Original article

Prevalence of blindness and visual impairment and its causes among people aged 50 years and above in Karnali Zone, Nepal

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Abstract

Objective: To estimate the prevalence of blindness and visual impairment and its causes among those aged 50 years and above in Karnali Zone.

Materials and methods: Stratified cluster sampling method was used. Twenty four clusters of 50 people aged 50 years and above were selected for the study. Visual acuity was recorded with simplified vision testing card with one optotype "E" of size 60 on one side and size 18 on the other side. Examination by ophthalmologist under mydriasis was done for those with a pinhole visual acuity of less than 6/18.

Results: Of 1200 enumerated persons 1,174 were examined (97.8% response rate). The prevalence of blindness (VA <3/60 in better eye) with available correction was 3.4% (40), (95% CI=2.36-4.44); 2.3% (15) for male and 4.8% (25) for female; with best correction it was 1.6% (19), (95% CI=0.9-2.34), 1.1% (7) for male and 2.3% (12) for female. Untreated cataract was the cause of blindness in 67.5%. Severe visual impairment (<6/60 - 3/60 BCVA in better eye) was seen in 2.1% (1.1% male and 3.4% female). Refractive error was the cause of visual impairment in 36.8% and untreated cataract in 58.8%.

Conclusion: Cataract and refractive error are the commonest cause of blindness and visual impairment. Females are 3 times more prone to blindness than their male counterpart. Accessible and equitable services are necessary for blindness prevention.

Key Words: Blindness, cataract, visual impairment, avoidable blindness

Introduction

Karnali is the biggest but most remote and poorest zone of Nepal. Five districts that make up this zone, all come at the bottom of Nepal's district-wise human development index. The Karnali people suffer from widespread hunger, illiteracy, poor health, unemployment, and very low incomes (Karnali Integrated Rural Development and Research Center Report, 2002). The prevalence of blindness in Karnali according to Nepal Blindness Survey of 1981 was 1.63% (best corrected visual acuity of less than 3/60 in better eye) for all ages, 3.7% for people 50 years or above and surgical coverage of less than 30% (Brilliant GE, 1988).

The health facilities in Karnali are very pathetic. Most of the hospitals are not operational due to the absence of doctors and other mid level health personnel. People of Karnali zone are facing problem posed even by the diseases that can

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otherwise be checked through simple preventive measures (Shangrila Sustainable Development Programs).

There are District Eye Centres (DECs) in all 5 districts of Karnali where the Ophthalmic Assistants (OAs) provide eye care service throughout the year. Ophthalmologist and surgical team from base hospital visit the DEC once a year and provide surgical services at a fixed time. This practice has been effective in Karnali for last 25 years. No studies have been done to know the efficacy of these surgical eye camps in terms of coverage, quality and blindness reduction. This study was done to find out the prevalence of blindness and visual impairment and its causes in Karnali Zone.

Materials and methods

Twenty four clusters of 50 people aged 50 years and above were selected by stratified cluster sampling. In each cluster, after a random start 50 individuals aged 50 years or above were enumerated by door to door visits and examined sequentially in each cluster at their homes. Each cluster was confined to a ward of the VDC. When 50 persons were enumerated, further enumeration was stopped and if the number of sample was not enough in the particular cluster, next adjoining ward was picked up and enumerated until the number reached to 50. The study was carried out using the RAAB protocol designed by Dr Hans Limburg which has been approved by the WHO (Limburg, 2007). Visual acuity was recorded with simplified vision testing card of 15 x 15 cm (6x6 inch) size with one optotype "E" of size 60 on one side and size of 18 on the other side. Those with presenting vision of less than 6/18 were given a pinhole for vision recording and dilated by using 1% tropicamide for detaled examination by an ophthalmologist using a handheld slit-lamp and a direct ophthalmoscope. An informed consent was taken from all the participants of the study.

Results

Out of the 1,200 enumerated people aged 50 years or above, 1,174 were examined (response rate of 97.8%). The cause for all absentee was unavailable for examination in 3 visits. Among the examined, 545 (46.6%) were between 50-59 years, 417 (35.6%) between 60-69 years, 171 (14.6%) between 70-79 and 38 (3.2%) were above 80 years of age. The number of male and female was 646 (55.2%) and 525 (44.8%) respectively.

