

# Study of Major Pediatric Ophthalmic Complications in Consanguineous Marriage

Heber Anandan<sup>1</sup>, Lional Raj<sup>2</sup>, J Mohamed Ali<sup>3</sup>, J L Dhanisha<sup>4</sup>

<sup>1</sup>Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal's Eye Hospital, Tirunelveli, Tamil Nadu, India, <sup>2</sup>Regional Medical Director, Department of Ophthalmology, Dr. Agarwal's Eye Hospital, Tirunelveli, Tamil Nadu, India, <sup>3</sup>Associate Professor, Department of Clinical Optometry, Dr. Agarwal's Eye Hospital, Tirunelveli, Tamil Nadu, India, <sup>4</sup>Senior Consultant, Department of Ophthalmology, Dr. Agarwal's Eye Hospital, Tirunelveli, Tamil Nadu, India

## Abstract

**Introduction:** Consanguineous marriage is the practice of marrying close blood relatives, commonly cousins; it is customary in many cultures worldwide. The risk of congenital disabilities is higher because there is a greater chance of two related individuals sharing a common harmful gene and passing it on to the child.

**Aim:** This study aims to assess various types of eye disorders in children to establish a relationship between consanguineous marriage and eye disorders in their offspring.

**Materials and Methods:** To ensure scientific and clinical relevance on this matter, individual's data of patients were obtained through a questionnaire which comprised information, including the diagnosis of the eye disorder, age of parents at the time of marriage, number of pregnancies, type of delivery, ratio and degree of consanguineous and non-consanguineous marriages, birth complication, and birth weight. Data entry and analysis were performed using SPSS version 16.0. The quantitative data were presented using the arithmetic mean, standard deviation and analyzed using one-way ANOVA.

**Results:** Consanguineous marriage among affected patients was significantly higher in our study group [59%] and represented as 41%, 32%, and 27% in the first cousins, one and a half cousins, and second cousins, respectively. Four types of eye diseases such as squint, glaucoma, cataract, and retinitis pigmentosa were prominently found. Most of the affected children and their parents belong to rural background, mostly being less educated, which indicated the lack of knowledge about the impact of consanguineous marriage.

**Conclusion:** This work suggests that premarital genetic, social counseling, and mass media efforts are needed to increase public awareness about genetic risks associated with cousin marriage. A further study is crucial to do a detailed survey for a long time; the affected person's DNA should be isolated to do chromosome mapping and gel documentation to identify the affected gene.

**Key words:** Consanguinity, Eye diseases, India, Pediatric

## INTRODUCTION

Consanguinity has been defined as the marriage or union between people of the same blood, which has decreased heavily in most developed countries. However, marriages between biological relatives have remained common in developing countries.<sup>[1]</sup> Consanguinity is common, especially in people originating from the Middle East, the

northern parts of Africa, and large parts of Asia.<sup>[1]</sup> Such marriage makes offspring susceptible to various types of genetic disorders. The highest consanguineous marriage rates in South India are usually reported in traditional rural areas and among the poorest and least educated groups.<sup>[2]</sup> In many communities in India, the first preference is to get married within the family. Intra-community and consanguineous marriages are still more common, and it has been so for centuries. Much of India, particularly South India, practiced endogamy or marriages within the community for centuries. In many communities, preference has been given to uncle-niece marriages and between cousins (mother's brother's child and father's sister's child). In Tamil Nadu and Andhra Pradesh, usually one in two marriages in the rural areas is consanguineous.<sup>[3]</sup> Pregnancy

Access this article online



www.ijss-sn.com

**Month of Submission :** 11-2020  
**Month of Peer Review :** 11-2020  
**Month of Acceptance :** 12-2020  
**Month of Publishing :** 01-2021

**Corresponding Author:** Dr. Lional Raj, Department of Ophthalmology, Dr. Agarwal's Eye Hospital, Tirunelveli, Tamil Nadu, India.

outcomes such as abortions, stillbirths, congenital anomaly, and neonatal and infant deaths were more common in consanguineous marriages.<sup>[3]</sup>

### Aim

This study aims to assess various types of eye disorders in children to establish a relationship between consanguineous marriage and eye disorders in their offspring.

## MATERIALS AND METHODS

A prospective study was conducted in an ophthalmic hospital in South India. Children between the age groups of 2 and 12 years are considered in this survey. Data were collected through a survey method using a standard questionnaire form. It includes the questionnaire regarding the patient's history. It was obtained from the children's parents, such as the type of delivery of affected children as to whether it is a normal delivery or cesarean, if cesarean, was there any complication during pregnancy. Then marriage details were also collected regarding whether they had a consanguineous marriage or non-consanguineous marriage. The high degree of consanguinity shows the high level of sharing the genes between the parents. The maternal age during pregnancy was also noted. Finally, the baby and its siblings' numerical order details whether the siblings are having any complications related to the affected child's disease and the birth weight of the child during the delivery were obtained.

