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Assessment of Risk Factors for age Related Cataract in a Rural Population of Southern India

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ABSTRACT

Age related cataract is the major cause of blindness in India.1,2 The prevalence of age related cataract and cataract surgery is higher in this rural southern Indian population than reported for most other populations studied.3 A previous study reported an earlier age of onset for age related cataract among people from the Indian subcontinent compared to other populations.4 Despite the public health significance of cataract in India, there are few reports on the risk factors for age related cataract from India.5–7 This paper reports on certain risk factors for age related cataract in a rural population aged 40 years and above in southern India.

KEYWORDS : CATARACT.

SUBJECTS AND METHODS

We randomly identified 50 representative clusters from three southern districts in southern India through multistage cluster sampling. Demographic details of eligible respondents in the selected clusters were collected by trained social workers after a door to door enumeration. All subjects aged 40 years and above were invited to the base hospital for a comprehensive ocular examination. We defined cataract as nuclear opalescence ⩾3.0 and/or cortical cataract ⩾3.0 and/or PSC ⩾2.0.

Assessment of potential risk factors

Potential risk factors assessed as part of this study included a history of smoking, diabetes, hypertension, body mass index, waist to hip ratios, and pseudoexfoliation (PXF).

We defined systemic hypertension as either a measured systolic blood pressure ⩾160 mm Hg and/or a diastolic blood pressure ⩾90 mm Hg or current use of systemic antihypertensive medications.

Statistical analysis

We assessed interactions between the different variables in the multiple logistic regression models and considered interactions to be significant if the p value was <0.05. Prevalence estimates, odds ratios (OR), and 95% confidence intervals (95% CI) are presented. Confidence intervals for prevalence estimates and odds ratios from the regression analyses were calculated taking into account design effects (deff) associated with cluster sampling using generalised estimation equation.

RESULTS

Definite cataract in one or both eyes was present in 2499 (47.5%) of 5150 the subjects. The age adjusted prevalence (adjusted to US population estimates for the year 2000) of definite cataract in this population was 61.9% (95% CI: 60.6 to 63.3), indicating that our population had a younger age structure than that of the United States. In those eyes with cataracts, nuclear cataract (n = 2236, 43.5%) was the most common type of cataract; cortical cataract was present in 717 (13.9%), posterior subcapsular cataract in 1024 (19.9%), and mixed cataracts were present in 1167 (47.7%).

The prevalence of definite age related cataracts of all types increased significantly (p<0.001) with increasing age, from 15.7% among those aged 40–49 years to 79.4% among those aged ⩾70 years. The odds ratio (95% CI) for definite cataract for age groups 50–59, 60–69, and ⩾70 (reference category 40–49 years) were 1.3 (1.1 to 1.4), 4.3 (3.7 to 5.0), and 3.8 (3.0 to 4.8), respectively. After adjusting for age, males had lower odds (odds ratios 0.8, 95% CI: 0.7 to 0.9, deff = 1.0) for cataract than females. The odds ratio for cataract was significantly lower for literate subjects (OR: 0.5, 95% CI: 0.4 to 0.6, deff = 2.5), after adjusting for age and sex.

Cataract surgery in one or both eyes had been performed for 482 (9.4%) people including 153 people who had bilateral cataract surgery (31.7% of all subjects having had cataract surgery). The prevalence of cataract surgery in either eye increased with increasing age (p<0.001).

The most common location for cortical lens opacities was the lower nasal quadrant (n = 799, 57.2%). Even among 235 eyes with minimal cortical changes between 0 to 1 LOCS III grade, the most common location was the lower nasal (n = 130, 55.3%), and lower temporal segment (n = 95, 40.4%).

We found hypertension (OR 1.3, 95% CI: 1.1 to 1.6, deff = 1.4), diabetes (OR 1.9, 95% CI: 1.4 to 2.6, deff = 1.2), and PXF (OR 4.6, 95% CI: 3.7 to 5.6, deff = 0.5) to be associated with cataract on bivariate analysis. Cataract was associated with subjects with lean body mass (OR: 1.7, 95% CI: 1.4 to 2.1, deff = 3.1) on bivariate analysis. We found a protective effect for cataract (OR: 0.8, 95% CI: 0.6 to 0.9, deff = 0.8) among those who never smoked on bivariate analysis. We found a protective effect for cataract among those with higher waist to hip ratios (OR:0.8, 95% CI: 0.7 to 0.9, deff = 4.1)

Odds ratios (95% CI) on multivariate analysis for different cataract subtypes (nuclear, cortical, and PSC); subjects aged 40 years and older

DISCUSSION

Our study was not designed to prospectively evaluate details pertaining to nutritional intake and ultraviolet light exposure. To assess ultraviolet light exposure as a risk factor for cataract, ocular exposure measurements should be taken, and we did not have the resources to obtain such measurements in this study. The association of lower body mass index with increased risk for cataract has also been previously reported from India.[4] Moderate calorie intakes has been shown to delay the formation of cataract in animal studies, the proposed biological mechanism being lower energy intake that prolongs the antioxidant or proteolytic capabilities of the lens.[20] BMI also affects glucose levels; higher glucose levels are associated with a higher risk for cataract.[21] Previous studies have reported lower educational levels associated with higher prevalence of age related cataract.[4,11–13] We found similar results with illiteracy associated with age related cataract of any type. The biological association between education and cataracts is not clear. It is possible that low education is confounded by several variables including exposure to sunlight, hygiene, illnesses, and nutritional factors among others. Previous studies have reported lower surgical coverage for people with less education in this population.[23,24]

Previous population based studies have also reported an association between smoking and cataracts, especially nuclear cataracts.[16–19]

We explored the possibility of PXF as a risk factor for age related cataract as both PXF and cataracts are age related.[26] This finding concurs with previous studies in the United States and elsewhere.[28,29] To explore this association further, we also looked at the location of minimal cortical changes (cortical changes <1.0); we found these changes to be more in the inferior nasal quadrant.

It is possible that the higher prevalence of age related cataracts in India is entirely attributable to the low surgical coverage.[23,30] However, the prevalence of cataract surgery among Indians aged more than 40 years is reported to range from 9.5% to 13.7% compared to 3.8% for a population in the same age group in Melbourne, Australia.[31–33] We do not think that the lower odds of having a cataract for males is the result of the higher surgical rate for males. We have previously found a comparable surgical rate for males and females in this population.[3]

TABLES:

Table 1

Population attributable risk of potentially modifiable risk factors for age related cataract in this population

Risk factor	Relative risk	Population attributable risk (%)
Hypertension	1.14	2.11
Diabetes	1.36	1.59
Smoking	1.02	0.62
Lean body mass index	1.32	15.78

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