

Original Research Article

Public knowledge, attitudes and practices related to eye diseases in Southern Indian population

Srinivasa Reddy Pallerla^{1*}, Rohit C. Khanna², Krishnaiah Sannapaneni², Jill Keefe²

¹Andhra Pradesh Right to Sight Society, Hyderabad, Telangana, India

²LV Prasad Eye Institute, Hyderabad, Telangana, India

Received: 06 September 2020

Revised: 02 November 2020

Accepted: 04 November 2020

*Correspondence:

Dr. Srinivasa Reddy Pallerla,

E-mail: srinivasar107@hotmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: This study was conducted to determine the level of the public knowledge, attitudes and practices related to common eye diseases in the southern Indian population.

Methods: A cross sectional population-based survey used a semi structured questionnaire on awareness, knowledge, attitude and practices related to eye diseases. Stratified multistage cluster random sampling method was used with a sample size of 867 adults >16 years based on, estimated awareness of cataract 70%, assuming an expected rate of 85%, design effect of 1.5, margin of error 4% with 95% confidence interval with 25% from urban areas and 75% from rural areas. A pilot study was conducted to validate the questions used in the main study. SPSS (version 19) used for analysis.

Results: A total of 782/867 (90.1%) subjects participated in the survey, with females 47.4%. Awareness of major eye diseases for cataract 81.5%, glaucoma 47.8%, refractive error 74.3%, squint 89.0%, diabetic retinopathy 65.0% and age-related macular degeneration 36.7% respectively. 41.8% subjects reported wearing glasses either for distance, near or for both. Of the 777 subjects only 294 people underwent an eye examination by an ophthalmologist in the last two years (37.8%). 57.5% subjects had knowledge of the nearest eye care facility within five kilometers of their residence. Electronic media were the major source of information on eye health.

Conclusions: Though the awareness levels of common eye diseases were quite high, the knowledge of cataract (10.4%) was poor. There is a need to increase the level of awareness for eye diseases like glaucoma and age-related macular degeneration.

Keywords: Attitudes, Awareness, Eye diseases, General public, Knowledge

INTRODUCTION

Information about adults knowledge, attitudes and practices (KAP) regarding eye health and disease is essential to design effective eye care programs and the formation of important vision related policy.¹ A major factor hindering public health strategies is the lack of awareness of eye conditions which has been associated with poorer outcomes in terms of prevention, eye care use and treatment.²⁻⁷ Awareness and knowledge of common eye diseases which cause blindness and visual impairment play an important role in encouraging people to seek

treatment for their eye problems. The level of public awareness of major causes of blindness has been reported from some developed countries.⁸⁻¹¹ Among the many barriers to access health services for patients with glaucoma, awareness and knowledge of the condition was identified as a key issue. Enhancing the understanding of glaucoma may improve access by triggering earlier presentation, informing those at risk and improving adherence to treatment.¹² Very few studies have been carried out to assess the awareness and knowledge about eye diseases among the Indian population. Dandona et al has reported that the awareness of cataract was high but

that of diabetic retinopathy and glaucoma was low to poor.¹³ Avoidable vision loss, which can be influenced by socioeconomic factors such as education and poverty could account for much of the blindness in the elderly population worldwide.^{14,15} Increased awareness levels of common eye diseases are important to promote preventive ophthalmic care. Eye health education can encourage people to seek consultation from a (qualified) eye care professional at an early stage of an eye disease. This can prevent the complications and help in good visual recovery from potentially blinding eye disease. This study was conducted to determine the level of awareness and knowledge of common eye diseases among adults in both urban and rural areas of south Indian population.

METHODS

This study was approved by the ethics committee of the LV Prasad eye institute as part of a research project on the impact of blindness control activities in the southern Indian states of Andhra Pradesh and Telangana and was conducted in accordance with the principles of declaration of Helsinki.

This survey used a stratified multi-stage, random cluster sampling and was conducted between March to June 2015. The sample size was determined based on the estimated awareness of cataract in the urban population (70%) as per the APEDS study.¹³ Assuming an expected response rate of 85%, design effect of 1.5, margin of error 4% with confidence interval of 95%, the sample size calculated was 867 subjects, from the total sample size, a quarter (217) of subjects for each of four areas were selected.

