An Association of Risk Factors to the Development of Cataract

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ABSTRACT

OBJECTIVE: To determine the association of potential risk factors with cataract formation.

STUDY DESIGN: A case-control study

PLACE AND DURATION: Ophthalmology Department of Yusra General Hospital, Islamabad from 1st June 2016 to 1st December, 2016.

METHODOLOGY: A pre-tested structured questionnaire was used to collect data on demographics and various risk factors through direct interviews. Various risk factors were estimated for cataract formation like smoking, diabetes, hypertension, glaucoma, trauma, myopia and intraocular inflammation.

RESULTS: A total of 90 cases and 180 controls of both sexes and having age between 35–75 years, were included in the study. The majority of the respondents (71%) were between 51-60 years of age, 52% were males and 48% were females. In multiple logistic regression analysis, risk factors i.e., glaucoma, diabetes and hypertension increased risk of cataract (OR = 10.36, OR = 7.15 and OR = 5.39 respectively). In addition, myopia (OR = 5.19), trauma (OR = 4.41), intraocular inflammation (OR = 3.59) also lead to cataract formation.

CONCLUSION: The present study concluded that glaucoma, intraocular inflammation, myopia, metabolic diseases, smoking, trauma, dehydration crisis, poor education, low income and exposure to sunlight are significant risk factors for cataract formation on the basis of risk estimation.

KEY WORDS: Cataract, Glaucoma, Intraocular Inflammation, Myopia, Ophthalmology, Risk Factors, Trauma.

INTRODUCTION

The cataract is one of the foremost reasons of global blindness and visual impairment, represents an enormous public health problem in both developed and developing countries, with the majority of those affected in Asia. The cataract is responsible for 51% of blindness, i.e., about 20 million people worldwide. The current 20 million people with severely reduced vision as a result of cataract will twofold to 40 million by the year 2020. Regardless of recent improvements in terms of reduction of prevalence, cataract is still the most important cause of visual morbidity in the developing nations.

Age related or senile cataract is the most significant global eye disease, having a multi-factorial etiology, associated with increasing age and growing cases of age-related co-morbidities. The prevalence of cataract increases with age in both developed and developing countries, although significant cataract found earlier in life causing visual morbidity and need for cataract surgery. In Pakistan, visual impairment in individuals aging above 30 years is due to cataract. The blindness owing to cataract presents a massive predicament in terms of magnitude, functional disability, considerable economic loss and social burden.

Identification of the risk factors responsible for cataract formation is a difficult and comprehensive task because multiple risk factors are involved in cataract etiology. Despite of the complexity of these cataract risk factors association, an attempt to identify and evaluate these factors is essential to tackle the burden of this disease. The risk factors significantly associated with cataracts include all socio-demographic factors, metabolic disorders and drug-induced cataract. In addition, other identified risk factors for cataract include smoking, drugs abuse, alcohol and radiation and sunlight exposure. Although major advancements in treatment modalities, cataract still poses a major public health problem. Considerable efforts in terms of advocacy, availability, affordability, and accessibility to prompt diagnosis and treatment of cataract in developing countries are mandatory to reduce the prevalence of avoidable visual impairment and blindness.

The purpose of this case-control study was to determine the
association of potential risk factors with cataract formation.

**METHODOLOGY**

This case control study was conducted at Ophthalmology Department of Yusra General Hospital (YGH) Islamabad, from 1st June 2016 to 1st Dec 2016. Sample size of 270 was calculated with the help of WHO sample size calculator. A total of 90 cases were selected from patients attending the Ophthalmology Department of Yusra General Hospital having lens opacity with visual impairment and waiting for surgery. The post operative cases were excluded from the study. There were a total of 180 controls with a ratio of 1:2, selected from the relatives of patients with similar diagnostic criterion to exclude cataract, through purposive sampling technique. The matching was done for two confounding factors i.e., age and sex both for cases and controls. Ethical approval was taken from ethical review board of Yusra Medical & Dental College. The individuals willing to provide information were included in the study. The data was obtained from the study participants after taking informed consent and data confidentiality was ensured. Information on demographics and various risk factors was gathered through direct interview using structured questionnaire. Various risk factors were estimated for cataract formation including smoking, diabetes, hypertension, glaucoma, steroid use and analgesics; occupational exposure to sunlight, family history of cataract, myopia early in life, trauma, intraocular inflammation, social class and education.

**Data Analysis:** The collected data was analyzed using SPSS version 22. Frequencies and percentages were calculated for the categorical variables. The analysis was carried out taking cataract as outcome variable. Multiple logistic regression analysis was conducted to evaluate the association of different risk factors with cataract formation. The risk factors with p-value <0.05 were identified as significant.

**Table – I: Age and sex distribution of cases and controls (n=270)**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Cases (n=90)</th>
<th>Controls (n=180)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40</td>
<td>9(10.0%)</td>
<td>19(10.5%)</td>
</tr>
<tr>
<td>41-50</td>
<td>25(27.7%)</td>
<td>50(27.8%)</td>
</tr>
<tr>
<td>51-60</td>
<td>32(35.5%)</td>
<td>64(35.6%)</td>
</tr>
<tr>
<td>61-70</td>
<td>12(13.3%)</td>
<td>25(13.9%)</td>
</tr>
<tr>
<td>&gt;70</td>
<td>12(13.3%)</td>
<td>22(12.2%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>47(52.2%)</td>
<td>94(52.2%)</td>
</tr>
<tr>
<td>Females</td>
<td>43(47.8%)</td>
<td>86(47.8%)</td>
</tr>
</tbody>
</table>

**RESULTS**

A total of 90 cases and 180 controls of both sexes and having age between 35–75 years, were included in the study. The majority of the respondents 71% (n=96) were between 51-60 years of age, 52% (n=141) were males and 48% (n=129) were females. The distribution of study participants according to matching factors shown in table I.

