

Ocular Morbid Conditions in the Rural Area of Central India

Vaishali K Shrote (Brahmapurkar) ^{1*}, Sushma S Thakre ², Ashok G ³. Lanjewar,
Kishor P Brahmapurkar ⁴, Gautam M Khakse ⁵

¹ M.D. (PSM); Assistant Professor, Department of Preventive and Social Medicine,
S. V. N. Government Medical College, Yavatmal (M.S) India

² MD. (PSM); Associate Professor, Department of Preventive and Social Medicine,
Indira Gandhi Government Medical College, Nagpur (M.S) India

³ M.D. (PSM); Professor, Department of Community Medicine, Raichur Institute of Medical Sciences,
Raichur (Karnataka), India

⁴ M.D. (PSM); Assistant Professor, Department of Preventive and Social Medicine,
S. V. N. Government Medical College, Yavatmal (M.S) India

⁵ M.D. (PSM); Associate Professor and Head of Department, Department of Preventive and Social
Medicine, S. V. N. Government Medical College, Yavatmal (M.S) India

* **Corresponding Author:** Dr. Vaishali K Shrote (Brahmapurkar)
Quarter No.4, Type III (OLD), Shri V N Government Medical Campus Yavatmal.445001 (M.S.), India
Phone: +919403614780 | Email: dr.vaishali2709@rediffmail.com

Abstract

Introduction: Ocular morbid conditions are responsible for partial or total blindness. Ocular morbidities by its sheer magnitude form an enormous problem, not only in human suffering, but also in terms of economical loss and social burden.

Aim: The aim of present study was to find the prevalence of ocular morbidities in rural area.

Methods: Community based cross-sectional study in area covered by Rural Health Training Centre (RHTC), Hingna which is under the administrative control of Department of Preventive and Social Medicine, Indira Gandhi Government Medical College [IGGMC], Nagpur, was carried out in 194 families with 925 study subjects during February 2005-December 2005. The study focuses on ocular examination and diagnosis of ocular morbid conditions. Both eyes were examined and all the relevant clinical findings were recorded in predesigned proforma. Chi Square test was used for the analysis of data .

Results: The results revealed that out of 925 study subjects 297(32.11%) were had ocular morbidity. Common ocular morbidity was Myopia (13.62%), Conjunctival xerosis (12.11%), Hypermetropia (11.68%), Xerophthalmia (3.46%), Pterygium (2.92%), immature senile cataract (2.70%), Eye strain (2.49%), mature senile cataract (1.84%) and Presbyopia (0.86%). Females were more affected (36.58%) as compared to males (28.37%), [$\chi^2 = 7.09$; d.f. =1, $P < 0.05$]. It was observed that as the age increases the prevalence of ocular morbidity increases

$[\chi^2=318.03; \text{d.f.}=7, p<0.001]$. Higher prevalence of ocular morbid conditions was found in illiterates 122 (40.94%) $[\chi^2 = 16.47; \text{d.f.}=3, p<0.001]$

Conclusion: High prevalence of ocular morbidities was found in rural areas of central India with greater predominance among women and illiterates.

Key words: Ocular morbidity, Rural area, Myopia, Conjunctival xerosis, Hypermetropia, Xerophthalmia, cataract.

Short Running Title: Ocular Morbidity in the Rural Community

Introduction

Ocular morbid conditions are responsible for partial or total blindness. Loss of sight of a person should not remain just a statistic but a personal tragedy, not only for the individual concerned, but for all of us who claim to be concerned. Blindness and visual impairment by its sheer magnitude forms an enormous problem, not only in human suffering, but also in terms of economical loss and social burden. Blindness, with its social and economic consequences, represents a significant public health problem in many parts of the world.¹

Ocular morbid conditions are cataract, refractive errors, Xerophthalmia, Pterygium, strabismus, dacryocystitis, etc; are some of them.

