Demographic Characteristics and Causes of Visual Impairment in the White Nile State of Sudan: A Hospital-based Study

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Abstract

BACKGROUND: The World Health Organization (WHO) states that visual impairment (VI) is a reduction of vision functions due to eye diseases, trauma, and congenital eye conditions. The current estimates indicate that more than 90% of people with vision impairment live in rural and developing countries.

AIM: This study aimed to determine demographic characteristics and causes of visual impairment in the White Nile State of Sudan.

METHODS: A cross-sectional retrospective hospital-based study, including all patients attending Kosti and Rabak eye hospitals from January to December 2017, was conducted. A total of 1,000 records reviewed, 300 of them met the required criteria and then included in this study, with a mean age of 59.8 ± 18.5 (ranged from 10 to 95) years old. Visual impairment was classified according to the International Classification of Diseases, 11th revision, 2018 (ICD-11).

RESULTS: The prevalence of VI was found at 28.5%. Based on best-corrected visual acuity (BCVA), six participants (2.0%) were mild VI, 32 (10.7%) had moderate VI, 152 (50.7%) had severe VI, and 110 (36.7%) were blind. VI was more common among males 158 (52.7%) than females, but statistically not significant (p = 0.35). The main causes of VI were cataract (52%), refractive errors (20.7%), glaucoma (16.3%), corneal disorders (5.3%), diabetic retinopathy (1.7%), and other causes (4%).

CONCLUSION: Visual impairment was high in the community and more prevalent among older age. Cataract was the leading cause of VI, then refractive errors and glaucoma. Among children, uncorrected refractive errors and cataracts were the common leading causes of VI. In adults, the main causes were cataracts, uncorrected refractive errors, and glaucoma.
causes of blindness in the developed world [14]. The World Health Organization (WHO) estimates that 80% of VI cases are either avoidable or curable with early investigation and treatment [3]. This includes cataracts, onchocerciasis, trachoma, glaucoma, diabetic retinopathy, uncorrected refractive errors, and some cases of childhood blindness [3], [1].

Few studies were conducted in Sudan to estimate the prevalence and causes of VI. The study was performed by Ibrahim and Elnimeiri [15] to estimate the prevalence and major causes of blindness among Sudanese adults attending ophthalmic services in Sudan in 2019. They reported that the prevalence of blindness was high, the majority were female of older age groups and glaucoma was the leading cause of blindness followed by cataract and diabetic retinopathy. Another study was conducted by Atrasheed et al. [2] to assess the prevalence of childhood VI and refractive error in the South Darfur State of Sudan. They reported that refractive error was a major cause of childhood VI among children in the South Darfur State. In another study done by Mohamed et al. [16], to determine the prevalence and causes of childhood VI in the Al-Gazira state of Sudan. They found that the prevalence of VI was 1.5% and uncorrected refractive errors were a major cause of childhood VI. Binnawi et al. [17] conducted a study to estimate the prevalence and causes of VI in people aged 50 years and older in the North Kordofan state of Sudan. They stated that the prevalence of blindness and VI was 8.37% and 9.06%, respectively. To the best of our knowledge, there is no study conducted in the White Nile State of Sudan to determine the causes and prevalence of VI. Therefore, the present study aimed to determine demographic characteristics and causes of visual impairment in the White Nile State of Sudan.

Materials and Methods

Study design

A cross-sectional retrospective hospital-based study was conducted to determine the leading causes of visual impairment in White Nile State-Sudan. Data were collected from all patients attending the Two Eye Hospitals (Kosti and Rabak) from January to December 2017.

Ethical consideration

Ethical approval was obtained from the Al-Neelain University Research Ethics Committee, and the study was performed according to the Declaration of Helsinki guidelines. Informed consent was waived due to the retrospective nature of the study. However, efforts were made to ensure that patients’ confidentiality was guaranteed. The collected data were saved confidentially, and no individual information was obtained.

Data collection procedures

A total of 1000 records were reviewed, 300 of them were satisfied with the required criteria and then included in this study, with a mean age of 59.8 ± 18.5 (ranged from 10 to 95) years older, 52% of whom were male, while 48% were female. Visual impairment was classified according to the International Classification of Diseases 11th revision, 2018 (ICD-11). Distance vision impairment: Mild VI is defined as VA worse than 6/12 to 6/18 of the best-corrected eye, while moderate VI is VA worse than 6/18 to 6/60. However, the severe VI defined as VA worse than 6/60 to 3/60 and blindness defined as VA worse than 3/60 in the better eye with the best correction possible.

Data collection procedures

The data were entered into an Excel sheet and then analyzed using SPSS version 21 and GraphPad prism. Descriptive analysis was carried out to calculate the means with frequencies and proportions for the categorical variables, p-value ≤ 0.05 was considered significant for all inferential analyses.

Results

A total of 300 out of 1,000 patients from Kosti and Rabak eye Hospital records were included in this study. The mean age of the participants was 59.8 ± 18.5 (range: from 10 to 95) years older, 52% of whom were male, while 48% were female. With regard to the refractive condition, 36.7% were myopic, 13.3% hypermetropic, and 50% with faint fundus reflex.

The prevalence of VI was found at 28.5%. Based on BCVA, 6 (2.0%) had mild VI, 32 (10.7%) had moderate VI, 152 (50.7%) had severe VI, and 110 (36.7%) were blind, as illustrated in Table 1. Cataract was the major leading cause of VI in the current study (52%), followed by uncorrected refractive error (20.7%), glaucoma (18.3%), diabetic retinopathy (5.3%), corneal opacity (1.6%), and other causes (4.3%), as shown in Figure 1.