Data entry and analysis were performed using SPSS version 16.0. The quantitative data were presented using the arithmetic mean, standard deviation. The variance analysis (ANOVA) was calculated to check the relationship between maternal age and degree of consanguinity.

## RESULTS

Consanguinity marriage is still being practiced in India. It is reported to be more in rural areas when compared to urban areas. For this study, a survey was conducted on 75 children and their parents. The prevalence of consanguinity marriage was significantly higher in most of the study population (59%) [Table 1].

Consanguinity marriages represented 41%, 32%, and 27%, among the first cousins, one and a half cousins, and second cousins, respectively [Table 2]. Significant ( $P > 0.05$ ) correlation was observed between maternal age group and degree of consanguinity [Table 3].

When the family history was analyzed for the prevalence of eye defects, the ratio of frequent occurrences of eye diseases was observed to be high among first cousins. In this current study, we observed that the mother's age during pregnancy plays an important role in disease prevalence. About 46% of the patients' mothers' fall in the age group of 26–30 years [Table 4]. Among consanguineous marriage couples, a delayed pregnancy rate has been observed.

There was no distinguishable difference in the birth weight of affected children, which was mostly normal. The abnormal to normal birth weight is usually considered to be 1.6–3.5 kg, respectively. In this survey, birth weight varied between 2.0 and 2.8 kg which were categorized to be normal [Table 5].

**Table 1: The prevalence of consanguinity marriage among patients**

Type of marriage	Parents
Consanguinity marriage	44
Non-consanguinity marriage	31

**Table 2: The degree of consanguinity**

Degree of consanguinity marriage	Number of individuals
Maternal uncle	17
Second cousins	14
Close relatives	17

**Table 3: One-way analysis of variance for maternal age and degree of consanguinity**

Groups	Sum of squares	df	Mean square	F	Sig.
Between groups	6.400	8	0.800	1.600	0.548
Within groups	0.500	1	0.500		
Total	6.900	9			

AQ6

**Table 4: The maternal age during delivery**

Age of mother during pregnancy	No. of patients
16–20	4
21–25	27
26–30	33
31–35	11

**Table 5: The birth weight of children who had participated in the survey**

Birth weight	No. of children
1–1.5	2
1.6–2.0	9
2.1–2.5	27
2.6–3.0	33
3.1–3.5	4

Of the entire study population who had participated in the survey, ocular defects were observed in 40 male children while 35 female children have ocular defects. Of the children affected with ocular defects, 63 children were diagnosed with squint followed by 8 children with cataract, glaucoma and retinitis pigmentosa in 2 patients each. Both esotropia and exotropia squints were observed. Most of the patients were well aware of squint disease, which is identified at an earlier stage.

Child marriage practice was found to be considerably low in the study. The affected children's parents have some awareness about eye diseases such as squint, glaucoma, cataract, and retinitis pigmentosa. In our study, there was a high prevalence of squint in children compared to other ocular diseases. It affected male to a great degree when compared to female.

In our study, normal delivery was observed in 44 patients, while cesarean was observed in 31 patients. Ocular eye defects were observed mostly in children born after cesarean delivery (9 children). In the siblings of the affected children born to consanguineous parents, no ocular disease was reported except in the sibling of one affected child.

## DISCUSSION

Consanguineous marriage occurs among Muslims, Christians, and Hindus to a varying degree within each religion's subgroups. The tradition of arranged marriage is the main factor for consanguine marriage. Consanguineous unions are strongly preferred in much of Asia's west and south parts and have both social and economic impacts on the population groups that practice this type of marriage.

In the current study, the influence of consanguinity on the prevalence of visual disorders was examined in patients coming for treatment. The result showed the highest percentage of consanguinity marriage among the parents of affected children. Consanguineous unions increase in prevalence in the states south of the Narmada, with the highest rates reported in Andhra Pradesh, Karnataka, and Tamil Nadu.<sup>[4]</sup>

In 1993, consanguineous marriage was higher in South India in various society sections, except in Kerala. At that time, in Andhra Pradesh, the percentage of consanguineous marriages was about 36.2. Next to Andhra Pradesh, in Tamil Nadu, there was a more common practice of consanguineous marriage. Overall, the percentage of consanguinity in India was about 12.9. Whereas in 2008, consanguine marriages were considerably reduced and it was about 8.5%.<sup>[4]</sup>

In 59% of our study population, ocular defects were observed. Of them, 41%, 32%, and 27% were first cousins, one and a half cousins, and second cousins. These results obtained were higher than the results obtained in the study by Shawky *et al.*<sup>[5]</sup> who reported that the consanguineous marriage was highly significant in 54.4% of the studied group compared to 35.3% in the control group ( $P < 0.05$ ) and consanguineous marriages were represented in 31.4%, 7.1%, 0.8%, 6%, and 9.1% among first cousins, one and a half cousins, double first cousins, second cousins, and remote relatives, respectively.

