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A cross sectional study of clinical profile of deaf mute children at tertiary care center

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ABSTRACT

Background: Hearing is necessary to learn language, speech and to develop cognitive skills. Hearing helps in developing child to learn, recognize sounds, identify objects, events and internalize concepts. Effects of hearing loss on the development of child's ability to learn, to communicate and to socialize can be devastating. The study is planned with the aim to study clinical profile of deaf mute children and to identify 'socio-demographic' and 'health' profile of deaf mute children. This study shows distribution of various socio-demographic factors in deaf mute children and to study their clinical profile.
Methods: The present cross sectional descriptive study was conducted at OPD of ENT department, Government Medical College and Hospital, Akola, Maharashtra. Study was carried out for a period of two months, it's included Deaf mute children from 2-12 years of age. 50 subjects were reported over the study of 2 months. For data collection demographic parameters, complete birth history including prenatal, perinatal and postnatal history was noted. Thorough clinical examination was carried out with special attention to branchial arch system.
Results: There were 70% males compared to 30% females. Male: female ratio was 2.33: 1. Pneumonia (10%) and hyperbilirubinemia (10%) was the commonest health problem. In the study deafness were attributed to 38% genetic causes, 28% Non-genetic and idiopathic in 34% of children.
Conclusions: The age at detection of hearing loss is 0-2 yrs age at which if rehabilitation is done can benefit the child to the maximum. Delayed diagnosis of hearing loss can be explained on basis of community practices of neglecting delayed speech, lack of social awareness and partly due to absence of any active health surveillance in this aspect. Multistep protocol for hearing assessment and parental awareness about facilities of rehabilitation and accessibility of services should be emphasized.

Keywords: Deaf mute child, Clinical profile

INTRODUCTION

Hearing is necessary to learn language, speech and to develop cognitive skills. Hearing helps in developing child to learn, recognize sounds, identify objects, events and internalize concepts. It is important for normal educational and social development. Since exposure to a normal acoustic environment is required for maturation of peripheral and central auditory pathways, significant reduction of sensory input induces both anatomical and physiological alteration of auditory pathways.[1]

The developing child must pass through critical periods of language acquisition and even a mild hearing loss can interfere with his natural growth. Effects of hearing loss on the development of child's ability to learn, to

communicate and to socialize can be devastating. Worldwide approximately 360 million people have hearing disorders. Overall prevalence of congenital hearing disorder is 1-3 per 1000 newborns. As per WHO estimates in India, there are approximately 63 million people who are suffering from significant hearing impairment; this places the estimated prevalence at 6.3% in Indian population.[2] In developing countries the technology of early diagnosis, effective hearing aids, cochlear implants, education in special schools & other rehabilitative measures are not adequately distributed. This leads to delayed diagnosis of congenital hearing losses. In India this problem has started to be addressed just now with advent of National Programme for prevention and control of deafness according to operational 12th five year plan. However it is not effectively implemented throughout India till date.[3]

With this background, the study is planned with the aim to study clinical profile of deaf mute children and to identify 'socio-demographic' and 'health' profile of deaf mute children. The data obtained would help not only in creating awareness, establishing multidisciplinary prediction screening model for at risk babies.

METHODS

The present cross sectional descriptive study was conducted at outpatient department (OPD) of Government Medical College and Hospital, Akola, Maharashtra. Present study was carried out for a period of two months from 1st of August 2016 to 30th September 2016 which included Deaf mute children from 2-12 years of age given that whose parents were willing to give consent to participate in the study. All postlingually deaf children were excluded along with those who failed to give consent. 50 subjects were reported over the study of 2 months. For data collection of sample, complete birth history including prenatal, perinatal and postnatal history was noted to find out various exogenous congenital risk factors of deafness and history regarding previous illness, treatment, immunisation and accident was asked. Detailed history was elicited including demographic parameters like religion, occupation, income and education. Thorough clinical examination was carried out with special attention to brachial arch system. In cases of children having deafness with other associated anomalies, mental retardation, cardiac diseases and syndromes, pediatric consultation was obtained to confirm the syndrome related to hearing loss. Detailed systemic examination was also carried out. Detailed workup of an individual case was carried out and when the family members were also suffering from deafness, they were interviewed to search for genetic associations. All the details were recorded in pretested, semi structured, paper based questionnaire. Clearance from institutional ethical committee (IEC) was taken. For data compilation and analysis Microsoft excel was used.