Inclusion criteria included the subjects who are ≥ 16 years of age.

Exclusion criteria excluded the subjects who are < 16 years of age.

This was a cross-sectional study designed to gain information from one urban and three rural areas of the states of Andhra Pradesh and Telangana. The urban area was from Hyderabad (capital of Telangana) and the three rural areas were selected from three representative districts, one each from the three geographical regions of the former state of Andhra Pradesh. The recently divided state of Andhra Pradesh state has three distinct geographical regions, namely, 1. Coastal Andhra- the districts along the southern east coast line of the state, 2. Telangana- the North West part of the Deccan Plateau region and 3. Rayalaseema- the South West part of the dry arid region of the state. The three representative districts were selected on the criteria of 5 parameters namely the size of the population, literacy rate, the gross domestic product, the per capita income and revenue of the district.¹⁶ The mean of the 5 parameters was calculated and the district which had at least 4 parameters

out the 5 parameters near to the mean was selected. Using these criteria, the West Godavari district from the Coastal Andhra region, Karimnagar district from the Telangana region, and Anantapur district from the Rayalaseema region were selected. Within each district, the area proportion to the sample size was selected by the simple random sampling method. In the urban area, Hyderabad district has 16 administrative divisions which were entered into the computer and area of Himayath Nagar was randomly selected.

The questionnaire had two sections, with the first section including questions on awareness of common eye diseases such as cataract, glaucoma, refractive error, strabismus, diabetic eye disease and age-related macular degeneration. It also contained the questions on knowledge of cataract and the nearest eye care facility from their residence, insurance and willingness to pay for eye surgery and their source of information on eye health. The second section had questions on the demographic profile of the subjects such as gender, age in categories (16-29, 30-39, 40-49, 50-59, 60-69, ≥ 70 years), educational level (illiterate or no schooling, primary education 1st to 5th class, secondary education 6th to 10th class, 11th class to degree and masters and above) and occupation (agriculture, laborer, employee, student, housewife, business and retired). The subjects were given the questionnaire to fill in and if the subject was illiterate, he or she was asked to respond to the questions narrated by the investigator. Having heard of the disease in question was taken as 'awareness' and having some understanding of an eye disease was defined as 'knowledge', the responses of excellent, very good and good for their response about their eyesight as a positive attitude. Eye health practice was defined as an eye examination by the ophthalmologist in the last two years. A pilot study was conducted on 50 subjects before the main study. The Cronbach's Alpha for the overall questions on health seeking behaviour was 0.86 (95% CI; 0.79-1.0) which indicated the questionnaire was able to measure what it was supposed to measure in the pilot study with the experience of the pilot study, two questions were modified so that they were clearly understood in the local language for the main study.

The data were entered into Excel and the statistical package SPSS version 19.0 was used for the data analysis. The Chi-square test was used to compare the relationship between the variables (awareness and knowledge) and individual characteristics- age, gender, education level, urban and rural, and occupation. All p values were regarded as significant if the p value was < 0.05 . Odds ratios were calculated by logistic regression to assess the variables that were independently associated with the outcomes of awareness of eye diseases.

RESULTS

A total of 782/867 (90.1%) subjects participated in the survey, with 47.4% females. The mean age of the subjects

was 40.2 years, range 16-93 years with over half ages from 16 to 39 (Table 1). About 325 subjects (41.7%) had no schooling or completed only primary education. Of the 782 subjects participated, 439 subjects (56.8%) had no insurance coverage for cataract surgery.

Table 1: Socio demographic characteristics of the study subjects.

