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An Epidemiological Study of Common Ocular Morbidities among Elderly Population in the Wardha, District, Maharashtra, India

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Abstract

Globally, estimated 272.4 million people are visually disabled (i.e. low vision) of whom nearly 42.7 million are blind. Out of them 175 million people are suffering from cataract and refractive errors in all ages all over the world, out of which more than 90% dwell in low income countries. Despite of national programme in India other causes of blindness are increasing due to the lack of locally available data on ocular morbidities, hence the present study was carried out to know prevalence of common ocular morbidities and to know about its epidemiological determinants. Material and Methods: A cross-sectional study was conducted in five adopted villages of a Medical College, during the period from Jan. 2010 to Dec. 2010. All elderly persons, of age 50 years and above were involved in study. Data was collected using pre-designed and pre-tested questionnaire on socio-demographic, socioeconomic class and personnel characteristics were recorded after obtaining written informed consent from the study subject. The participating subjects were examined for ocular morbidity and the findings were recorded in the field itself. For effective ocular examination investigator underwent two months training in the Department of Ophthalmology. Institutional ethical clearance was taken. Results and conclusion: Among 974 persons, blindness (<6/60) was 7.2% in the study population and by WHO (<3/60) was 5.4%. Blindness was found significantly associated with age and sex. Prevalence of low vision was found to be 29.3% and was found to be significantly associated with age, sex, caste, education, socioeconomic status and fuel used. Refractive error was the most common ocular disease (85%) in study population. It was found to be significantly associated age, caste, education, occupation and tobacco consumption. Proportion of cataract was 36.3% and was found to be significantly associated with age, sex, caste, education, occupation, socio-economic status, type of house, fuel used and blood pressure. Prevalence of dry eye was 12.7%. It was found to be significantly associated with age, sex, education, and occupation. Diabetic retinopathy was present in 8.9% study population and was found to be significantly associated with age, sex, education, type of house, fuel used, tobacco consumption and alcohol consumption. Glaucoma was present in 5.6% of the study population. In the present study glaucoma was found to be significantly associated with age. Age related macular degeneration (AMD) was present in 6.6% of study population. AMD was found to be significantly associated with age and education.

Keywords: Ocular morbidities; Refractive error; Cataract; Dry eye; AMD; Glaucoma; Diabetic retinopathy

Introduction

Globally, estimated 272.4 million people are visually disabled (i.e. low vision) of whom nearly 42.7 million are blind. Out of them 175 million people are suffering from cataract and refractive errors in all ages all over the world, out of which more than 90% dwell in low income countries. These countries suffers loss of 8% extra years due to disability (Years Lost due to Disability). Most people with visual impairment are older, and females are more at risk at every age, in every part of the world. Approximately 71 million people above the age of 60 years suffer from the correctable visual impairment in the low income countries [1].

Globally, the leading causes of blindness, in order of frequency are: Cataract, Uncorrected refractive errors, Glaucoma, Age-related macular degeneration. Other major causes include Corneal opacities, Diabetic retinopathy, Blinding trachoma and eye conditions in children such as Cataract, Retinopathy of prematurity and Vitamin A deficiency [2].

World's one-third blind people live in South-East Asia region. Four out of every 12 people who become blind every minute in the world are from South-East Asia. With one quarter of global population and one third of world's blind, South-East Asia has particularly heavy burden of disease. Blindness in this region is truly a public health problem and it is estimated to cost US$ 5.6 billion annually to the countries of the region, in terms of loss of productivity, education and rehabilitation. Thus, it constitutes an additional burden to these already poor countries. The life expectancy of the blind persons is one-third less than that of their sighted peers, and most of them die within 10 years of becoming blind. 90% of blindness in the region is avoidable, i.e. preventable or curable. Cataract can be cured with inexpensive

surgery, refractive errors are correctable with simple optical devices, xerophthalmia and trachoma are easily preventable [3].

