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STUDY OF COCHLEAR CELLS ABNORMALITIES IN CHILDREN; ITS CAUSES AND MANAGEMENT IN PAKISTANI POPULATION

Amna Mumtaz, Muhammad Nadeem*, Javeid Iqbal, Samiullah Burki

Department of pharmacology, Faculty of Pharmacy, Hamdard University Karachi Pakistan

***Corresponding author e-mail:** nadeem_d30@yahoo.co.in

ABSTRACT

Deafness is the disability to hear sounds usually due to malfunctioning of cochlear cells. These cells are responsible for deafness. If inner ear or auditory nerve is involved in causing deafness it is called sensory neural hearing loss. Causes of hearing loss vary in different regions of the world. Many diseases like meningitis, measles and high grade fever are responsible for deafness as well as trend of consanguineous marriages and positive family history is also thought to be responsible for deafness. As Pakistan is a developing country lack of immunization, trend of consanguineous marriages, factors associated with prenatal and postnatal care of mother play a major role in causing deafness in children, management of deafness is difficult and expensive. It includes hearing aid, cochlear implant and rehabilitation services the purpose of this study was to find the major causes of deafness in Pakistani children. For this purpose 122 children were included from deaf school located in Karachi, Pakistan. The data was gathered in the form of questioners and interviews of parents and children, and there previous audiological test reports. The provided information was analyzed and it was noted that the consanguineous marriages are responsible for deafness as well as positive family history and diseases also play role in causing deafness. In this study, it was found that 69.67% of deaf children have parental relationship(cousins) ,44.26% have family history of deafness .The cause of deafness was unknown in 65.57 children Ear infection was present in 7(5.73%) children .High grade fever was 3.27 %. Meningitis was 2.45 %, Measles was 1.63%, 4.9% were born premature ,jaundice was present in 2.45% of children but due to lack of education and awareness parents were not able to provide satisfactory answers of questioners/interviews. It was concluded that trend of family marriages is common in Pakistani population, poor immunization of children, no screening at the time of birth, lack of awareness and poor socioeconomic conditions are factors which are responsible for deafness in children of Pakistan.

KEY WORDS: Deafness, Cochlear cell, abnormalities of cochlear cell in children, and management of deafness

INTRODUCTION

Deafness is inability to hear, perceive and locate sounds. It is considered the most common birth defect among children and after hypertension and arthritis it is the third leading chronic disability [1]. According to 1981 census, 13% of people are deaf and dumb of total disable population of Pakistan, females are more affected by disabilities then males that may be due to environmental conditions, dietary requirement, conditions at the time of delivery etc females disability ratio is much higher in rural areas then urban areas [2]. There are increased risks of accidents and physical abuse for deaf because of inability of hearing warning alarms [3]. There is difference in hearing impairment and deafness, the word deafness shows that no more hearing is present in one or both ears and the word hearing impairment is used when some residual hearing is present in one or both ears. According to world health organization in 2005 about 278million people worldwide are suffering from severe to profound hearing loss and most of them belong to middle or lower income countries. Hearing loss has great impact on person's life; it not only affects ability to learn and speak but also plays a role in person's social relationships. It also burdens economy of a country because cost of

special education is high. People who are deaf or hard of hearing cannot get jobs and are mostly dependent unless they get proper treatment on time. children with hearing loss show less progress in school and face difficulty in learning and understanding teachers and class mates thus remain isolated socially [4]. Pakistan is an under developed country and there is a little database available on children with hearing disability, In a study which was conducted in Peshawar, Pakistan, 92.1 % of children were found profoundly deaf and 7.9 % were severely deaf of 140 deaf school pupil [5]. For basic evaluation of hearing, many tests are available for audiometric evaluation which includes; Pure tone audiometry, Air and bone conduction testing, Speech audiometry, Acoustic admittance measurement, Auditory Brainstem Response (ABR). Management includes the use of hearing aids and cochlear cell implants that can facilitate in the hearing process.

MATERIAL AND METHODS

Patient population

This multicentre, observational and survey based study consists of 122 children which was conducted at different deaf schools, private and public hospitals and clinics of Karachi, Pakistan. Total 200 children's data was collected but 122 children were included in this study.

Inclusion and Exclusion Criteria

Data of 200 children were collected but only 122 were included in the study. Children were included in this study on the basis of non syndromic deafness and those having unilateral and bilateral deafness. Some children were excluded from the study who didn't qualify the inclusion criteria and who was less interested to provide information.

Age and Sex Distribution

One hundred and twenty two children for this study was comprises of 69 (56.55%) female deaf children and 53 (43.44%) were male deaf children. All selected deaf children were distributed into different age groups; 4 male and 1 female deaf children were in age group of 1-2 years, in age group 3-4 years, 4 male and 14 female deaf children were present and 11 male and 13 female deaf children were placed in age group of 5-6 years. 10 male and 10 female deaf children were included in age group of 7-8 years while in age group of 9-10, 13 male and 13 female deaf children were present. Age groups 11-12 years comprised of 4 male and 10 female deaf children and while remaining 7 male and 8 female deaf children were included in age group of 13-14 years which are also shown in Table No. 1.

