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Original Research Article

Prevalence and pattern of ocular morbidity and factors influencing ocular morbidity in a rural population in south India: a community based cross sectional study

Venkataramana[1], Amarnath R. L. C.[2]*

Department of Community Medicine, [1]Viswabharathi Medical College, Andhra Pradesh, India; [2]Dr. V.R.K. Women's Medical College, Telangana, India

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***Correspondence:**
Dr. Amarnath R. L. C.,
E-mail: amarnathreddivalam@hotmail.com

ABSTRACT

Background: Preventable blindness is still one of the major public health problems in India. The scarcity of community-based studies on ocular morbidity, more especially from rural areas is one of the reasons for the inadequate focus on the subject. The objectives were to study the pattern and factors associated with ocular morbidity in a rural adult population.
Methods: The study was a cross sectional study conducted in field practice area of rural health Center, Cheluvanatti village in the state of Karnataka. Among 16 villages, one village was selected by convenient sampling. Ocular morbidity was assessed by detailed history and clinical examination by trained clinicians.
Results: Among total 1181 population, 872 people >18 years were included in the final analysis. Majority portion (72.9%) of the study population was in 18-45 years age group. There were 51.3% of males and the proportion of females was 48.7%. The prevalence of ocular morbidity was 13.9% (95% CI 12.0%-16.0%) in the study population. The most common ocular morbidity was refractive errors seen in 56(6.4%), followed by cataract seen in 35 (4%) and corneal blindness seen in 26 (3%) subjects. The presence of ocular morbidity was 4.49 times more in 46-60 years age group compared with 18 to 45 years age group (95% CI 2.76 -7.33, p<0.01). Compared with higher studies people the presence of ocular morbidity in illiterate was 35.32 times more (95% CI 16.61-75.12, p<0.01). The presence of ocular morbidity was 20.64 times more in diabetic patients (95% CI 8.95-47.61, p<0.01) comparing with non-diabetic patients.
Conclusions: The prevalence of ocular morbidity is still more in aged people and the village people are getting more effect with their practices and behavior. There is a need to go with more community-based cross sectional studies and also the preventive methods to reduce and avoid the risk of ocular diseases.

Keywords: Ocular morbidity, Rural population, Cross sectional study, Risk factors, Elderly population

INTRODUCTION

Ocular morbidity is considered as one of most under diagnosed and undertreated public health problems in many developing nations especially in Asia.[1-3] The people with visual impairment in the world estimated to 285 million, out of which 39 million blind and 246 million having low vision.[4, 5] As per National Program for Control of Blindness (NPCB) the prevalence of avoidable blindness in India was 1.1% in 2001 -2002, which has reduced to 1% in 2006-07. The country has still a long way to go to achieve the target prevalence of 0.3% envisaged by the program by the year 2020.[6] In terms of absolute numbers, India has about 12 million blind

people, the majority of them living in rural areas, with poor access to quality eye care services. By the year 2020, this number is projected to be twice the current level, without appropriate strategies.[7]

Various reports have highlighted the fact that 80% of global burden of visual impairment can be prevented, treated or cured. Globally, the leading causes of blindness are a cataract, uncorrected refractive errors, glaucoma, age-related macular degeneration. Other major causes include Corneal opacities, Diabetic retinopathy, Blinding trachoma.[8] Even in India, preventable and treatable causes like cataract (62.6%) refractive error (19.70%) still contribute to more than 80% preventable blindness.[6] Factors which strongly influence the occurrence and burden and pattern of ocular diseases in a particular community include age structure of the population, socioeconomic conditions, Educational status, occupational profile and environmental conditions etc., Healthcare system related factors like access, quality, financing etc., also strongly influence the impact of these morbidities.[9]

Lack of proper awareness among the population groups, delay in seeking care coupled with poor quality eye care services, not adequately geared up to address the prevailing burden of eye diseases are the reported reasons for this situation.[10] Lack of up to date data on the exact burden of the disease in many developing nations is also one of the major contributors. In countries where there is a lack of credible data at the national or regional level, community-based studies conducted by individual researchers are of vital importance. These studies, apart from highlighting the burden of the disease, unmet need in the community also provide us understanding about the pattern and factors influencing eye diseases in the community. This will help us in not only drawing the attention of relevant stakeholders towards the issue but also in designing appropriate preventive interventions.[11-14]

The present study attempts to determine the prevalence and pattern of common ocular morbidity and the factors associated with ocular morbidity in a rural community in South India.

