



## Original Article

## Association of Different Type of Refractive Errors with Parental Cousin Marriages

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## ABSTRACT

Refractive errors are the major reason of visual impairment and its prevalence has increased over time. Refractive errors affect ocular structures as corneal shape, eye's axial length, vitreous changes and retinal dystrophies. Uncorrected and high degree of refractive errors are the leading cause of blindness worldwide. Due to several mechanism, there is an increased risk of refractive errors with parental cousin marriages. **Objective:** To find association of different types of refractive errors in patients with positive history of parental consanguinity, and to evaluate that which type of refractive error is more compromised. **Methods:** A cross-sectional study accompanied 175 patients having positive history of consanguinity age between 14-35 years was performed at the University of Lahore, Teaching Hospital Pakistan during September 2020 to January 2021. Using non probability convenient sampling technique 175 individuals were evaluated for refractive error type with positive parental consanguinity. To measure distance visual acuity of patients, Standard Snellen chart at (6m) was used. Data were recorded by asking the patients to fill a self-made Performa. **Results:** Myopic refractive error is most common type of error with consanguinity patients as compare to hyperopic patients. Second most common error occurs myopic astigmatism. Hypermetropia was seen very less with consanguinity history. Refractive errors in total families found 68% with myopia and myopic astigmatism 40%. **Conclusions:** Refractive errors found more with consanguinity history as compare to patients with absence of consanguinity history.

## INTRODUCTION

There are 259 million people globally with visual impairment, in these 98 million having refractive errors [1]. It has been revealed that the most common reason of people to visit an ophthalmologist clinic or an eye care professional due to problem with vision or refractive errors [2]. Refractive errors are defined as a condition in which the visual system of the eye is incapable to bring the parallel rays of light to focus on retina for clear image [3]. There are three different kinds of refractive errors. One of them is myopia so the rays of light focus in front of retina, second is hypermetropia in which light rays focus on the back of the retina, and thus the third one is astigmatism in this the light rays cannot be focused properly on retina at one point,

causing blurred vision [4]. In human populations, mating between relatives is quite frequent and encouraged for social and economic reasons. Consanguinity is recognized in many studies as a significant factor which affecting the health of individual over several generations and postures a real public health problem [5]. Consanguineous marriages are a deeply rooted social culture among 20% of the world's population [6]. Recent studies and WHO reports shows that refractive errors are the primary cause of visual impairment, therefore visual loss due to refractive errors is the second cause of visual impairment worldwide as 43% people are documented with refractive errors [7]. Prevalence of refractive errors is 22.3% in China, 17.3% in

Singapore and 17.1% in Malaysia [8]. In Punjab refractive errors prevalence has been predictable in another study to be around 20 percent in children of Pakistan [9, 10]. A global inventiveness launched and WHO take initiative in the year 2020 as right to sight of vision (vision 2020) [5, 11]. This culture is usually located within the Middle East, West Asia, and North Africa [12]. Due to the autosomal recessive trait, it has been proposed that the danger of birth deficiencies in first cousin marriages may be 2–2.5 times more than that in general population [13]. It has been predictable that greater than 80% of the whole adult population having myopic refractive error. Myopia could also be inherited so as it is an autosomal dominant and autosomal recessive, or X-linked recessive trait. High myopia could even be transmitted as complex trait in families [14]. Astigmatism is most predominant in infants and young children as compare to the adult population [15]. Presence of refractive errors and visual impairment give an indicative point that there is a strong genetic role. Which shows in Chinese Singapore and Malaysian population [16]. Myopia which is due to parental history explained significantly more modification in the children's refractive error. There's prevalence rate of myopia is 36.7% [17]. Patients with nearsightedness have choroidal changes as well because in myopic refractive error eye ball length become increases so cause choroidal changes as well [18]. Effects of cousin marriages on refractive errors in children. As the result of research percentage refractive errors, a family have consanguinity history was 68% myopia and 32% astigmatism [19]. A study estimates the prevalence of a myopic refractive error in students of Bahauddin Zakariya University (BZU) Multan. Myopia was present to be higher in inbreeding group in cousin marriage when it's compared to the out-breeding group as non-cousin marriage [20].

Cousin marriages are the more cultural part of our society because of the belief that they make strong relationships between families but this causes many genetic disorders included systematic disorders, eye diseases like refractive errors and increases the susceptibility to any one of the autosomal recessive genetic disorders. Myopia was a very common refractive disorder and X-linkage trait which can cause loss of vision or blindness due to vitreous detachment, retinal detachment, chorioretinal degenerations, pre mature cataract, glaucoma and retinitis pigmentosa.

## METHODS

All the participants of 175, male patients there were 77 and 98 females. Results shows both different types of refractive errors with positive history of consanguinity and with negative history as well. So, in total sample size that was 175, there were 115 patients with positive history of

consanguinity and 60 patients with negative history of consanguinity having different type of refractive errors. The table 1 showed that out of 175 patients 77 were males having percentage 44% and 98 were females having percentage of 56%. 1 cell (10.0%) have expected count less than 5. The minimum expected count is 4.53.

