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PREVALENCE AND PATTERN OF OCULAR MORBIDITY AMONG CHILDREN LIVING IN ORPHANAGES IN PESHAWAR: A CROSS-SECTIONAL STUDY

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Abstract

Background

Childhood visual impairment is a significant public health concern and contributes substantially to the global burden of blindness. Approximately 1.4 million children worldwide are affected by blindness, with refractive errors being the leading cause of visual impairment among school-aged children. Children living in orphanages may have limited access to healthcare services, including eye care, making them a vulnerable group for undiagnosed ocular conditions. This study aimed to assess the ocular health status of children residing in orphanages in Peshawar, Pakistan.

Methods

A cross-sectional study was conducted from January to March 2024 among 227 children living in three orphanages in Peshawar. Comprehensive ocular examinations were performed, including visual acuity assessment, refractive error evaluation, and anterior and posterior segment examination. Data were analyzed using SPSS version 23. Descriptive statistics were calculated, and the Chi-square test was applied to determine the association between ocular morbidity and demographic variables such as age and gender.

Results

Overall ocular morbidity was observed in 26% of the participants, with refractive errors being the most common condition (18%). Myopia was present in 16 children (7.0%), hyperopia in 15 children (6.6%), and astigmatism in 10 children (4.4%). Strabismus and amblyopia were each identified in 2 children (0.9%). Mild visual impairment (visual acuity worse than 6/12) was observed

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in 37 children (16.3%), moderate visual impairment (worse than 6/18 to 6/60) in 12 children (5.3%), and severe visual impairment (worse than 6/60 to 3/60) in 1 child (0.4%). Other ocular conditions included conjunctivitis (1.8%), blepharitis (1.3%), stye (0.4%), chalazion (0.4%), cataract (0.9%), and retinitis pigmentosa (0.4%). No statistically significant association was found between ocular morbidity and the age or gender of the participants.

Conclusion

Refractive errors were the most common ocular disorder among children living in orphanages in Peshawar. Since refractive errors are largely preventable and correctable, regular vision screening programs in orphanages could play an important role in reducing childhood visual impairment in Pakistan.

INTRODUCTION

Childhood visual impairment remains an important public health concern worldwide, with significant social, educational, and economic consequences.[1, 2] Children represent a substantial proportion of the global population, accounting for approximately 2.2 billion of the world's 7.7 billion people.[3] Visual impairment occurring during childhood has long-term implications, as it affects educational performance, social development, and future productivity.[4] It is estimated that nearly 1.4 million children worldwide are blind, and approximately 90% of these children live in low- and middle-income countries.[5, 6] In addition to blindness, millions of children suffer from varying degrees of visual impairment that can adversely affect their learning and quality of life.[7]

Refractive errors are among the leading causes of visual impairment in children and are largely preventable or correctable.[8, 9] Globally, it is estimated that over 153 million people experience visual impairment due to uncorrected refractive errors, with a significant proportion occurring among school-aged children.[10] Approximately 12.8 million children aged 5–15 years are visually impaired because of uncorrected refractive errors, making it one of the most common causes of avoidable visual impairment in this age group.[11] If left untreated, refractive errors can negatively affect academic performance, reduce educational opportunities, and impair psychosocial development.

Visual impairment is unevenly distributed across the world, with a greater burden in developing countries due to limited access to eye care services, lack of screening programs, and socioeconomic barriers. The World Health Organization estimates that around 90% of visually impaired individuals live in developing regions, particularly in Asia and Africa.[12] In many of these regions, childhood eye conditions remain undiagnosed due to insufficient awareness, lack of trained eye care professionals, and limited access to corrective measures such as spectacles.[13]

Children living in orphanages represent a particularly vulnerable group. According to the United Nations Children's Fund (UNICEF), an orphan is defined as a child under the age of 18 who has lost one or both parents.[14] Globally, an estimated 153 million children are classified as orphans, many of whom live in institutional settings such as orphanages.[15] These children often face numerous challenges, including limited access to healthcare services, inadequate nutrition, and psychological stress resulting from the loss of parental support. Such factors may increase their risk of undiagnosed or untreated health problems, including ocular disorders.

