

Awareness of cataract and glaucoma in two rural districts of Telangana, India

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Purpose: To determine the level of awareness of cataract and glaucoma and identify the determinants of awareness in two rural districts of Telangana, India. **Methods:** A population-based cross-sectional study was conducted using the rapid assessment of visual impairment (RAVI) methodology in Khammam and Warangal districts. A validated questionnaire was administered to participants aged 40 years and above to assess the level of awareness of cataract and glaucoma. **Results:** The awareness questionnaire was administered to 3273 participants of whom 1433 (43.8%) were men, 1985 (60.6%) of them had no education, and 1645 (50.3%) were from Khammam district. In total, 2539/3273 (77.6%; 95% confidence intervals (CI): 76.1–79.0%) participants reported awareness of cataract. Awareness of cataract was higher in Khammam compared to that in Warangal (84.4% versus 70.6%; $P < 0.01$). Only 41/3273 (1.25%, 95% CI: 0.90–1.69%) participants were aware of glaucoma. Awareness of glaucoma was also higher in Khammam (1.88% versus 0.61%; $P < 0.01$). Younger age groups, men, any level of education, and residing in Khammam were factors associated with awareness of cataract. Only having any level of education and residing in Khammam were associated with awareness of glaucoma. **Conclusion:** Awareness of cataract was high, but awareness of glaucoma was very poor. There is a need to spread awareness about these potentially blinding conditions. Moving forward, this can be a critical step in developing a preventive eye care strategy to achieve universal eye health in India.

Key words: Awareness, cataract, glaucoma, rapid assessment of visual impairment, visual impairment

Globally, vision impairment is a leading public health concern affecting over a billion people.^[1] By 2050, it is predicted that 1.7 billion will have vision loss worldwide.^[1] Fortunately, a large proportion of this vision loss is avoidable.^[2] After uncorrected refractive errors, cataract and glaucoma are the leading causes of vision loss.^[2] The huge burden of vision loss can be addressed using a comprehensive eye care approach as a part of the Universal Eye Health program (UEH).^[3] This approach involves prevention, promotion, treatment, and rehabilitation of untreatable vision loss.^[4] Prevention and promotion of eye conditions are two critical components of the UEH program. Having a good understanding of awareness levels of common eye conditions can help develop and design effective campaigns to educate the population about eye health.^[4] Understanding the level of knowledge helps in raising awareness by appropriately customizing programs for the community.^[5] Several studies on awareness of various eye conditions have been conducted but mostly focused on awareness of cataract, glaucoma, and diabetic retinopathy.^[6–13]

A large population-based cross-sectional study using the rapid assessment of visual impairment (RAVI) methodology was conducted in two large districts in Telangana State, India in 2017.^[14] In the earlier publications from this study, prevalence

and temporal trends in vision impairment in these regions were reported.^[14,15] As a part of this study, awareness of common eye conditions was assessed using a validated questionnaire. This paper reports on awareness of cataract and glaucoma in the population aged 40 years and older from two districts in Telangana State.

Methods

The Institutional Review Board of Hyderabad Eye Research Foundation, L V Prasad Eye Institute approved the study protocol.^[16] The study was carried out in adherence to the tenets of the Declaration of Helsinki. All participants provided written-informed consent expressing their willingness to participate in the study.

The study team comprising vision technicians, optometrists, community eye health workers, and field investigators visited the households in the randomly selected clusters and conducted eye examinations. The clinical eye examination protocol is described in our previous publications.^[14–17] After collecting personal and demographic information such as age, gender, education, occupation, and residential district, the awareness questionnaire was administered in the local

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language (Telugu) by trained field investigators and followed by clinical examination. All participants had distance and near visual acuity assessment and comprehensive eye examinations.^[18,19]

A validated questionnaire was used to assess the awareness level of cataract and glaucoma.^[18,19] Only those subjects who were aware of the eye condition (cataract or glaucoma) were asked the follow-up questions on the source of knowledge, reversible nature of the condition, and other questions such as awareness of intraocular lenses in case of cataract. Responses by the participants were marked against the matching responses in the questionnaire. The questions related to cataract were “Do you know what a cataract is?,” “How did you know about cataract?,” “At what age does it occur more commonly?,” “How it is treated?,” “Is it possible to recover vision from cataract blindness?” and “Do you know of intraocular lens implantation (IOL)?” The questions related to glaucoma were “Do you know what glaucoma is?,” “How did you come to know about glaucoma?,” and “Is vision loss due to glaucoma permanent or reversible?”

