

Cataract and Associated Factors Among OPD Attendees in a Teaching Institute of North East India: A Baseline Observation

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ABSTRACT

Background: In India 66% of blindness among individuals aged 50 yrs and above is attributable to cataract. Cataract has multiple etiologies and many of them are modifiable. But data regarding burden and correlates of cataract among OPD attendees in Northeast India are insufficient. **Objectives:** To estimate the proportion of cataract among the attendees of ophthalmology OPD of a teaching hospital of Northeast India and to study the factors associated with it. **Methods:** This hospital based cross-sectional study was conducted during 7th February to 6th March 2020, using a pre-tested structured interview schedule, among 330 adults attending ophthalmology OPD of Agartala Government Medical College, chosen by consecutive sampling. **Result:** Proportion of cataract among the attendees was 36.7% and it was 51.5% among the subjects aged ≥ 50 years. Age, family type, literacy, diabetes mellitus and hypertension had significant associations with cataract ($P < 0.05$). Logistic regression model has identified age ≥ 50 yrs (OR: 5.57, 95% CI: 2.98-10.43) and illiteracy (OR: 2.67, 95% CI: 1.55-4.59) as the significant predictors for developing cataract ($P < 0.05$) in the study population. **Conclusion:** Proportion of cataract among OPD attendees is 36.7%, which is higher than the community prevalence of cataract in Tripura. Promoting literacy, reducing family size, blood sugar and blood pressure may bring down the proportion of cataract in this population.

Keywords: Cataract, diabetes mellitus, hypertension, Northeast India

Introduction

Cataract is the commonest cause of visual impairment worldwide and though it affects all age groups it is more prevalent among people aged 50 yrs or more. According to the World Health Organization (WHO), cataract is the leading cause of blindness all over the world and is responsible for 47.8% of the blindness and accounts for 17.7 million blind people.^[1,2] In India, as per National Blindness Survey (NBS) 2006-2007, cataract accounts for 60% of all preventable blindness. A program named National

Program for Control of Blindness (NPCB), was launched in the year 1976 with an aim to reduce the prevalence and burden of avoidable blindness from 1.4% to 0.3% by 2020, which was estimated to be 1% as per 2006-2007 National blindness survey.^[3]

Cataract is the most common avoidable condition if timely intervention is instituted. Otherwise, it results in different catastrophic complications that end up with irreversible blindness.^[4] Studies showed that the reasons for delaying the treatment in time are: low economic status, lack of transportation, wrong perception, residual vision and poor knowledge regarding risk factors and nature of disease and treatment options.^[1,5] Various studies across world described its association with different other factors like advancing age, UV exposure, diabetes,

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hypertension, obesity, smoking etc., and many of which are modifiable.^[6-10]

Tripura is a small state in the North Eastern region of India having an area of 10,491.69 sq. km and a population of 36,73,917 bordered by Bangladesh from three sides. Its population consists of a mixture of 30% tribal and 70% non-tribal.^[11] Despite cataract being a public health problem throughout the nation, limited reports are available regarding its prevalence and risk factors in different regions of the nation. About 80% of the population of Tripura is dependent up on public healthcare facilities. But Tripura being an under developed far province of the nation, have very few eye care facilities. Limited data are available regarding prevalence and risk factors of cataract among different communities, regions and ethnic population groups of Tripura. In this context, this hospital-based study was designed to generate baseline data regarding proportion of cataract and associated risk factors among patients attending the ophthalmology outpatient department (OPD) of a teaching institute of Agartala, the capital city of Tripura, India. Information obtained from this study will be helpful for the primary care physicians to understand the local factors if any associated with cataract and they will be able to design action plan to address these issues to prevent cataract in this population.

Methodology

Present study was a hospital based cross-sectional study carried out between 7th February and 6th March 2020, among adults attending Ophthalmology OPD of Agartala Government Medical College, Tripura. Minimum sample size requirement for

this study was calculated by using the formula: $N = \frac{Z^2 \times pq}{l^2}$ ^[12]; Where, *N* is sample size; *Z* is the value of standard normal deviate at 95% confidence which is 1.96; *P* is the proportion of cataract among hospital attendee, which was considered as 28.2%^[13]; and *l* is allowable error which was considered as 5%. Thus, minimum sample size was determined to be 323 subjects for this study. Study was permitted by appropriate authority on 14 Feb 2020.