**Table 1:** Gender wise distribution

Gender	Frequency (%)
Male	77(44)
Female	98(56)
Total	175(100)

In total 175 sample size, 115 patients having positive history of cousin marriage and the frequency of each refractive error is given in numbers and percentage as well. The results showed that most common form of refractive error was myopia 68(38.9%) from with 45 patients with positive history of cousin marriage and 23 patients had negative history of consanguinity. This was followed by Myopic astigmatism 40(23%) and hypermetropia 35(20%). While 20(11.4%) patients were having hypermetropic astigmatism and remaining 12(6.9%) with mixed astigmatism. Myopia found the most common type of refractive error and according to results high frequency of refractive errors occur in patients with positive history of consanguinity as compare to patients with negative history. As other hand patients with negative history of consanguinity had the frequency of refractive errors less as compare to positive history as shown in the table 2.

**Table 2:** Association distribution of RE in Cross Tabulation

Refractive errors	Consanguinity marriage		Total
	Present	Absent	
Myopia	45	23	68
Hypermetropia	20	15	35
Myopic astigmatism	30	10	40
Hypermetropia astigmatism	12	8	20
Mixed astigmatism	8	4	12
Total	115	60	175
<b>Chi-square table</b>	<b>value</b>	<b>df.</b>	<b>Asymp. Sig.(2-sided)</b>
Pearson chi-square	14.261 <sup>(1)</sup>	4	.003
Likelihood ratio	14.382	4	.002
Linear-by-linear	3.321	1	.004
Asso. N of valid cases	175	-	-

## DISCUSSION

For the purpose of adequate sight best visual acuity play important role. In this study our main focus is to find out the prevalence of different types of refractive errors on populations vision and their correlation with positive history of consanguinity. In current study most common type of refractive error with consanguinity is myopia 68% and 40% myopic astigmatism. Subjects with double cousin history shows slightly strong relation with ocular anomalies

as significant and comparative to those with first cousin marriage. Research has been done at King Edward Medical University, results almost synchronized to present study as highest refractive error form was myopia 68% and astigmatism 32% with parental cousin marriages history [19]. The current study also tells that 35% patients have hypermetropia. Another study was reported and suggested results that it may be more associated with hyperopia in which all database hyperopic patients with positive consanguinity history also showed auxiliary association with ocular diseases [21]. Likewise, another study was completed in Multan at Bahauddin Zakariya University (BZU) among young students' group. There were both alienated data for male and female showed prevalence of all type of refractive error as Nearsightedness was found to be higher in inbreeding group (Parental cousin marriage) 56.67% as compare with out-breeding group 43.33%. This is showing strong association of refractive errors with inbreeding group and mainly myopia found with consanguinity [20]. One other factor is also evaluated in this study that, a great correlation in individuals whose parents are having double first cousin marriage history have other ocular diseases like vitreous detachment, macular edema, retinal detachment and low vision. Consanguineous marriage could have impression by increasing the genetic risk in offspring due to the autosomal recessive trait. A past study by Arooj and Riaz correlates in results as high nearsightedness could also be inherited as an autosomal dominant, or X-linked recessive trait also transmitted as complex trait in families [14]. High prevalence of nearsightedness as it was more than 80% of the entire adult population having myopic refractive error [8]. Past study by Flores-Moreno *et al.*, showed that two to three decades of people's life myopia shows significantly high proportion frequency as compare to other different types of errors. Although low and moderate myopia appears to be more marked frequently [18]. Research showed more similar ideas like present study as parental history of myopia and myopia related astigmatism explained significantly more association in the children's refractive error, the prevalence rate of myopia 36.7% [22]. In Turkey a study held to examine the product of cousin marriages on visual impairment so all subjects total 236 participants were including and suffering from visual impairments, mild and moderate [23]. Study conducted in Saudi Arabia explained prevalence of consanguinity overall prevalence in first and second cousins was moderate 29.7% [24]. Magnitude of refractive errors in high school children were present as myopia 52% and it was the major type of refractive errors found in school strength, astigmatism 38.1% and hypermetropia 9.8% in children [4]. Complete ocular examination was organized by ophthalmic

practitioners to found out the prevalence of refractive error with association of consanguinity in a past descriptive study. Results explained in preschooler group, myopia was 4.2% and in the young age group, 45.6% members were myopic accordingly. Previous studies also demonstrate similarity to present study results as astigmatism and myopia associates with consanguinity [6].

## CONCLUSIONS

The conclusion of present study suggests that refractive errors show great association in patients having positive history of parental consanguinity and myopic refractive error shows highest among all refractive errors. Other than that astigmatism shows second more frequency with consanguinity as compare to non-consanguinity history of patients and prevalence of other refractive error shows least in results. Degree of refractive errors and other genetic traits are more prominent in patients whose parents are double cousins.

## Authors Contribution

Conceptualization: AA, SA

Methodology: DA, SA, AA

Formal analysis: AA

Writing-review and editing: ZH, SA, AA

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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