In Pakistan, the burden of visual impairment remains considerable. National surveys have reported a high prevalence of blindness and visual impairment, particularly in underserved populations. It is estimated that approximately 4.2 million orphaned children live in Pakistan, many of whom depend on institutional care or charitable organizations.[16] Despite the large number of children living in orphanages, limited research has been conducted to evaluate their ocular health status. Lack of regular vision

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screening in orphanages may result in delayed detection and treatment of common eye conditions such as refractive errors, amblyopia, and other ocular disorders.

Early detection and management of ocular problems in childhood are essential to prevent long-term visual disability. Regular vision screening programs and timely treatment can significantly reduce the burden of avoidable visual impairment among children. Identifying ocular health problems in vulnerable populations such as orphaned children can help guide public health interventions and improve access to eye care services.

Therefore, this study aimed to assess the ocular health status of children living in orphanages in Peshawar, Pakistan, and to determine the prevalence of refractive errors and other ocular conditions in this population.

METHODS

This cross-sectional study was conducted among children residing in three orphanages in Peshawar, Pakistan. Ethical approval for the study was obtained from the Ethical Committee of Khyber Medical University prior to the commencement of the study. Permission was also obtained from the administrations of the participating orphanages. Participation in the study was voluntary, and all participants were assured that their personal information would remain confidential and used solely for research purposes.

The study was carried out over a six-month period, with data collection conducted from January 2024 to March 2024. The objective of the study was to assess the ocular health status of orphan children and identify common ocular disorders present in this population.

The study population consisted of children living in the selected orphanages during the study period. Children of both genders and all age groups who were present at the orphanages at the time of the examination were eligible to participate in the study. Children who were absent during the examination period or unable to cooperate with the ocular examination were excluded from the study.

The sample size was calculated using an anticipated prevalence of refractive errors of 18%, a margin of error of 5%, and a confidence level of 95%.[17] Based on these parameters, the required sample size was determined to be 227 participants. A simple random sampling technique was used to select participants from the eligible population of the participating orphanages.

Data collection was performed using a structured questionnaire and a comprehensive ocular examination. Permission to conduct the study was obtained from the administration of the participating orphanages before the commencement of data collection. The purpose and procedures of the study were explained to the orphanage authorities and participants prior to examination. Verbal informed consent was obtained before the examination, and confidentiality of participant information was maintained throughout the study.

Distance visual acuity was assessed using a Snellen visual acuity drum at a distance of 20 feet under standard examination conditions. Participants with reduced visual acuity underwent further refractive assessment. Objective refraction was performed using retinoscopy for participants with visual acuity worse than 6/6, followed by subjective refraction to confirm the refractive status. Ocular alignment was evaluated using the Hirschberg test and the cover–uncover test to detect manifest and latent deviations. Examination of the anterior and posterior segments of the eye was carried out using a direct ophthalmoscope.

For the purpose of this study, refractive error was defined as visual acuity worse than 6/6 that improved with pinhole or optical correction. Myopia was defined as a spherical refractive error of −0.25 diopter (D) or greater, while hyperopia was defined as a spherical refractive error of +0.25 diopter (D) or greater. Astigmatism was defined as a cylindrical refractive error of ±0.25 diopter cylinder (DC) or more. Anisometropia was defined as a difference in refractive error of at least 1.00 diopter between the two eyes. Amblyopia was defined as best-corrected visual acuity worse than 6/9 in one or both eyes in the absence of any identifiable ocular pathology. Strabismus was

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defined as any ocular misalignment detected using the Hirschberg test or cover test.

The collected data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 23. Descriptive statistics were used to summarize the data. Frequencies and percentages were calculated for categorical variables such as age, gender, and types of ocular disorders. The Chi-square test was applied to determine the association between ocular morbidity and demographic variables including age and gender. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 227 orphan children participated in the study. Among them, 138 (60.8%) were males and 89 (39.2%) were females. Regarding age distribution, 116 (51.1%) participants were aged 1–9 years, while 111 (48.9%) were aged 10–17 years. Most participants were studying at the primary education level (50.2%), followed by middle level (25.6%) and secondary level (24.2%). (Table. 1)

Table 1. Demographic Characteristics of Participants (n = 227)