In India, recent estimates state that prevalence of blindness (presenting vision, 6/60 in better eye) was 8.5%. The prevalence varied from 4.2% to 13.7% across the different districts. The blindness load could be nearly halved by correction. Presenting vision, 6/60 has been traditionally used to define blindness in the Indian context and therefore comparison with earlier studies is possible if the same cut-off point is used. Using World Health Organization (WHO) cut off, the prevalence of blindness was 5.34%. The prevalence of low vision (presenting vision, 6/18-6/60 in better eye) was 23.85%. Those aged 70 years and above had a five times higher risk of being blind compared to those aged 50-59 years. Cataract in one or both eyes was responsible for 62.4% of bilateral blindness. One-fifth of all the bilaterally blind individuals had uncorrected or poorly corrected refractive errors. Glaucoma and posterior segment causes were other important reasons for bilateral blindness [4].

National Programme for Control of Blindness was launched in the year 1976 with the goal to reduce the prevalence of blindness from 1.4% to 0.3%. Target for the 10th Plan was to reduce prevalence of blindness to 0.8% by 2007 prevalence of Blindness is 1%. During the 11th plan, the scheme is to consolidate gains in controlling cataract blindness and also initiate activities to prevent and control blindness due to other causes [5]. Despite of national programme in India other causes of blindness are increasing due to the lack of locally available data on ocular morbidities, hence the present study was carried out to know prevalence of common ocular morbidities (Refractive Error, Cataract, Dry Eye, Diabetic retinopathy, Age related macular degeneration) and to know about its epidemiological determinants.

Material and Methods

A cross-sectional study was conducted in five adopted villages of a Medical College, during the period from January 2010 to December 2010. All elderly persons, of age 50 years and above who were residents of the village were included in the study. First, a door to door enumeration was done to identify the study subjects. Total of 1064 subjects were enumerated i.e. 17.2% of the total population. Subsequently, visits were made for data collection. Efforts were made to include the entire elderly person in these villages. Three repeat visits were made before declaring a subject unavailable. Out of 1064 subjects enumerated, 974 could be included in the study. Data was collected using pre-designed and pre-tested questionnaire on socio-demographic variables such as age, sex, caste, education, occupation and socioeconomic class, information regarding housing condition and cooking material used, and personnel characteristics such as tobacco consumption, alcohol, tobacco consumption and blood pressure were recorded after obtaining written informed consent from the study subject. The participating subjects were examined for ocular morbidity and the findings were recorded in the field itself. For effective ocular examination investigator underwent two months training in the Department of Ophthalmology. Detailed ophthalmic examination was done with the help of simple torchlight, magnified loop and ophthalmoscope (WelchAllyn CE REF 13010). Color vision was tested with Ischihara's color vision charts. Visual acuity was taken using standard Snellen charts (separately for distant and near vision). Each eye was examined separately. Improvement of vision using pinhole was recorded as the best corrected visual acuity. Confrontation test was done to detect any gross diminution of field of vision was done in cases suspected to have glaucoma [6]. The eyeball and its deviation

were examined by direct observation with, torchlight by doing Heirschberg test/Cover-uncover test. Upper and lower eyelid was examined by retracting manually. Lacrimal sac disorders were diagnosed based on clinical signs, symptoms, regurgitation test and digital examination. Anterior segment, which include conjunctiva, anterior part of sclera, cornea, anterior chamber, pupil, iris diaphragm and lens, have been examined by torchlight and magnifying uniocular loupe (x10). Any suspected cases of lenticular opacity on torch light examination was confirmed on distant direct ophthalmoscopy and was labeled as cataract [7]. Posterior segment that includes vitreous cavity, retina and optic disc was examined by the direct ophthalmoscope. Diagnosis of retinal diseased and optic nerve diseases were made on direct ophthamoscopy. Digital tonometry was carried out and suspected cases of raised intraocular tension were referred to ophthalmologist of the medical college hospital for final diagnosis.

For Visual impairment, 'presenting' visual acuity of <6/18 is better eye. Low vision was taken as 'presenting' visual acuity of <6/18, but ≥6/60 in the better eye blindness as 'presenting' visual acuity of <6/60 in the better eye [6]. Corneal opacity was taken as Loss of normal transparency of the cornea. For glaucoma an intraocular pressure of more than 21 mm Hg accompanied by a horizontal or vertical cup-disc ratio differences ≥0.6 or a horizontal or vertical cup-disc ratio difference ≥0.2 [8]. The data was entered and analyzed using epi_info 6.04d version [9]. The magnitude of ocular morbidity is expressed as percentage. The chi-square test has been applied to test the association between the exposure variable and the morbidity status. An approval from Institutional Ethical Committee was obtained before conducting the present study; those patients needing further investigation, diagnosis and treatment were referred to the medical college hospital.

