

# Prevalence of Hearing Loss in Children of Parents with Consanguineous Marriages

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## ABSTRACT

**Introduction:** According to the World Health Organization, 6.1% of the world's population has hearing impairment, making it one of the most common disabilities. Congenital, prenatal, genetic, and environmental factors are among the many causes of hearing impairment. Congenital hearing loss is thought to be mostly caused by consanguinity. Numerous studies, both in the Middle East, where the practice is very common, and in Europe, where it is taboo, show a strong connection between congenital hearing loss and consanguinity. There is virtually little research on hearing loss brought on by consanguinity in the literature.

**Objective:** The find the prevalence of hearing loss in children of parents with consanguineous marriages.

**Material & Methods:** This an observational cross-sectional study. The study had a sample size of 377 subjects. The data was collected from Alam Audiology Clinic and Sir Ganga Ram Hospital for 6 months from January to June, 2022. The data was collected from parents who reported a consanguineous marriage, and the children were taken between the ages of 0.5 years to 5 years, children were test using various audiological intervention, i.e., Pure Tone.

Audiometry, Otoacoustic emissions, Auditory Brain-stem Response. The children who were syndromic or had other associated psychological issues were excluded. A Performa was generated inquiring about demographics, nature of consanguinity, other disabilities type of hearing impairment and other risk factors, this was filled out by the parents or the researcher in consultation of the parents. All the parents were informed of the study and their consent was taken. The study data was analyzed using SPSS 21 and frequencies were found out, tables and charts were systematically drawn and their conclusions were drawn. The study followed all ethical parameters.

**Results:** The results showed that out of the 377 participants, 186 were male and 191 were females, children of the age group 2-5 years were the most extensive numbering 323 participants (85.7%). An overwhelming number of children brought for assessment were with congenital hearing loss 286 (75.9%). Very few people reported hearing impairment in their family history. The nature of the cousin marriage shows that most of the participants 78.2% reported that they are first cousins. Most of the children 69% had moderate to severe hearing loss.

**Practical Implication:** The study will show us the impact of consanguineous marriages have on the hearing capacity of their children. The study will highlight consanguineous marriages as a factor in hearing impairment.

**Keywords:** Hearing loss, consanguinity, hearing impairment, hearing impairment.

## INTRODUCTION

One of the most common health issues on the planet is hearing impairment. The World Health Organization (WHO) estimated the prevalence of HL in the world in 2018; according to WHO, 34 million (or 7%) of the 466 million people who have permanent HL<sup>1</sup>—or 6.1% of the global population—are children. In 2050<sup>2</sup>, about 900 million people are expected to have crippling HL. <sup>3</sup> In the US, 1-3 per 1000 live births of term, healthy neonates and 2-4 per 100 live births of high-risk newborns are born with persistent HL.<sup>4</sup>

Congenital infections, environmental factors, prenatal conditions, genetic factors, and birth defects can all contribute to HL<sup>5</sup> Causes of newborn and pediatric HL include hypoxia, hyperbilirubinemia, meningitis, chronic otitis media, mumps, measles, CMV, trauma, ototoxic medications, and head injury<sup>7</sup>. One of the risk factors for the development of congenital hearing loss has been identified as consanguinity. In emerging nations, HL and its complications seem to be becoming more prevalent. The relationship between HL and consanguinity has already been supported by research. The term "consanguineous marriage" refers to the union of parents who are blood relatives and who have a recent common ancestor, second cousin, or other close relative<sup>8</sup>. Consanguineous marriage is more common in some regions of the world than others, accounting for up to 67.6% of marriages in the Middle East and only 0.5% in Europe<sup>9</sup>. El-Mouzan et al. estimate that 33.6% of first-cousin consanguineous marriages in Saudi Arabia, out of the country's overall 56% consanguinity rate, occur<sup>10</sup>. Social practices involving the practice of planned marriage within families and public ignorance of the negative repercussions of such a practice are blamed for the high prevalence of consanguineous marriage<sup>11</sup>. It is important to note

that by consanguinity we refer to first cousins (share a grandparent), second cousins (share a great-grandparent), and more distant cousin (share same tribe), as other forms of consanguineous marriage are religiously and legally prohibited<sup>12</sup>.