In the changing concepts in eye health care, the epidemiological approach which involves studies at the population level has been recognized. It focuses, among other things, on the measurement of the incidence, prevalence of diseases.

The local epidemiological situation will determine the action needed.² Higher prevalence of trachoma, conjunctivitis and cataract among females than in males has been reported.

In the national survey on blindness, 2001–2002 conducted in the country, cataract accounted for 62.6 percent of all cases. Uncorrected refractive error was responsible for about 19.7 percent of blindness; overall prevalence of glaucoma was about 5.8 percent, posterior segment pathology accounts for about 4.7 percent cases. Corneal opacity and other causes were responsible for 0.9 percent and 6.2 percent of the cases respectively.³

Cataract is the most common easily correctable cause of blindness in the developing regions of the world.⁴ In India alone 3.8 million people become blind from cataract each year.⁵ In many parts of the world refractive errors would become the second largest cause of treatable blindness after cataract, if the blindness were defined on the basis of 'presenting' distance visual acuity.⁶

So, the present study was conducted to study the prevalence of ocular morbid conditions and to study some epidemiological factors (like age, sex, literacy) responsible for them in a rural area of Nagpur district.

Materials & Methods

The present study was carried out in a community of Raipura village, Rural Health Training Centre (RHTC), Hingna which is under the administrative control of Department of Preventive and Social Medicine, I.G.G.M.C., Nagpur, India.

Study Design: It was a community based cross-sectional study.

Study Area: The areas adopted by the RHTC are Hanuman Nagar, Dheeverpura, Tiwaskarwadi, Malipura and Chambarpur. Hanuman Nagar was selected randomly by lottery method for the study purpose.

Study Subjects: As per Health survey registers (April 2004 – March 2005) of PHC, Hingna, there were total 380 families in Hanuman Nagar. These families comprised approximately 1900 population.

Study Period: Data was collected from February 2005-December 2005.

Pilot Study: In pilot study, the first consecutive 100 families comprising of 480 subjects were studied, Prevalence of persons having ocular morbid conditions was found to be 30.20%. Estimation of sample size was done on basis of pilot study 7.

Formula

$$n = \frac{4PQ}{L^2} \quad L - \text{Allowable error 10\% of P}$$

$$n = \frac{4 \times 30.20 \times 69.80}{(3.02)^2} = 924.54$$

$$n = 925$$

At the end of the pilot study of 100 families (480 subjects), no modification in method and procedure were suggested and the study continued to cover the remaining study subjects. The pilot study was included in the full-scale study. In this way, 194 families were studied in which 925 study subjects were present. Here all houses were selected to select remaining houses. To cover all the age groups, all the members of the family were considered for the study.

Methodology

Before starting the pilot study, one month training was undertaken in Ophthalmology Department, IGGMC, Nagpur, regarding ocular examination and diagnosis of ocular morbid conditions. Approval from the Institutional Ethics Committee was obtained.

A house to house survey was done. Study subjects were explained about the purpose & methodology of examination. A rapport was established and co-operation was obtained. The timing of the survey was adjusted to suit the convenience of the subjects and to ensure their availability in home. The survey was done daily, mostly in the morning hours. Each individual of the family was interviewed as per pre-designed proforma. In case of children, information was obtained from the parents, in most of the cases informant was the mother.

In the presentation of the pilot study, there were no modifications in the proforma, the proforma was approved.

In each study subject, eye examination was carried out (irrespective of the presence or absence of symptoms) in the daylight with the help of torch.

The subjects were examined for visual acuity (V/A) (distant and near), ocular movements, cover test for strabismus, Ishihara's pseudochromatic plates for colour vision test. Visual acuity and colour vision testing was not done in children <5 years of age. In addition, all study subjects of 40 years and above were examined by digital tonometry; near vision was tested for presbyopia. Both eyes were examined and all the relevant clinical findings were recorded in predesigned proforma.