METHODS

The current study was a community-based cross-sectional study, conducted in Cheluvanatti village under field practice area of Handiganur Primary health center under the department of community medicine, Jawaharlal Nehru Medical College, Belgaum. The village was selected by convenient sampling from a total of 16 villages under 4 sub-centers in the field practice area.

The data collection for the study was conducted for a period of one year from January 2009 to December 2009.All the individuals above the age of 18 years who are permanent residents of Cheluvanatti village for the last one year were considered as the study population.

Inclusion criteria

Inclusion criteria were all the individuals above the age of 18 years; permanent residents of Cheluvanatti village for last one year.

Exclusion criteria

An exclusion criterion was all migrants were excluded.

Method of data collection

All the households in the village were visited by trained medical personnel and informed consent was sought from all the available individuals. Subsequent visits were made at the appropriately fixed time to cover people not available in the first visit. Data on socio-demographic factors, history of any eye disease, current symptom profile suggesting ocular illness etc. were documented in a structured proforma. Thorough clinical and ocular examination was conducted by trained medical personnel, using a standard case report form. Snellen's charts were used to test visual acuity. Subjects found to have diminished vision or any positive findings on screening were taken to the ophthalmology department for further examination. Both the findings were triangulated and the final diagnosis was given to each participant.

Statistical analysis

Ocular morbidity was taken as the primary outcome variable. Individual parameters like age, gender education, occupation etc., were considered as primary explanatory variables and type of family, smoking status, alcohol status, diabetes mellitus, hypertension etc., were considered as other variables. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. The association between explanatory variables and ocular morbidity was assessed by cross tabulation and comparison of percentages. Chi square test was used to test statistical significance. Univariate and multivariate logistic regression analysis was used to assess the factors associated with ocular morbidity. Unadjusted and adjusted Odds ratio along with 95% CI is presented. Data was analyzed by IBM SPSS version 21.[15]

RESULTS

Out of the total 1181 people living in the village, 260 people were below 18 years and were excluded from the study. Out of the remaining 921, 49 had migrated out of the village and were not available. A total of 872 cases were included in the final analysis.

The majority (72.9%) of the study population were in 18-45 years age group, the proportion of 46-60 years and Above 60 years was 18.7% and 8.4% respectively. There were 51.3% of males and the remaining 48.7%were females. There were 33.5% cases possessing high school and 28.6% were in primary school, the proportion of illiterate and college or more was 15.5% and 22.5% respectively. As per the educational status is concerned, 15.5% were illiterates. The proportion of subjects, completing primary school, high school and college education were 28.6%, 33.5%, and 22.5% respectively. The majority (45.6%) of the study population were farmers. The proportion of housewives, students and others was 35.7%, 9.6%, and 9.1% respectively. All the study subjects were Hindus. The proportion of smokers was 7.5% and 7.3% were alcoholics. The proportion of diabetes was 3.4% and 6.7% of the study subjects had hypertension. There were 20.8% of the study population with a family history of eye disease (Table 1).

Table 1: Frequency distribution of individual parameters in study group (N=872).

Parameters	Frequency	Percentage
Age group		
18-45years	636	72.9
46-60years	163	18.7
61 above	73	8.4
Gender		
Male	447	51.3
Female	425	48.7
Education status		
Illiterate	135	15.5
Primary school	249	28.6
High school	292	33.5
College or more	196	22.5
Occupation		
Farmer	398	45.6
Housewife	311	35.7
Student	84	9.6
Others	79	9.1
Religion		
Hindu	872	100
Others		
Smokers	65	7.5
Alcoholics	64	7.3
Diabetes Mellitus	30	3.4
Hypertension	58	6.7
Family of history	181	20.8

The majority (59.4%) of the study population belonged to the nuclear family. The proportion of subjects, who belonged to the joint family and three generation family were 34.7% and 5.8% respectively. Overcrowding was reported by 37% of the subjects. Cow dung use was reported by 26.3% of the study population. The proportion of subjects, reporting use of wood, kerosene, gas and electricity were 27.6%, 63.2%, 36.4% and 2.6% respectively (Table 2).

