

Original Research Article

Causes and determinants of blindness in inmates of blind schools

Vivek Gupta^{1*}, V. K. Agrawal²

¹Department of Community Medicine, ²Department of Preventive and Social Medicine, Armed Forces Medical College, Pune, Maharashtra, India

Received: 27 December 2020

Revised: 06 February 2021

Accepted: 08 February 2021

***Correspondence:**

Dr. Vivek Gupta,

E-mail: vivekramag99@rediffmail.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: Globally visual impairment is a serious public health, social and economic problem, 1.1 billion people are visually disabled. India has 12 million blind people. Studies conducted so far have highlighted mainly the medical aspects of blindness. With the intention to study medico-social aspects of blindness in India the current study was undertaken in two institutes for the blind in Pune.

Methods: It was a cross sectional descriptive study conducted using a study questionnaire. A modified WHO eye examination record for blindness and low vision was administered to all (290) inmates of Technical Training Institute of Pune Blind Men's Association and The Pune School and Home for the Blind Boys from 01 Aug 2014 to 31 July 2015 at Pune. Psychosocial aspects of inmates were recorded as per hospital anxiety and depression scale (HADS). Analysis of collected data was done with the help of epi info and PEPI Programs version-4.

Results: Retina (61.7 percent) and cornea (31.0 percent) were the main site of lesion. Overall, 40.4 percent had potentially avoidable cause of blindness. 46.6 percent of inmates had normal psychosocial patterns as per HADS scale.

Conclusions: Strengthening of preventive and curative services for the complex medico-social aspects of blindness. Involvement of retina in 61.7 percent of inmates shows that genetically determined diseases are an emerging important cause of blindness justifies the requirement of genetic counselling along with other preventive and curative intervention for prevention of blindness in India.

Keywords: Blindness, Causes, Determinants

INTRODUCTION

The control of blindness is one of the priority areas of the World Health Organization's "Vision 2020- the right to sight" programme. This is a global initiative, to eliminate avoidable blindness worldwide by the year 2020.¹ The criteria, proposed by WHO, for the definition of blindness, is "visual acuity of less than 3/60". The prevalence of blindness in India is estimated to be 1.0 percent.² Thirty percent of the blind in India lose their eyesight before they attain 21 years of age; most cases during the first five years of life.³ The case for elimination of preventable blindness is justified not only

on humanitarian grounds but also because of its social and economic consequences.⁴

The prevention of blindness encompasses complex array of approaches and resources as well as we need to understand the exact prevalence, the etiology and various determinants of blindness. Reliable, population based data on the causes of blindness are difficult to obtain in developing countries as registers of the blind do not exist, and very large sample sizes would be required for cross sectional surveys. Alternative sources include the examination of inmates of blind schools, but possible sources of bias (inmates may not represent all age, sex group and socioeconomic status of society) need to be

borne in mind. The advantages of blind school studies are that many inmates can be examined in a standard manner by a limited number of observers. The classification system developed by the WHO has been used in several blind school studies over the past 10 years, which allows causes to be compared.⁵

The primary objectives of the present study were to determine the causes (anatomical/etiologic/avoidable) and determinants of blindness in inmates in schools for the blind in southern India so that remedial measures can be suggested.

METHODS

It was a cross sectional descriptive study conducted using a study questionnaire. The study was presented before ethical committee for approval, it was approved after a pilot study was conducted. The study was carried out in Technical Training Institute of Pune Blind Men's Association, Pune and The Pune School and Home for the Blind Boys from 01 August 2014 to 31 July 2015. 100% available strength was subjected to study, relevant information was collected from the class teacher, parents (whenever possible), by reviewing medical records and by administering a semi-open ended questionnaire to the inmates. A brief history of the age of onset of visual loss, involvement of other members of the family and the place of residence was recorded. Socioeconomic status of the subjects was assessed by the Kuppuswamy scale 6. Distance visual acuity was measured using a Snellen E chart, and near vision was assessed using figures equivalent to N18. The anterior segment was examined using a torch and loupe and/or handheld slit lamp. The posterior segment was examined by direct and indirect ophthalmoscopy, after dilating the pupil. The WHO eye examination record for blindness was used to categorize the causes of blindness and to record findings, using the definitions in the coding instructions.⁵ A major anatomical site and underlying cause was selected for each inmate. Psychosocial aspects of inmates were recorded as per hospital anxiety and depression scale (HADS).⁷ Analysis of collected data was done with the help of epi info software and PEPI Programs version-4.