Data collection

Data was collected from April 2011 to Nov 2011. A questioner was presented to parents /guardians of selected children who were deaf. A detailed interview was also conducted for complete knowledge of every aspect of problems causing deafness. The Questions were intended to elicit the following aspects of their histories: Age, sex, history of disease like ear infections jaundice, prematurity, complications during pregnancy etc, vaccination of meningitis, consanguinity of parental relationship, and other hearing impaired siblings, family history of deafness, result of ABR (Auditory Brain Stem Response) Test, socioeconomic condition of parent /guardian and current treatment followed.

Analysis of Data

Data was collected and organized and was analyzed by using MS Excel-2007 to determine frequencies percentage of the major causes of deafness in children of Karachi, Pakistan.

RESULT AND DISCUSSION

The results of this study revealed that there is more deafness in females then male's. Females are more affected from deafness in Pakistan as 69 (56.55%) children were females and males were 53 that are 43.44% as shown in Table No. 1

There was a history of ear infection in 7 of 122 (5.73%) children; High grade fever was present in 3.27 %, Meningitis was 2.45 %, measles was 1.63%, 4.9% were born premature, jaundice was present in 2.45%, typhoid was in 4.09%. Miscellaneous cases of deafness were 9.8% which include different prenatal and many other postnatal factors as shown in Table No. 2.

The frequency of deafness was 4.0 % in age group (Agp.) 1-2 years (yrs), 14.75 % in Agp. of 3-4 yrs, 19.67% in Age group 5-6 yrs, 16.39 %in Agp 7-8 yrs, 21.31% in 9-10 yrs, 11.47% in Agp 11-12 yrs and 12.29% in Agp 13-14 yrs showing the highest number of children in Agp ranging from 9-10 yrs. The statistical analysis of data shows Mean age 7.8. The frequency of deafness was highest in age group between 9-10 yrs.; possibly due to late diagnosis and treatment. Family marriages are common in Pakistan and our study showed that 69.67% of children under study have parental relationship as they belong to a same family and 30.32 % have no relation between parents Family history of deafness was present in 44.26% children and 55.73 % children have no family history of deafness which is shown in figure No.1.

In Pakistan, major cause of deafness is family marriages that's why deafness runs family after family which is increasing day by day which can be

lessen by avoiding such marriages. According to our research, in age group 1-2 years, the frequency of negative family history was about 0.8% and 3.27 were with positive family history of deafness. Out of all selected children, 44.26% were with negative family history and 55.737% were with positive family history which is shown in Table No. 3.

Due to poor socioeconomic condition of the Pakistan, the treatment of the deafness is much costly. In our research, it is observed that about 51.63 % deaf children were using hearing aids, 1.63 % were treated with cochlear implants while 46.72 % were receiving no any treatment and 53.27 % were receiving treatment which is shown in Table No.4.

As Pakistan is a developing country and children are not screened at the time of birth for disabilities like hearing loss parents often fail to diagnose hearing loss at early stage [6]. The results of this study revealed the fact that most of cases of childhood deafness are of unknown cause The etiology of deafness was unknown in 80 (65.57) children. Ear infection was present in 7(5.73%) children .High grade fever was 3.27%. Meningitis was 2.45 %, measles was 1.63%, 4.9% were born premature, jaundice was present in 2.45%, typhoid was present in 4.09%. Other factors which includes problems during pregnancy like anoxia and use of drugs during pregnancy.

Das. V. K reported in another similar study that etiology of deafness was due to unknown cause 33.9%, perinatal group 12.8%, bacterial meningitis 6.5%, congenital infections 8.2%; chromosomal anomalies 5.3%, and miscellaneous group 4.7% [7] Derekoy.S.F reported the high incidence of unknown cases of deafness in children Etiological groups showed the following distribution: unknown cause 26.1% febrile Convulsion 26.9%, hereditary group 23.8%, meningitis 10%; measles 6.1%; and 6.6% cases miscellaneous [8].

In the Saudi study the commonest cause of hearing loss is otitis media with effusion [9] which was 5.73 % in this study showing high percentage of children affected by otitis media in Pakistan. in Tanzania a study showed 24.2 % unknown cause of deafness in children ,other causes include meningitis in 23.9%,otitis media in 8.8%,measles in 4.1%,ototoxicity in 20.8% of children understudy [10] Parents often fail to notice hearing impairment in their child thus many children in Pakistan are not diagnosed early and treatment becomes difficult as the early years of life plays crucial role in child ‘s development of learning and cognitive skills as Watkin et al reported that parents suspicion is poor indicator of childhood deafness [11]. This is the reason that mean age of children under study was 7.8 years, delayed detection and treatment of hearing loss increase the risk that child will not be able to learn spoken language and mainstreamed.

Reardon W reported that in a deaf school in Karachi Pakistan, parents noticed hearing loss is only 44% of severe to profound hearing loss children and this ratio is lower in mild to moderate hearing loss cases [12]. In these study, 55.73% i-e 68 out of 122 children has no family history of deafness and 44.26% i-e 54 out of 122 children have family history of deafness. In another study positive family history was present in 26% of hearing impaired population [12]. V.K.Das reported that 23.3 % of children in Manchester city were affected by deafness due to positive family history [7].