The prevalence of ocular morbidity was 13.9% (95% CI 0.12-0.16) in the study population (Table 3).

Table 2: Frequency distribution of family and Household parameters in study group (N=872).

Parameters	Frequency	Percentage (%)
I. Type of family		
Joint	303	34.7
Nuclear	518	59.4
Others	51	5.8
II. Overcrowding		
Present	323	37.0
Absent	549	63.0
III. Fuel		
Cow dung	229	26.3
Wood	241	27.6
Kerosene	551	63.2
Gas	317	36.4
Electricity	23	2.6

Table 3: Frequency distribution of Final Ocular morbidity in study group (n=872).

Parameters	Frequency	Percentage (%)
Present	121	13.9
Absent	751	86.1
Total	872	100.0

Table 4: Frequency distribution of specific Ocular morbidities in study group (N=121).

Parameter	Frequency (%)
Refractive errors	56 (6.4)
Cataract	35 (4)
Corneal Blindness	26 (3)
Pseudophakia	15 (1.7)
Conjunctivitis	7 (0.8)
Glaucoma	5 (0.6)
Stye	4 (0.5)
Ocular trauma	3 (0.3)
Pterygium	3 (0.3)
Corneal ulcer	3 (0.3)
Diabetic retinopathy	2 (0.2)
ARMD	2 (0.2)
Scleritis	1 (0.1)
Hypertensive retinopathy	1 (0.1)
Others	9 (1.0)

The most common ocular morbidity was refractive errors seen in 56 (6.4%), followed by cataract seen in 35 (4%) and corneal blindness seen in 26 (3%) subjects. The proportion of Pseudophakia, conjunctivitis, glaucoma and stye was 15 (1.7%), 7 (0.8%), 5 (0.6%) and 4 (0.5%) respectively. The ocular trauma, pterygium, and corneal ulcer were with 3(0.3%) whereas Diabetic retinopathy and ARMD with the proportion of 2 (0.2%) scleritis and

hypertensive retinopathy with 1 (0.1%). The proportion of other ocular morbidities was 9 (1.0%) (Table 4).

Table 5: Association of individual parameters with ocular morbidity in study population (N=872).

Parameter	Exp (B)	95.0% CI for Exp (B)		P value
		Lower	Upper	
Age group18-45 years (baseline)				
46-60 years	4.49	2.76	7.33	<0.01
61 above	24.60	13.88	43.60	<0.01
Male(Baseline= Female)	1.21	0.82	1.78	0.33
Education status (baseline=graduation or more)				
Illiterate	35.32	16.61	75.12	<0.01
Primary school	1.62	0.71	3.69	0.25
High school	0.66	0.26	1.69	0.39
Occupation (baseline=other occupations)				
Farmer	1.37	0.67	2.80	0.39
House wife	1.02	0.49	2.14	0.96
Student	0.44	0.14	1.34	0.15
Others				
Smoker (baseline=No)	3.37	1.93	5.91	<0.01
Alcoholic (baseline =No)	2.93	1.64	5.19	<0.01
Diabetes (baseline = No)	20.64	8.95	47.61	<0.01
Hypertension (baseline= No)	15.31	8.56	27.38	<0.01
Family history (baseline= No)	2.68	1.77	4.05	<0.01

Table 6: Association of family and household parameters with ocular morbidity in study population (N=872).

Parameter	Exp (B)	95.0% CI for Exp (B)		P value
		Lower	Upper	
Family type (baseline=joint)				
Nuclear	0.74	0.49	1.10	0.14
Others	0.55	0.21	1.45	0.23
Overcrowding (Baseline=Absent)	0.85	0.57	1.28	0.44
Cow dung (baseline=Absent)	0.58	0.36	0.95	0.03
Wood (baseline=Absent)	1.90	1.28	2.83	0.002
Kerosene (baseline=Absent)	0.63	0.43	0.93	0.02
Gas (baseline=Absent)	0.85	0.56	1.27	0.42
Electricity(baseline=Absent)	0.58	0.14	2.52	0.47