Variables	Study sample (n=782)	
	N	%
Gender		
Male	411	52.6
Female	371	47.4
Age (Years)		
16-29	220	28.1
30-39	187	23.9
40-49	143	18.3
50-59	106	13.6
60-69	83	10.6
≥70	43	5.5
Education*		
Illiterate	219	28.0
Primary	106	13.6
High school	212	27.1
11 th class to degree	216	27.6
Masters and above	27	3.5
Occupation*		
Agriculture	200	25.6
Laborer	282	36.1
Employee	118	15.1
Student	104	13.3
Housewife	53	6.8
Business	20	2.6
Retired	3	0.4
Area		
Urban	217	27.7
Rural	565	72.3

Awareness and knowledge

The awareness of eye diseases ranged from 36.7% for AMD to >80% for cataract and squint. Awareness of glaucoma was 47.8%, refractive error 74.3%, and diabetic retinopathy 65.0% (Table 2).

Though 637 subjects had an awareness of cataract, only 66 (10.4%) had correct knowledge of it (opacity of the lens) (Table 3). Most of the subjects (67.2%) were aware that the treatment for cataract was surgery and also knew (90.0%) that it is possible to recover vision from cataract blindness and 357 (56.0%) subjects knew about intra ocular lens implantation. Multiple logistic regression analysis (Table 4) indicated that awareness of cataract was higher among subjects aged 40-49 years (OR=1.94; CI=1.02-3.69) and also those whose education levels were 11th class to degree (OR=3.19; 1.53-6.68, masters and above (OR=10.92; CI=1.37-86.94).

Health attitudes: A total of 705 people responded to the question how they rated their eyesight; with 587 subjects having a positive attitude ('excellent, very good, good') and 118 people had a negative attitude ('bad' or 'worse'). Multiple logistic regression indicated that a positive attitude was higher among those aged 16 to 29 years (OR=6.40; CI=2.53-16.19). There was no significant difference in attitude between gender and level of education.

Health practices: Of the 777 subjects who responded to the question whether they were wearing glasses or not, 325 (41.8%) were wearing glasses, out of which 133 were wearing for distance, 82 for near, 98 for both distance and near vision and 12 subjects reported they didn't know what they were wearing glasses for. There was no significant difference by gender in wearing glasses with 174/325 (42.5%) males and 151/325 (46.0%) females wearing glasses, $p=0.71$. Of 405 subjects who were less than 40 years of age 157 (38.7%) wearing glasses compared to 168 (61.7%) subjects out of 272 more than 40 years of age, $p=0.015$. Of the 199 subjects whose occupation was agriculture, 60 (30.1%) wearing glasses followed by laborers 85/279 (30.4%) compared to employees, 73/118 (61.8%) $p=0.0001$.

Of the 331 people who responded that they had an eye examination in the last two years, 294 (88%) were examined by an ophthalmologist, 22 (7%) were examined by physicians and 15 (5%) were examined by traditional healers/unqualified person. Of the 294 subjects examined by ophthalmologists, 236 (80.3%) were told that they had an eye disease. Of the 782 participants 334 (43.2%) had insurance coverage for eye surgery. Of 439 (56.8%) subjects who don't have insurance, 307 (70.0%) of them were not willing to pay for eye surgery. The subjects aged between 40-59 years of age had a higher awareness of the nearest eye care facility compared to the other age groups ($p=0.034$) and those who were educated also had a higher awareness of the nearest eye care facility when compared to subjects who were illiterate or with no schooling ($p=0.0001$). There was no significant difference in the awareness of nearest eye care facility related to gender. Of the 782 subjects, 457 (58.1%) were aware of eye care facility in their neighborhood; 261 (33.4%) subjects had access to eye care facility within 5 km of their residence.

Mode of eye health information and distance to the nearest eye care facility: 673/777 (86.5%) subjects had heard or seen eye health information from one of the modes of information channels such as electronic media (39.1%), social media (10.6%) print media (4.0%) and the remaining was made up of combination of electronic, print and social media. Despite awareness measures by multiple stakeholders in eye care, a significant (13.5%) number of people had not heard any eye health information.

Table 2: Awareness of major eye diseases (n=782) with the number of positive respondents by age group, gender, education, occupation and area.

