Original Research

Prevalence and associated factors of visually impaired cataract of the better eye among adults aged 40 years and above in Mahara Medical Officer of Health Area, Sri Lanka: a cross-sectional study

Champa Hapugoda[1] **& Chrishantha Abeysena**[2*]

[1]Ministry of Health, Sri Lanka; [2]Department of Public Health, Faculty of Medicine, University of Kelaniya, Sri Lanka

[*]Correspondence: chrishanthaabeysena@yahoo.com

Abstract

Introduction: Cataract is the main cause of visual impairment in the world, accounting for 51% of global blindness.

Objectives: To determine the prevalence and associated factors of visually impaired cataract of the better eye among adults aged 40 years and above in Mahara Medical Officer of Health (MOH) Area in Sri Lanka

Methods: This was a community-based descriptive cross-sectional study conducted in an MOH area during the period August-October 2009. The study population consisted of 602 adults aged 40 years and above selected using cluster sampling technique. Study instruments were interviewer-administered questionnaire and a record sheet. The presence of lens opacities following ophthalmoscope examination with visual acuity less than 6/18 in the better eye was considered as cataract. Multivariate logistic regression was applied for assessment of factors associated with cataract. Results were expressed as adjusted odds ratio (aOR) and 95% confidence interval (CI).

Results: The overall prevalence of visually impaired cataract of the better eye was 14.6% (95% CI=11.78, 17.42). It was 35.1% (95% CI=28.3, 41.86) among the age group of 60 years and above and 15% (95% CI=11.28, 18.72) among females and 14.4% (95% CI=9.77, 18.43) among males. After controlling confounding factors, age 60 years and above (aOR=4.72; 95% CI=3.18, 7.01), lower level of education (aOR=2.01; 95% CI=1.39, 2.89) and duration of diabetes mellitus of more than six years (aOR=2.13; 95% CI=1.11, 4.07) were found to be the associated factors.

Conclusions: The burden due to prevalence of visually impaired cataract in the better eye was considered serious as it will affect the quality of life. Being elderly, lower education and longer duration of diabetes mellitus were associated with visually impaired cataract.

Key words: blind, cataract, factors, prevalence, vision

Introduction

Cataract has been defined as any opacity in the crystalline lens, but the use of term implies that the opacities are clinically significant (1). One of the main causes of visual impairment in the world is cataract (2) while 51% of global blindness is due to cataract (3). Prevalence of cataract in the age group above 60 years in the Gampaha district was 56% in 2006 (4). Edussuriya et al reported that 79% of visual impairment was due to cataract in the population aged ≥40 years (5).

According to population projections, there will be 43% of over 40 years of age in 2021 (6). While the principle non-modifiable risk factor for cataract is ageing, other frequently associated risk factors are certain eye diseases, diabetes, hypertension, ultraviolet irradiation and smoking (7). Visually disabling cataract was found to occur far more frequently in developing countries than in industrialized countries (8). World Health Organisation has introduced rapid assessment of avoidable blindness which defines cataract as lens opacities with visual acuity of <6/18 (9).

In implementing preventive programmes, it is necessary to address factors associated with cataract. There is epidemiological transition taking place in parallel to demographic transition. There are changes in socio-economic status, diet, physical activity, alcohol, tobacco use and presence of chronic diseases like diabetes mellitus and hypertension. Evaluation of association between cataract and the above factors will be helpful in preventive measures. Therefore, the objective of this study was to determine the prevalence of visually impaired cataract of the better eye and associated factors among adults aged forty years and above in Mahara MOH Area.

Methods

This was a community-based descriptive cross-sectional study conducted in Mahara MOH Area during the period August-October 2009. The study population consisted of adults aged 40 years or above by 1st July 2009. All the males and females who were residing in this area for at least six months were included. Exclusion criteria were people who were bed-ridden or hospitalized.

For the calculation of sample size, we considered the desired prevalence of cataract as 20%, precision as 5% with 95% confidence limits, design effect as 1.5 and non-response rate as 10%. Therefore, the final sample size was 634. A cluster sampling method was used, in which a public health midwife (PHM) area was considered as a cluster. Of the 44 PHM areas in the selected MOH area, 16 PHM areas were selected by simple random sampling. In each selected PHM area, a road was selected randomly. First house of the road was the index house. The direction was to the left by standing at the front door facing outside from the index house. Forty houses were selected from each PHM area and one eligible adult from each house.

An interviewer-administered questionnaire was used for collecting demographic characteristics of the person, socio-economic status, presence of diabetes mellitus, presence of hypertension and other behaviours. Both open-ended and close-ended questions were used. The content validity was maintained by reviewing literature and the questionnaire evaluated by an ophthalmologist beforehand. Age was cross-checked with national identity card. History of diabetes mellitus and hypertension was cross-checked with clinic card or diagnosis card when available.