The presence of ocular morbidity was 4.49 times more in 46-60 years age group comparing with 18 to 45 years age group (95% CI 2.76 -7.33, p<0.01), and the odds were 24.60 times more in above 60 years age group (95% CI 13.88-43.60, p<0.01). Comparing with females presence of ocular morbidity was 1.21 times more in males (95% CI 0.82-1.78, p>0.05). Comparing with higher studies people the presence of ocular morbidity in illiterate was 35.32 times more (95% CI 16.61-75.12, p<0.01) and in primary school children it was 1.62 times more (95% CI 0.71-3.69, p>0.05) and in high school children it was 0.66 times less (95% CI0.26-1.69, p>0.05). The presence of ocular morbidity was 1.37 times more in farmers (95% CI 0.67-2.80, p>0.05) comparing with others, the same was 1.02 times more in housewives (95% CI 0.49-2.14, p>0.05) and the same was 0.44 times less in students (95% CI 0.14-3.14, p>0.05). Comparing with non-smokers the presence of ocular morbidity was 3.37 times high in smokers (95% CI 1.93-5.91, p<0.01). Comparing with the people who not addicted to alcohol the presence of ocular morbidity was 2.93 times high of the people who addicted to alcohol (95% CI 1.64-5.19, p<0.01). The presence of ocular morbidity was 20.64 times more in diabetic patients (95% CI 8.95-47.61, p<0.01) comparing with non-diabetic patients. The presence of ocular morbidity was 15.31 times more in the people with hypertension (95% CI 8.56-27.38, p<0.01) comparing with the people without hypertension. Comparing with the people without family history the presence of ocular morbidity was 2.68 times high in people with family history (95% CI 1.77-4.05, p<0.01) (Table 5).

Comparing with joint families the presence of ocular morbidity was 0.74 times low in nuclear families (95% CI 0.49-1.10, p>0.05) and the same in others was 0.55 times low (95% CI 0.21- 1.45, p>0.05). The presence of ocular morbidity was 0.85 times low in overcrowding houses comparing with not overcrowded houses (95% CI

0.57-1.28, p<0.01). The presence of ocular morbidity was 0.58 times low of people who use cow dung as fuel comparing with non-users (95% CI 0.36-0.95, p<0.05). The presence of ocular morbidity was 1.90 times high in people who uses wood as fuel comparing with non-users (95% CI 1.28-2.83, p<0.01). The presence of ocular morbidity was 0.63 times low of people who use kerosene as fuel comparing with non-users (95% CI 0.43-0.93, p<0.05). The presence of ocular morbidity was 0.85 times low in people who uses gas as fuel comparing with non-users (95% CI 0.56-1.27, p>0.05). The presence of ocular morbidity was 0.58 times low in people who uses cow dung as fuel comparing with non-users (95% CI 0.14-2.52, p>0.05) (Table 6).

DISCUSSION

In the present study, the prevalence of ocular morbidity, sociodemographic factors and other individual factors association with ocular morbidity were more or less similar to the other studies. Refractive error was the leading cause (6.4%) of visual impairment in the present study population (whereas Myopia accounts 4.35% and hyperopia accounts 2.06%). This is similar to the study of Kedir et al, the contribution of refractive error 3.5% as a major cause of the visual impairment.[16] Marmamula et al reports that, refractive errors were the leading cause and the major cause of the blindness was cataract.[17] Among all the common ocular morbidities refractive error was found to be most prevalent with 25.5% and it was observed very high in 41-50 years age group (36.5%) whereas the results provided were with statistical significance (p<0.01). According to the same author, Cataract was also most prevalent in the age group of 51-70 years (19.3%) and second major contribution in ocular morbidities occupied by this Cataract.[12,18] In the present study the second major cause of the visual impairment was cataract and then follows blindness, conjunctivitis, glaucoma, corneal ulcer, diabetic retinopathy, ARMD, hypertensive retinopathy etc.