Variables	Cataract (n=637) 81.5%	Glaucoma (n=374) 47.8%	Refractive error (n=581) 74.3%	Squint (n=696) 89.0%	D.R.* (n=508) 65.0%	A.M.D.** (n=287) 36.7%
Age group (years)						
16-29	178 (27.9)	126 (33.7)	180 (31.0)	202 (29.0)	155 (30.5)	101 (35.2)
30-39	155 (24.3)	79 (21.1)	134 (23.1)	167(24.0)	122 (24.0)	64 (22.3)
40-49	119 (18.7)	69 (18.4)	103 (17.7)	122 (17.5)	89 (17.5)	50 (17.4)
50-59	88 (13.8)	50 (13.4)	80 (13.8)	97 (13.9)	70 (13.8)	33 (11.5)
60-69	64 (10.0)	39 (10.4)	58 (10.0)	72 (10.3)	50 (9.8)	29 (10.1)
≥70	33 (5.2)	11 (2.9)	26 (4.8)	36 (5.2)	22 (4.3)	10 (3.9)
Gender						
Men	335 (52.6)	214 (57.2)	304 (52.3)	355 (51.0)	262 (51.6)	162 (56.4)
Women	302 (47.4)	160 (42.8)	277 (47.7)	341(49.0)	246 (48.4)	125 (43.6)
Education						
Illiterate	171 (26.8)	97 (25.9)	149 (25.6)	195 (28.0)	119 (23.4)	62 (21.6)
I	85 (13.3)	31 (8.3)	77 (13.2)	92 (13.2)	72 (14.2)	30 (10.4)
II	169 (26.5)	86 (23.0)	143 (24.6)	186 (26.7)	119 (23.4)	70 (24.4)
III	184 (28.9)	139 (37.2)	187 (32.2)	197 (28.3)	174 (34.2)	109 (38.0)
IV	26 (4.1)	19 (5.1)	23 (3.9)	24 (3.4)	22 (4.3)	14 (4.9)
Occupation						
Agriculture	146 (22.9)	90 (24.1)	115 (19.8)	171 (24.6)	94 (18.5)	68 (23.7)
Business	15 (2.4)	10 (2.7)	13 (2.2)	16 (2.3)	11 (2.2)	8 (2.8)
Student	84 (13.2)	63 (16.8)	90 (15.5)	95 (13.6)	80 (15.7)	58 (20.2)
Employee	109 (17.1)	74 (19.8)	100 (17.2)	105 (15.1)	94 (18.5)	51 (17.8)
Laborer	238 (37.4)	110 (29.4)	218 (37.5)	253 (36.3)	193 (38.0)	83 (29.0)
Housewife	41 (6.4)	24 (6.4)	40 (6.9)	51 (7.3)	33 (6.5)	16 (5.6)
Retired	2 (0.3)	1 (0.3)	3 (0.5)	3 (0.4)	1 (0.2)	1 (0.3)
Area						
Urban	180 (28.3)	132 (35.3)	182 (31.3)	195 (28.0)	158 (31.1)	94 (32.8)
Rural	457 (71.7)	242 (64.7)	399 (68.7)	501 (72.0)	350 (68.9)	193 (67.2)

*DR = Diabetic retinopathy, **AMD=age related macular degeneration

Table 3: Positive responses among those who were aware of cataract (n=637).

Response	No. of responses (%)
What is Cataract? ^a	
A white spot in the eye	225 (35.3)
A lens change where lens became opaque ^b	66 (10.4)
A white membrane growing over the eye	280 (44.0)
An age related process leading to decrease in vision ^c	61 (9.6)
How is it treated? ^c	
By medicine	84 (13.2)
By surgery	424(67.2)
Do not know	68 (10.7)
Others	12 (1.9)
Is it possible to get back vision from cataract blindness? ^d	
Yes	573 (90.0)
No	57 (8.9)
Do you know about intraocular lens implantation? ^e	
Yes	357 (56.0)
No	275 (43.2)

^aData not available for 5 subjects; ^bConsidered as knowledge; ^cData not available for 4 subjects; ^dData not available for 7 subjects;^eData not available for 5 subjects

Table 4: Association of awareness of cataract, glaucoma, Diabetic Retinopathy and age related macular degeneration with age, sex, education, urban-rural (n=782) by multiple logistic regression*.