The prevalence of blindness (VA <3/60 in better eye) with available correction was 3.4% (95% CI 2.36-4.44) and with best correction it was 1.6% (95% CI=0.9-2.34). The prevalence of blindness in female for available and best correction was 4.8% and 2.3% respectively and for males it was 2.3% and 1.1%. The prevalence of blindness increased with the age, being highest at 70-79 years (37.5%). The detail of the prevalence of blindness in different age and sex group with available and best corrected vision is given on table 1.

Table 1

Prevalence of blindness; (VA <3/60 with available and best correction in better eye) according to age and sex group (%)

Age Group	Male (n=646)		Female (n=525)		Total (n=1171)	
	Available correction	Best correction	Available correction	Best correction	Available correction	Best correction
50-59	4 (0.6)	4 (0.6)	2 (0.4)	1 (0.2)	6 (0.5)	5 (0.4)
60-69	4 (0.6)	1 (0.2)	8 (1.5)	4 (0.8)	12 (1.0)	5 (0.4)
70-79	6 (0.9)	2 (0.3)	9 (1.7)	4 (0.8)	15 (1.3)	6 (0.5)
80 +	1 (0.2)	-	6 (1.1)	3 (0.5)	7 (0.6)	3 (0.3)
Total {95% CI}	15 (2.3) {1.14- 3.46}	7 (1.1) {0.3-1.9}	25 (4.8) {2.97- 6.63}	12 (2.3) {1.02-3.58}	40 (3.4) {2.36-4.44}	19 (1.6) {0.9-2.34}

Prevalence of blindness, SVI and VI (all causes): When considering the blind eyes, 57 (4.4%) of eyes in male and 69 (6.6%) in female were having VA of less than 3/60 after best correction (WHO definition of

blindness) which was 126 (5.4%) for both the sexes. Similarly available VA of less than 3/60 was seen in 83 (6.4%) male and 100 (9.5%) female eyes. Severe visual impairment; VA<6/60-3/60 in better eye with available correction among all bilateral cases was 7 (1.1%) for male and 18 (3.4%) for female and for all SVI eyes it was 30 (2.3%) and 55 (5.2%) respectively. Visual Impairment (VI), VA <6/18-6/60 in better eye with available correction for all bilateral VI was 45 (6.9%) for male and 69 (13.1%) for female (table 2).

Table 2

Prevalence of blindness, severe visual impairment (SVI) and visual impairment (VI) - all causes (%)

Level of VA	Male n=646	Female n=525	Total n=1171
Blindness - VA<3/60 in the better eye, with best correction or pinhole (WHO definition)			
All bilateral blindness	7 (1.1)	12 (2.3)	19 (1.6)
All blind eyes	57 (4.4)	69 (6.6)	126 (5.4)
Blindness - VA<3/60 in the better eye, with available correction (presenting VA)			
All bilateral blindness	15 (2.3)	25 (4.8)	40 (3.4)
All blind eyes	83 (6.4)	100 (9.5)	183 (7.8)
Severe Visual Impairment (SVI) - VA<6/60 - 3/60 in the better eye, with available correction			
All bilateral SVI	7 (1.1)	18 (3.4)	25 (2.1)
All SVI eyes	30 (2.3)	55 (5.2)	85 (3.6)
Visual Impairment (VI) - VA<6/18 - 6/60 in the better eye, with available correction			
All bilateral VI	45 (6.9)	69 (13.1)	114 (9.7)
All VI eyes	126 (9.8)	137 (3.1)	263 (11.2)

Causes of blindness (VA <3/60 in better eye with available correction); Sixty percent male and 72% female were blind due to cataract, 13.3% male and 4% female were blind due to uncorrected aphakia, 6.7% male and 2.5% female were blind due to surgical complications, 6.7% male had phthisis bulbi, 4% female were blind due to corneal scar, 6.7% male and 8% female had glaucoma, 6.7% male and 8% female had blindness due to posterior segment disease

Causes of severe visual impairment, SVI (VA <6/60-3/60 in better eye with available correction); the commonest cause of SVI among both the sexes was untreated cataract, 85.7% and 100% for the male and female respectively.

Causes of Visual impairment VI (VA <6/18-6/60 in better eye with available correction); Refractive error was the cause of VI for 35.6% male and 37.7% female. Similarly untreated cataract was the cause for VI among 57.8% males and 59.4% females respectively. Posterior segment disease was responsible for VI in 2.2% males and 2.9% females.