CONCLUSION

There are many causes of deafness in Pakistan, in our study consanguineous marriages are very obvious in increasing number of deaf children, poor socioeconomic condition make the situation worse. Many acquired causes of deafness are preventable and even the deafness can be treated if diagnosed in early years of life but the lack of awareness and poverty plays role in poor management of deafness in children. This study indicates the need of awareness programs for prevention and diagnosis regarding deafness for general population and educational programs for parents of deaf children regarding treatment.

Every child should be screened at the time of birth for any type of hearing loss as early few years are important for learning and language development, early diagnosis and intervention can save this precious time of child’s life.

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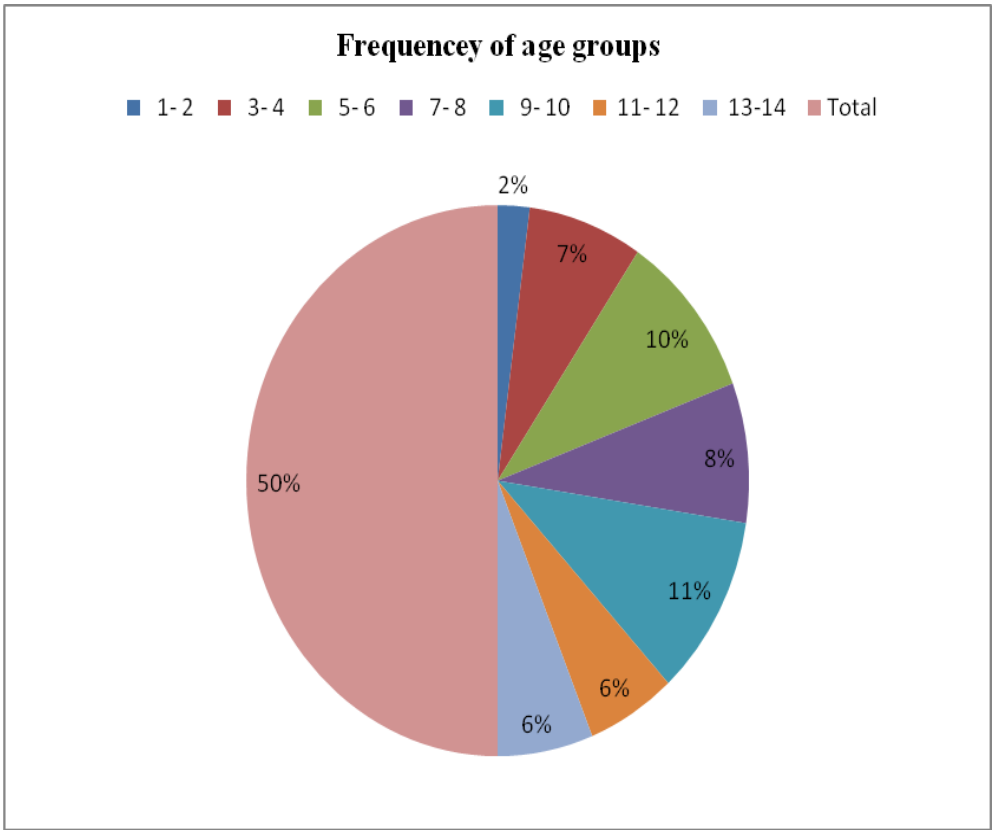

Figure No. 1 Frequency of deafness in different age groups

Table no 1 Age and sex distributions of deaf children

Age group	Males	Females
1-2 yrs	4	1
3-4 yrs	4	14
5-6 yrs	11	13
7-8 yrs	10	10
9-10 yrs	13	13
11-12 yrs	4	10
13-14 yrs	7	8
Total (n=122)	53(43.44%)	69 (56.55%)

Table No. 2 Children affected by different diseases causing deafness

No.	History of Diseases	No of Children Effected n=122	Percentage
1	Measles	2	1.63%
2	Meningitis	3	2.45%
3	Ear Infection	7	5.73%
4	Premature	6	4.9%
5	High grade Fever	4	3.27%
6	Jaundice	3	2.45%
7	Typhoid	5	4.09%
8	Unknown	80	65.57%
9	Miscellaneous	12	9.83%

Table No. 3 Age groups of children with positive and negative family histories

Age groups (Years)	No of children with positive Family history	No of children with negative family history
1-2	1 (0.81%)	4 (3.27%)
3-4	13 (10.6 %)	5 (4.09%)
5-6	10 (8.19%)	14 (11.47%)
7-8	8 (96.55%)	12 (9.83%)
9-10	7 (5.73%)	19 (15.57%)
11-12	9 (7.37%)	5 (4.09%)
13-14	6 (4.91%)	9 (7.37%)
n=122(100%)	54 (44.26%)	68 (55.737%)

Table No. 4 Number of children receiving different treatments

Total no of children	Hearing aid users	Cochlear implant users	Children receiving no treatment	Number of children receiving treatment
122	63	2	57	65
100%	51.63%	1.63%	46.72 %	53.27%

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