The standard definitions used to detect ocular morbid conditions.⁸⁻¹⁰ The standard procedures and methods for ophthalmic examinations were used to detect ocular morbid conditions. Whenever feasible, study subjects were treated on the spot.

Subjects with vitamin A deficiency were given two doses of vitamin A solution orally on consecutive days. The preschool children who had not received the scheduled vitamin A prophylaxis were given the dose of Vitamin A.

Subjects, who required referral, were referred to the Department of Ophthalmology, I.G.G.M.C., Nagpur for further examination, specialized investigations and management.

Health education was imparted to subjects and parents of children regarding eye care practices, hygiene regarding eye, vitamin A rich foods, and vitamin A prophylaxis program with special emphasis to the mothers of the under fives. Needs for surgical intervention in the cases of cataract and for correction of refractive error were emphasized. Washing of eyes with cold and clean water was advised.

Statistical Analysis: Chi Square test was used for the analysis purpose.¹¹

Results

The prevalence of various ocular morbid conditions in study subjects was summarized in Table 1; it reveals out of 925 study subjects examined 297 (32.11%) study subjects were having ocular morbidity. Refractive error was seen in 242(26.16%) and cataract in 45(4.87%) study subjects. Distribution of study subjects according to number of ocular morbid conditions showed in Table 2 revealed 214 (23.14%) subjects were having one ocular morbid condition while 66 (7.14%) subjects were having two ocular morbid conditions.

Educational status, age and sex specific prevalence of ocular morbid conditions as in Table 3, it was seen that as level as education increases, prevalence of ocular morbid conditions decreases. $\chi^2 = 16.47$; d.f. =3, $p < 0.001$. Higher prevalence of ocular morbid conditions was found in 122 Illiterates (40.94%) and in age group 65 and above, out of 28, 25(89.29%) were having ocular morbidity. When age group was compared with respect to ocular morbid conditions, $\chi^2 = 318.03$; d.f. =7, $p < 0.001$. Females were more affected as compared to males ($\chi^2 = 7.09$; d.f. =1, $P < 0.05$).

Discussion

The prevalence of cataract in the present study (4.87%) was lower than that reported by other studies in India, i.e. Gupta S.K.,¹² (27.9%) and Singh MM et al.¹³ (40.4%). The reason behind less prevalence of cataract in our study as compared to the above study is that, we had included all age groups and age group of 45 years and above comprised only 17.19% of the study population; whereas Gupta S.K. and Singh MM studied subjects above 40 and 50 years of age respectively.

The prevalence of refractive error in the present study was 26.15% (242 subjects). In the present study prevalence of Myopia (13.62%) was more than prevalence of Hypermetropia (11.68%) similar to that reported by Wong T.Y et al.¹⁴ [38.7% and 28.4% respectively] and Nepal B.P et al.¹⁵ [4.3% and 1.3% respectively]. Higher percentage was reported by Wong T.Y et al because study subjects were in the of age ranging from 40 to 79 years. Lower percentage was reported by Nepal B.P et al because the study was carried out in school going age group. Similar findings by Amruta S. Padhye et al.,¹⁶ that the cluster-weighted prevalence of uncorrected refractive error in rural children was 2.63% (95% CI, 2.62-2.64).

Prevalence rates of Xerophthalmia (3.46%) similar to our study was reported by Tielsch J.M et al. (3.9%), Desai S et al. (5.4%), Kassaye T et al. (5.8%) respectively.¹⁷⁻¹⁹ However only one case was reported of vitamin A deficiency by Sheikh S.P and Aziz T.M.²⁰

The prevalence of pterygium similar to our study (2.92%) has been reported by Hussain A et al.²¹ i.e. 2.6%.

