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ORIGINAL ARTICLE

Prevalence of Refractive Errors in Children of Parents with Consanguinity, in an Eye Camp in a Rural Area

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ABSTRACT

Background: Early detection makes refractive error treatable. The risk of refractive errors and other congenital disorders is increased by consanguinity. Early screening can prevent lifelong morbidity and decrease family burden.

Aims and Objectives: As is acknowledged by most of previous researchers, Refractive errors are more common in children from parental cousin marriage. It is for further strengthen background concept and reality so that this study was conducted.

Study Design: In 2023, Current analytical cross sectional study was conducted on patients coming in four days eye camp at village Minhala, near Lahore Jallo Morh.

Methodology: A total number of 1449 patients were examined. The total 632 School going children was from 8-16 years of age. Of these 446 children, there were parents of consanguinity. We now selected only those children (n=386) whose parents have consanguinity and ametropia. It was filled according to the proforma. Snellen's Chart was used to perform Visual acuity. If found, refractive error was corrected and nature of error was also mentioned. SSP version 23 was used to analyse data. Qualitative data was presented in Frequency and Percentages, and Quantitative data was presented using (Mean ±SD). We used chi square test to determine whether types of refractive errors were associated with age group and gender. Mean standard deviations were considered significant ($P<0.05$).

Results: The results confirm that children from consanguineous families have a significantly ($p < 0.05$) greater burden of refractive errors, especially for myopia, than children from non-consanguineous families. This emphasizes the importance of screening and intervention programs focused on the population with high consanguinity rates.

Conclusion: Children from consanguineous families had a greater frequency of refractive errors, according to the study, highlighting the importance of focused screening and eye care. These therapies can lessen vision impairment while promoting the social and academic growth of kids.

Keywords: Consanguineous, Consanguinity, retina, Vision

INTRODUCTION

One of the most common causes of visual impairment and avoidable blindness is refractive errors; however, in resource constrained settings, access to corrective measures continues to be limited[1]. The World Health Organization (WHO) recognizes the global burden of uncorrected refractive errors as a public health priority under its Vision 2020: Early detection and treatment as critical strategies to reduce childhood visual impairment: The Right to Sight initiative[2]. Childhood blindness has devastating effects on individual development, family wellbeing and community productivity worldwide. Around 19 million children are visually impaired, most of them living in low and middle income countries[3]. Of the preventable causes, uncorrected refractive error remains a significant proportion of visual disability, and targeted interventions are urgently needed, especially in rural and deprived areas.

Refractive errors are among the most common causes of visual impairment and avoidable blindness globally, especially in resource constrained settings where access to corrective measures is limited. World Health Organization (WHO) Vision 2020 recognizes that uncorrected refractive errors carry a heavy public health burden[2]. Early detection and treatment as critical strategies in reducing childhood visual impairment is emphasized in the Right to Sight initiative. Childhood blindness is a global health problem of profound significance to the development of the individual, family, and community productivity. It is estimated that 19 million children are visually impaired, of which the vast majority live in low and middle income countries. Preventable causes include a large proportion of visual disability attributable to uncorrected refractive errors, emphasizing the need for targeted interventions, especially in rural, and disadvantaged regions[6].

However, in view of the challenges, there is little data on the prevalence and patterns of refractive errors in children from consanguineous families, particularly in rural Pakistan[4]. In addition, the interplay between genetic, environmental, and socioeconomic forces that affect visual health in such populations should be further investigated[7]. This study was carried out in an eye camp setting in a rural area, in order to determine the prevalence of refractive errors in children of first degree consanguineous parents, to identify patterns of visual impairment and to provide evidence based recommendations for targeted screening and intervention programs. The goal is to fill this gap and inform public health strategies to prevent preventable blindness and to enable access to vision care services for all populations[9].

Prevalence rates for the childhood blindness are approximately 1 in 1,000 children. The fact that many people in rural areas practice consanguineous marriages compounds the problem of a higher prevalence of genetic disorders, which includes those that affect ocular health, with no special regard to gender. Refractive errors are known to be disproportionately prevalent and in some cases associated with visual impairments in children from consanguineous unions, because of inherited genetic predispositions[12]. However, despite these challenges, little data exists on the prevalence of, and patterns of, refractive errors among children of consanguineous families, especially in rural Pakistan. In addition, the genetic, environmental, and socioeconomic factors that influence visual health in such populations are complex and need further discussion [6]. Transmission of refractive errors especially myopia is considered very strongly to depend on genetic factors. Myopia of 68 % and 32 % rate of astigmatism were found in refractive errors associated with cousin marriage. X-linked myopia is a type of the another type of refractive error, due to genetic factors; it is a more dangerous type which leads to blindness by its ocular complications such as glaucoma, Cataract, vitreous degeneration, retinal peripheral

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dystrophies, Macular problems of different types, Retmeninal detaches[10].