Results

Total 974 elderly persons were studied out of them, majority (42.3%) were from age group of 60-69 years followed by 33.6% were in age group of 50-59 years, and 24.1% were above 70 years of age. In the study subjects, 50.7% were males and 49.3% were females (Table 1). In the study population 49.2% were from SC/ST/NT category and 47% were from OBC category. Only 3.8% were from open category.

	Sex		Total (%)
	Male (%)	Female (%)	
Age (in years)			
50-59	167 (33.8)	160 (33.3)	327 (33.6)
60-69	193 (39.1)	219 (45.6)	412 (42.3)
>70	134 (27.1)	101 (21.1)	235 (24.1)
Education (in class)			
Illiterate	118 (23.9)	238 (49.6)	356 (36.5)
01-Apr	144 (29.1)	112 (23.3)	256 (26.3)
05-Oct	190 (38.5)	101 (21.0)	291 (29.9)
>10	42 (8.5)	29 (6.1)	71 (7.3)
Occupation			
Daily Labourer	297 (60.1)	395 (82.3)	692 (71.0)
Farmer	147 (29.8)	40 (8.3)	187 (19.2)

Others	50 (10.1)	45 (9.4)	95 (9.8)
Consumption tobacco			
Yes	274 (55.5)	175 (36.5)	449 (46.1)
No	220 (44.5)	305 (63.5)	525 (53.9)
Socio-economic Class			
I class	34 (6.9)	30 (6.3)	64 (6.6)
II class	59 (57.8)	54 (11.2)	113 (11.6)
III class	88 (18.0)	108 (22.5)	196 (20.1)
IV class	211 (42.7)	196 (40.8)	407 (41.8)
V class	102 (20.6)	92 (19.2)	194 (19.9)
Total	494 (50.7)	480 (49.3)	974 (100)
Caste			
Open	16 (3.2)	21 (4.3)	37 (3.8)
OBC	235 (47.6)	223 (46.5)	458 (47.0)
SC/ST/NT	243 (49.2)	236 (49.2)	479 (49.2)
Fuel used			
Wood	376 (76.1)	388 (80.8)	764 (78.3)
Kerosene	50 (10.1)	39 (8.1)	89 (9.1)
Coal	10 (2.0)	9 (1.9)	19 (1.9)
Gas	58 (11.8)	44 (9.2)	102 (10.5)
Type of house			
Kuccha	192 (38.9)	208 (43.3)	400 (41.1)
Semipucca	228 (46.1)	195 (40.7)	423 (43.4)
Pucca	74 (15.0)	77 (16.0)	151 (15.5)
Consumption of alcohol			
Yes	81 (16.4)	12 (2.5)	93 (9.5)
No	413 (83.6)	468 (97.5)	881 (90.5)
Blood Pressure			
Normal	90 (18.2)	114 (23.7)	204 (21.0)
Pre HT	360 (72.9)	329 (68.6)	689 (70.7)
HT	44 (8.9)	37 (7.7)	81 (8.3)
Total	494 (50.7)	480 (49.3)	974 (100)

Table 1: Socio-demographic profile of study subjects involved.

The above table shows that 36.5% were illiterate followed by 29.9% were educated upto 5-10th class, 26.3% persons studied up to the 4th class and only 7.3% were educated above 10th class.

In the study population majority of persons i.e. 71% were daily labourer, 19.2% were farmer and 9.8% were earning their livelihood by doing other occupation such as service, business etc. In the study population majority of people 41.8% belonged to IV socioeconomic class of Modified Prasad's classification followed by approximately 20% people in class III and V. Only 6.6% population belonged to class I. Study population majority of persons i.e. 43.4% live in Kuccha house, followed by 41.1% in semipucca house. Only 15.5% persons in the study area stayed in pucca house. About use of fuel for cooking i.e. 78.3% used wood as fuel followed by LPG gas which was used by 10.5% people in their houses as fuel.