Variables	Responses for cataract/ glaucoma	Odds Ratio for being aware of cataract/glaucoma 95% CI	Responses for DR**/AMD***	Odds Ratio for being aware of DR/AMD 95% CI
Age group (years)				
16-29	217/218	1.00 / 1.00	219/218	1.00/1.00
30-39	187/186	1.43; 0.81-2.51/0.79; 0.51-1.21	186/186	1.25; 0.79-2.00/0.85; 0.55-1.31
40-49	138/138	1.94; 1.02-3.69/1.04; 0.65-1.67	142/139	1.17; 0.71-1.92/0.93; 0.58-1.49
50-59	103/106	1.96; 0.96-3.99/1.06; 0.62-1.78	106/106	1.52; 0.87-2.66/0.82; 0.48-1.41
60-69	82/83	1.16; 0.57-2.33/1.05; 0.59-1.87	83/82	1.17; 0.66-2.12/0.99; 0.55-1.78
≥70	43/43	1.07; 0.46-2.51/0.39; 0.18-0.86	43/41	0.85; 0.42-1.75/0.59; 0.26-1.31
Sex				
Men	405/407	1.00/1.00	408/405	1.00/1.00
Women	365/367	1.13; 0.76-1.68/0.85; 0.62-1.15	371/367	1.43; 1.04-1.97/0.92; 0.67-1.26
Education				
Illiterate	217/217	1.00/1.00	219/216	1.00/1.00
1 st to 5 th class	103/105	1.23; 0.66-2.26/0.51; 0.31-0.85	106/106	1.73; 1.06-2.83/0.98; 0.59-1.65
6 th to 10 th class	209/210	1.25; 0.76-2.06/0.82; 0.55-1.23	210/207	1.18; 0.79-1.76/1.28; 0.84-1.95
11 th to degree	212/214	3.19; 1.53-6.68/1.99; 1.17-3.39	215/214	5.38; 2.93-9.89/2.83; 1.64-4.89
≥Masters	27/26	10.92; 1.37-86.94/3.02; 1.15-7.96	27/27	5.16; 1.76-15.14/3.09; 1.28-7.46
Area				
Urban	215/215	1.00/1.00	216/215	0.74; 0.46-1.18/0.73; 0.48-1.13
Rural	555/559	1.70; 0.96-3.02/0.94; 0.61-1.44	563/557	1.00/1.00

*Hosmer and Lemeshow goodness of fit test for cataract = 0.80 and for glaucoma = 0.38, for DR = 0.50 and for AMD = 0.09; **DR = Diabetic Retinopathy, ***AMD = Age Related Macular Degeneration.

DISCUSSION

The awareness of the six major eye diseases in the present study was comparatively higher than reported in the previous studies from Andhra Pradesh (2001) and Nepal (2014).^{5,13} It is interesting to note how the time difference between APEDs study (2000) and the present study (2015) affected the awareness levels of the eye diseases along with changes in socio-demographic characteristics (Table 5) the increase in the literacy rate and change in urban rural population ratio may have resulted in the increased awareness of common eye diseases.

The awareness of cataract in the present study was almost similar to the study conducted in Bangladesh in 2015, but the awareness of other eye diseases like glaucoma, diabetic retinopathy, age related macular degeneration was higher compared to that study.¹⁷ Education was an important factor in the awareness of eye diseases in this study. There was no major difference between gender and rural-urban population regarding awareness levels of the eye diseases except in diabetic retinopathy where the females had a higher awareness. This may be due to increased female literacy and also increased penetration of the electronic media in rural areas, which was the major source of information on eye health.

In this study the awareness levels of cataract were highest in the age group of 40-49 years but not in other age groups especially in the older people, a finding which

needs to be investigated further. Even though the level of awareness of cataract was high, knowledge of what is cataract was poor. Of those who were aware of cataract only 10% of people know that it was opacity in the lens. Of those who were aware of cataract 43.5% of subjects had not heard of intra ocular lens implantation compared to 68% of the subjects in Andhra Pradesh Eye Disease Study.¹³ This showed an increased awareness of intra-ocular lens implantation in cataract surgery since the APEDS was conducted. Most subjects were aware that the treatment for cataract is surgery and vision due to cataract blindness can be restored.