RESULTS

Sociodemographic data of study population

A total of 290 visually impaired inmates were interviewed/examined out of which 79 percent of the study populations were males and 21 percent were females. The age of the study population ranged from under 5 to 35 years with about 50 percent of the study population belonging to the age group 11-20 years. The study population was predominantly Hindu 91.4 percent coming from urban areas 70 percent. Most of the visually impaired individuals (99 percent) of the study population were literate. 87.6 percent of the study population belonged to upper lower socioeconomic class IV.

Category of visual impairment

Distribution of inmates according to category of visual impairment is shown in Table 1. It shows that 29.0 percent of the subjects had no perception of light, 67.0 percent had 1/60- light perception and 4.0 percent had visual acuity 3/60-1/60.

Table 1: Distribution of study population according to category of visual impairment.

Category of visual impairment	Frequency	Percentage
3(3/60-1/60)	11	3.8
4(1/60-light perception)	195	67.2
5(No light perception)	84	29.0
Total	290	100.0

Anatomical site of blindness

Distribution of inmates according to anatomical site of ocular lesion is given in Table 2 and data has also been compared with other studies (Titilal et al 2001 in North India and WHO in 9 states).^{8,9} Posterior segment was seat of lesions in 62.4 percent of the subjects, whereas anterior segment was involved in 31.7 percent of the population retina (61.7 percent), cornea (31.0 percent) and whole eye (5.9 percent) was the main site of lesion in inmates.

Table 2: Ocular lesions according to anatomical location.

Ocular lesions	Present study	Titilal et al 2001 (North India) ⁸	WHO India ⁹
Retina	179 (61.7)	98 (15.1)	416 (22.0)
Cornea	90 (31.0)	141 (21.7)	529 (28.0)
Pthisis bulbi	17 (5.9)	178 (27.4)	453 (24.0)
Lens	2 (0.7)	71 (10.9)	208 (11.0)
Optic atrophy	2 (0.7)	69 (10.6)	113 (6.0)
Uvea	0	57 (8.8)	95 (5.0)
Glaucoma	0	32 (4.9)	57 (3.0)
Others	0	5 (0.8)	19 (1.0)
Total	290 (100.0)	650 (100.0)	1890 (100.0)

Aetiological causes of blindness in study population

The aetiological classification was based on the time of onset of the insult leading to visual loss and the findings are shown in Table 3. The underlying cause of visual loss was undetermined in 32.4 percent children (mainly abnormality since birth), acquired childhood conditions were responsible in 37.6 percent [infections (29.3 percent), vitamin A deficiency (4.8 percent), trauma (3.5 percent)] and hereditary factors were identified in 30.0 percent cases, in which there was a positive family history of another similarly affected individual or well

recognized or proved genetic/chromosomal disorders according to WHO/PBL eye examination record coding instructions.

Table 3: Aetiological causes of blindness in study population.

Causes of visual impairment	Frequency	Percentage
Hereditary	87	30.0
Infection	85	29.3
Trauma	10	3.5
Vitamin A deficiency	14	4.8
Undetermined	94	32.4
Total	290	100.0

Avoidable causes of blindness in study population

Distribution of study population according to avoidable causes of blindness is shown in Table 4. Overall, 40.4 percent (117 inmates) had potentially avoidable cause of blindness: preventable causes in 37.6 percent (109 inmates), and treatable causes in 2.8 percent (8 inmates). Infections were the major preventable cause of visual loss followed by vitamin A deficiency and trauma/harmful traditional remedies.

Table 4: Avoidable causes of blindness in study population.

