 60 and 80 years old, and cataract was significantly associated with the level of education ($P < 0.03$).

According to a similar study, the prevalence of cataract is higher in women [9]. However, another study reported that the prevalence of cataract in elderly men is slightly higher than that in women [11]. Additionally, the incidence of cataract increases with age. 88.67% of participants between 70 and 80 years of age have cataract, while only 15.91% of patients have cataract between 40 and 45 years of age [10]. Age is the most common risk factor for cataract [12]. In this study, cataract was significantly associated with the level of education, and a similar association was reported in other studies [13]. Interestingly, even though women are more commonly affected, cataract extraction is 1.6 times more common in men, and the lack of extraction is associated with low literacy and socioeconomic status [14].

A previous report showed that cataracts were significantly associated with exposure to sunlight during work [15]. In addition, ultraviolet (UV) radiation is associated with the formation of eyelid malignancies. However, there is insufficient evidence to determine whether age-related macular degeneration is related to exposure to UV light. The authors concluded that eyelid malignancies are strongly associated with ultraviolet radiation. Nonetheless, exposure to ultraviolet light may increase the risk of ocular diseases [16], [17].

Numerous studies reported that cataracts are associated with ocular trauma, a family history of cataract, high blood pressure, smoking and diabetes. Genetic factors also increase the risk for cataract in the elderly [18]-[21]. Similar to our study, other reports also suggested that hypertension plays an important role in the development of cataract [22]-[26]. Smoking is associated with an increased risk of cataract extraction [27]. Diabetes is one of the most important risk factors for the development of senile cataract. In our study, 21.3% of patients with cataract had diabetes, which was higher than that in patients without cataract. Accordingly, it was reported that diabetes is associated with cataract [28]. Some studies show that multivitamins or mineral supplements may decrease the risk of nuclear cataract, and sufficient evidence supports the role of these dietary supplements in decreasing the risk of age-related cataracts [29], [30].

According to estimations, the need for cataract extraction would decrease by half, if the onset of cataract could be delayed by 10 years. Therefore, it is crucial to characterize the etiology of cataract more precisely to detect modifiable environmental factors that may lead to the disease [8]. According to our findings, we suggest that senile cataract may be avoided or delayed by controlling epidemiological factors such as exposure to sunlight, electric shock, head radiography, ocular trauma, high blood pressure, smoking and diabetes, and the use of multivitamins and mineral supplements may delay the development of senile cataract. The epidemiological factors mentioned here are important for cataract prevention and for improving the general public health.

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