In the present study awareness of glaucoma was higher compared to the previous studies conducted in India and elsewhere, which was a positive sign that shows the effect of eye health education measures taken by multiple stakeholders like Government, Non-Governmental organizations and private individuals in eye care.^{11,13} Higher education played an important role in the awareness of glaucoma similar to that in Andhra Pradesh eye diseases study.¹³ An increase in the level of awareness of glaucoma is essential to detect the condition early and prevent the person losing vision. The higher awareness of diabetes was found among people who were more educated in the present study goes in line with the similar studies reported from both the developing and developed countries.^{4,5,13,18-21} Except for higher education other factors such as age, gender and area played no role in the awareness of both in diabetic retinopathy and age-related macular degeneration.

Table 5: Trends in awareness levels and wearing of glasses in relation to socio-demographic characteristics* in the state of Andhra Pradesh.

Variables	APEDS ¹³ (1996-2000)	Present study (2015)
Population* (Million)	76.2	84.6
Urban*	27.4	33.4
Rural*	72.6	66.6
Literacy rate*	60.5	67.0
Awareness of cataract	69.8	82.7
Awareness of glaucoma	2.3	47.8
Awareness of DR	27.0	65.0
Awareness of AMD	-	36.7
Percentage of people wearing glasses	17.4 % ²²	42.0

*Information accessed from <http://www.census2011.co.in/>

In the present study awareness of glaucoma was higher compared to the previous studies conducted in India and elsewhere, which was a positive sign that shows the effect of eye health education measures taken by multiple stakeholders like Government, Non-Governmental organizations and private individuals in eye care.^{11,13} Higher education played an important role in the awareness of glaucoma similar to that in Andhra Pradesh eye diseases study.¹³ An increase in the level of awareness of glaucoma is essential to detect the condition early and prevent the person losing vision. The higher awareness of diabetes was found among people who were more educated in the present study goes in line with the similar studies reported from both the developing and developed countries.^{4,5,13,18-21} Except for higher education other factors such as age, gender and area played no role in the awareness of both in diabetic retinopathy and age-related macular degeneration.

CONCLUSION

Of the awareness levels of six major diseases determined in this study, the age-related macular degeneration has the least awareness levels. With an ageing population and increasing prevalence of age-related macular degeneration, there is an urgent need to create more awareness for age-related macular degeneration in the community.

In this study majority of the subjects were not covered by insurance for eye surgery and were not willing to pay the high cost of cataract surgery. Hence there is a need to have a universal insurance cover for the people so that people will not lose vision just because they cannot afford the cost of cataract surgery. There is also a need to increase the level of awareness, particularly for eye diseases like glaucoma, age-related macular degeneration.

The present study brought out the importance of electronic and social media as major channels for

spreading awareness among population and the agencies responsible for doing awareness campaigns should take a note of it, contrary to the traditional methods of campaigning like print media.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support from Andhra Pradesh Right to Sight Society and also from the midlevel ophthalmic personnel, Asha workers (female health assistants) working in the Ministry of Health and Family Welfare, Government of Andhra Pradesh and Telangana in helping to carry out the study in remote rural areas of both the states.

Funding: The present study received funding from Andhra Pradesh Right to Sight Society, India

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of LV Prasad Eye Institute, Hyderabad, India

