Awareness of Eye Health and Diseases among the Population of the Hilly Region of Nepal

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Abstract

Purpose: To collect information regarding awareness and knowledge of eye health and diseases among the population of the hilly region of Nepal.

Methods: In a population-based survey, 1834 participants were enrolled in the study. Field procedures included the development of a survey questionnaire, field orientation, pretesting, and household data collection. Association between knowledge of eye diseases was derived using the Chi-square test and odds ratios with a 95% confidence interval. A \( P \) value of \( \leq 0.05 \) was considered significant.

Results: Most participants were 31–40 years old (33.4%), female (51.1%), of upper caste (43.4%), Hindus (83.3%), received secondary level of education (34.4%), and involved in agriculture (48.6%). Awareness of cataract, night blindness, glaucoma, strabismus, and systemic diseases was 74.6%, 53.4%, 17.4%, 70.8%, and 46.5%, respectively. Knowledge regarding these diseases among those aware was 39.1%, 72.2%, 50.9%, and 92.3%, respectively. Awareness of cataract was significantly higher (88.4%) among higher caste groups (\( P < 0.001; OR, 4.29; 95\% CI, 3.34–5.54 \)), followed by business as an occupation (88.2%; \( P = 0.001; OR, 2.65; 95\% CI, 1.44–4.9 \)). Awareness of night blindness was significantly higher among students (72.6%; \( P < 0.001; OR, 2.46; 95\% CI, 1.65–3.67 \)).

Conclusion: There was a general lack of awareness and knowledge of common eye diseases. Improved awareness and knowledge are required for the prevention, early treatment, and access to eye care.

Keywords: Awareness; Cataract; Glaucoma; Knowledge; Night Blindness; Strabismus

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INTRODUCTION

Blindness and visual impairment are more prevalent in low-income countries such as Nepal, with cataract remaining the major cause of blindness.11 There is a
Moreover, illiteracy, poverty, ignorance, related to awareness and knowledge of eye health and resources and infrastructural development, community preventive ophthalmic care. Increased community awareness and knowledge of common eye diseases even blindness in some cases. Increased community awareness and knowledge of common eye diseases and their treatment options are important in promoting availability, accessible, and affordable eye care services.

Awareness of eye diseases and their treatment can play an important role in seeking and accessing available services. Eye-related symptoms are often ignored, leading to delayed presentation, which may culminate in ocular and visual disorders leading to temporary or permanent visual impairment and even blindness in some cases. Increased community awareness and knowledge of common eye diseases and their treatment options are important in promoting preventive ophthalmic care. Hence, apart from human resources and infrastructural development, community programs are necessary to ensure utilization of eye care services.

The main aim of this study was to collect information related to awareness and knowledge of eye health and common diseases that affect the eye among the people of the hilly region of Nepal.

METHODS

Study Design and Sample Size

A population-based cross-sectional study was conducted between 2008 and 2016 in eight village development committees (VDC) of eight districts. This comprised of four clusters in the central development region, two in the western development region, and one each in the midwestern and the eastern development regions. A proportionate stratified systematic sampling technique was employed in each cluster. Target population of each selected VDC and the unit of analysis were the individuals and the household, respectively. The sample frame of all households was obtained from each VDC office for this purpose. The households were listed serially, and each household was assigned a unique number. These households were again stratified based on their location within the wards of each VDC; the household sample was drawn based on the ethnic distribution in a proportionate manner within each ward of the VDC. The minimum number of households in a cluster was 648, with a maximum of 2642 households. The sample size was calculated based on the sample formula of proportion for an infinite population \( S = \frac{Z^2 p(1-p)}{c^2} \) considering \( Z = 1.96 \) with 95% confidence interval, \( p = \) percentage expressed as decimal (taken as 0.5 when it is not known) and \( c = \) margin of error of 0.05. Using this method, we calculated a sample size of 372 households. This number was upgraded by a factor of 2.0 to account for cluster sampling design effects and adjusted for 20% non-response error. The sample size was estimated to be 1116. The final sample size arrived at was larger by a factor of 1.64 and included 1843 (16.0%) of a total of 11465 households.