In multiple logistic regression analysis (Table II), socioeconomic indicators i.e., low literacy and low income, were positively associated (OR = 2.04 and OR = 2.27) with lens opacities. Glaucoma, diabetes and hypertension increased risk of cataract (OR = 10.36, OR = 7.15 and OR = 5.39 respectively), myopia (OR = 5.19), trauma (OR = 4.41), intraocular inflammation (OR = 3.59) also lead to cataract formation. In addition, smoking (OR = 2.98), exposure to sunlight (OR = 2.73), and family history (OR = 1.20), were significant risk factors for cataractogenesis. Most people were not chronic steroid and analgesic users, therefore their odds ratio was not found significant (OR = 1.08 and 1.07 respectively).

**DISCUSSION**

The present case control study was conducted to establish association of certain risk factors for cataractogenesis.

**Table - II: Various risk factors of cataract by multiple logistic regression analysis (n=270)**

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Odds Ratio (OR)</th>
<th>95% Confidence Interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma</td>
<td>10.36</td>
<td>2.74 – 39.18</td>
<td>0.000</td>
</tr>
<tr>
<td>Diabetes</td>
<td>7.15</td>
<td>1.26 – 40.56</td>
<td>0.000</td>
</tr>
<tr>
<td>Hypertension</td>
<td>5.39</td>
<td>1.58 – 18.29</td>
<td>0.004</td>
</tr>
<tr>
<td>Myopia</td>
<td>5.19</td>
<td>1.39 – 19.32</td>
<td>0.001</td>
</tr>
<tr>
<td>Trauma</td>
<td>4.41</td>
<td>0.48 – 40.04</td>
<td>0.008</td>
</tr>
<tr>
<td>Intraocular inflammation</td>
<td>3.59</td>
<td>1.18 – 10.92</td>
<td>0.002</td>
</tr>
<tr>
<td>Smoking</td>
<td>2.98</td>
<td>1.15 – 10.92</td>
<td>0.003</td>
</tr>
<tr>
<td>Exposure to sunlight</td>
<td>2.73</td>
<td>0.30 – 9.89</td>
<td>0.005</td>
</tr>
<tr>
<td>Dehydration crisis</td>
<td>2.37</td>
<td>1.55 – 7.29</td>
<td>0.001</td>
</tr>
<tr>
<td>Low income</td>
<td>2.27</td>
<td>1.27 – 4.07</td>
<td>0.006</td>
</tr>
<tr>
<td>Low education</td>
<td>2.04</td>
<td>0.68 - 6.11</td>
<td>0.009</td>
</tr>
<tr>
<td>Family history of cataract</td>
<td>1.20</td>
<td>0.46 – 3.13</td>
<td>0.012</td>
</tr>
<tr>
<td>Steroid use</td>
<td>1.08</td>
<td>0.80 – 1.46</td>
<td>0.010</td>
</tr>
<tr>
<td>Analgesics (NSAIDs)</td>
<td>1.07</td>
<td>0.85 – 1.34</td>
<td>0.051</td>
</tr>
</tbody>
</table>
Cataract formation can be attributed to multiple risk factors; therefore it is mandatory to appreciate the involvement of these factors in multifaceted causation of cataract. It was not surprising to find low socioeconomic status significantly associated with cataract formation in our study. Socioeconomic variables like low monthly household income and low literacy rate were found to be imperative risk factors for cataract formation, consistent with the previous studies also reported their significant association with cataract. The cataract was identified to be significantly associated with the family history of cataract in most studies, however, family history of cataract was not found to be associated with cataract in the present study.

The present study revealed that metabolic disorders like diabetes mellitus and hypertension were found to be significant risk factors for cataract formation. This finding was supported by preponderance of some previous studies as diabetes mellitus has been identified as second most common significant predictor of cataract development i.e., about 4% of all cataract is attributed to diabetes. Our study identified strong positive association (OR=5.3) of hypertension with cataract. Ocular inflammations or inflammatory conditions of the eye i.e., uveitis also appeared to be a powerful risk factor for cataract in present study, a finding similar to other studies. An interesting finding of our study was the ocular trauma found significantly associated with cataract formation; the finding was consistent with that of the study done in Lahore, Pakistan showing 34% of patients developed cataract after ocular trauma. A study done in China also found traumatic cataract after firework-related eye injuries. Similar trauma pattern particularly exists in our country which can explain why trauma one of the frequent causes of acquired cataract in the current study.

The current study also found significant relationship between occupational exposure to sunlight and cataract. A high prevalence of cataract has been revealed in tropical countries due to increased exposure to ultraviolet light by several studies. The main limitation of our study was small sample size and all risk factors, especially linked to systemic diseases could not be considered. Moreover, multiple drugs are responsive in iatrogenic cataract but could not be catered in this study. Our study highlights the importance of preventive strategies against these risk factors for reducing the burden of disease in our community.

CONCLUSION

The present study concluded that glaucoma, intraocular inflammation, myopia, metabolic diseases, smoking, trauma, dehydration crisis, poor education, low income and exposure to sunlight are significant risk factors for cataract formation on the basis of risk estimation.

CONTRIBUTION OF AUTHORS

Atif I: Conception and design of study, data analysis and manuscript writing
Mohammad K: Manuscript drafting, data compilation and analysis
Rashid F: Final critical review of manuscript
Ishfaq S, Seerat H, Iftikhar S, Sohail M, Siddique H, Haq SU:
Data collection and compilation, literature review

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REFERENCES

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