In Addiction study population 46.1% persons consumed tobacco in one or other form of which 55.5% were males and 36.5% were females. Only 9.5% of the persons consume alcohol of which 87.1% were males and 12.9% were females. According to JNC 7 classification [10] majority of the persons were prehypertensive (70.7%) and 8.3% persons being hypertensive.

Ocular morbidity	No of cases (n=974)
Normal	101 (10.4%)
Ocular diseases	
Refractive error	828 (85%)
Cataract	354 (36.3%)
Dry eye	124 (12.7%)
Diabetic retinopathy (DR)	87 (8.9%)
Corneal Opacity (CO)	67 (6.9%)
Age related macular degeneration (ARMD)	64 (6.6%)
Glaucoma	57 (5.6%)
Visual status	
Low vision	285 (29.3%)
Blindness (<6/60)	70 (7.2%)

Table 2: Magnitude of the ocular diseases.

Above Table 2 shows that Refractive error was the most common ocular disease (85%) in study population. Proportion of cataract was 36.3%. Dry eye and Diabetic retinopathy was 12.7% and 8.9% respectively. Diseases of fundus such as Age related macular degeneration was 6.6% and glaucoma was 5.6% in prevalence in the study population. As per visual status, low vision was found in 29.3% people and blindness (<6/60) in 7.2% of study population.

Study parameters				P value
Age (in years)	50-59 (N=327)	60-69 (N=412)	>70 (N=235)	p <0.05
Refractive error	234 (71.5%)	385 (93.4%)	209 (88.9%)	
Cataract	75 (22.9%)	170 (41.3%)	109 (46.4%)	

Dry eye	22 (6.7%)	43 (10.2%)	59 (25.1%)	
DR	22 (6.7%)	29 (7.0%)	36 (15.3%)	
CO	9 (2.8%)	31 (7.5%)	27 (11.5%)	
ARMD	5 (1.5%)	21 (5.1%)	38 (16.2%)	
Glaucoma	11 (3.4%)	23 (5.6%)	23 (9.8%)	
Caste	Open (N=37)	OBC (N=458)	SC/ST/NT (N=479)	
Refractive error	30 (81.1%)	370 (80.8%)	428 (89.3%)	
Cataract	14 (37.8%)	131 (28.6%)	209 (43.6%)	
Occupation	Daily labourer (N=692)	Farmer (N=187)	Others (N=95)	
Refractive error	607 (87.7%)	144 (77%)	77 (81.1%)	
Cataract	288 (41.6%)	44 (23.5%)	22 (23.2%)	
Dry eye	107 (15.5%)	9 (4.8%)	8 (8.4%)	
Type of house	Kuccha (N=400)	Semi pucca (N=423)	Pucca (N=151)	
Cataract	183 (45.8%)	116 (27.4%)	55 (36.4%)	
DR	19 (4.8%)	51 (12.1%)	17 (11.3%)	
Blood pressure	Normal (N=204)	Prehypertension (N=689)	Hypertension (N=81)	
Cataract	60 (29.4%)	252 (36.6%)	42 (51.9%)	

Table 3A: Determinants of ocular morbidities. Age, Caste, occupation, Type of house, blood pressure and ocular morbidities.

In above Table 3A Refractive error was found in 71.5% persons of age group 50-59 years, 93.4% were in age group 60-69 years and 88.9% of population from the age >70 years. Refractive error was found to be significantly associated with increasing age (p<0.05). Table also shows that the percentage of the cataract in the study population also increases from 22.9% in age group 50-59 years, to 41.3% in age group of 60-69 years and further 46.4% in persons above 70 years. Cataract was found to be significantly associated with the increasing age (p<0.05).

Dry eye, Diabetic retinopathy, Corneal Opacity, and age related macular degeneration were also found significantly associated with the increasing age (p<0.05).

Table 3A shows that the Refractive error was 80.8% in OBC category followed by 81.1% in open caste category and 89.3% in SC/ST/NT. The magnitude of Refractive error differed significantly in different caste categories (p<0.05). The proportion of Cataract was 37.8% in open category followed by 28.6% in OBC category and 43.6% in SC/ST/NT. The magnitude of cataract differed significantly in different caste categories (p<0.05).