Data management

Data analysis was carried out using Stata Statistical Software 14.^[20] The prevalence of awareness was estimated and reported with 95% confidence intervals (95% CI). Association of awareness with personal and demographic variables such as age, gender, education, and area of the study were assessed using multiple logistic regression analysis. Adjusted odds ratios with 95% CI are presented.

Results

Study participants

The awareness questionnaire was administered to 3273 participants of whom 1433 (43.8%) were men, 1985 (60.6%) of them had no education, and 1645 (50.3%) were from Khammam district. The mean age of participants in Khammam was 54.3 years (Standard Deviation – SD: 11.5) and 56.5 years (SD: 11.8) in Warangal ($P < 0.05$). Table 1 provides information about the demographic details of the participants based on the study location.

Table 1: Characteristics of the sample based on the study location (n=3,273)

Variables	Total in sample	Study locations		P
		Khammam [†]	Warangal [†]	
Age group (Years)				<0.001
40-49	1259	721 (57.26)	538 (42.74)	
50-59	847	404 (47.69)	443 (52.31)	
60-69	685	313 (45.69)	372 (54.31)	
70 and above	482	207 (42.94)	275 (57.06)	
Gender				0.820
Male	1433	717 (50.03)	716 (49.97)	
Female	1840	928 (50.43)	912 (49.57)	
Education				
No education	1985	922 (46.44)	1063 (53.56)	<0.001
Any education	1288	723 (56.13)	565 (43.87)	
Total	3273	1645	1628	

[†]Figures in parentheses are row percentages

Awareness of cataract

In total, 2539/3273 (77.6%; 95% CI: 76.1– 79.0%) reported awareness of cataract. [Fig. 1] Awareness of cataract was higher in Khammam compared to that in Warangal (84.4% versus 70.6%; $P < 0.01$). Over half of the respondents (52.3%) responded by saying that “cataract is a white spot in the eye,” followed by “the white membrane growing over the eye” (45.3%). The responses of the participants stratified by the district are shown in Table 2.

About 1707 (67.2%) participants reported that media, television, and magazines as their source of awareness, followed by the information shared by a known relative or a friend. Overall, 1666 participants (65.61%, 95% CI: 63.73–67.46%) were aware that surgery is the treatment for cataract, and 1962 (77.27%) participants believed that vision would recover after cataract surgery. Among them 1633 (64.31%, 95% CI: 62.41– 66.18%) participants were aware of IOL implantation [Table 2].

Awareness of glaucoma

In total, 41 participants (1.25%, 95% CI: 0.90– 1.69%) were aware of glaucoma. Awareness was higher in Khammam compared to Warangal (1.9% versus 0.61%; $P < 0.01$). Twenty participants (48.7%) reported that media, magazine, and television were their source of awareness. Twenty-six participants (63.41%, 95% CI: 46.23–77.87%) were aware that vision loss due to glaucoma was permanent [Table 3].

Determinants of awareness

On multiple logistic regression analysis, older participants were less likely to be aware of cataract when compared to participants in younger age groups [Table 4]. Men (OR: 1.34; 95% CI: 1.14–1.59), participants with any level education (OR: 2.63; 95% CI: 2.18–3.18), and those residing in Khammam district (OR: 2.25; 95% CI: 1.90–2.67) had higher odds for awareness of cataract. Except for any level of education (OR: 3.10, 95%CI: 1.51–6.35) and Khammam district (OR: 9.21; 95% CI: 3.86–1.96), there were no significant associations between awareness of glaucoma with age and gender.

Discussion

Over 75% of the participants in two large districts in the state of Telangana were aware of cataract, whereas only 2% aware of glaucoma. While it is good to see more than three quarters of the people are aware of cataract, very low awareness of glaucoma is a matter of concern. This is especially low in the Warangal district where the awareness of glaucoma was less than 1%. Relatively higher awareness levels in Khammam compared to that of Warangal may partly due to community activities carried out by L V Prasad Eye Institute.^[14,21] This also corroborates well with the decline in vision impairment over the last 5–6 years in Khammam compared to that of Warangal as reported in the previous publications.^[14,21]

Recent studies also show a higher prevalence of visual impairment in rural areas partly attributed to access and uptake of services and low awareness levels.^[22] Thus, it is critical to obtain data about awareness of eye conditions in the rural setting and use it for planning purposes. The majority of the awareness studies in India focused on urban areas and very few in rural areas.^[7,10,12,13] This study thereby gives the awareness level of cataract and glaucoma in rural South India. As discussed earlier, the prevention and promotion of

Table 2: Responses among those who were aware of cataract stratified by study location