Verbal informed consent was obtained from all study subjects prior to the survey. The study protocol was approved by the Ethics Committee of the Institute of Medicine and was in accordance with the Declaration of Helsinki.

Field Procedures

The survey questionnaire was developed by a team of ophthalmologists and optometrists. A week-long field orientation program was conducted by the faculties of Community Medicine and Public Health, Maharajgunj Medical Campus for preparation of the survey questionnaire and checklist of observations, data collection, and familiarization with the form and the situation on the field. A pre-testing of instrument and pre-pilot studies were conducted in a small village that was not included in the sample cluster.

Household data were collected from the head of the household or any other family member above 18 years of age, using a structured questionnaire. The eye diseases
for which awareness was assessed included cataract, glaucoma, night blindness, strabismus, and the effect of systemic diseases on the eye. The questionnaire was developed exclusively in the Nepali language. Colloquial terms for eye diseases in the local language were obtained from eye care personnel, patients, and experts in questionnaire formulation. All the questions were semi-structured. Those subjects who said they knew about any particular eye disease, were asked to describe the disease in their own words. The questionnaire included a list of possible responses. The response given by the subject was marked by field investigators (final year optometry students) against the closest match on the list of responses in the questionnaire.

Analysis

All data were entered into the statistical package of social sciences (SPSS). “Awareness” was defined as having previously heard of the specific eye disease; “knowledge” was defined as having some understanding of the disease. The association between knowledge of various eye diseases (cataract, strabismus, glaucoma, night blindness, and effect of systemic diseases on eye) was derived by the Chi-square test. The odds ratio was calculated for awareness of cataract and night blindness with 95% confidence interval. A \( P \) value ≤0.05 was considered as statistically significant.

RESULTS

Demographic distribution of subjects who participated in the survey is presented in Table 1. Most participants (33.4%) were between 31–40 years of age, followed by participants between 41–50 years of age (25.9%). There were more female (51.1%) compared to male (48.9%) participants. Regarding ethnic distribution, 796 (43.4%) participants belonged to the Upper Caste Group (Brahmin, Chhetry, Thakuri, and Yogi) followed by 236 (12.9%) in the Disadvantaged Janajatis group (Magar, Tamang, Rai, Limbu, Bhujel, Danuwar, and Mukhiya), and 227 (12.4%) in the Relatively Advantaged Janajatis group (Newar and Gurung). The majority of the participants (83.3%) were Hindus. Most of the participants had a secondary level of education (34.4%) and were involved in agriculture as occupation (48.6%).

Awareness about Eye-related Symptoms

Among the 1619 participants surveyed [Table 2], the most common eye-related symptoms included “burning, itching, foreign body sensation, or grittiness” in 526 (32.5%) participants. “Blurring of vision” was experienced by 460 (28.4%) participants while “pain or soreness in the eye” was experienced by 398 (24.6%) participants. The major causes of eye-related symptoms were attributed to environmental pollution (24.5%), infection/germs (23.9%), and water pollution (21.0%). Most of the participants believed that eye hygiene (41.3%) and eating green vegetables and fruits (20.4%) could prevent eye illnesses.

Awareness and Knowledge of Cataract

A total of 1369 (74.6%) participants were aware of cataract [Table 3]. Knowledge about cataract was present in only 535 (39.1%) participants. Most of the participants had knowledge about the onset of cataract (49.8%), its treatment (64%) and location where treatment was available (82.8%). Most of the participants knew about cataract through eye camps, brochures, and pamphlets (58.7%) and from local health care professionals (21.3%). Awareness of cataract was significantly higher in the 31–40 year age group.
group (81.1%; \( P < 0.001; \text{OR, 1.73; 95\% CI, 1.35–2.17} \)) and the 51-60 year age group (81.0%; \( P = 0.007; \text{OR, 1.54; 95\% CI, 1.12–2.11} \)) [Table 4]. Awareness was also significantly higher among higher caste groups (Brahmin and Chettry) (88.4%; \( P < 0.001; \text{OR, 4.29; 95\% CI, 3.34–5.54} \)), among Hindus (75.9%; \( P = 0.005; \text{OR, 1.46; 95\% CI, 1.12–1.91} \)), among groups with all levels of education, except the illiterate and the literate with no formal education. Awareness was also high among subjects involved in all occupations except laborers and others.