In Table 3A it was seen that refractive error was present in 87.7% of daily labourers, 77% in farmers and 81.1% with other occupation. Refractive error was significantly associated with different occupation (p<0.05). In above table it was seen that Cataract was present in 41.6% of daily labourers, 23.5% in farmers and 23.2% with other occupation. Cataract was significantly associated with different occupation (p<0.05).

In Table 3A, study population shows that Cataract was present in 45.8% of the people staying in Kuccha house, 27.4% in persons staying in semi pucca house and 36.4% in persons staying in pucca house.

Magnitude of cataract differed significantly in different type of houses (p<0.05), it was also seen that Diabetic retinopathy was present in 4.8% of the people staying in Kuccha house, 12.1% in persons staying in semi pucca house and 11.3% in persons staying in pucca house. Magnitude of diabetic retinopathy differed significantly in different type of houses (p<0.05).

Study parameters			P value
Sex	Male (N=494)	Female (N=480)	p <0.05
Cataract	131 (26.5%)	223 (46.5%)	
Dry eye	49 (9.9%)	75 (15.6%)	
DR	34 (6.9%)	53 (11.0%)	
Tobacco consumption	Yes (N=449)	No (N=525)	
Refractive error	398 (88.6%)	430 (81.9%)	
DR	25 (5.6%)	62 (11.8%)	
Alcohol Consumption	Yes (N=93)	No (N=881)	
DR	3 (3.2%)	84 (9.5%)	

Table 3B: Sex, tobacco consumption, alcohol consumption and ocular morbidities.

Above Table 3B shows that cataract was 26.5% in males and 46.5% in females and was found to be significantly associated with sex (p<0.05). Above table also shows that Dry eye was 9.9% in males and 15.6% in females and was significantly associated with sex (p<0.05).

Diabetic retinopathy were also found to be significantly associated with sex with females getting more affected (p<0.05).

In above Table 3B, study population shows that Refractive error was present in 88.6% of the persons who consumes tobacco and 81.9% in those who do not consume tobacco. Refractive error was found to be significantly associated with consumption of tobacco (p<0.05), it also shows that Diabetic retinopathy was present in 5.6% of the persons who consume tobacco and 11.8% in those who do not consume tobacco. Diabetic retinopathy was found to be significantly associated with Consumption of tobacco (p<0.05).

In above Table 3B, study population shows that Diabetic retinopathy was present in only 3.2% of the persons who consume alcohol and 9.5% in those who don't consume alcohol. Diabetic retinopathy was found to be significantly associated with consumption of alcohol (p<0.05).

In above Table 3B, cataract was present in 29.4% of the persons having normal blood pressure, 36.6% of the persons who are prehypertensive and 51.9% of the persons who are hypertensive. Cataract was found to be significantly associated with hypertension (p<0.05).

In above Table 3B, study population shows that cataract was is present in 28.1% in SES I, 38.1% in SES II, 4.1% in SES III, 31.9% in SES IV and 41.8% in individuals in SES V. Cataract was found to be significantly associated with the socioeconomic class (p<0.05). It also shows that, in study population low vision was significantly associated with the socioeconomic status (p<0.05).

Study parameters					P value
Education	Illiterate (N=356)	1-4 class (N=256)	5-10 class (N=291)	>10 class (N=71)	p <0.05
Refractive error	312 (87.6%)	219 (85.5%)	247 (84.9%)	50 (70.4%)	
Cataract	212 (59.5%)	91 (35.5%)	33 (12.9%)	18 (25.3%)	
Dry eye	64 (17.9%)	32 (12.5%)	26 (10.2%)	2 (2.8%)	
DR	20 (5.6%)	29 (11.3%)	34 (13.2%)	4 (5.6%)	
ARMD	33 (9.3%)	16 (6.3%)	14 (4.8%)	1 (1.4%)	
Fuel used	Wood (N=764)	Kerosene (N=89)	Coal (N=19)	Gas (N=102)	
Cataract	294 (38.5%)	20 (22.5%)	4 (21.1%)	36 (35.3%)	
DR	59 (7.7%)	13 (14.6%)	6 (31.6%)	9 (8.8%)	

Table 3C: Education level, fuel used and ocular morbidities.