A record sheet was used to record the presence of cataract. Cataract was detected by using an ophthalmoscope. A darker area in the selected house was prepared for ophthalmoscope examination. The ophthalmoscope was adjusted so that the light was not brighter than required. The aperture was adjusted to a plain white circle. The dioptre dial was set to zero. The left hand and the left eye were used to check the participant's left eye. The right hand and the right eye were used to check the right eye of the participant. Examiner's free hand was placed on the shoulder of the participant to stabilize the person. The participant was asked to stare at a distant fixed point parallel to examiner's ear. The ophthalmoscope was kept close to examiner's eye. The examiner looked through the ophthalmoscope and shined a light into the participant's eye from about two feet away. The examiner could see the retina as a 'red reflex' where there is no obliterating opacity or no cataract. Lens opacities could be seen if present. With mature cataract, there is no red reflex seen (7). Ophthalmoscope was checked each day before starting the examination. Visual acuity was tested using a Snellen's chart under good day-light at seated position. Cataract was defined as presence of lens opacity with ophthalmoscope examination. Both eyes were tested. Presence of lens opacities with visual acuity of <6/18 (9) of the better eye (10) was considered as 'visually impaired cataract'.

A pre-test was done in Gampaha MOH Area, where 20 adults participated. A few changes were made accordingly to the questionnaire and record sheet. Two medical students were trained for administering the interviewer-administered questionnaire. The ophthalmoscope examinations were done by the first author. The participants who had visual problems were referred to the District General Hospital Gampaha.

Data analysis

Data analysis was done using Statistical Package for Social Sciences (SPSS) version 16. Multiple logistic regression with backward selection was applied for assessment of the factors associated with cataract. Results were expressed as adjusted odds ratio (aOR) and their corresponding 95% confidence intervals (CI).

Results

A total of 640 participants was invited, of which 602 participated, giving a non-response rate of 5.9%. The median age of the study population was 53 years (range 40-90 years) and 191 (33.7%) of them were 60 years and above. Among the study population, 468 (77.8%) were educated above grade five. It was found that a majority was engaged in non-paid employment

(n=331; 55%). Of the total study population, 267 (44.4%) had cataract in either eye or both.

The prevalence of visually impaired cataract of the better eye was 14.6% (95% CI=11.78, 17.42) among the study population. The prevalence of cataract in population aged ≥60 years was higher (35.1%; 95% CI=28.34, 41.86) than that in 40-59 aged (5.1%; 95% CI=2.98, 7.22) population. The prevalence of cataract in males was 14.1% (95% CI=9.77, 18.43) and 15% (95% CI=11.28, 18.72) in females.

There were statistically significant associations between visually impaired cataract and age of 60 years and above, lower level of education and lower monthly per capita income (Table 1). There were statistically significant associations between cataract and history of alcohol consumption of more than 20 years and of smoking more than 20 years (Table 2).

After controlling for confounding effects, age 60 years and above (aOR=4.72; 95% CI=3.18, 7.01), lower level of education (aOR=2.01; 95% CI=1.39, 2.89) and duration of diabetes mellitus of more than six years (aOR=2.13; 95% CI:1.11, 4.07) showed statistically significant association with visually impaired cataract of the better eye (Table 3).

Table 1. Distribution of the study sample by cataract and socio-economic factors

| Socio-economic factors | Presence of cataract | | | | OR (95% CI) |
| | Yes (n=88) | | No (n=514) | | |
	No.	%	No.	%	
Age in years					
≥ 60	67	76.1	124	24.1	**10.04 (5.91-17.06)**
40-59	21	23.9	390	75.9	
Sex					
Female	53	60.2	301	58.6	1.07 (0.68-1.70)
Male	35	39.8	213	41.4	
Educational level					
Up to grade 9	69	78.4	273	53.1	**3.21 (1.86-5.48)**
Above grade 9	19	21.6	241	49.9	
Monthly income Rs.					
Less than 2500	56	69.1	244	51.2	**2.14 (1.29-3.52)**
≥ 2500	25	30.9	233	48.8	
Employment					
Non-paid	56	63.6	275	53.5	0.67 (0.41-1.05)
Paid	32	36.4	239	46.5	

Table 2. Distribution of the study sample by status of cataract, other diseases and behavioural factors

Diseases and behavioural factors	Presence of cataract				OR (95% CI)
	Yes (n=88)		Yes (n=88)		
	No.	%	No.	%	
History of diabetes					
Present	23	26.1	99	19.3	1.48 (0.88-2.50)
Absent	65	73.9	415	80.7	
Duration of diabetes					
> 6 years	13	14.8	44	8.6	1.85 (0.95-3.60)
≤ 6 years	75	85.2	470	91.4	
History of hypertension					
Present	28	31.8	117	22.8	1.58 (0.97- 2.59)
Absent	60	68.2	397	77.2	
Duration of hypertension					
> 6 years	14	15.9	64	12.5	1.33 (0.71-2.49)
≤ 6 years	74	84.1	450	87.5	
Alcohol consumption					
No	26	29.5	166	32.3	0.88 (0.54-1.44)
Yes	62	70.5	348	67.7	
Duration of alcohol consumption					
> 20 years	17	19.3	43	8.4	**2.62 (1.42-4.85)**
≤ 20 years	71	80.7	471	91.6	
Smoking status					
Smoker	22	25.0	121	23.6	1.08 (0.64-1.82)
Non-smoker	66	75.0	393	76.4	
No. of cigarettes smoked					
> 3 per day	9	10.2	69	13.4	0.73 (0.35-1.53)
≤ 3 per day	79	89.8	445	86.6	
Duration of smoking					
> 20 years	12	13.6	32	6.2	**2.38 (1.17-4.82)**
≤ 20 years	76	88.4	482	93.8	