Children of age group between 2-5 years of age were evaluated by a team of specialist in ENT. Age group was divided into 3 groups. 2-5 years, above 5-9 years and above 9 years. Variable age at detection – it includes the child's age at which the deafness was confirmed.

RESULTS

Table 1: Distribution of study subjects according to age and sex (n=50).

Age	Male (%)	Female (%)	Total (%)
2-5 yrs	10 (28)	04 (26)	14 (28)
>5-9 yrs	15 (42)	07 (46)	22 (44)
Above 9 yrs	10 (28)	04 (26)	14 (28)
Total	35 (70)	15 (30)	50 (100)

In the present study of 50 cases majority of subject were from age group 5-9 yrs (44%) followed by equal (28%) in both age groups 2-5 yrs and above 9. There were 70% males compared to 30% females. Male: female ratio is 2.33: 1.

The demographic profile of deaf mute children was studied it was found that majority of children in the present study were from a nuclear family (64%) were of Hindu religion 42 (84%). 78% of patients visited hospital for handicap certificate for hearing disability. The occupation of parents of deaf mute children was studied. The parents of deaf mute children were involved in different occupations which were classified in 7 categories scale as profession, semi profession, clerical, shop owner, farmer, skilled worker, semi-skilled worker, unskilled worker and unemployed. Socioeconomic status was assessed according to modified BG Prasad classification. They were divided into upper class, upper middle class, middle class, lower middle class and lower. Majority of the children (26%) were from lower middle SE class and upper middle class (Table 2).

The education of parents of deaf mute children was studied. They were grouped according to Kuppuswamy's classification of occupation i.e. as profession, graduate or post graduate, intermediate or post high school diploma, high school certificate, middle school certificate, primary school certificate, illiterate Parents of majority of deaf mute children were having high school certificate (40%). Parents of many children were having education of middle school (22%) and graduate level also (26%) followed by primary level education (2%). Some of the parents were illiterate (6%).

Detailed natal history was enquired. It was found that most of the deliveries in the present study were full term (84%), normal (66%) and conducted at hospital (96%) (Table 3).

In the present study, the age at detection of hearing loss varies between 0-6 yrs. The age at which hearing loss was confirmed was considered as age at detection. In

Maximum number of children (48%) the age at detection was between 0-2 years. overall mean age of detection was about 2.18 years, for male it was 2.12 years and for female it was 2.31. In 44% children age at detection was between 2-4 yrs. In only 8% children it was above 4 years (Table 4).

Table 2: Distribution of study subjects according to various socio-demographic factors.

S. No.	Factors	Variants	No. of children (%)
1	Socio-economic class	1. Upper class	10 (20)
		2. Upper middle class	13 (26)
		3. Middle class	10 (20)
		4. Lower middle class	13 (26)
		5. Lower class	04 (08)
2	Occupation of Parents	1. Professional	08 (16)
		2. Semi-professional	00
		3. Clerical, shop owner, farmer	17 (34)
		4. Skilled worker	11 (22)
		5. Semi-skilled worker	01 (02)
		6. Unskilled worker	13 (26)
		7. Unemployed	00
3	Education of parents	1. Professor	02 (04)
		2. Graduate or Post graduate	11 (26)
		3. Intermediate or post high school diploma	00
		4. High school certificate	20 (40)
		5. Middle school certificate	11 (22)
		6. Primary school certificate	01 (02)
		7. illiterate	03 (06)
4	Family type	Nuclear	32 (64)
		Non –nuclear	18 (36)
5	Religion	Hindu	42 (84)
		Muslim	08 (16)

Table 3: Distribution of deaf mute children according to natal history (n=50).