The association between age and ocular morbid conditions in our study was found to be statistically significant similar to that reported by Livingston P.M et al.²² i.e. age was reported as the significant predictor of visual impairment (O.R. - 3.19, C.I: 2.29-4.43). Dandona R et

al.²³ observed that in participants > 15 years of age, myopia and hypermetropia increased with increasing age, a significant rising trend of ocular infection with increase in age was reported in study by Kumar R et al.²⁴

In the present study, ocular morbid conditions were found to be significantly associated with females. It could be because most rural women tend to use cheap cooking fuels (e.g. dried wood, twigs and sticks, cow dung) which produce a lot of smoke. Prolonged exposure to this smoke (particularly in ill ventilated spaces) would serve as an additional and cumulative source of oxidative damage to the eye. Thus, such cooking smoke could be a risk factor.

In the present study most of the women in rural areas were illiterates and were having low education level as compared with males. The prevalence of both blindness as well as cataract blindness was around 60% higher in females than in males was reported by Limburg H et al.²⁵ Female gender was associated with higher risk of blindness as found in study by Dandona R et al.²⁶ and Dandona R et al.²⁷ reported that female sex was found to be significantly associated with moderate visual impairment. Nirmalan PK et al.²⁸ reported that cataract blindness burden was higher for females ($P < 0.001$). The age adjusted prevalence of blindness was more common in women than men as reported by Courtright P et al.²⁹ Anjum K.M et al, reported that women had a 2.1 fold greater prevalence of bilateral cataract blindness than men ($P < 0.0001$).³⁰

Higher prevalence of ocular morbidity was found in 122 (40.94%) Illiterates. The association of ocular morbid conditions and educational status in the present study was similar to that reported by Nirmalan P.K et al.³¹ In the case of cataract surgical coverage, they found it was inversely associated with illiteracy. In univariate analysis by Ughade S.N et al., illiteracy was one of the 14 risk factors, significantly associated with age related cataract.³² Unconditioned multiple logistic regression analysis confirmed this significance. Multiple regression analysis that best corrected visual acuity was significantly correlated with educational background ($P < 0.001$) as observed by Xu L et al.³³

Conclusion & Recommendations

High prevalence of ocular morbidities was found in rural areas of central India with greater predominance among women and illiterates.

Screening and early referral of population in need of specialized ophthalmic care should be emphasized. Campaigns for public awareness regarding surgical correction for cataract, correction for refractive errors should be strengthened.

Early and prompt treatment of ocular morbid conditions should be emphasized. Health education should be imparted to community regarding healthy eye care practices, causes, preventive measures, and appropriate treatment of ocular morbid conditions, hygiene regarding eye, diet rich in vitamin A and vitamin A prophylaxis program (specially to the mothers of under-fives).

Limitations of the study

No ophthalmoscopy, tonometry, slit lamp examination or refraction were carried out therefore diseases of vitreous, retina, optic nerve could not be detected. Mild glaucoma, mild diseases of cornea, anterior chamber, iris may also have been missed.

References

1. Thylefors B. Avoidable blindness. *Bull World Health Organ.* 1999;77:453.
 2. Park K. *Park's Textbook of Preventive and Social Medicine*, Eighteenth edition, Banarsidas Bhanot Publishers, Jabalpur. 2005: 320-323.
 3. Murthy GVS, Gupta SK, Bachani D, Jose R, John N. Current estimates of blindness in India. *British Journal of Ophthalmology.* 2005; 89: 257-260.
 4. Dawson CR, Schwab IR. Epidemiology of cataract—a major cause of preventable blindness. *Bull World Health Organ.* 1981;59:493-501.
 5. Minassian DC, Mehra V. 3.8 million blinded by cataract each year: projections from the first epidemiological study of incidence of cataract blindness in India. *Br J Ophthalmol.* 1990;74:341-3.
 6. Dandona R, Dandona L. Refractive error blindness. *Bull World Health Organ.* 2001;79:237-43.
 7. Rao KV. *Biostatistics – A manual of statistical methods for use in Health Nutrition, Anthropology.* First edition. 1996; 222-223,172-175.
 8. Statye M, Reeves B, Wortham Cathereen. Ocular and vision defects in pre school children, *Br J Ophthalmol* 1993;77(4): 228-232.
 9. Miller SJH. *Parson's Diseases of the eye*, Publisher : Churchill Livingstone, Robert Stevenson, 18th Edition. 1990: 75-102 / 127-228.
 10. Basak SK. *Essentials of ophthalmology* 1st edition, Current books International publishers, Calcutta. 1997.
 11. Mahajan BK, Gupta MC. *Textbook of Preventive and Social Medicine*, Third edition, Jaypee Brothers medical publishers. New Delhi. 2003: 322/384-386.
 12. Gupta SK. Determinants of blindness and cataract in a rural area, *Indian Medical Gazette.* 1995: 114-120.
 13. Singh MM, Murthy GV, Venkatraman R, Rao SP, Nayar S. A study of ocular morbidity among elderly population in a rural area of central India. *Indian J Ophthalmol.* 1997; 45(1):61-65.
-