In the present study, eye-related diseases such as squint, glaucoma, cataract, and retinitis pigmentosa were recorded. Consanguineous marriages are associated with an increased risk for congenital malformations and autosomal recessive diseases, with some resultant increased postnatal mortality in the offspring of the first cousin couple.<sup>[6]</sup>

Concerning the religious status of affected children, all the parents of the ocular affected children from the Muslim community surveyed were shown to have the consanguineous marriage. The observed results can be correlated with Bittles and Hussain<sup>[4]</sup> who reported that consanguineous marriage is common in most Indian Muslim communities. It is estimated that globally over 20% of the human population live in communities with a preference for consanguineous marriage, and over 8.5% of all children have consanguineous parents.<sup>[4]</sup>

In this study, three children from the Christian community had a squint. Their parents were interviewed, and it was found that they were not married consanguinity. However, they said that the prevalence of squint is common among their close relatives. The low number of consanguinity in the Christian community can be substantiated with the low prevalence of consanguine marriages among Kerala people because of the strict avoidance of consanguineous marriage among Christian Syrian members orthodox church.<sup>[7]</sup>

There is a positive relationship between the higher maternal age of the mother and children's eye diseases. The result is supported by Hornby *et al.*<sup>[6]</sup> who stressed the importance of maternal age because some disorders increase in incidence with mothers' age.

In this study, consanguineous marriage was seen in 59% of our studied group. This practice is common in South India because many families prefer marriage among first cousins to preserve the family structure, links, and provide social, economic, and cultural benefits. Cousin marriages remain culturally and socially favored and respected in many countries.<sup>[8]</sup>

Usually, most of the affected population was from rural areas. This condition may be attributed to a lack of knowledge about

the impact of consanguinity. Srinivasan and Mukherjee<sup>[2]</sup> revealed that the highest consanguineous marriage rates in South India are usually in traditional rural areas and among the poorest and least educated groups. However, close kin marriage is commonplace in Brahmin communities, and it may be strongly favored among major landowning families.<sup>[9]</sup> These data suggest that premarital genetic, social counseling, and mass media efforts are needed to increase public awareness about genetic risks associated with cousin marriage.

Our results showed that the high degree of consanguineous marriages was among first cousin marriage. The same was also reported among Egypt's general population, where first cousin marriages occurred in 86% of study subjects. The autosomal recessive and multifactorial disorders had the highest consanguinity rate (78.8% and 69.8%, respectively).<sup>[2]</sup>

The incidence of primary and secondary glaucoma was very low in our study. By the time, glaucoma is diagnosed, a high percentage of them become blind. In consanguineous marriage, genetic and medical disorders are increased in the offspring with time. It is a big challenge for our society to get complete information about their prevalence, risk factors, and control of these disorders.

## CONCLUSION

We observed that the rural people showed high levels of consanguinity and are under a high risk of eye-related

defects through our work. We suggest that premarital genetic, social counseling, and mass media efforts are needed to increase public awareness about genetic risks associated with cousin marriage. There is also a need for developing policies by the government and work in coordination with NGOs to promote awareness in rural areas about the impact of consanguineous marriages on offspring.

## REFERENCES

1. Rao NA, Savithri HS, Bittles AH. A genetic perspective on the South Indian tradition of consanguineous marriage. Prestige Books; 2003.
2. Srinivasan S, Mukherjee D. Inbreeding among Some Brahman Populations of Tamil Nadu. *Hum Hered* 1976;26:131-6.
3. Kumaramanickavel G, Joseph B, Vidhya A, Arokiasamy T, Shetty NS. Consanguinity and ocular genetic diseases in South India: Analysis of a five-year study. *Community Genet* 2002;5:182-5.
4. Bittles AH, Hussain R. An analysis of consanguineous marriage in the Muslim population of India at regional and state levels. *Ann Hum Biol* 2000;27:163-71.
5. Shawky RM, Elsayed SM, Zaki ME, El-Din SM, Kamal FM. Consanguinity and its relevance to clinical genetics. *Egypt J Med Hum Genet* 2013;14:157-64.
6. Hornby SJ, Dandona L, Foster A, Jones RB, Gilbert CE. Clinical findings, consanguinity, and pedigrees in children with anophthalmos in southern India. *Dev Med Child Neurol* 2007;43:392-8.
7. Bittles AH. Endogamy, consanguinity and community genetics. *J Genet* 2002;81:91-8.
8. Hamamy H. Consanguineous marriages: Preconception consultation in primary health care settings. *J Community Genet* 2012;3:185-92.
9. Srinivasan S, Mukherjee DP. Inbreeding among some Brahman populations of Tamil Nadu. *Hum Hered* 1976;26:131-6.

**How to cite this article:** Anandan H, Raj L, Ali JM, Dhanisha JL. Study of Major Pediatric Ophthalmic Complications in Consanguineous Marriage. *Int J Sci Stud* 2020;8(10):173-176.

**Source of Support:** Nil, **Conflicts of Interest:** None declared.