Responses	Total responses (2,539)	No of responses in Khammam (1,389) [†]	No of responses in Warangal (1,150) [†]	P
What is cataract?				<0.001
A white spot in the eye	1,326 (52.3)	686 (49.4)	640 (55.8)	
A white membrane growing over the eye	1,151 (45.3)	668 (48.1)	483 (42.0)	
Others	61 (2.4)	34 (2.4)	27 (2.3)	
Source of information about cataract?				<0.001
Medical professional	164 (6.4)	97 (7.0)	67 (5.8)	
Family member/friend suffering	600 (23.6)	356 (25.6)	244 (21.2)	
Family member/friend not suffering	68 (2.7)	60 (4.3)	8 (0.7)	
Television, magazines, media, and others	1,707 (67.2)	876 (63.01)	831 (72.3)	
Treatment options for cataract?				<0.001
Medical treatment	186 (7.3)	98 (7.1)	88 (7.7)	
Surgical treatment	1,666 (65.6)	1043 (75.1)	623 (54.2)	
Do not know	687 (27.1)	248 (17.9)	439 (38.2)	
Is cataract blindness reversible?				<0.001
Yes	1,962 (77.3)	1175 (84.6)	787 (68.4)	
No	122 (4.8)	42 (3.0)	80 (7.0)	
Do not know	455 (17.9)	172 (12.4)	283 (24.6)	
Are you aware of IOL?				<0.001
Yes	1,633 (64.3)	959 (69.0)	674 (58.6)	
No	906 (35.6)	430 (31.0)	476 (41.4)	
Total	2539	1389	1150	

[†]Figures in parentheses are column percentages

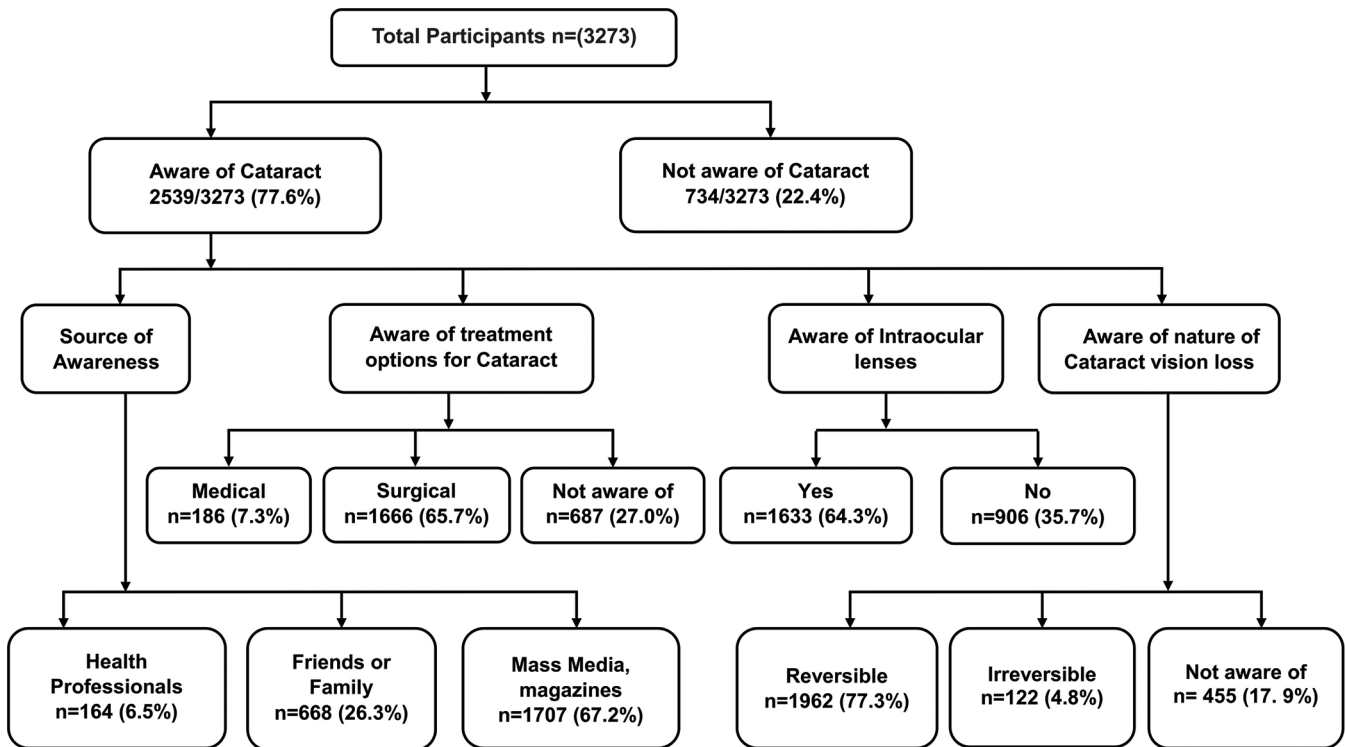


Figure 1: Awareness of cataract and responses to questions related to cataract

eye conditions will help in providing comprehensive eye care. This study helps in planning an effective campaign to promote eye health in rural areas.