Cause	Frequency	Percentage
Preventable		
Vitamin A deficiency	14	4.8
Infection	85	29.3
Trauma/harmful traditional eye remedies	10	3.5
Subtotal of preventable	109	37.6
Treatable		
Cataract	2	0.7
Retinopathy of prematurity	6	2.1
Subtotal of treatable	8	2.8
Total avoidable	117	40.4

Distribution according to psychological trait

Distribution of inmates according to psychological trait is shown in Table 5. 46.6 percent of subjects were showing normal psychosocial patterns, 15.9 percent of subjects have shown mild anxiety and mild depression patterns, 13.1 percent of subjects are showing mild anxiety patterns, 11 percent of subjects were showing moderate anxiety and mild depression, 5.5 percent of subjects were showing moderate anxiety and moderate depression, 4.5 percent of subjects were showing moderate anxiety only. 1.4 percent of subjects were showing severe anxiety and moderate depression, 0.7 percent of subjects were showing severe anxiety and severe depression, 0.3 percent were showing severe anxiety only. Only 1 percent of subjects were showing mild depression.

Table 5: Visually impaired and psychological traits.

Psychological traits	Frequency	Percentage
A1D1 (mild anxiety & mild depression)	46	15.9
A1DN (mild anxiety)	38	13.1
A2D1(moderate anxiety & mild depression)	32	11.0
A2D2(moderate anxiety & moderate depression)	16	5.5
A2DN(moderate anxiety)	13	4.5
A3D2(severe anxiety & moderate depression)	4	1.4
A3D3(severe anxiety & severe depression)	2	0.7
A3DN(severe anxiety)	1	0.3
AND1(mild depression)	3	1.0
ANDN(normal)	135	46.6
Total	290	100.0

DISCUSSION

Thirty percent of the blind in India lose their eyesight before they attain 21 years of age; most cases during the first five years of life. In order to develop control programmes to prevent childhood blindness it is necessary to identify important avoidable causes in each country and monitor the changing patterns of childhood SVI/BL in each country over time. It is estimated that 15000 children attend residential schools for the blind in India and a further 5000 are in integrated education.¹⁰ Blind school studies have the advantage that a large number of children can be examined in a short time, are relatively inexpensive, can be done by a single observer, and provide an indication of relative importance of the different causes of blindness. However, they are subject to certain inherent biases: children less than 5 years of age, those with multiple disabilities, and those from lower socioeconomic groups or from rural communities are likely to be under-represented, as are causes in children who have died. Blind school studies have been undertaken in various countries using the standard WHO proforma and have found a varied spectrum of causes of blindness in children.¹¹⁻¹⁸

In the present study 62.4 percent inmates were having blindness since birth. Blindness since birth may be due to genetic diseases or intrauterine factors or perinatal factors. The reason for the high proportion of anomalies in our study is not clear, but similar findings have been reported from other institution based and population based studies in India.^{11,19} Corneal blindness was the second most common cause of blindness (31.0 percent) and identified as the major preventable cause. Although it is difficult to specifically ascertain the aetiology of corneal scarring several years after the original pathology, infections (measles, trachoma, and conjunctivitis) appear to be the major causes followed by vitamin A deficiency

and traumas. These findings suggest the importance of primary prevention e.g. high measles immunization coverage, promotion of breast feeding, health and nutrition education, and continued programmes for the control of vitamin A deficiency.

Hereditary factors were identified in 30.0 percent blind. Reduction in blindness due to genetic diseases will prove more challenging as there are few medical geneticists in India, and advice given will need to be sensitive to the complex social, economic, and cultural factors influencing marriage and child rearing. There is a need to expand specialist paediatric ophthalmic services in India, and it has been recommended that there should be one well equipped child eye care centre for every 10 million total population.²⁰ Finding of normal psychosocial traits in 46.6 percent inmates may be due to the training being given to them in blind school and it shows the importance of rehabilitative services for blind.