In the above Table 3C it shows that refractive error in 87.6% in illiterate persons and 85.5% in those who were educated up to 1-4 class, 84.9% in persons educated up to 5-10 class and 70.4% in the persons who are having education >10 class. Refractive error was significantly associated with the educational status (p<0.05). Cataract is 59.5% in illiterate persons and 35.5% in 1-4 class educated, 12.9% in persons educated up to 5-10 class and 25.3% in the persons who are having education >10 class. Cataract was significantly associated with the educational status (p<0.05).

Study population shows that dry eye, diabetic retinopathy, age related macular degeneration and Low vision were also found to be significantly associated with the educational status (p<0.05).

In above table, study population shows that Cataract was present in 38.5% of the people using wood as fuel, 22.5% persons use kerosene as fuel, 21.1% persons use coal for cooking food and 35.3% persons use gas for cooking food. Magnitude of cataract differed significantly in different type fuel used (p<0.05).

It was also observed that cataract and diabetic retinopathy was also significantly in different type material used for cooking (p<0.05).

Discussion

In the study conducted, socio-demographic and other factors were more or less similar to the other studies conducted in other different regions in India. As it was seen in the different studies done by Murthy and Singh [4,11,12], Nirmalan [13] and Haq [14] in different parts of countries were having similar findings with the present study with respect to age, sex, literacy, occupation, socioeconomic class, use of fuel and addictions. Overall, some differences in these socio-demographic characteristics of the study population across all the studies may be attributed to differences in study setting, sampling methods used, age group studied and the differences in sociocultural milieu.

Study by Singh et al. in the rural setting stated that the blindness was 12.2% (<3/60) [11] which was higher than the findings of the present study, however Dandona et al. and Haq et al. reported lesser prevalence than the present study. Study in Andhra Pradesh by Dandona et al. found that prevalence of blindness was 1.84% [15,16]. Study by Haq et al. in Aligarh stated the blindness based on presenting visual acuity was 5.4% (<6/60), based on best corrected vision it was found to be 3.6% [14]. The differences in the prevalence of blindness may be attributed to the differences in study setting and age and sex composition of the study population.

In the present study, blindness was found to be significantly associated with age. It was least (3.1%) in age group of 50-59 years, and was highest (14.9%) in the persons of age >70 years. Study conducted by Dandona et al. it was found that blindness was significantly associated with age with 5.06% of blind in age group 50-59 years, 11.11% in 60-69 years and 20.40% in >70 years [16]. Similar association was reported by Murthy et al. in their nationwide survey and also from study in Rajasthan [17], Thulasiraj et al. [18] and Nirmalan et al. [13] also reported that blindness was significantly associated with age.

The prevalence of blindness was 8.7% in males and 5.6% in females in the present study, the difference was not statistically significant. Similar finding was reported by Singh et al. They reported less prevalence of blindness (5.9%) among females than that of males (6.9%) [11]. Other studies such as Dandona et al. [16], Murthy et al. [17], Nirmalan et al. [13] and Murthy et al. [4] reported that prevalence of blindness was significantly higher among females than that of males. This may be attributed to the different study setting and different age structures of the study population.

In the present study, prevalence of blindness was 9.6% among the illiterate person and 6.3% in those who studied upto 4th class and 4.5% those studied from 5-10th class and 9.9% in those who are studied >10th class. The association was not found to be statistically significant. Murthy et al. [4] reported that prevalence of blindness was 10.44% in illiterate, 4.82% those educated upto 5th class, 2.2% in those who are studied to grade 6-10 and 1.87% educated beyond 10th class. The difference was found to be statistically significant. Murthy et al. [17] and Nirmalan et al. [13] reported that blindness was significantly associated with literacy with higher prevalence among illiterates. The differences may be attributed to the difference in age structure as very few participants were there in the group having studied 10 years or more in the present study. Blindness was not found to be significantly associated with occupation. Study by Murthy et al. all over India, found that blindness was associated occupation and was more in the persons who were not working [4]. Singh et al. reported that ocular morbidity was more prevalent among the landless labourers [11].