The cataract is a normal aging process in which the natural crystalline lens gets opacified. It is the leading but also a treatable cause of visual impairment in India.^[23] Studies have

Table 3: Responses among those who were aware of glaucoma (n=41) based on the study location

Responses	Total (41)	No of responses in Khammam (n=31) [†]	No of responses in Warangal (n=10) [†]	P
What is glaucoma?				0.02
Increased pressure of the eye	7 (17.1)	5 (16.2)	2 (20.0)	
Nerve of the eye becomes weak	8 (19.5)	5 (16.2)	3 (30.0)	
Damage to the nerve due to high pressure	8 (19.5)	6 (19.4)	2 (20.0)	
Decrease in vision/peripheral vision	5 (12.2)	2 (6.5)	3 (30.0)	
Participant/known person suffering from glaucoma	2 (4.8)	2 (6.5)	0 (0.0)	
Watering of eyes	2 (4.8)	2 (6.5)	0 (0.0)	
Others	9 (21.9)	9 (29.0)	0 (0.0)	
Source of information about glaucoma?				0.02
Medical professionals	5 (12.19)	4 (12.9)	1 (10.0)	
Family member/friend suffering	16 (39.0)	13 (41.9)	3 (30.0)	
TV, magazines, media, and others	20 (48.7)	14 (45.2)	6 (60.0)	
Is glaucoma blindness reversible?				<0.001
Permanent	26 (63.4)	21 (67.7)	5 (50.0)	
Reversible	4 (9.8)	2 (6.5)	2 (20.0)	
Do not know	11 (26.8)	8 (25.8)	3 (30.0)	
TOTAL	41	31	10	

[†]Figures in parentheses are column percentages

Table 4: Association of awareness of cataract and glaucoma with age, gender, education, and district of residence

	Cataract awareness		Glaucoma awareness	
	Adjusted odds ratio (95%CI)	P	Adjusted odds ratio (95%CI)	P
Age group				
40-49	Reference		Reference	
50-59	0.84 (0.67-1.04)	0.119	1.40 (0.68-2.84)	0.352
60-69	0.76 (0.60-0.95)	0.017	0.80 (0.32-1.95)	0.628
70 and above	0.53 (0.42-0.68)	<0.001	0.48 (0.14-1.67)	0.254
Gender				
Female	Reference		Reference	
Male	1.34 (1.14-1.59)	<0.001	1.49 (0.80-2.77)	0.203
Education				
No education	Reference		Reference	
Any education	2.63 (2.18-3.18)	<0.001	9.21 (3.86-21.96)	<0.001
Area				
Warangal	Reference		Reference	
Khammam	2.25 (1.90-2.67)	<0.001	3.10 (1.51-6.35)	<0.001

shown varied awareness levels of cataract and glaucoma depending on the study location and population included making direct comparisons difficult.^[7,10,12,13] Adding to this, the emergence of mobile and internet technology in recent years makes the direct comparison with earlier studies redundant [Table 5]. In all, studies done in the hospital setting and involving patients showed a higher level of awareness compared to studies done in the general population. Awareness was also found to be higher among younger participants and those with higher levels of education. It can be attributed to better access to educational resources and mass media.^[7]

Several studies reported awareness of cataract and glaucoma from India and other developing countries [Table 5]. In the study done in the field practice area of a hospital in northern

India in 2017, 42% of the respondents were aware of cataract in the primary eye care service area of the hospital; however, the awareness about the signs and symptoms of cataract was still low.^[26] In the study in Eastern China in 2008, the doctors administered the questionnaire to patients requiring cataract surgery, and showed a much higher (90%) awareness level of cataract. However, the awareness about cataract treatment was still low.^[28] Hossain *et al.*^[25] reported that age, region, and level of education are related to the level of awareness along with family history and marital status in Bangladesh. A very low awareness of cataract of 6% was reported from Nepal. In that study, women had even lower levels of awareness and the literacy rate was correlated with the awareness level.^[27] The study conducted in the Nigerian community in 2008 revealed

Table 5: Awareness of cataract and glaucoma in some representative studies conducted in India and other developing countries