Study participants were selected using consecutive sampling. Every adult patient attending the study setting were approached consecutively and included in the study after obtaining written informed consent for participating in this study. Patients underwent cataract surgery were excluded. Data were collected using a pre-tested structured interview schedule. Apart from recording data regarding clinical examination of eye, it had provision for entering data regarding socio-demographics namely: education, occupation, income; personal history like: lifestyle, habits of smoking, alcohol consumption etc., anthropometry like: height and weight and self-reported status of diabetes, hypertension etc., Face and content validity of the interview schedule was evaluated by piloting upon 30 OPD patients and also examining by three epidemiologists. In this study, cataract was defined as the presence of lenticular opacity

Table 1: Associations of Cataract with Socio Demographic Profile of The Study Subjects

Factors	Sub-groups	Cataract		P
		Present, n (%)	Absent, n (%)	
Age	<50 yrs	18 (13.8)	112 (86.2)	0.000
	≥50 yrs	103 (51.5)	97 (48.5)	
Sex	Male	54 (36.7)	93 (63.3)	0.982
	Female	67 (36.6)	116 (63.4)	
Ethnicity	Tribal	16 (41%)	23 (49%)	0.547
	Non-tribal	105 (36.1%)	186 (63.9%)	
Residence	Rural	58 (35.4)	106 (64.6)	0.626
	Urban	63 (38)	103 (62)	
Family type	Nuclear	63 (30.7)	142 (69.3)	0.004
	Joint	58 (46.4)	67 (53.6)	
Literacy [#]	Illiterate	53 (55.8)	42 (44.2)	0.000
	Literate	68 (28.9)	167 (71.1)	
Socio-economic class	Upper class	18 (24)	57 (76)	0.097
	Upper middle class	27 (40.3)	40 (59.7)	
	Middle class	28 (40)	42 (60)	
	Lower middle class	32 (44.4)	40 (55.6)	
	Lower class	16 (34.8)	30 (65.2)	

[#]Subjects who did not have formal schooling were considered as illiterate in this study. Significantly higher proportions of the subjects aged 50 yrs or more, illiterate and subjects living in joint families had cataract (*P*<0.05). Though higher proportion of male, tribal, urban, and subjects belonging to lower middle class had cataract but these were not significant

Table 2: Associations of Cataract with Personal History of the Study Subjects

Personal history		Cataract		P
		Present, n (%)	Absent, n (%)	
Smoking tobacco	Non-smoker	93 (37.8)	153 (62.2)	0.463
	Smoker	28 (33.3)	56 (66.7)	
Alcohol intake	Alcoholic	103 (38.7)	163 (61.3)	0.114
	Non-alcoholic	18 (28.1)	46 (71.9)	
Sun exposure	Prolonged	30 (38.5)	48 (61.5)	0.707
	Average	91 (36.1)	161 (63.9)	
Smokeless tobacco	User	82 (35.81)	147 (64.19)	0.716
	Non-user	39 (38.61)	62 (61.39)	

Higher proportions of the study subjects accustomed to either smoking or smokeless tobacco use, alcohol consumption and prolonged exposure to sunlight had cataract but these were not significant

and the diagnosis was made by an ophthalmologist at the study setting. Data entry and analysis were performed in computer using SPSS for windows version 25. Categorical data were expressed in terms of frequency or percentages and quantitative data were expressed by mean and standard deviation. Chi-square test was applied to test the associations between different variables of interest with cataract. To study the effect of predictor variables upon cataract, binary logistic regression model was applied. *P* value < 0.05 was considered as statistically significant. Prior permission for conducting this study was obtained from the authority of Agartala Government Medical College.

Result

In the present study a total of 330 individuals attending ophthalmology OPD of Agartala Government Medical

College were enrolled. Mean age of the study participants was 51.63 ± 14.46 yrs and 60.6% of the participants were aged 50 yrs and above. Among the study subjects, 55.5% were female, 50.3% were from rural areas, 71.2% were literate and 62.1% belonged to nuclear families. Out of all, 32.7% of the study subjects were housewives, 20% were daily labourer, 18.8% got retired from job, 16% were office goer, 5.2% had their own business and the rest were students. About 23% of the participants gave history of long-time exposure to direct sunlight during their day-to-day work. Among all, 22.7% of the participants belonged to upper class, 20.3% to upper middle, 21.2% to middle, 21.8% to lower middle and 13.9% to lower socioeconomic class as per BG Prasad's socioeconomic classification. Among the respondents, 32.7% were beneficiaries of Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY). Regarding personal habits, 11.5% subjects used to smoke regularly, 9.4% occasionally, 4.5% quit smoking and 74.5% never smoked. Regarding alcohol, 1.8% was regular consumers, 16.1% were occasional, 1.5% were quitters and 80.6% never consumed alcohol. On clinical examination, 37% of the participants were identified as having normal BMI, 14.5% as underweight, 37% as overweight, 11.5% as obese and 38.8% were found to be hypertensive and 21.2% were found to be diabetic.