**Awareness and Knowledge of Night Blindness**

A total of 979 (53.4%) participants were aware of night blindness [Table 5]. Knowledge about night blindness was present in only 707 (72.2%) participants. Most of the participants had knowledge about the cause (52.1%) and prevention (41.4%) of night blindness. The majority of participants had knowledge of the source of vitamin A (80.2%). Demographic distribution [Table 4] showed a significantly higher level of awareness among higher ethnic groups (61.2%; \( P < 0.001; \text{OR, 1.75; 95\% CI, 1.45–2.11} \)), Hindus (55.9%; \( P < 0.001; \text{OR, 1.83; 95\% CI, 1.43–2.35} \)), those who had secondary level education (64.6%; \( P < 0.001; \text{OR, 2.02; 95\% CI, 1.65–2.49} \)), bachelor level education (68.4%; \( P < 0.001; \text{OR, 2.0; 95\% CI, 1.34–2.98} \)) and students (72.6%; \( P < 0.001; \text{OR, 2.46; 95\% CI, 1.65–3.67} \)).

**Awareness and Knowledge of Glaucoma, Strabismus, and Systemic Diseases**

A total of 285 participants (17.4%) were aware of glaucoma [Table 6]. However, only 50.9% had knowledge of glaucoma. Awareness of strabismus was present in 1257 of 1776 participants (70.8%) [Table 7]. The majority of participants who were aware of glaucoma also had knowledge about it (92.3%). Most of them were aware of the cause of strabismus as congenital or
Table 4. Demographic distribution of awareness on cataract and night blindness