14. Wong TY, Foster PJ, Hee J, Ng TP, Tielsch JM, Chew SJ et al. Prevalence and risk factors for refractive errors in adult Chinese in Singapore. *Investigative Ophthalmology and Visual Science*. 2000; 41:2486-2494.
15. Nepal BP, Koirala S, Adhikary S, Sharma AK. Ocular morbidity in school children in Kathmandu. *Br. J. Ophthalmol*, 2003; 87.
16. Padhye AS, Khandekar R, Dharmadhikari S et al. Prevalence of Uncorrected Refractive Error and Other Eye Problems Among Urban and Rural School Children. *Middle East Afr J Ophthalmol*. Apr-Jun 2009; 16(2):69–74.
17. Tielsch JM, West KP, Katz J, Chirambo MC, Schwab L, Johnson GJ et al. Prevalence and severity of xerophthalmia in Southern Malawi. *American Journal of Epidemiology*. 1986; 124(4):561-567.
18. Desai S, Desai R, Desai NC, Lohiya S, Bharagav G, Kumar K. School eye health appraisal. *Indian J Ophthalmol*. 1989; 37(4):173-175.
19. Kassaye T, Receveur O, Johns T, Becklake MR. Prevalence of vitamin A deficiency in children aged 6-9 years in Wukro, western Ethiopia. *Bulletin of the World Health Organization*. 2001; 79:415-422.
20. Sheikh SP, Aziz TM. Pattern of eye diseases in children of 5-15 years at Bazzertaline area (South Karachi) Pakistan. *JCPSP*. 2005; 15(5):291-294.
21. Hussain A, Awan H, Khan MD. Prevalence of non –vision – impairing conditions in a village in Chakwal district, Punjab, Pakistan, *Ophthalmic Epidemiol*. 2004; 11(5):413-426.
22. Livingston PM, Mc Carty CA, Taylor F. Visual impairment and socio-economic factors. *Br J Ophthalmol*. 1997; 81:574-577.
23. Dandona R, Dandona L, Srinivas M, Giridhar P, Mc, Carty CA, Rao GN. Population based assessment of refractive error in India; the Andhra Pradesh eye disease study. *Clin Experiment Ophthalmol*. 2002; 30(2):84-93.
24. Kumar R, Mehra M, Dabas P, Kamlesh and Raha R. A study of ocular infections amongst primary school children in Delhi. *J. Commun. Dis*. 2004; 36(2):121-126.
25. Limburg H, Vaidyanathan K, Pampattiwar KN. Cataract blindness on the rise, results of a door to door examination in Mohadi. *Indian J Ophthalmol*. 1996; 44(4): 241-244.
26. Dandona R, Dandona L. Review of findings of the Andhra Pradesh eye disease study: Policy implications for eye – care services. *Indian J Ophthalmol*. 2001; 49: 215-234.
27. Dandona R, Dandona L, Srinivas M, Giridhar P, Prasad MN, Vilas K, McCarty CA, Rao GN. Moderate visual impairment in India: the Andhra Pradesh eye disease study, *Br J Ophthalmol*. 2002 ; 86:373-377.