S. No.	Variables	Variants	No. of children (%)
1	Place of delivery	Hospital	48 (96)
		Home	02 (04)
2	Term of delivery	Full-term	42 (84)
		Preterm	08 (16)
3	Type of delivery	Normal	33 (66)
		Caesarean	12 (24)
		Assisted	05 (10)
4	Reason for visit	Obtaining handicap certificates	39 (78)
		For treatment	11 (22)

Table 4: Distribution of deaf mute children according to age at detection of hearing loss.

S. No.	Age at detection	Male (%)	Female (%)	Total
1	0-2 yrs	17 (34)	07 (14)	24 (48)
2	2-4 yrs	15 (30)	07 (14)	22 (44)
3	Above 4 yrs	03 (06)	01 (02)	04 (08)
	Total	35 (70)	15 (30)	

Pneumonia (10%) and hyperbilirubinemia (10%) was the commonest health problem which might be of some significance in etiology of deaf children. This was followed by birth asphyxia (6%), non-specific cervical lymphadenopathy and exanthematous fever (4%). Other health problems were very infrequent like refractive error, cerebral palsy, cleft palate, tonsillitis, cataract, urinary incontinence, chikungunya, septal defect (Table 5).

Table 5: Distribution of study subjects according to various health problems identified.

S. No.	Health problems		No. of children *(%)
1.	Systemic disorders	Pneumonia	5 (10)
		Hyperbilirubinemia	5 (10)
		Birth asphyxia	3 (6)
		Exanthematous fever	2 (4)
		Septal defect	1 (2)
		Chikungunya	1 (2)
2.	Congenital defects	Whiteforelock	2 (4)
		Cerebralpalsy	1 (2)
		Telecanthus	1 (2)
		Aniridia	1 (2)
		Micrognathia	1 (2)
		Cleft palate	1 (2)
		Tongue tie	1 (2)
		Urinary incontinence	1 (2)
3.	Otorhinolaryngology conditions	Non -specific cervical lymphadenopathy	3 (6)
		Wax	2 (4)
		Tonsillitis	2 (4)
4.	Ophthalmic defects	Cataract	1 (2)
		Refractive error	1 (2)

*multiple causation, in some children more than one complaint was found.

Table 6: Distribution of study subjects (n=50) according to etiology.

S. No.	Variables		No. of children (%)
1.	Etiology	Genetic	19 (38)
		Non-Genetic	14 (28)
		Idiopathic	17 (34)
2.	Genetic (n=19)	Syndromic	03 (16)
		Non syndromic	16 (84)
3.	Syndromes	Waardenberg syndrome	02
		Treacher Collins syndrome	01

Table 7: Distribution of deaf mute children with non genetic causes of hearing loss.

S. No	Non genetic causes		No. of children (%)
1	Prenatal n=05	Pregnancy induced hypertension	02 (04)
		Maternal infections	02 (04)
		Oligohydroamnios	01 (02)
2	Perinatal	Preterm	05 (10)
		NICU	10 (20)
		LBW	03 (06)
		Convulsions	01 (02)
		Cyanosis	02 (04)
		Total	20 (40)
3	Postnatal	Cerebral palsy	01 (02)
		Hyperbilirubinemia	05 (10)
		Pneumonia	05 (10)
		Asphyxia	03 (06)
		Chikungunya	01 (02)
		Septal defect	01 (02)
		Urinary incontinence	01 (02)
		Total	17 (34)

The etiology of hearing loss was broadly divided in three groups. In the present study majority children 19 (38%) had deafness attributable to genetic causes. Non-genetic causes of deafness were evident in 14 (28%) and any etiology could not be ascertained in 17 (34%) of children. The genetic hearing loss can be divided into syndromic and non syndromic hearing loss. In present study majority of children (84%) with congenital hearing loss were having non syndromic hearing loss where as 16% deaf mute children had syndromic hearing loss. In the present study 3 out of 50 children had syndromic hearing loss. Autosomal dominant syndromes were Waardenberg syndrome and Treacher Collins syndrome (Table 6).