Variable	Frequency (n)	Percentage (%)
Age group (years)		
1–9	116	51.1
10–17	111	48.9
Gender		
Male	138	60.8
Female	89	39.2
Education level		
Primary	114	50.2
Middle	58	25.6
Secondary	55	24.2

Most children did not report ocular symptoms (94.7%). However, some children experienced symptoms including burning and itching (2.2%), redness (2.2%), blurred vision (0.4%), and eye pain (0.4%). (Table. 2)

Table 2. Ocular Symptoms Among Participants

Symptom	Frequency (n)	Percentage (%)
Burning / itching	5	2.2
Redness	5	2.2
Blurred vision	1	0.4
Eye pain	1	0.4
No symptoms	215	94.7

Visual acuity assessment showed that 177 children (78.0%) had normal visual acuity. Mild visual impairment (visual acuity worse than 6/12) was observed in 37 (16.3%) participants, moderate visual impairment (worse than 6/18 to 6/60) in 12 (5.3%), and severe visual impairment (worse than 6/60 to 3/60) in 1 (0.4%) participant. (Table. 3)

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Table 3. Visual Acuity Status of Participants

Visual Acuity Category	Frequency (n)	Percentage (%)
Normal	177	78.0
Mild visual impairment (<6/12)	37	16.3
Moderate visual impairment (<6/18–6/60)	12	5.3
Severe visual impairment (<6/60–3/60)	1	0.4

Refractive errors were the most common ocular disorder identified. In the right eye, myopia was present in 16 (7.0%), hyperopia in 15 (6.6%), and astigmatism in 10 (4.4%) participants. Similar findings were observed in the left eye. (Table. 4)

Table 4. Distribution of Refractive Errors

Refractive Error	Right Eye n (%)	Left Eye n (%)
Myopia	16 (7.0)	16 (7.0)
Hyperopia	15 (6.6)	14 (6.2)
Astigmatism	10 (4.4)	10 (4.4)
Emmetropia	186 (81.9)	187 (82.4)

The prevalence of amblyopia and strabismus was low, with each condition identified in 2 participants (0.9%). Various anterior and posterior segment disorders were also identified, including blepharitis (1.3%), conjunctivitis (1.8%), stye (0.4%), chalazion (0.4%), cataract (0.9%), and retinitis pigmentosa (0.4%). (Table. 5)

Table 5. Distribution of Ocular Anterior and Posterior Segment Diseases

Ocular Condition	Frequency (n)	Percentage (%)
Amblyopia	2	0.9
Strabismus	2	0.9
Blepharitis	3	1.3
Conjunctivitis	4	1.8
Stye	1	0.4
Chalazion	1	0.4
Cataract	2	0.9
Retinitis Pigmentosa	1	0.4

A small proportion of participants had a positive ocular history, reported in 5 (2.2%) individuals, while the majority 222 (97.8%) had no prior ocular history. Among those with a positive history, 2 (0.9%) were using ocular medications and 3 (1.3%) were using spectacles. Similarly, current optical history was present in 5 (2.2%) participants, while 221 (97.4%) had no history of optical correction. Regarding spectacle use, 2 (0.9%) participants were using glasses for near vision, whereas 3 (1.3%) were using glasses for distance vision. (Table. 6)

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Table 6. Ocular and Optical History of Participants (n = 227)

Variable	Category	Frequency (n)	Percentage (%)
Ocular history	Present	5	2.2
	Absent	222	97.8
Type of ocular history	Medication	2	0.9
	Glasses	3	1.3
Optical history	Present	5	2.2
	Absent	221	97.4
Glasses for near	Yes	2	0.9
	No	225	99.1
Glasses for distance	Yes	3	1.3
	No	224	98.7

Chi-square analysis showed no statistically significant association was found between age and anterior segment diseases (p = 0.207), nor between age and posterior segment diseases (p = 0.328). Similarly, gender showed no significant association with anterior segment diseases (p = 0.875) or posterior segment diseases (p = 0.422).