| Characteristics          | Cataract (n=1369/1834) | Night blindness (n=979/1834) |
|--------------------------|-------------------------|-----------------------------|
|                          | Yes, n (%)              | No, n (%)                   | OR (95% CI)       | Yes, n (%)              | No, n (%)                   | P  | OR (95% CI)       |
| Age (years)              |                         |                            |                  |                         |                            |    |                  |
| 18-30                    | 253 (70.3)              | 107 (29.7)                 | 0.033            | 0.75 (0.59-0.98)        | 208 (57.8)                 | 152 (42.2) | 0.062            | 1.25 (0.99-1.57) |
| 31-40                    | 497 (81.1)              | 116 (18.9)                 | <0.001           | 1.73 (1.35-2.17)        | 334 (54.5)                 | 279 (45.5) | 0.006            | 0.75 (0.61-0.92) |
| 41-50                    | 327 (67.0)              | 147 (33.0)                 | 0.001            | 0.67 (0.53-0.85)        | 242 (51.1)                 | 232 (48.9) | 0.23             | 0.88 (0.71-1.08) |
| 51-60                    | 230 (81.0)              | 54 (19.0)                  | 0.007            | 1.54 (1.12-2.11)        | 150 (52.8)                 | 134 (47.2) | 0.83             | 0.97 (0.75-1.25) |
| >60                      | 63 (61.2)               | 40 (18.8)                  | <0.001           | 0.49 (0.32-0.73)        | 45 (43.7)                  | 58 (56.3) | 0.042            | 0.66 (0.44-0.98) |
| Sex                      |                         |                            |                  |                         |                            |    |                  |
| Male                     | 639 (71.2)              | 259 (18.8)                 | 0.061            | 0.81 (0.66-1.01)        | 518 (57.7)                 | 380 (42.3) | <0.001           | 1.17 (0.97-1.41) |
| Female                   | 731 (78.1)              | 225 (11.9)                 | 0.061            | 1.22 (0.99-1.50)        | 461 (48.2)                 | 495 (51.8) | <0.001           | 0.85 (0.71-1.03) |
| Religion                 |                         |                            |                  |                         |                            |    |                  |
| Hindu                    | 1160 (75.9)             | 368 (24.1)                 | 0.005            | 1.46 (1.12-1.91)        | 854 (55.9)                 | 674 (44.1) | <0.001           | 1.83 (1.43-2.35) |
| Buddhist                 | 158 (70.5)              | 66 (29.5)                  | 0.131            | 0.79 (0.58-1.07)        | 91 (40.6)                  | 133 (59.4) | <0.001           | 0.55 (0.42-0.74) |
| Christian                | 39 (76.5)               | 12 (23.5)                  | 0.761            | 1.11 (0.57-2.13)        | 22 (43.1)                  | 29 (56.9) | 0.13             | 0.65 (0.37-1.15) |
| Muslim                   | 12 (38.7)               | 19 (61.3)                  | <0.001           | 0.21 (0.10-0.43)        | 12 (38.7)                  | 19 (61.3) | 0.098            | 0.54 (0.26-1.13) |
| Education                |                         |                            |                  |                         |                            |    |                  |
| Illiterate               | 143 (46.1)              | 167 (53.9)                 | <0.001           | 0.21 (0.16-0.27)        | 110 (35.5)                 | 200 (64.5) | <0.001           | 0.41 (0.32-0.53) |
| Literate no formal education | 130 (55.1)             | 106 (44.9)                 | <0.001           | 0.35 (0.27-0.47)        | 105 (44.5)                 | 131 (55.5) | 0.003            | 0.66 (0.50-0.87) |
| Primary                  | 312 (88.9)              | 35 (11.1)                  | <0.001           | 3.6 (2.51-5.23)         | 164 (47.3)                 | 183 (52.7) | 0.011            | 0.74 (0.58-0.93) |
| Secondary                | 504 (80.0)              | 126 (20.0)                 | <0.001           | 1.56 (1.24-1.97)        | 407 (64.6)                 | 223 (35.4) | <0.001           | 2.02 (1.65-2.49) |
| Higher secondary         | 174 (90.2)              | 19 (9.8)                   | <0.001           | 3.4 (2.1-5.55)          | 112 (58.0)                 | 81 (42.0)  | 0.17             | 1.23 (0.91-1.67) |
| Bachelor and above       | 106 (89.8)              | 12 (10.2)                  | <0.001           | 3.17 (1.72-5.81)        | 81 (68.4)                  | 37 (31.6)  | <0.001           | 2.0 (1.34-2.98)  |
| Occupation               |                         |                            |                  |                         |                            |    |                  |
| Agriculture              | 689 (77.2)              | 203 (22.8)                 | 0.013            | 1.3 (1.06-1.61)         | 478 (53.6)                 | 414 (46.4) | 0.86             | 1.01 (0.84-1.22) |
| Service                  | 94 (92.2)               | 8 (7.8)                    | <0.001           | 4.2 (2.03-8.73)         | 65 (63.7)                  | 37 (36.3)  | 0.031            | 1.57 (1.03-2.37) |
| Business                 | 90 (88.2)               | 12 (11.8)                  | 0.001            | 2.65 (1.44-4.9)         | 59 (57.8)                  | 43 (42.2)  | 0.35             | 1.21 (1.81-1.81) |
| Labors                   | 154 (69.7)              | 67 (31.3)                  | <0.001           | 0.75 (0.55-1.02)        | 100 (45.2)                 | 121 (54.8) | 0.009            | 0.69 (0.52-0.91) |
| Student                  | 109 (85.1)              | 19 (14.9)                  | 0.004            | 2.0 (1.23-3.34)         | 93 (72.6)                  | 35 (27.4)  | <0.001           | 2.46 (1.65-3.67) |
| Others                   | 233 (59.9)              | 156 (41.1)                 | <0.001           | 0.4 (0.32-0.51)         | 184 (47.3)                 | 207 (52.7) | 0.006            | 0.73 (0.58-0.91) |

Ethnicity: Dalit (G1), Disadvantaged janajatis (G2), Religious minorities (G4), Relatively advantaged janajatis (G5), Upper caste group (G6).