Table 3. Adjusted odds ratios of the factors associated with cataract

Variable	β co-efficient	Standard error	AOR	95% CI	p value
Educational level: up to Grade 9	0.69	0.19	2.01	1.39-2.89	<0.001
Duration of Diabetes Mellitus >6 years	0.75	0.33	2.13	1.11-4.07	0.02
Age ≥ 60 years	1.55	0.20	4.72	3.18-7.01	<0.001

aOR = adjusted odds ratio; CI = confidence interval

Discussion

The overall prevalence of visually impaired cataract of the better eye was 14.6%. The prevalence of cataract in those aged 60 years and above was 35.1%. The prevalence of cataract in females and males was 15% and 14.4%, respectively. Several studies reported higher prevalence than our study. Nanayakkara (2006) had reported that the prevalence of cataract in elderly was 56% (4). In the same study, more prevalence among females (65.3%) than males (48.2%) was reported. The study however had not defined cataract in relation to visual acuity. This could be explained by the difference in definitions of the two studies where the definition is narrower in our study. Another community-based study done in Bangladesh reported that the prevalence was 8.4% for the 50 years and above age category (9). This study defined cataract in relation to visual acuity of less than 6/18, as in our study. A study in Singapore reported that the prevalence of visually significant cataract in either eye was 6.54% according to the Wisconsin Grading System (11). In a study done in Andra Pradesh (12), the overall prevalence of cataract was 3.2% while it was reported in the age group 40-49 years as 0.88%, 50-59-year age group as 33.5%, 60-69-year age group as 24.32% and above 70-year age group as 30% (12). According to a study done in India (13) the prevalence of cataract among the population of more than 50 years of age was 62.8% and among males and females, it was 66.9% and 60.4%, respectively. A study in Korea (14) also reported that the prevalence was 25.2% in the 40-64-year age group and 87.8% among the ≥65-year age group. Compared to the present study, a higher prevalence of cataract was also reported in studies done in Taiwan (15) and Indonesia (16). Both these studies used different diagnostic criteria and were carried out in different populations.

We found that the age group of 60 years and above, lower level of education and duration of diabetes mellitus of more than six years were statistically significant with cataract, after controlling for the confounding effects. Nanayakkara also reported (4) a statistically significant association between cataract and age more than 70 years. Several studies (13-14, 17-19) also reported that there was a significant increase in cataract with increasing age. Increasing age causes senile changes, which increase the lens opacities and the risk for cataract. Few studies had reported (11-19) that there was an association between lower level of education and cataract.

Present study did not reveal any statistically significant association between cataract and sex. Our findings are consistent with other studies (4, 19). In contrast, a study done in Korea reported a higher prevalence of cataract among females than in males (14). Another study reported that there was a significant association between cortical cataract and females, but not with other types of cataracts (18).

The present study reported there was no statically significant association between cataract and duration of alcohol consumption being more than 20 years. Mohan et al (20) also revealed no statistically significant association between cataract and the current alcohol consumption or with its duration.

In the present study, it was found that there was no significant association between cataract and the history of smoking or duration of smoking. Mohan et al too revealed that there was no statistically significant association between cataract and current smoking, duration of smoking or frequency of smoking (20). In contrast, a few studies reported a significant association between cataract and current smoking practice (4, 18-19).

In the present study, it was found that there was no statically significant association between cataract and history of hypertension or duration of hypertension. In contrast, several studies (4, 16, 18) reported a statistically significant association. Present study assessed the presence of hypertension by history, whereas the former studies have measured blood pressure. This is a limiting factor in the present study.

The present study reported no statistically significant association between cataract and history of diabetes mellitus. Our findings are consistent with findings of a few studies (18-19). The present study revealed a statistically significant association between cataract and duration of diabetes mellitus of more than six years. Some studies reported that there was statistically significant association between history of diabetes and cataract (4, 16-17). Different age groups considered in the two populations and the different diagnostic criteria used may be the reason for this. The present study assessed the presence of diabetes only by history, which was a limiting factor of the current study.

Conclusions & Recommendations

In conclusion, even though the prevalence of visually impaired cataract in the better eye was low, the burden is likely to be significant due to impaired visual acuity. Being elderly, low income and longer duration of alcohol consumption were associated with cataract. The cataracts can be classified into cortical (anterior and posterior) and nuclear and posterior sub-capsular. We recommend a community-based study to determine the prevalence of different sub-types of bilateral cataract and risk factors.

Public health implications

One of the main causes of visual impairment is cataract. The extent of visually impaired cataract in the better eye will affect the quality of life of a person. Therefore, necessary steps need to be taken to educate the vulnerable groups on the risk factors for early prevention of this condition.

Author Declarations

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