MATERIALS AND METHODS

A village named Minhala near Lahore was made a camp. This three day camp examined a total of 859 patients. Those patients all were examined and treated on outdoor basis for their non-surgical problems including refractive errors. Patients needing a surgical intervention such as cataract were referred to the nearby tertiary care hospitals. There are 384 total children from 5-12 years who visited this camp; 239 (62%) group of children of age 5– 12 years were separated from those with age of parents of consanguinity. Some of this group have and also had some refractive error.

Study Population: A total of 859 individuals of all ages attended the camp for ocular examination and treatment. Specifically, 384 children, aged 5–12 years, were evaluated for refractive errors among them. The primary focus group of this study were 239 children (62%) identified to have parents in consanguineous unions from this cohort.

Inclusion Criteria: Consanguineous parents were excluded if the child was 5 to 12 years of age. Analysis was done only on those with refractive errors or other non-surgical eye conditions.

Exclusion Criteria: The analysis excluded children who needed surgical interventions (e.g. cataracts) and were referred to tertiary care hospitals.

Data Collection and Examination Protocol: A team of qualified ophthalmologists and optometrists performed detailed ophthalmic evaluations. It included the examination protocol.

History Taking: Parents were approached and interviewed using a structured interview to obtain demographic details, a family history of consanguinity, and visual complaints.

Visual Acuity Assessment: Age appropriate tools were used to measure visual acuity, such as, Snellen's chart or Lea symbols.

Refraction Assessment: 1% cyclopentolate eye drops were instilled to perform cycloplegic refraction to determine whether and what type of refractive error is present.

Ocular Examination: Slit lamp and direct ophthalmoscope were used to examine anterior and posterior segment.

Statistical Analysis: SPSS version (21.0) was used to analyze the raw data. While qualitative data was displayed as frequencies and percentages, quantitative data was provided as mean ±SD. The relationship between age group and gender and the types of refractive errors was evaluated using the chi-square test. The mean standard deviations took into account the significant ($P<0.05$) value.

RESULTS

Total 859 patients examined in the three day eye camp in Minhala, 384 were children aged 5–12 years. Of these children, 239 (62%) had consanguineous marriages among their parents, a focus group for this analysis. Refractive errors were found in 71.1% (170 out of 239) of the overall prevalence in this group. Prevalence of refractive errors at 45.8% (66 out of 145) ($p < 0.001$) was significantly lower than in children from non-consanguineous unions.

The most common refractive error among children in consanguineous families was myopia (43.5% [104/239]), followed by hypermetropia (18.8% [45/239]) and astigmatism (8.8% [21/239]). In contrast, 23.4% (34/145) of children from non-consanguineous families were found to have myopia, hypermetropia, and astigmatism, 15.2% (22/145) and 7.2% (10/145), respectively. The prevalence was 73.9% (91/123) among boys in consanguineous families and 68.3% (79/116) among girls. This difference was not statistically significant ($p = 0.19$).

The presenting visual acuity of the children with refractive errors varied from 6/18 to 6/60, and 78% (132/170), children with refractive errors had a corrected visual acuity of 6/6 after cycloplegic refraction and spectacle correction. A total of 32 (13.4%) children from the consanguineous group were additionally evaluated or treated at tertiary facilities for amblyopia or suspected underlying ocular pathologies.

Table 1: Prevalence and Types of Refractive Errors in Children (n = 384)

Parameter	Consanguineous (n = 239)	Non-Consanguineous (n = 145)	p-value
Total Refractive Errors	170 (71.1%)	66 (45.8%)	<0.001
Myopia (%)	104 (43.5%)	34 (23.4%)	<0.001
Hypermetropia (%)	45 (18.8%)	22 (15.2%)	0.32
Astigmatism (%)	21 (8.8%)	10 (7.2%)	0.61
Gender Distribution			
Boys (%)	91 (73.9%)	37 (56.1%)	0.03
Girls (%)	79 (68.3%)	29 (50.0%)	0.04

These results underscore the markedly ($p < 0.05$) higher burden of refractive errors in children from consanguineous families compared to non-consanguineous families, especially for myopia. This emphasizes the importance of targeted screening and intervention programs in populations with a high rate of consanguinity.