OR, Odds ratio; CI, Confidence interval

Discussion

The findings of the present study represent population-based data. The Rapid Assessment of Avoidable Blindness (RAAB) Survey had previously reported the prevalence of blindness in 0.39% of the population in Nepal[3] with cataract as the major etiological factor. The present study was the report of the community eye health project of BP Koirala Lions Centre for Ophthalmic Studies, Institute of Medicine. The findings of this study may be useful in planning health education in the study population and to

hereditary (39.8%) and its treatment (42.5%). Impairment of vision (37.7%) and cosmetic distortion (27.3%) were reported to be the major drawbacks of strabismus. Among 960 participants, systemic illnesses were reported in 180 (18.7%). Hypertension (52.2%) and asthma (22.9%) were the most common systemic illnesses [Table 8]. Only 34 participants (18.9%) had undergone an eye checkup for systemic illnesses. Awareness about systemic illnesses was noted in 446 (46.5%) participants. Most of them were aware of systemic illnesses from their own personal affliction (28.9%), or from health care professionals (23.3%).
increase awareness and knowledge about common eye diseases.

Among the study population, awareness of cataract (74.6%) was higher than expected, but the knowledge was poor (29.2%). Eye camps, brochures, pamphlets, and information from medical professionals had a major role in creating awareness about cataract. Similar findings were reported by Dandona et al., Sapkota et al., and Attebo et al. In contrast to our findings, the source of awareness was mostly from family members, friends, and relatives suffering from cataract in the study by Dandona et al. The same authors also reported that awareness of cataract was higher among Muslims and increased with age and educational status. Similarly, Sapkota et al reported that a significant proportion of participants had awareness about cataract (72%) and eye camps (63.2%) were the major source of information, similar to our findings. Attebo et al reported that 98% of subjects were aware of cataract; however, only 20% had some knowledge about it. A study of cataract surgery in South India and different zones of Nepal reported that individuals who were likely to be more aware of cataract surgery tended to be male, literate, and more affluent than those who were unaware. In our study, awareness of cataract was significantly related to the level of education [Table 3]. The majority of subjects were aware that the treatment for cataract was surgical (64%). Awareness regarding treatment of cataract was higher in the Dandona et al study (82.8%). However, awareness was less compared to our findings in a study conducted at the Takeo Province in Cambodia (18.6%).

Awareness of glaucoma among participants was poor in our study (17.4%); it was even less in the Dandona et al study (2.4%). A reasonable level of awareness (70%) was reported by Livingston et al and Attebo et al, (93%) in Australia. A higher level of awareness (90%) was reported in the 2005 KAP (knowledge, attitudes, and practice) study, conducted by National Eye Institute. Knowledge of glaucoma was even less in our study (8.9%) and other studies by Livingston et al (22%) and Attebo et al (29%). It is important to improve awareness of glaucoma in this population particularly because it is difficult to detect because of its silent nature. It is slowly progressive and leads to irreversible loss of vision. Early detection and treatment could prevent progression. Hence, education on the importance of periodic eye examination should be imparted to prevent glaucoma-related loss of vision.

We found a moderate level of awareness regarding night blindness (53.4%); 72.2% of those who were aware had knowledge of this illness. However, knowledge regarding night blindness was higher than for cataract (OR, 1.5; CI, 1.33–1.75; P < 0.001) and glaucoma (OR, 6.4; CI, 5.30–7.82; P < 0.001). Our findings on awareness were similar to the previous report by Dandona et al (55.8%). Knowledge regarding night blindness was less (33.4%) in that study. In the present study, knowledge regarding the cause of night blindness was also moderate (52%), and most of the participants did not know about the method to prevent night blindness (45.6%). However, most participants (80.2%) had knowledge of the source of vitamin A. Dandona et al reported that lack of awareness regarding night blindness was related to female gender, low socio-economic status, and ethnic minority groups. In our study, night blindness was significantly related to the level of education [Table 3].
Knowledge of night blindness should be increased to prevent childhood blindness. Childhood blindness due to vitamin A deficiency is still a major public health issue in India and Nepal. Coverage of the national vitamin A program was reported to be excellent and successful in Nepal. The awareness campaign along with the vitamin A distribution program could be a boon to increase awareness and prevent preventable blindness.