CONCLUSION

Antenatal care to be reinforced with thorough screening for genetic causes. Primary prevention to be thrust upon e.g., 100% measles immunization coverage, promotion of breast feeding, health and nutrition education, and continued programmes for the control of vitamin A deficiency. Expansion of paediatric ophthalmic services in India, and it has been recommended that there should be one well equipped child eye care centre for every 10 million total population. It was felt that psychological assessment and psychotherapy should form the part of management of the visually impaired in early stages to prevent subsequent psychiatric morbidity in later years, which has been neglected hitherto. From the present study, it can be inferred that the visually impaired had become more acceptable to their families and friends and had learnt to accept the handicap realistically. They had less anxiety and more confidence in themselves as a result of education/ vocational training in the institutes.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- World Health Organization. Programme for the Prevention of Blindness and Deafness. (2000). Global initiative for the elimination of avoidable blindness. World Health Organization. Available from: <https://apps.who.int/iris/handle/10665/63748>. Accessed on 7 September 2020.
- Park K. Park's Text Book of Preventive and Social Medicine. 18th edn. Jabalpur, M/s Banarsidas Bhanot; 2005;319-323.
- Government of India, Central Health Education Bureau. Swasth Hind. 1968;12;245.
- WHO Study Group on the Prevention of Blindness & World Health Organization. (1973). The prevention of blindness: report of a WHO Study Group [meeting held in Geneva from 6 to 10 November 1972]. World Health Organization. <https://apps.who.int/iris/handle/10665/38222>. Accessed on 7 September 2020.
- Gilbert C, Foster A, Negrel AD, Thylefors B. Childhood blindness: a new form for recording causes of visual loss in children. *Bull World Health Organ*. 1993;71(5):485.
- Kuppuswamy B. Manual of socioeconomic status (urban). Delhi: Manasayan. 1981;8:66-72.
- Zigmond AS, Snaith PR. The hospital anxiety and depression scale. *Acta Psychiatr Scand*. 1983;67:361-70.
- Titiyal JS, Pal N, Murthy GV. Causes and temporal trends of blindness and severe visual impairment in children in schools for the blind in North India. *Br J Ophthalmol*. 2003;87(8):941-5.
- Gilbert C, Foster A. Childhood blindness in the context of VISION 2020: the right to sight. *Bull World Health Organ*. 2001;79(3):227-32.
- Rahi JS, Sripathi S, Gilbert CE, Foster A. Childhood blindness due to vitamin A deficiency in India: regional variations. *Arch Dis Childhood*. 1995;72(4):330-3.
- Hornby SJ, Adolph S, Gothwal VK, Gilbert CE, Dandona L, Foster A. Evaluation of children in six blind schools of Andhra Pradesh. *Indian J Ophthalmol*. 2000;48(3):195.
- Schwabe L, Kagame K. Blindness in Africa: Zimbabwe schools for the blind survey. *Br J Ophthalmol*. 1993;77:410-2.
- Goggin M, Keefe M. Childhood blindness in Republic of Ireland: a national survey. *Br J Ophthalmol*. 1991;75:425-9.
- Eckstein MB, Foster A, Gilbert CE. Causes of childhood blindness in Sri Lanka: results from children attending six schools for the blind. *Br J Ophthalmol*. 1995;79(7):633-6.
- Gilbert CE, Canovas R, Hagan M, Rao S, Foster A. Causes of childhood blindness: results from West Africa, south India and Chile. *Eye*. 1993;7(1):184-8.
- Hornby SJ, Xiao Y, Gilbert CE, Foster A, Wang X, Liang X, et al. Causes of blindness in People's Republic of China: results from 1131 blind school students in 18 provinces. *Br J Ophthalmol*. 1999;83:929-32.
- Waddell KM. Childhood blindness and low vision in Uganda. *Eye*. 1998;12:184-92.
- Kocur I, Kuchynka P, Rodný S, Barakova D, Schwartz EC. Causes of severe visual impairment and blindness in children attending schools for the visually handicapped in the Czech Republic. *Br J Ophthalmol*. 2001;85(10):1149-52.
- Dandona L, Williams JD, Williams BC, Rao GN. Population-based assessment of childhood blindness in southern India. *Arch Ophthalmol*. 1998;116(4):545-6.

20. World Health Organization. Blindness and Deafness Unit and International Agency for the Prevention of Blindness. (2000). Preventing blindness in children: report of a WHO/IAPB scientific meeting, Hyderabad, India, 13-17 April 1999. World Health Organization. Available from: <https://apps.who.int/iris/handle/10665/66663>. Accessed on 7 September 2020.

Cite this article as: Gupta V, Agrawal VK. Causes and determinants of blindness in inmates of blind schools. *Int J Community Med Public Health* 2021;8:1376-80.