In the present study, amongst non-genetic causes of hearing loss perinatal causes were commonest accounting for 20 (40%) cases followed by postnatal causes in 17 (34%) cases and prenatal causes in 05 (10%) cases. Amongst perinatal causes children with histroy of NICU (20%) admission was the most common cause of hearing loss followed by preterm children (10%) LBW (6%) and cyanosis (4%). Among postnatal causes hyperbiliru-binemia and pneumonia constituted for 10% cases each. They were followed by asphyxia (3%), chikungunya, cerebral palsy, urinary incontinence and septal defect whose incidence was only 1%. In prenatal causes PIH and diseases like high fever encountered during pregnancy contributed to 4% cases of each, some of them were also had oligohydroamnios (2%) (Table 7).

DISCUSSION

Deaf mutism is defined as inability to speak as a result of deafness. Deaf mutes are a separate group into themselves with a severe handicap. Advances in technology have changed the perceptive of evaluation and rehabilitation of deaf mutes however these advances do not reach the rural areas and population belonging to low socio-economic classes. Concerted efforts to assess these problems are strengthening in India with the National programme for prevention and control of deafness.

Socio- demographic profile: The present study comprised of 50 deaf mute children presenting to ENT OPD. The age group ranged from 2-12 years with mean age of 7.6±2.96 years. Majority of children (44%) were from >5-9 years age group. In the present study, there were 35 (70%) males and 15 (30%) females with male to female ratio of 2.33:1. Male predominance was seen which was not statistically significant. Komal et al in the study of 138 deaf mute children in age group of 2-12 years reported male predominance male: female ratio 2.07: 1. Such male predominance is widely reported in literature with Bhadauria et al reporting high male to female ratio of 3.73:1.[4]

The reason of this male preponderance in deaf mutism might be related to genetics or biased care towards girl child. Some family still more concern about the care of male child. The male child is express or of genes in dominant, recessive as well as sex linked transmission. Male children are also more susceptible to adverse factors acting in prenatal, natal, postnatal life, though the reason for this has not been identified.

In the present study of 50 deaf mute children, most of the children were from upper middle class (26%) and lower middle class (26%), relatively few from upper class (20%) and lower class (20%) and least number of cases from lower class (8%). Nearly 2/3rd of the children were from nuclear family (64%). Majority of them were Hindu by religion (84%). This reflects demographic character of the region. Most of the parents of children studied were farmer by occupation (34%), while (26%)of the parents being involved in unskilled work, (22%) in skilled work, (16%) of the parents being professionals, only (2%) children had parents involved in semi-skilled laborer category. Majority of children were from poor uneducated family involved in manual occupation. 78% children came to the hospital for availing the disability certificate and benefits associated with. Few children (18%) came for treatment or rehabilitation. This suggests low level of awareness among parents, many of whom were totally unaware that anything could be done for their children.

Natal history: Most of the children (84%) were result of full term normal delivery. However (4%) children had home delivery. Prolonged birth asphyxia (6%) preterm (10%) NICU admission (20%), LBW-(6%), cyanosis (2%) and postnatal causes like pneumonia (10%), hyperbilirubinemia (10%) may cause deafness.

Age at detection of hearing loss: In the present study the maximum numbers of children (48%) were detected at the age between 0-2 years. while (44%) were diagnosed between >2-4 years of age. 4 children (8%) were not diagnosed till 4 years. Contrast to our study Bahaduria et al reported same to be 6.7 years in 2004.[4] Average age at detection of hearing loss is lower at 2.32 yrs in profoundly deaf children in western countries as reported by Lemajic–Komazec et al which was similar to our study.[5] Age at which hearing loss is detected is single most important factor in management and rehabilitation of deaf child which can actually lead in prevention of deaf mutism. General health problems: In the present study the most common general health problem in deaf & mute children was found to be pneumonia and jaundice (10%) each, birth asphyxia (6%), exanthematous fever (4%), cerebral palsy, tonsillitis, refractive error, cataract (2%) each.