To ascertain the relationship between consanguineous marriages and congenital SNHL, a descriptive and analytical cross-sectional investigation was carried out. The study comprised kids with congenital SNHL that ranged from severe to profound. The degree of consanguinity was used to split the patients into subgroups. 189 parents and kids with CHL took part in the study. 157 children have blood relatives as parents (83.1%)<sup>13</sup>. Only two parents who were not connected by blood had more than one child with CHL (6.25%; P=.005), compared to 48 who had more than one child with CHL (31.4%)<sup>14-15</sup>. Among the 189 kids, 131 (69.3%) had parents who were blood relatives<sup>16</sup>. Only 39 (20.6%) and 43 (22.8%) children had family histories of CHL on the paternal and maternal sides, respectively<sup>17</sup>. In the progeny of a consanguineous marriage, the probability of having more than one kid with SNHL is 3.5 times higher than that of a non-consanguineous union<sup>18</sup>.

Ten years apart, two epidemiological surveys were conducted using a questionnaire. There were 9540 participants from all over the Saudi Arabian Kingdom, including 6421 from Riyadh City. The first survey revealed consanguinity among 22% of first cousins and 23% of second cousins. 19% of those in the second survey had first cousins, while 28% had second cousins. In both the first and second surveys, the consanguinity rate was 47%. In the first and second surveys, respectively, the prevalence of hereditary (SNHL) was 66.07% and 36.6%<sup>19</sup>. According to the study's findings, consanguinity should be discouraged by educating the general public about the negative effects of connected marriage. To decrease the occurrence of genetic

hearing loss, prevention is crucial<sup>20</sup>. Hereditary SNHL is a disorder that can be avoided. To investigate the prevalence of consanguineous marriage and its impact on the prevalence of inherited SNHL, a random sample survey of 6,421 Saudi babies and children was done. The parents of 21.1% of the children under study had first cousin consanguineous marriages, and 23% had second cousin consanguinity<sup>21</sup>. 1.7% of people had hereditary SNHL overall. Children of first cousin parents had a greater prevalence of deafness (2.8%) compared to 1.6% for children of more distant consanguinity and 1.4% for children of non-consanguineous families. Consanguinity is extensively practiced among the population assessed, and the study proved that it has a significant negative impact on the incidence of hereditary SNHL<sup>22</sup>.

The study is required to raise awareness of the causes of hearing impairment and guide parents in avoiding this potential risk factor because there is insufficient literature on the subject at the national and international levels.

**Objective:** To find the prevalence of hearing loss in consanguinity.

**METHODOLOGY**

Cross sectional study will be conducted. This study will be done on the hearing impaired children by taking responses from their parents through questionnaire in Alam Audiology Clinic, Lahore and Sir Ganga Ram Hospital, Lahore. Study will be completed within 6 months From January – June 2022. Sample size will be 377 hearing impaired children’s parents and it is determined by the formula. The study will be conducted according to ethical guidelines of Advance study and research committee, Fatima Jinnah Medical University/ Sir Ganga Ram Hospital, Lahore. Confidentiality of participant’s data will be maintained throughout the research. Informed consent will be obtained from all the participants prior to recruiting them in study. Data will be directly collected from parent/ caregivers of the hearing impaired children using the questionnaire. Questionnaire will be filled as per participant response. A basic demographic sheet attached in appendix (A) and a Standardized Questionnaire for association between Hearing Loss and consanguinity attached in appendix (B) (Ref) for hearing impaired children will be used to collect data. Consent has been obtained from author. Statistical analysis will be performed using SPSS version 23.0. Results will be depicted through percentages, mean and standard deviation in tables and also by pictorial representation in bar charts. Inclusion criteria was set to include hearing impaired children of age 6 months-5 years will be included. Hearing impaired children whose parents have cousin marriage. Hearing impaired children from Urban and Rural areas visiting Alam Audiology Clinic and OPD of Sir Ganga Ram Hospital, Lahore. Unwilling hearing-impaired children’s parents were excluded from the data, children which other risk factors were excluded.