Unlike the Geta and Bejiga study (100%) and Takeo Province study (94%), we noted that 1257 participants (70.8%) were aware of strabismus and the majority of participants (92.3%) had knowledge about it. However, we noted that knowledge of strabismus among the participants was higher than knowledge of cataract (OR, 4.6; CI, 3.97–5.26; P < 0.001), glaucoma (OR, 19.9; CI, 16.30–4.25; P < 0.001), and night blindness (OR, 3.0; CI, 2.62–3.44; P < 0.001). Only 374 participants (42.5%) were aware of the treatment of strabismus. Awareness about treatment was even less in a previous study (32.1%). Participants reported that the potential problems with strabismus were loss of vision (37.7%) and cosmetic distortion (27.3%).

Psychological trauma (12.7%) and difficulty in finding a marriage partner (11.8%) were also noted. Similar findings were also noted in the Geta and Bejiga study (2011). The source of information was seen to be neighbors and relatives in the above study. Strabismus is one of the common causes of amblyopia. Prevalence of strabismus was reported to be between 0.4% to 2.5% among school children in Nepal. Though this may seem low, there is growing evidence of the psychological impact, loss of opportunities, and deteriorating interpersonal relationship.

We found that only 446 participants (46.5%) were aware of the effect of systemic diseases on the eye. Only 34 participants (18.9%) with systemic illnesses had undergone an eye checkup. Hypertension (52.2%) was the most common systemic illness reported. Most had heard about it from their own personal experience (28.9%).

| Responses | Number of response (%) |
|-----------|------------------------|
| Deviation of eyes* | 973 (77.4) |
| Squeezing of eyes in bright light | 60 (4.8) |
| Looking sideway | 37 (2.9) |
| Nonparallel alignment of eyes* | 187 (14.9) |

| What can cause strabismus (n=1135)? |
|------------------------------------|
| Congenital/hereditary | 452 (39.8) |
| Trauma to eye | 79 (7.0) |
| Blessings/curse/luck | 91 (8.0) |
| Diseases of eye | 112 (9.9) |
| Gazing at intense light | 97 (8.5) |
| Others | 53 (4.7) |
| Don’t know | 251 (22.1) |

| What is strabismus (n=1257)? |
|-------------------------------|
| Yes | 374 (42.5) |
| No | 459 (52.1) |
| Don’t know | 48 (5.4) |

| What could be the problem with strabismus (n=881)? |
|---------------------------------------------------|
| Cosmetic distortion | 241 (27.3) |
| Loss of confidence | 56 (6.4) |
| Psychological trauma | 112 (12.7) |
| Problem with marriage | 104 (11.8) |
| Decrease vision | 332 (37.7) |
| Others | 36 (4.1) |

*Considered as knowledge, *Awareness derived from 1776
medical professionals (23.3%), and friends, relatives, or neighbors (21.5%). Most published articles have reported knowledge on the effect of diabetes on the eye. In the National Eye Institute 2005 survey, 51% subjects had awareness on diabetes-related eye diseases. Dandona et al. reported that awareness of the possibility of diabetes causing impaired vision was low (28.6%); awareness was higher in subjects belonging to the upper and middle socioeconomic strata. In the above report, subjects heard about diabetic eye diseases mostly from family members, friends, or relatives suffering from it. Awareness of diabetes-related eye diseases was less (8%) in the Takeo province study. In the Pikayi et al. (2013) study, 25 subjects (100%) having diabetes and attending diabetes clinics had knowledge of the effect of diabetes on the eye and stated that blindness and diabetic retinopathy were the major complications of diabetes.

Though we noted that knowledge of common eye diseases is generally lacking, this finding cannot be generalized because the study did not include subjects from the urban area and the population from the far western, the Terai and the mountainous regions of Nepal. In conclusion, there is a need to increase awareness and knowledge of common eye diseases for the prevention, early treatment, and regarding access to available eye care services in these regions. This may enable minimization of visual impairment and cost of eye care.

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Conflicts of Interest
There are no conflicts of interest.

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