Sehgal et al reported that there were 36.10% people belonged to elderly with refractive error and 22.48% with Cataract. More or less similar results were observed by Singh et al, (25.8%) who found 40.8% participants with refractive error present in rural central India. The other studies by Mishra, Sreeevatsava et al, it was found that older age and the education were strongly associated with ocular morbidity. Although the odds of ocular morbidity presence were high in females, it was not statistically significant (p>0.05).[3,17,19,20] In another study by Thiagalingam et al reported that the association between age and refractive error was significant with an increase in age by 10 years 51% increase observed.[21] Our study findings were similar to previous studies as the odds of having ocular morbidity in above 60 years age group was 24 times comparing to below 45 years. In the case of gender also males were the more risk facing compare with females and the association shown was statistically significant. This was stated almost similarly in Zhou et al studies as eye injuries in men and women were with [odds ratio (OR), 3.3; 2.2-4.9]. According to the author observations, ocular trauma was most significant in hypertensive patients compare to normotensive patients. (Hypertensive vs. normotensive: OR, 0.6; 0.4-0.9).[22] In the present study, the results stated the association of hypertension with ocular morbidity was 15 times comparing with the normal participants and it was with great statistical significance (p<0.01).

Parmar et al reported that the presence of ocular morbidity in children strongly associated with the parent's education. The occurrence of ocular diseases was affected by the illiterate, primary level and secondary level educated parents of children. The other studies conducted in Ahmadabad and Maharashtra also reported the similar results as the ocular morbidity in children was significantly associated with the parent's education status. Whereas the increase in the education of parents decreases the presence of ocular diseases in children. This observation proposed the importance of education to get the awareness about the common ocular morbidities and the results showed the strong association between refractive error and the father's education.[23] As compared with the other studies illiterate people found to be more risk factors comparing with higher studies people (OR= 35, p<0.01) whereas the educated people up to primary school also not excepted from the risk with less risk (OR=1.62). Puri et al reported that there was a strong association between occupation and ocular morbidity. The people in the field of agriculture and outdoor work were the most affected compared to others by these ocular diseases. This particular study noted that old age and lower education status also were the most influencing factors of ocular morbidity.[12]

Saaddine et al reported that comparing with the other people the people with diabetes mellitus facing more risk of eye diseases like cataract, glaucoma etc., the loss of vision because of eye disease in the diabetes mellitus people was leading to other disorders as depression, mobility reduction and the reduction of quality of life. The people with diabetes in older age as 65-74 years and above 75 years were also the most strongly associated with ocular disease. The reports from previous studies stated that the people with diabetes mellitus were mostly affected by cataracts when compare to non-diabetic patients. The similar association found between open-angle glaucoma and diabetes mellitus, with very high rate of glaucoma presence in diabetic people.[24,25] In our study, the results showed the risk of ocular morbidity was more in the diabetic people comparing with nondiabetic people (OR=20.64, p<0.01).

Thiagalingam et al reported that there was the very high prevalence of undercorrected refractive error in the people living alone after adjusting for age, sex in multiple logistic regression. Living alone in society leads to less awareness about health providers for different conditions including visual impairment.[21] The present study findings

explained the same by the other factor like overcrowding houses were facing less risk compared with not overcrowded houses.

Saha et al reported that the cross sectional study with the total 469 participants in a rural area in western Indi revealed the strong association of ocular diseases with different types of fuel usage. The people who were using wood as fuel found to be more risk facing with age-dependent cataract (OR 2.12, 95% CI 1.03–4.34). The results noted that comparing wood only and LPG only users, the odds ratio was 3.47 (95% CI 1.05–11.50). The eye irritation was reporting more in coal and cattle dung fuel users as coal use (OR 2.04, 95% CI 1.13–3.68) and cattle dung use (OR 1.83, 95% CI 1.35–2.47).[26] our study the results showed similarly with other studies like people using wood as fuel were facing more risk (OR 1.90, $p<0.05$) with ocular diseases. Whereas the other fuel usage like gas (OR=0.85) and electricity (OR= 0.58) users were not facing the risk of ocular morbidity.

Limitations of the study

Ocular morbidity association with the old people observed throughout the study. There are no factors related to ocular morbidity with urban area population.

CONCLUSION

The present study exposes the association of socio-demographic factors and clinical parameters with ocular diseases. This community-based cross sectional study is providing data related to the quantity of risk of ocular morbidity with individual factors, which will be beneficial to get solutions and reducing the risk. People should get awareness about the eye care services and appropriate treatment. From the government side and health practitioners should take responsibility in reducing this ocular morbidity.

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