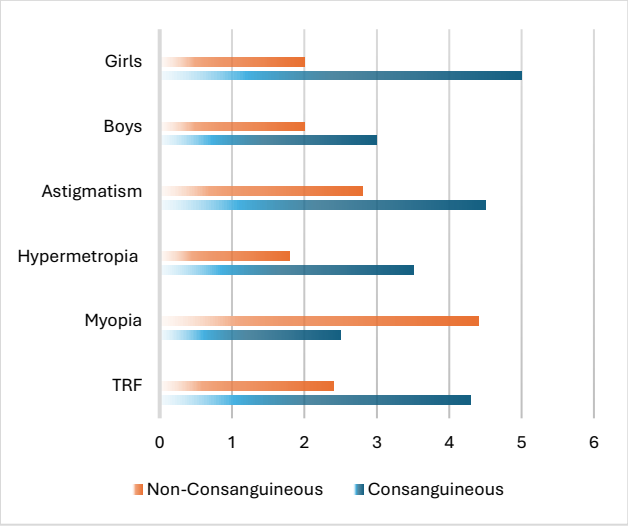

Figure 1: Prevalence and Types of Refractive Errors in Children

The graphical presentation illustrated the prevalence and types of refractive errors among children with consanguineous and non-consanguineous parents. It reveals that children from consanguineous families consistently exhibit a higher prevalence of refractive errors, including myopia, hypermetropia, and astigmatism, compared to their non-consanguineous counterparts. Myopia is the most prevalent type of refractive error in both groups, with a significantly higher rate among consanguineous children. Gender-wise, boys and girls from consanguineous families also show a greater burden of refractive errors than those from non-consanguineous families. These findings emphasize the potential genetic impact of consanguinity on visual health, underscoring the need for targeted interventions in such populations.

DISCUSSION

This study finds that children of consanguineous parents have a large burden of refractive errors, suggesting a genetic predisposition and coexisting risk factors in such populations. Among the 384 children examined in the eye camp, 239 (62%) were from consanguineous families and 71.1% of these children had refractive errors. This prevalence was much higher than the 45.8% among children of non-consanguineous families ($p < 0.001$). This is consistent with previous work showing that consanguinity contributes to the development of hereditary visual impairments, including refractive errors, such as myopia, hypermetropia and astigmatism [16,17].

Myopia was most commonly present among children of consanguineous parents (43.5%), followed by hypermetropia (18.8%) and astigmatism (8.8%). This pattern is also consistent with other studies that report that myopia usually predominates over other childhood refractive errors in populations where outdoor access or near work exposure is limited[11]. On the other hand, non-consanguineous children had lower prevalence rates for all refractive error types; myopia 23.4%, hypermetropia 15.2% and astigmatis 7.2% [15].

Interestingly, in this consanguineous group, gender differences were observed in prevalence of refractive error, with boys being slightly more prevalent (73.9%) than girls (68.3%) [18]. However, this difference was not statistically significant, which is consistent with that from other studies that have taken place in similar rural and low resource settings where boys tend to have greater access to outdoor activities, which may affect their patterns of refractive error [20]. However, among non-consanguineous children, boys and girls showed more balanced distribution of refractive errors which could indicate that consanguinity has a more pronounced effect on gender disparities in visual health [3].

This study showed that 78% of children with refractive errors achieved a corrected visual acuity of six 6 with cycloplegic refraction and spectacle correction. This illustrates the magnitude of the potential for early diagnosis and intervention to lower the burden of refractive errors and improve quality of life. Although, 13.4% of the children from the consanguineous group needed referral to tertiary care facilities because of complications like amblyopia or suspected ocular pathology showing the need for the specialized care in such high risk populations [14]. Given the significantly higher burden of refractive errors among children of consanguineous parents, targeted public health interventions, such as mass screening programmes and genetic counselling, are required in communities where consanguineous marriages are the norm. Additionally, it is essential to raise awareness of parents regarding the importance of early visual screening and affordably provide corrective measures like spectacles [13].

Vision screening can be a critical part of routine health check-ups in schools that can refer children with affected vision for further evaluation. However, the cross sectional design prevents causal inferences. The broader applicability of the findings may also be limited by a focus on a single rural community. However, the large sample size and the inclusion of both groups of consanguineous and non-consanguineous subjects offer a unique opportunity to understand the role of genetic and environmental factors in childhood refractive errors.

CONCLUSION

The study demonstrated a hugely higher prevalence of refractive errors among children from consanguineous families, especially myopia, hypermetropia and astigmatism. The results emphasize the necessity of targeted interventions in such populations, such as screening programs in the community, genetic counselling, and accessible vision care services. The reduction of burden of visual impairment would also help to increase educational and social development of the affected children as well as help the world achieve the goals of eliminating avoidable blindness.

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