REFERENCES

- Rani PK, Raman R, Subramani S, Perumal G, Kumaramanickavel G, Sharma T. Knowledge of diabetes and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. *Rural Rem Health*. 2008;8(3):838.
- Attebo K, Mitchell P, Cumming R, Smith W. Knowledge and beliefs about common eye diseases. *Aust N Z J Ophthalmol*. 1997;25(4):283-7.
- Varma R, Lee PP, Goldberg I, Kotak S. An assessment of the health and economic burdens of glaucoma. *Am J Ophthalmol*. 2011;152(4):515-22.
- Huang OS, Tay WT, Tai ES, Wang JJ, Saw SM, Jeganathan VS, et al. Lack of awareness amongst community patients with diabetes and diabetic retinopathy: the Singapore Malay eye study. *Ann Acad Med Singapore*. 2009;38(12):1048-55.
- Shrestha MK, Guo CW, Maharjan N, Gurung R, Ruit S. Health literacy of common ocular diseases in Nepal. *BMC Ophthalmol*. 2014;14:2.
- Muller A, Vu HT, Ferraro JG, Keeffe JE, Taylor HR. Utilization of eye care services in Victoria. *Clin Exp Ophthalmol*. 2006;34(5):445-8.
- Bylisma GW, Le A, Mukesh BN, Taylor HR, McCarty CA. Utilization of eye care services by Victorians likely to benefit from eye care. *Clin Exp Ophthalmol*. 2004;32(6):573-7.
- Altangerel U, Nallamshetty HS, Uhler T, Fontanarosa J, Steinmann WC, Almodin JM, et al. Knowledge about glaucoma and barriers to follow-up care in a community glaucoma screening program. *Can J Ophthalmol*. 2009;44(1):66-9.
- Livingston PM MCC, Taylor HR. Knowledge, attitudes, and self-care practices associated with the age related eye diseases in Australia. *Br J Ophthalmol*. 1998;82:780-5.

10. Mansouri K, Orgul S, Meier-Gibbons F, Mermoud A. Awareness about glaucoma and related eye health attitudes in Switzerland: a survey of the general public. *Ophthalmologica*. 2006;220(2):101-8.
11. Saw SM, Gazzard G, Friedman D, Foster PJ, Devereux JG, Wong ML, et al. Awareness of glaucoma, and health beliefs of patients suffering primary acute angle closure. *Br J Ophthalmol*. 2003;87(4):446-9.
12. Gilmour-White JA, Shah P, Cross V, Makupa W, Philippin H. Glaucoma awareness and access to healthcare: perceptions among glaucoma patients in Tanzania. *Postgrad Med J*. 2015;91(1077):373-8.
13. Dandona R, Dandona L, John RK, McCarty CA, Rao GN. Awareness of eye diseases in an urban population in southern India. *Bull World Health Organ*. 2001;79(2):96-102.
14. Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, et al. Global data on visual impairment in the year 2002. *Bull World Health Organ*. 2004;82(11):844-51.
15. Jones GC, Crews JE, Danielson ML. Health risk profile for older adults with blindness: an application of the International Classification of Functioning, Disability, and Health framework. *Ophthalmol Epidemiol*. 2010;17(6):400-10.
16. Satish TN. Per Capita Income and GDP by District in A.P. Available from: <http://blog.tnsatish.com/2010/02/per-capita-income-and-gdp-by-district.html>. Accessed on August 10 2020.
17. Islam FM, Chakrabarti R, Islam SZ, Finger RP, Critchley C. Factors associated with awareness, attitudes and practices regarding common eye diseases in the general population in a Rural District in Bangladesh: The Bangladesh Population-based Diabetes and Eye Study (BPDES). *PLoS One*. 2015;10(7):e0133043.
18. Islam FM, Chakrabarti R, Dirani M, Islam MT, Ormsby G, Wahab M, et al. Knowledge, attitudes and practice of diabetes in rural Bangladesh: the Bangladesh Population based Diabetes and Eye Study (BPDES). *PLoS One*. 2014;9(10):e110368.
19. Demaio AR, Otgontuya D, de Courten M, Bygbjerg IC, Enkhtuya P, Oyunbileg J, et al. Exploring knowledge, attitudes and practices related to diabetes in Mongolia: a national population-based survey. *BMC Public Health*. 2013;13:236.
20. Huang OS, Zheng Y, Tay WT, Chiang PP, Lamoureux EL, Wong TY. Lack of awareness of common eye conditions in the community. *Ophthalmol Epidemiol*. 2013;20(1):52-60.
21. Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N, Yeatts KB. Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PLoS One*. 2013;8(1):e52857.

Cite this article as: Pallerla SR, Khanna RC, Sannapaneni K, Keeffe J. Public knowledge, attitudes and practices related to eye diseases in Southern Indian population. *Int J Community Med Public Health* 2020;7:4993-9.