Overall proportion of cataract among the study subjects was found to be 36.7%. It was 51.5% among the subjects aged 50 yrs or more and 13.8% among subjects aged less than 50 yrs. This difference was found to be statistically significant ($P < 0.05$). Proportion of cataract was 36.7% among males and 36.6% among females but this difference was not significant. Proportion of cataract among participants from urban and rural areas were 38% and 35.4% respectively, which was not significant ($P > 0.05$). Proportion of cataract among participants belonging to nuclear and joint families were 30.7% and 46.4% respectively, and this difference was found to be significant ($P < 0.05$). About 55.8% of the illiterate subjects and 28.9% of literate subjects were diagnosed with cataract and this difference was statistically significant ($P < 0.05$). Cataract was present among 41% and 36.1% of the tribal and non-tribal population respectively though this difference was not significant ($P > 0.05$) [Table 1]. Proportion of cataract was higher (38.5%) among subjects, who had prolonged exposure to direct sunlight due to their nature of day-to-day work than those who had lesser exposure, but statistically it was not significant ($P > 0.05$). Proportion of cataract across different socio-economic classes were: 24% in upper class, 40.3% in upper middle, 40% in middle, 32% in lower middle and 34% among subjects belonging to lower class. But these differences were not significant ($P > 0.05$). Proportion of cataract did not differ significantly across ever smokers (33.3%) and never smokers (37.8%). The proportion of cataract was found to be 28.1% among those who ever consumed alcohol and 38.7% among those who never consumed alcohol, but this difference was not significant ($P > 0.05$) [Table 2]. Cataract was present among 45.8% of the underweight subjects, 33.6% of the subjects with normal weight, 35.2% of the overweight and 39.5% of the obese subjects, but these differences were

not significant ($P > 0.05$). Proportion of cataract was 51.4% among diabetic and 32.7% among non-diabetic subjects and this difference was statistically significant ($P < 0.05$). About 46.1% of the hypertensive subjects and 30.7% of the non-hypertensive subjects were found to have cataract and this difference was statistically significant ($P < 0.05$). Among the diabetic subjects, proportion of cataract was higher (85%) among those who were suffering from this disease for 10 year or more than those who were suffering for less than 10 years (38%) but this difference was not significant ($P < 0.05$) [Table 3].

Binary logistic regression model was applied using the variables found to be associated with development of cataract in bivariate analysis. This model showed that subjects aged 50 yrs and above had 5.57 times higher risk of developing cataract than the subjects aged 50 yrs or less (OR: 5.57, 95% CI: 2.98 – 10.43, $P < 0.05$). Illiterate subjects had 2.67 times higher chances of developing cataract than the literate (OR: 2.67, 95% CI: 1.55-4.59, $P < 0.05$). Variables like: family type, diabetes mellitus and hypertension etc., which showed significant association with cataract in bivariate

Table 3: Associations of Cataract with Clinical and Biochemical Parameters of the Study Subjects

Factors	Cataract		P	
	Present, n (%)	Absent, n (%)		
Blood sugar	Diabetic	36 (51.4)	34 (48.6)	0.004
	Non-diabetic	85 (32.7)	175 (67.3)	
Blood pressure	Hypertensive	59 (46.1)	69 (53.9)	0.005
	Non-hypertensive	62 (30.7)	140 (69.3)	
BMI*	Under weight	22 (45.8)	26 (54.2)	0.482
	Normal	41 (33.6)	81 (66.4)	
	Over weight	43 (35.2)	79 (64.8)	
	Obese	15 (39.5)	23 (60.5)	
Lipid profile	Eulipidaemic	70 (37.43)	117 (62.56)	0.829
	Dyslipidaemic	51 (35.66)	92 (64.34)	
Kidney function	Normal	109 (35.74)	196 (64.26)	0.313
	Abnormal	12 (48.0)	13 (52.0)	

[*BMI classified as per the WHO criteria for Asian people]. Significantly higher proportion of the Diabetic and Hypertensive subjects had cataract ($P < 0.05$). Higher proportions of the underweight, dyslipidaemic and subjects with impaired kidney functions also had cataract, but it was not significant

Table 4: Binary Logistic Regression Model Predicting the Probability of Developing Cataract Based Upon Selected Predictor Variables

Variables	Adjusted OR (95% CI)	P	
Age	<50 years	1	0.000
	≥50 years	5.57 (2.98-10.43)	
Literacy status	Literate	1	0.000
	Illiterate	2.67 (1.55-4.59)	
Family type	Nuclear	1	0.128
	Joint	1.49 (0.89-2.49)	
Presence of DM	No	1	0.767
	Yes	1.09 (0.59-2.01)	
Presence of Hypertension	No	1	0.706
	Yes	1.10 (0.64-1.90)	

The model in table 4 showed that age 50 yrs and above and being illiterate were significant predictors of cataract in the study population ($P < 0.05$)

analysis, did not attain the level of statistical significance in regression model [Table 4].