Table 1: Distribution of visual impairment among participants according to gender

<table>
<thead>
<tr>
<th>Classification of VI</th>
<th>Male</th>
<th>Female</th>
<th>Total (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Mild VI</td>
<td>6</td>
<td>2.0</td>
<td>0.0</td>
<td>6 (2.0)</td>
</tr>
<tr>
<td>Moderate VI</td>
<td>17</td>
<td>5.7</td>
<td>15 5.0</td>
<td>32 (19.7)</td>
</tr>
<tr>
<td>Severe VI</td>
<td>81</td>
<td>27</td>
<td>71 23.7</td>
<td>152 (50.7)</td>
</tr>
<tr>
<td>Blindness</td>
<td>54</td>
<td>18</td>
<td>56 18.7</td>
<td>110 (36.7)</td>
</tr>
<tr>
<td></td>
<td>158</td>
<td>52.7</td>
<td>142 47.3</td>
<td>300 (100)</td>
</tr>
</tbody>
</table>
Blindness and severe visual impairment were slightly high among males 52.7% and 27%, respectively, while moderate visual impairment some in males and females, the VI was not statistically associated with gender (p = 0.35), as shown in Table 1.

Regarding the distribution of VI according to the participant’s age, findings revealed that only 3.6% of visually impaired patients were children, 43% were adults, and 48.3% were elders. Among children, the leading cause of VI was uncorrected refractive errors 45.5% followed by cataract 36.4%. The major causes of VI among adults and elderly were cataract 51.9%, followed by uncorrected refractive errors and glaucoma 20.1% and 17%, respectively. The causes of VI were significantly associated with patients’ age as indicated by the Pearson Chi-square test ($\chi^2 = 31; p = 0.001$), as shown in Figure 2.

Independent t-test did not show a statistically significant difference in VA between males and females ($t = 1.76, p = 0.079$). Paired sample t-test reveals no statistical significant difference in VA between right and left eyes ($t = –1.261$, and $p = 0.208$). Results analysis shows an inverse correlation between age and vision (RE: $r = –0.31$, LE: $r = –0.19$; $p = 0.001$). While Pearson Chi-square test indicates no statistical significant difference between causes of VI in males and females ($\chi^2 = 6.57; p = 0.35$). However, in terms of age obtained by Pearson Chi-square test, a higher percentage of the older age group had visual impairment when compared with the younger group ($\chi^2 = 37.9; p = 0.001$), as illustrated in Figure 3.

Visual impairment is considered a public health concern worldwide. It impairs the quality of life and has an impact on career choices and job opportunities, and the socioeconomic burden on society. In the present study, VI was categorized according to the International Classification of Diseases 11th revision 2018 (ICD-11). In this hospital-based study, the prevalence of VI was 28.5% of the whole patients attending eye clinics during January–December 2017. This was higher than the prevalence reported by Binnawi et al. [17] in North Kordofan State of Sudan (8.37%) and by Assefa et al. [18] in Ethiopia (16.8%). The high rate of visual impairment may be principally attributed to the difference in study design, environmental differences, the age range of participants, gender differences, and sample sizes. This high prevalence of VI may reflect poor accessibility to eye care services among the community.

In this study, cataracts and uncorrected refractive error were the major leading cause of visual impairment in this rural community. These findings are remarkably comparable to other reported studies [17], [19] from Sudan, in which they showed that the cataract and uncorrected refractive errors were the leading causes of VI. Moreover, the findings of the current study are in consistent with the global estimation of visual impairment [10]. approximately 72.3% of the causes of VI were avoidable by early diagnosis and treatment similar to the findings of the previous study [10]. Inconsistent with many previous studies [20], [21], there was a significant association between age and visual impairment. The risk of visual impairment increases with age due to chronic eye diseases such as retinopathies, cataracts, and aging processes [3]. In an aging eye, many pathological and optical changes appear and produce an advanced
reduction in visual functions leading to VI [22]. Cataract was the major leading cause of VI in adults responsible for 51.9%. The high cataract rate as a cause of VI is comparable with the findings reported in the national guideline for the prevention of blindness [23]. However, among children cataract is due to genetic disorders and eye injuries. Systemic diseases such as diabetes result in osmotic overhydrating of the lens which leads to cataract formation this common in old age [24].

In terms of gender, there was no significant association between gender and visual impairment. This is inconsistent with the preceding study [25] reported that there is a significant association between gender and visual impairment and contrarily, blindness was reported to be more common in men. The authors attributed that the females being at risk of VI this mainly due to their longer life expectancy and in poorer societies; there is lack to access eye care services. This study had some limitations; first, this was a retrospective nature study. Patients’ information was sometimes incomplete, and there were missing records. Second, the study used an age group stratification. A difference in the stratification of age groups, with older than 18 years being the dominant age group in the study may have caused inconsistency from others, especially that this group may be associated with a high prevalence of VI. Third, the study came from a hospital referral practice and may not reflect the demographics of the general Sudanese population. Despite the limitations mentioned, the present study provides information about the demographic characteristics and causes of visual impairment in the White Nile State of Sudan.

Conclusion

Visual impairment was high in the community and more prevalent among old age. Cataract was the leading cause of visual impairment then refractive errors and glaucoma. Among children, refractive errors and cataracts were the common leading causes of visual impairment, while in adults the main causes were cataracts, uncorrected refractive errors, and glaucoma.

References


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