Low vision was found to be 29.3% in present study. In study by Singh et al. low vision (<6/18 to 3/60) was present in 32% of population [11]. Study in South Indian population low vision was found to be 12.2% [19]. Study by Murthy et al. it was found that low vision was 23.85% (<6/18 to >6/60) [4]. The study by Thulasiraj et al. in Sivaganga eye survey reported that low vision was 30% [20]. Study by Dandona et al. stated that the moderate visual impairment was 12% (adjusted prevalence was 8.09%) [15]. Study by Nirmalan et al. reported that 18.7% population as a presenting vision and 10% as a best corrected low vision [13]. The differences in magnitude of low vision across different studies may be attributed to differences in study setting and differences in socio cultural factors.

In present study refractive error was present in 85% of study population. Study by Haq et al. reported that refractive error was present in 25% [14]. Study by Singh et al. in rural setting reported that prevalence of refractive error to be 40.8% [11]. Nirmalan et al. reported to be 71.8% in the rural areas [21]. APEDS (Andhra Pradesh Eye Disease Study) reported myopia 34.6%; high-myopia 4.5%; hyperopia 18.4%; astigmatism 37.6%; and anisometropia 13.0% in age group 40 years and above [22]. In study by Raju et al. in rural Tamil Nadu, unadjusted prevalence of emmetropia, myopia, high myopia, and hyperopia were 50.60%, 26.99%, 3.71%, and 18.70% and age and gender adjusted were 46.77%, 30.97%, 4.32%, and 17.94%, respectively [23]. The difference may be attributed to the different study setting and different age groups studied.

Study by Haq et al. reported that reported that myopia, hypermetropia, and astigmatism were significantly associated with age, which was similar to the findings of the present study. Myopia and Hypermetropia were associated sex. But associated with educational status and socioeconomic status not associated significantly [14]. In study by Nirmalan et al. it was found that the presbyopia was significantly associated with the female sex and with alcohol consumption [21]. In APEDS, Krishnaiah et al. reported that

prevalence of myopia, astigmatism, high-myopia, and anisometropia significantly increased with increasing age. No gender difference in prevalence rates in any type of refractive error, though women had a significantly higher rate of hyperopia than men. Prevalence of myopia decrease significantly with increase in socioeconomic status. Hyperopia was significantly higher among those with a higher educational level. Hyperopia was significantly higher among the hypertensive group [22].

In study by Raju et al. in rural Tamil Nadu, reported that the prevalence of emmetropia decreased significantly with age and the prevalence of myopia and high myopia increased significantly with age while the prevalence of hyperopia increased until 60 years of age and then decreased and the prevalence of with the rule and against the rule astigmatism significantly decreased and increased with age, respectively. Prevalence of hyperopia was more common among women than men but was not statistically significant [23].

Cataract was present in 36.3% study population of this study. Study by Singh et al. stated that cataract prevalence was 40.4%. (11) In APEDS, it was reported 20.4% [12]. In ACES (Aravind Comprehensive Eye Study), prevalence of cataract was found to be 47.5%. Study by Haq et al. reported that prevalence cataract was 21.7% [14]. The cataract blindness prevalence was of 7.7% in a study by Nirmalan et al. [13]. This may be attributed to the difference in geographical locations of the study area. In the present study cataract was found to be significantly associated with age, sex, caste, education, occupation, socioeconomic status, type of house fuel used and blood pressure. No significant association was found with, tobacco consumption, alcohol consumption, and exposure to sunlight. Study by Haq et al. reported that the prevalence of cataract was significantly associated with increasing age, illiterates and fuel used (higher while using solid fuels). Prevalence of cataract higher in males and in low socioeconomic status but was not statistically significant [14]. Study by Singh et al. reported that prevalence of cataract increases with increasing age, decrease in SES and males were having more prevalence of cataract. but was not found statistically significant [11]. Study by Sreenivas et al. reported that variables such as systolic blood pressure, duration of exposure to sunlight per day, utilization of rice gruel, duration of exposure to fire and dust per day, family history of cataract, use of cheap cooking fuels (wood, cow dung) were significantly associated with cataract [24]. Nirmalan et al. in his study reported that the cataract was significantly associated with increasing age and illiteracy. Females were more likely to have cataract than males. Cataract was also associated with moderate smoking, lean body mass, and higher waist to hip ratio. Cortical cataract was associated with hypertension, pseudoexfoliation, and moderate to heavy smoking [15]. Krishnaiah et al. reported that increasing age was significantly associated with all types of cataract. After adjusting for all demographic factors history of smoking, females, illiterate person and those belonging to lower SES were found to have significantly associated with cataract [12]. This may be attributed to the multifactorial causation of cataract [25].