**RESULTS**

The results showed that out of the 377 participants, 186 were male and 191 were females, children of the age group 2-5 years were the most extensive numbering 323 participants (85.7%).

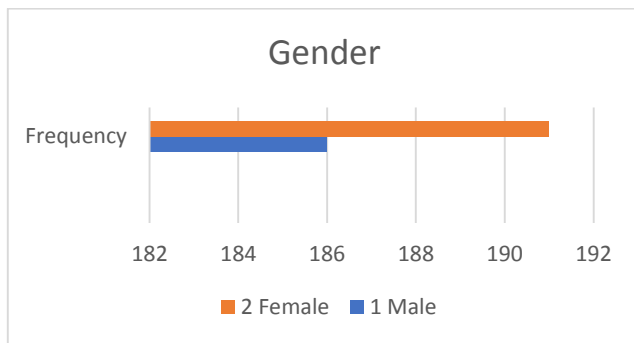


Fig.1

Table 1.

Age Range			
Sr. No.	Age Group	Frequency	Percentage
1.	0-1 years	54	7.9%
2.	2-5 years	323	85.6%

An overwhelming number of children brought for assessment were with congenital hearing loss 286 (75.9%). Very few people reported hearing impairment in their family history. The nature of the cousin marriage shows that most of the participants 78.2% reported that they are first cousins. Most of the children 69% had moderate to severe hearing loss.

All the patients were ruled out for all other risk factors other than consanguinity. The patients were also tested for other disabilities, their types of hearing losses were also graded. The demographic variables were also considered.

Degree of Hearing Loss			
Sr. No.	Types	Frequency	Percentage
1.	Normal Hearing	8	2.1%
2.	Mild Hearing Loss	12	3.2%
3.	Moderate Hearing Loss	112	29.7%
4.	Severe Hearing Loss	98	26%
5.	Profound Hearing Loss	147	39%

The consanguinity of the patients was also considered and they were asked about their relationship and a gradation of their cousin marriage was determined.

Consanguineous Marriage			
Sr. No.	Type	Frequency	Percentage
1.	1 <sup>st</sup> Cousin	297	78.8%
2.	2 <sup>nd</sup> /3 <sup>rd</sup> Cousin	58	15.7%
3.	Far Relation	22	5.8%

**DISCUSSION**

According to a study, most children of cousin marriages exhibit a propensity for hearing loss, and most of the patients were from close cousin unions. The pattern that cousin marriages cause hearing impairment in children is supported by earlier work. All further hearing-related factors were disregarded in these studies<sup>23</sup>. The majority of studies indicate to cousin weddings as a prominent factor in hearing loss, and studies from Europe and Asia all corroborate the same conclusion. Hearing loss is affected by the factor of cousin marriages<sup>24</sup>. Most of the kids did not appear to have any other evident causes of hearing loss, such as meningitis or noise-induced hearing loss, and neither did the parents record any prior instances of hearing loss or a family history<sup>25</sup>. More than 20% of families in northern Iran were analyzed in the 2019 Iranian study, which revealed that there is a genetic tendency for pre-lingual hearing loss as well as a smaller gene pool within the families, which increases the likelihood that patients may have hearing loss<sup>26</sup>. The candidate's children's gene pool is also constrained by their consanguineous marriages, which also compound any potential hereditary hearing loss. It is logical to suppose that hearing loss in consanguineous marriage offspring would fall within this range given that the study demonstrates that they do have other genetic illnesses that are amplified. One out of every five Arab families had congenital hearing loss, according to a study done in northern Israel on the Arab population, where the practice of consanguineous marriage is particularly common. This was also ascribed to other factors, such as their tendency to marry within the family<sup>27</sup>.

**CONCLUSION**

After analyzing the data using SPSS 21, it was concluded that the majority of the children whose parents are in a consanguineous marriage report varying degree of hearing loss in their children and cousin marriage hence show a prominent factor to hearing impairment.

**Recommendations:** The scope of the research was limited. The data was only acquired from the urban centers.

**Conflict of Interest:** There is no conflict of interest both personal and financial in the research project.

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