Author, Year	Study location	Study population	Awareness of cataract	Awareness of glaucoma
Bhagwan, 2006 ^[24]	Haryana, India	Urban and rural community, 40 years and above	90.10%	
Hossain, 2020 ^[25]	Cumilla, Bangladesh	Patients, all ages	83.64%	38.2%
Sathyamangalam, 2009 ^[13]	Chennai, India	Urban community, above 40 years of age		13.00%
Dandona, 2001 ^[7]	Hyderabad, India	Urban community, above 15 years of age	69.80%	2.30%
Misra, 2017 ^[26]	Delhi, India	Urban slum, 18 years and above	42.00%	
Thapa, 2011 ^[27]	Bhaktapur, Nepal	Community, age above 40 years	6.70%	2.4%
Krishnaiah, 2005 ^[10]	Andhra Pradesh, India	Rural community, above 15 years of age		0.27%
Current study	Telangana, India	Rural population, above 40 years of age	Khammam: 42.4% Warangal: 35.1%	Khammam: 1.98% Warangal: 0.61%

that 60% of the participants had awareness of cataract, and only one among six people were aware of IOL.^[29] A higher literacy rate was associated with a higher awareness level. There was a direct link between the high literacy rate and acceptance of surgery with IOL. Many illiterate people preferred surgery without an IOL in Nigeria.^[24]

Two decades have passed since IOLs were introduced in cataract surgery, but the concern is that close to one-third of the people were still unaware of it. Hence, educating people about cataract and its surgery with an IOL implantation is essential. This becomes even more relevant as there is a rise in the proportion of the elderly population in India, and cataract is more common in older individuals.

Glaucoma is a progressive optic neuropathy leading to a corresponding visual field defect with or without an increase in intraocular pressure. It is the third most common cause of blindness and causes irreversible vision loss if undiagnosed and not managed well in time.^[2] Thus, educating people can create awareness about this severe blinding condition to encourage routine eye examination, timely diagnosis, and proper management, thereby leading to early diagnosis and saving vision in people with glaucoma. However, awareness of glaucoma is considerably lower and ranges from 0.27 to 38% in different study locations. This study also reports a lower awareness level of 1.25% (Khammam: 1.9% and Warangal: 0.6%). Few reasons could explain this big difference in awareness levels. Cataract is far more common and more apparent than glaucoma to a naked eye. Also, cataract surgical camps were common in villages in India since the British era, and people tend to remember these events. Even now, though cataract surgical camps are banned, screening camps are still in vogue.^[30,31]

The Andhra Pradesh Eye Disease Study conducted in three rural and one urban region during 1996–2000 reported a lower level of awareness of glaucoma in urban and rural areas.^[7,10] That study included participants aged over 15 years and reported mass media as the major source of awareness.^[10] It is a matter of concern that awareness of glaucoma continues to be lower over the last two decades, which warrants an aggressive campaign to create awareness among the people in the state. A family member/friend suffering from glaucoma was a

major source of information in some studies.^[7,25] According to the Chennai Glaucoma Study, family history was also an important determinant of awareness level. Other determinants like age and higher educational levels were similar to this study.^[13]

Awareness regarding glaucoma was 2.3 and 2.4% in the urban population in Hyderabad and the rural population in Nepal, respectively.^[7,29] However, the determinants of awareness in these studies remain the same irrespective of the area.^[7,29] A study, done in the suburban area in Hong Kong, showed a 10.2% awareness level of glaucoma. The determinants were male gender, younger age group, and higher educational and economic levels. Very few participants knew about its nature and treatment.^[32] A majority of the studies have shown a direct correlation between awareness of glaucoma and education status, gender, and age. In a study done in the hospital setting in Bangladesh in 2020, awareness of glaucoma was highest (38%). The awareness level was well correlated with age, gender, and educational level.^[25]

The strengths of this study are: (a) it is a population-based study providing data on the level of awareness in a rural setting in South India (Telangana); (b) has a large population-representative sample randomly selected from two large districts; and (c) reported on associations for awareness. However, our study was limited to participants aged 40 years and older from rural areas only which limits extrapolation of our findings to the entire population.

Conclusion

In conclusion, lower awareness levels may be a barrier to the uptake of eye care services.^[33] Educating people about common eye conditions is expected to result in an increased uptake of services, resulting in early detection and treatment and cost savings. This in turn may have an impact on vision loss over time. We found that mass media, television, and magazines are the primary sources of information to raise awareness about eye diseases. Hence, by disseminating health education via social broadcasting, we can reach a wider audience and educate them on the nature of the disease and available treatment options. To combat vision impairment and achieve the goal of universal eye health, effective interventions addressing the entire range of

ocular conditions are needed, including eye health promotion, prevention, treatment, and rehabilitation.

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Conflicts of interest

There are no conflicts of interest.

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