Table 3

Principal cause of blindness in persons; VA<3/60 in better eye with available correction, severe visual impairment; VA <6/60-3/60 with available correction and visual impairment; VA<6/18-6/60 with available correction. (%)

Causes	Blindness; VA<3/60, available correction, better eye			Severe Visual Impairment; VA<6/60 - 3/60, available correction, better eye			Visual Impairment; VA <6/18 - 6/60, available correction, better eye		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Refractive error	-	-	-	-	-	-	16 (35.6)	26 (37.7)	42 (36.8)
Cataract untreated	9 (60.0)	18 (72.0)	27 (67.5)	6 (85.7)	18 (100)	24 (96.0)	26 (57.8)	41 (59.4)	67 (58.8)
Aphakia uncorrected	2 (13.3)	1 (4.0)	3 (7.5)	1 (14.3)	-	1 (4.0)	2 (4.4)	-	2 (1.8)
Total curable	***11 (73.3)***	***19 (76.0)***	***30 (75.0)***	***7 (100)***	***18 (100)***	***25 (100)***	***44 (97.8)***	***67 (97.1)***	***111 (97.4)***
Surgical complications	1 (6.7)	-	1 (2.5)	-	-	-	-	-	-
Trachoma	-	1 (4.0)	1 (2.5)	-	-	-	-	-	-
Phthisis bulbi	1 (6.7)	-	1 (2.5)	-	-	-	-	-	-
Corneal scar	-	1 (4.0)	1 (2.5)	-	-	-	-	-	-
Total preventable	***2 (13.3)***	***2 (8.0)***	***4 (10.0)***	**-**	**-**	**-**	**-**	**-**	**-**
Total avoidable	**13 (86.7)**	**21 (84.0)**	**34 (85.0)**	**7 (100)**	**18 (100)**	**25 (100)**	**44 (97.8)**	**67 (97.1)**	**111 (97.4)**
Glaucoma	1 (6.7)	2 (8.0)	3 (7.5)	-	-	-	-	-	-
Diabetic retinopathy	-	-	-	-	-	-	-	-	-
Potentially preventable	***1 (6.7)***	***2 (8.0)***	***3 (7.5)***	**-**	**-**	**-**	**-**	**-**	**-**
ARMD	-		-	-	-	-	-	-	-
Other post segment	1 (6.7)	2 (8.0)	3 (7.5)	-	-	-	1 (2.2)	2 (2.9)	3 (2.6)
Total post segment	***2 (13.3)***	***4 (16.0)***	***6 (15.0)***	**-**	**-**	**-**	***1(2.2)***	***2(2.9)***	***3 (2.6)***
Total Blindness	**15 (100)**	**25 (100)**	**40 (100)**	**7 (100)**	**18 (100)**	**25 (100)**	**45 (100)**	**69 (100)**	**114 (100)**

Discussion

In this study out of the 1,200 enumerated people aged 50 years or above; 1,174 were examined (response rate 97.8%). The prevalence of blindness (VA <3/60 in better eye with available correction) among the people aged 50 years or above was 3.4% (95% CI=2.36-4.44). For male and female it was 2.32% and 4.76% respectively. This figure is slightly less than the one reported by Pokharel GP et al (1998) where they observed 3.9%. This figure is slightly more than the similar study done by Wadud et al (2006) in Bangladesh where they have reported the prevalence of blindness to be 2.9%. Women bear approximately two-thirds of the global burden of Blindness (Lewallen S, 2002). But in our study the females were two times more prone for being blind compared to their male counterpart (Odds Ratio=2.1, 95% Confidence Interval (CI)=1.01-4.0 and p value <0.005). The cause for more females to be blind can be explained in terms that females have less access to eye care service. Men were twice as likely as women to attend the eye camp as reported by Fletcher AE (1999). With

correction the prevalence of blindness dropped to 1.1%, 2.3% and 1.6% for the male, female and both sexes respectively. It is worthy to note here that blindness can be reduced to half simply by providing spectacles.

The estimates of severe bilateral visual impairment (VA <3/60-6/60 in better eyes with available correction) was 2.1% (1.1% for male and 3.4% for female). The females were more than 3 times prone to suffer from severe visual impairment than their counterpart male (Odds ratio OR= 3.2). These estimates are less than reported by Wadud Z (2006) where it is reported to be 4.4% (3.7% for the male and 5.1% for female) and more than Neena J (2008) estimates where this figure is reported to be 1.6% (1.4% for male and 1.7% for female. The estimates for visual impairment (VA <6/18-6/60 in the better eye, with available correction) was 9.7% (7.0% for male and 13.1% female).