28. Nirmalan PK, Padmavathi A, Thulasiraj RD. Sex inequalities in cataract blindness burden and surgical services in south India. *Br J Ophthalmol*. 2003; 87: 847-849.
29. Courtright P, Hoesheman A, Metacalfe N, Chirambo M, Noertjojo K, Barrows J, Katz J. Changes in blindness prevalence over 16 years in Malawi: reduced prevalence but increased numbers of blind. *Br J Ophthalmol*. 2003; 87:1079-1082.
30. Anjum KM, Qureshi MB, Khan MA et al. Cataract blindness and visual outcome of cataract surgery in a tribal area in Pakistan, *British Journal of Ophthalmology*. 2006; 90:135-138.
31. Nirmalan PK, Thulasiraj RD, Maneksha V, Rahmathullah R, Ramakrishanan R, Padmavathi A, Munoz SR, Ellwein LB. A population based eye survey of older adults in Tirunelveli district of South India :blindness, cataract surgery and visual outcomes. *Br J Ophthalmol*. 2002; 86:505-512.
32. Ughade SN, Zodpey SP, Khanolkar VA. Risk factors for cataract: A case control study. *Indian J Ophthalmol*. 1998; 46(4), 221-227.
33. Xu L, Li J, Cui T, Hu A, Zheng Y, Li Y et al. Visual acuity in northern china in an urban and rural population: the Beijing eye study. *British Journal of Ophthalmology*. 2005; 89:1089-1093.
34. International statistical classification of diseases and related health problems. Xth Revision, WHO, Geneva. 1992.

Table 1: Prevalence of ocular morbid conditions in the study subjects

*ICD code	Ocular morbid conditions	Study subjects	
		(n=925)	
		No	%
H52.1	Myopia	126	13.62
H11.1	Conjunctival xerosis	112	12.11
H52.0	Hypermetropia	108	11.68
H19.8	Xerophthalmia	32	3.46
H11.0	Pterygium	27	2.92
H25.0	Immature senile cataract	25	2.70
H53.1	Eye strain	23	2.49
H25.1	Mature senile cataract	17	1.84
H52.4	Presbyopia	8	0.86
H27.0	Aphakia	7	0.76
S 05.0	Ocular injury	7	0.76
H50	Strabismus	5	0.54
H10.0	Conjunctivitis	3	0.32
H04.0	Dacryocystitis	2	0.22
H26	Congenital (cataract)	2	0.22
C69	Melanoma	1	0.11
H00.1	Chalazion	1	0.11
H01.0	Blepharitis	1	0.11
H02.4	Ptosis	1	0.11
H25.2	Hypermaturation (cataract)	1	0.11

* International statistical classification of diseases and related health problems (1992), Xth Revision, WHO, Geneva.³⁴

Table 2: Distribution of study subjects according to number of ocular morbid conditions

No of ocular morbid conditions	Study subjects	
	No.	%
Nil	628	67.89
1	214	23.14
2	66	7.14
3	16	1.72
4	1	0.11
Total	925	100.00

Table 3: Association of ocular morbid conditions and demographic factors

Variable	Study subjects		Prevalence percent	Significance
	No.	With ocular morbid conditions		
Educational status				
Illiterate	298	122	40.94	$\chi^2 = 16.47$; d.f. =3, p<0.001
Primary school	146	45	30.82	
Middle school	182	49	26.92	
High school and above	299	81	27.09	
Age Groups				
0-5	64	0	0.00	$\chi^2=318.03$; d.f=7, p<0.001
5-15	196	13	6.63	
15-25	221	30	13.57	
25-35	164	60	36.59	
35-45	121	70	57.85	
45-55	75	59	78.67	
55-65	56	40	71.43	
≥ 65	28	25	89.29	
Sex				
Males	504	143	28.37	$\chi^2 = 7.09$; d.f.=1, P< 0.05
Females	421	154	36.58	