Table 7. Association of Demographic Variables with Ocular Morbidities

Variable	Category	Anterior Segment Abnormality n (%)	Posterior Segment Abnormality n (%)	p-value (Anterior)	p-value (Posterior)
Age Group	1–9 years	10 (8.6%)	1 (0.9%)	0.207	0.328
	10–17 years	3 (2.7%)	0 (0.0%)		
Gender	Male	7 (5.1%)	1 (0.7%)	0.875	0.422
	Female	6 (6.7%)	0 (0.0%)		

DISCUSSION

The present study aimed to assess the ocular health status of children residing in orphanages. A total of 227 participants were included, providing important insights into the prevalence and pattern of ocular morbidities in this vulnerable population.

In this study, the overall prevalence of ocular morbidity was 26%, with refractive errors being the most common finding (18%). Among refractive errors, myopia (7.0%) was the most prevalent, followed by hyperopia (6.6%) and astigmatism (4.4%). These findings are consistent with previous studies conducted in similar populations, where refractive error has been reported as the leading cause of ocular morbidity. For instance, a study by Shrestha et al. reported an ocular morbidity prevalence of 21.4%, with refractive error accounting for 10% of cases.[18] Similarly, Shehroz Hassan et al. observed that 21.4% of children had reduced visual acuity, with 81% attributable to refractive errors as indicated by pinhole improvement.[19]

Other studies conducted in different regions also support these findings. Sara Nawaysir et al. reported refractive errors in a significant proportion of both orphaned and school-going children, while Kumah et al. identified refractive error as the most common ocular condition, affecting up to 40% of children in their study.[20, 21] However, some studies have reported lower prevalence rates, such as Haseeb Alam et al. (8.9%) and Opubiri et al. (2.2%), which may be attributed to differences in study design, population characteristics, and diagnostic criteria.[22, 23]

With respect to visual impairment, mild visual impairment was observed in 16.3% of participants, moderate in 5.3%, and severe in 0.4%. These findings are comparable to those reported by Kumah et al., where the majority of children had visual acuity between 6/5 and 6/12,

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with only a small proportion exhibiting moderate to severe impairment.[21]

The prevalence of amblyopia and strabismus in the present study was low (0.9% each), which is in line with findings from other studies. Shrestha et al. reported amblyopia in 1.1% and strabismus in 0.6% of children, while studies from other regions have also documented similarly low frequencies. Although these conditions were relatively uncommon, their early detection remains important due to their potential long-term impact on visual development.[24]

Ocular symptoms reported in this study were generally mild, with burning and itching (2.2%) and redness (2.2%) being the most common complaints. Other symptoms such as blurred vision and ocular pain were infrequent. These findings are comparable to studies conducted in Nepal and Saudi Arabia, where symptoms such as itching, redness, and blurred vision were commonly reported among children.[25, 26] The relatively low frequency of symptoms in the present study may reflect underreporting or limited awareness among children.

Only a small proportion of participants had a positive ocular history (2.2%) or were using spectacles (1.3%), highlighting the unmet need for eye care services in this population. Similar findings have been reported in other studies, where access to eye care and utilization of corrective measures were limited among children in underserved settings.

No statistically significant association was found between age or gender and anterior or posterior segment diseases ($p > 0.05$). This suggests that ocular morbidities in this population are relatively evenly distributed across different age groups and between males and females.

Overall, the findings of this study highlight that refractive error is the leading cause of ocular morbidity among orphaned children, and most visual impairments are preventable or correctable. Early screening programs, timely intervention, and increased awareness are essential to reduce the burden of avoidable visual impairment in this vulnerable population.

CONCLUSION

This study demonstrates that refractive error is the most common ocular morbidity among children residing in orphanages, accounting for the majority of visual impairment. Most cases of reduced visual acuity showed improvement with pinhole testing, indicating that uncorrected refractive errors are the primary and largely avoidable cause. The prevalence of other ocular conditions such as amblyopia, strabismus, and anterior segment diseases was relatively low.

No significant association was observed between age or gender and ocular morbidities, suggesting a uniform distribution across demographic groups. Overall, the findings highlight that a substantial proportion of visual problems in this population are preventable and treatable through timely screening and intervention.

LIMITATIONS

This study has several limitations. First, it was conducted in a limited number of orphanages within a single geographic region, which may affect the generalizability of the findings. Second, the sample size, although adequate for preliminary assessment, may not fully represent the broader population of orphaned children. Finally, the cross-sectional design limits the ability to establish causal relationships.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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