Discussion

The present study was conducted to estimate the magnitude of cataract among Ophthalmology OPD attendees of a teaching healthcare institute of Tripura and also to describe the epidemiological factors associated with it.

In the present study, a total of 330 subjects attending the ophthalmology OPD of AGMC and GBP hospital, were enrolled and among them 36.7% were found to be suffering from cataract. Mamatha *et al.*,^[13] in their hospital based study at Mysore reported the proportion of cataract as 28.2%, which was lower than the present study, whereas Avachat *et al.*,^[14] reported a higher prevalence of cataract (53%) in an another hospital based study.

In the present study, aging was found to be a contributing factor in development of cataracts. The prevalence of cataract was nearly 5 times higher among older subjects than younger subjects. Similar type of observation was reported by Mamatha *et al.*,^[13] in their study, where cataract were 1.08 times more common among aged subjects than younger subjects. In a study conducted by Singh *et al.*,^[15] also observed a strong association between increasing age and cataract. Vashist *et al.*^[16] reported a 7 times higher prevalence of cataract among participants with age >70 years than younger age group.

The present study observed a significant association between illiteracy and cataract. This observation shows consistency with observations from other studies conducted at different settings. Nirmalan *et al.*,^[17] in their study reported lower odds of developing cataract among literate subjects than illiterates. Avachat *et al.*,^[14] in their study also reported a significant association between education status and development of cataract.

In the present study co-morbidities like diabetes and hypertension had shown significant association with cataract, though those were not found to be an independent risk factor for cataract. A longer duration of diabetes (>10 years) was also found to be associated with cataracts though longer duration of hypertension had not shown any association. Studies from different settings also reported diabetes and hypertension as risk factor for cataract. Ugadhe *et al.*,^[18] in their study reported a significant association of diabetes and hypertension with cataract. Mamatha *et al.*,^[13] also reported a significant association between cataract and diabetes, whereas hypertension was not shown any association with cataract. Nirmalan *et al.*,^[17] in their study reported hypertension as a risk factor for cortical cataract, whereas diabetes was reported as a risk factor for posterior sub-capsular cataract.

In the present study factors like gender, ethnicity, exposure to sunlight for long time, alcohol intake, smoking and overweight had not shown any association with cataract. Many other studies across India reported a different observation. Avachat *et al.*,^[14]

reported a higher prevalence of cataract among males; whereas Camparini *et al.*,^[19] reported higher prevalence of cataract among females. Nirmalan *et al.*,^[17] Ugadhe *et al.*,^[18] and Camparini *et al.*,^[19] reported smoking as a potential risk factor for cataract in their studies, which was different from the observation of present one. These differences may be due to the fact that those studies were done in different settings and among different population with different sample size and sampling technique.

Fikrie A *et al.*,^[20] reported that cataract is the leading preventable and most treatable causes of blindness and bilateral low vision among adults. Despite being the leading cause of preventable and most treatable blindness, the lack of knowledge about the disease and its option of treatment is still a major barrier in reducing the blindness owing to cataract in the developing countries particularly in Ethiopia.

Atimaw YA *et al.*,^[21] reported that significant portion of the participants had good knowledge about cataract, which was positively associated with higher level of education, higher family monthly income, presence of previous eye examination and positive family history of cataract. However, significant knowledge-gap regarding the risk factors and prevention strategies was recognized. Hence, it might be logical to pay social attention in prospering knowledge on how to prevent the occurrence of the disease.

Sobti S. *et al.*,^[22] reported that India has the highest number of blind people globally, unoperated cataract being the most common cause of blindness and low vision. Although safe and effective surgical techniques are available, the cataract burden continues to increase annually, due to the backlog of patients to be operated upon and a growing number of cataract cases due to increase life expectancy.

In a study, Alfaqeeh AS *et al.*,^[23] found that in diabetic patients 12.7% were diagnosed with cataract. Cataract prevalence was significantly higher among those with an age more than 40 years, those having a DM duration more than 10 years, among those having life style changes as a DM- therapy and among those with no medication commitment. Cataract prevalence was significantly higher among those who had exposure to radiation.

Majority of the subjects suffering from cataract were aged 50 yrs or more, which was relatively early onset of cataract as compared to other part of the nation. Poor literacy rate might be a barrier to self care and also seeking health care in this population.

Conclusion

The present study identified some socio-demographic variables like age, illiteracy, family size and some lifestyle variables like diabetes, hypertension etc., as risk factors for cataract. Few of them are non-modifiable and the rest are modifiable. Controlling the modifiable risk factors namely diabetes, hypertension etc., and measures to improve literacy may help in reducing the

proportion of cataract in the study population. But being a hospital-based study; general legibility of the study findings to the whole population may be limited.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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