Prevalence of dry eye was 12.7% in study population. Study by Sahai et al. reported that the prevalence of dry eye was 18.5% [26]. In the present study, dry eye was found to be significantly associated with age, sex, education, and occupation. No significant association was found with caste, type of house, SES, fuel used tobacco consumption, alcohol consumption, exposure to sunlight and blood pressure. Sahai et al. reported in his study prevalence of dry eye was significantly associated with age, female sex, rural residence, farmers and labourers. A 2.15 fold increase was found in the odds for dry eye in those exposed to

excessive wind, 1.91 fold to sunlight exposure, 1.42 to smoking, 1.38 to air pollution and 2.04 for persons on drug [26]. These differences may be attributed to the study setting as this study was hospital based and the present study was rural population based study.

In the present conducted study, prevalence of diabetic retinopathy was 8.9%. Study by Dandona et al. reported that diabetic retinopathy was present in 1.78% of the population [27] and was found to be significantly associated with age, sex, education, type of house, fuel used, tobacco consumption and alcohol consumption. Study by Dandona et al. reported that diabetic retinopathy was significantly associated with age [27]. The factors such as sex, caste, occupation, education, SES, type of house, fuel used tobacco consumption, alcohol consumption, exposure to sunlight and blood pressure could not be discussed as it has not been reported by other studies.

In the present study, prevalence of glaucoma was present in 5.6% of study population. Study by Singh et al. reported that prevalence of glaucoma was 3.1%. (11)The study in Aligarh by Haq et al. reported that glaucoma among the persons of age >20 years was present in 0.9% of population [14]. Khandekar et al. reported the prevalence of glaucoma to be 3.6% among the age >35 years in central India [28]. The prevalence of POAG, PACG and ocular hypertension were 4.1, 43.2 and 30.8 per thousand respectively by the study of Jacob et al. [29]. Another APEDS by Dandona et al. reported that prevalence of definite POAG, suspected POAG and ocular hypertension were 1.62%, 0.79% and 0.32% respectively [30]. Study by Khandekar et al. reported that glaucoma was significantly associated with the age, but the gender variation was not found to be significant [28]. Study by Dandona et al. reported that prevalence of POAG increased significantly with age was proved using multivariate analysis [30]. The factors such as caste, occupation, education, SES, type of house, fuel used tobacco consumption, alcohol consumption, exposure to sunlight and blood pressure could not be discussed as it has not been reported by other studies.

The present study should be looked with limitation that most of the available Indian studies covered 60+ populations whereas the present study was done in 50+ population considering that high magnitude of morbidity in this age group. Further to add in limitations investigator has performed the study on its own, mobilizing all the participants was a big challenge.

Conclusion

Among 974 persons, blindness (<6/60) was 7.2% in the study population and by WHO (<3/60) was 5.4% blindness was found significantly associated with age and sex. Prevalence of low vision was found to be 29.3% and was found to be significantly associated with age, sex, caste, education, socioeconomic status and fuel used. Refractive error was the most common ocular disease (85%) in study population. It was found to be significantly associated age, caste, education, occupation and tobacco consumption. Proportion of cataract was 36.3% and was found to be significantly associated with age, sex, caste, education, occupation, socio-economic status, type of house, fuel used and blood pressure. No significant association was found with, tobacco consumption, alcohol consumption, and exposure to sunlight. In the present study, prevalence of dry eye was 12.7%. It was found to be significantly associated with age, sex, education, and occupation. Diabetic retinopathy was present in 8.9% study population and was found to be significantly associated with age, sex, education, type of house, fuel used, tobacco consumption and alcohol

consumption. Glaucoma was present in 5.6% of the study population. In the present study glaucoma was found to be significantly associated with age. Age related macular degeneration (AMD) was present in 6.6% of study population. AMD was found to be significantly associated with age and education. This study explains the concentrated efforts required at the local ground level so that the ocular morbidities can be prevented and cured in time.

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