Among the causes of blindness and visual impairment (table 3), untreated cataract was the main cause of blindness; responsible for 60%, 72% and 67.5% blindness for male, female and for both sexes respectively. Uncorrected aphakia was responsible for 13.3% and 4% blindness in male and female respectively. Thus 73% and 76% blindness in male and female respectively is curable. Preventable cause of blindness like surgical complication and phthisis bulbi was responsible for blindness in male in 6.7% each and trachoma and other corneal scar was the cause of blindness for female by 4% each. Thus 86.7% blindness in male and 84% blindness in female was avoidable.

Untreated cataract and uncorrected aphakia were the causes of severe visual impairment (SVI) in 85.7% and 14.3% males respectively. Similarly, untreated cataract was the cause of SVI by 100% in female. Thus 100% cause of SVI was curable (avoidable) for both the sexes. Similarly, refractive error (35.6%), untreated cataract (57.8%) and uncorrected aphakia (4.4%) were responsible for 97.8% curable cause of visual impairment for male. For female refractive error was responsible for 37.7% and untreated cataract for 59.4% of visual impairment contributing to the 97.1% of curable blindness. Posterior segment disease was responsible for visual impairment in 2.2% in male and 2.9% in female.

Conclusion

The prevalence of blindness among people aged 50 years and above in Karnali has declined from 3.7% in 1981 to 1.6% by 2010. Females are 3 times more likely to be blind in this age group than the males. Seventy five percent of the blindness is curable and 10% preventable. Cataract is the cause of blindness in 67.5% (60% male and 72% female). All cases of severe visual impairment are curable and 42% of visual impairment can be just treated by spectacles.

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References

Brilliant GE, Pokhrel RP, Grasset NC et al (1988). The epidemiology of blindness in Nepal: report of the 1981 Nepal blindness survey. (The Seva Foundation, Chelsea, MI)

Fletcher AE, Donoghue M, Devarem J, Thulasiraj RD (1999). Low uptake of Eye Care Service in Rural India, A Challenge for Programs of Blindness Prevention; Arch Ophthalmol; 117:1393-1399.

Karnali Integrated Rural Development and Research Center, Jumla, August 2002. An exploratory study, link: http://www.kirdarc.org/docs/publicationManagement/fd7cd9379f9f02c6b31bfa0e0e46c0a0.pdf

Lewallen S, Courtright P (2002). Gender and use of cataract surgical services in developing countries. Bulletin of the World Health Organization 2002, 80 (4); 300-3.

Limburg H (2007). Installation and use of the RAAB software package. In RAAB instruction manual. International Centre for Eye Health, London School of Hygine and Tropical Medicine, Keppel Street London WC1E 7HT: pp.37-59.

Limburg H, Foster A (2006). Rapid assessment of avoidable blindness and needs assessment of cataract surgical services in Satkhira District, Bangladesh. Br J Ophthalmol; 90:1225–1229.

Neena J, Rachel J, Praveen V, Murthy GVS (2008). Rapid Assessment of Avoidable Blindness in India. PLoS ONE 3(8): e2867. doi:10.1371/journal.pone.0002867

Pokharel GP, Regmi G, Shrestha SK, et al (1998). Prevalence of blindness and cataract surgery in Nepal. Br J Ophthalmol; 82:600–5.

Sapkota Y D, Pokharel G P, Nirmalan P K, Dulal S, et al (2006). Prevalence of blindness and cataract surgery in Gandaki Zone, Nepal. Br J Ophthalmol; 90:411–416

Shangrila Sustainable Development Programs; Appendix I, Facts on Karnali Region/ Western Nepal link; http://www.ask.com web?q=karnali+zone&qsrc=2871&o=14670cr&l=dis&qid=D81296306F8F88538A754F4E92379680&frstpgo=&page=2&jss=

Wadud Z, Kuper H, Polack S, Lindfield R et al (2006). Rapid assessment of avoidable blindness and needs assessment of cataract surgical services in Satkhira District, Bangladesh. Br J Ophthalmol; 90:1225-1229.

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