Etiology: The etiology of deaf mutism can broadly be classified depending in three groups of genetic, non-genetic and idiopathic causes. In present study genetic causes accounted for 38% of children with deaf mutism followed by idiopathic in 34% cases. In 28% non-genetic causes were found to be the cause for deafness finding was in accordance with Kalsotra et al study in which they

found genetic causes of hearing loss to be 47.5% that is the highest amongst the genetic, non-genetic and idiopathic causes.[6] Singh et al, found in their study genetic causes of hearing loss to be 15.6%, non-genetic causes as 15.3% and idiopathic causes in 50.6% children.[7]

Genetic causes of deaf mutism: The fact that genetic hearing loss is commonest cause of congenital and early hearing loss has also been reported by Wiley et al, 51.5%.[8] The findings in present study correlate well with those reported in literature. Genetic hearing loss in present study was divided in syndromic (15.7%) and non syndromic (84.3%). Kalsotra et al, in their study of 261 children identified 124 children with genetic causes of hearing loss.[6] Among children with genetic cases of hearing loss, 24.19% had syndromic hearing loss while remaining 75.81% children with genetic hearing loss had non syndromic hearing loss. Findings in present study are roughly comparable with these findings. However Ozturk et al, in their study found incidence of syndromic hearing loss among patients with genetic hearing loss to be 31.7% which was higher than present study.[9] High percentage of non syndromic hearing loss among genetic hearing loss has special significance in the terms of difficulty in diagnosis at birth or earlier because of presence of stigma. It is only after child fails to develop speech that parents may become concerned. However if adequate attention and infant screening is done these cases can also be easily diagnosed by age of six months by BERA or at least suspected at birth if TOAE is used.

Syndromic hearing loss: The diagnosis of syndromic hearing loss may appear uncomplicated but the variability in phenotype from one affected individual to the next can be confusing. In the present study total 3 (6%) syndromic children were found which constitutes some part of genetic etiology. Autosomal dominant- two cases of Waardenberg syndrome and one case of Treacher Collins syndrome was identified. Kalsotra et al, in their study of 261 cases, they had divided the congenital syndromes into six categories of which 30 cases having specific syndromes of autosomal dominance and 2 cases of autosomal recessive syndrome (Ushers type I) and 1 case of Hunter's syndrome in X linked recessive inheritance.[6]

Acquired causes of deaf-mutism: Present study was in accordance with Singh et al., which showed 10% prenatal cause and in study done by Abolfotouch et al, he found the prenatal causes to be 17.00%.[7,10] This difference might indicate level of care of expectant mother. In the present study the perinatal causes contributed to 40% which was in accordance with Elangos et al, whose incidence was second highest.[11] Singh et al, reported 10.80% perinatal cases while Kalsotra et al, reported only 4.60%.[6,7] In the present study postnatal causes contributes to 34% which is in accordance with various studies like Abolfotouch et al.[10] In almost all the studies mentioned above the incidence of cases in postnatal period is almost same portraying same incidence of various infections in postnatal period amongst various groups of population. In the present study idiopathic causes contributed to 34% which is in accordance with Singh et al, (50.60%) and Elangos et al, (28.40%).[7,11] Prenatal, perinatal and postnatal form 3/4th of cases which form preventable causes of hearing loss and can be improved by improving standard of obstetrics and neonatal care. This will require very concern efforts, in form of genetic counseling.

CONCLUSION

In the present study genetic cause was the commonest cause for hearing loss, which is almost not preventable; however genetic of partners in consanguineous marriages may help. Marriages with family history of two deaf mutes should be avoided, non-genetic causes like hyperbilirubinemia, NICU admission, prematurity which can be partially preventable by the screening and extra care towards them. Delayed diagnosis of hearing loss can be explained on basis of community practices of neglecting delayed speech, lack of social awareness and partly due to absence of any active health surveillance in this aspect and absence of any high risk registry. So protocol for early hearing assessment, genetic counseling of partners in consanguineous marriages and public awareness about causes and rehabilitation should be emphasized.

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REFERENCES

1. Aiyer RG. Parikh B. Evaluation of auditory brainstem responses for hearing screening of high-risk infants. Indian J Otolaryngol Head Neck Surg. 2009;61:47-53.
2. Mortality and Burden of Diseases and Prevention of Blindness and Deafness WHO, 2012.
3. Disability India J. 2006, April 04 edition
4. Bhadauria RS, Nair S, PalDK. A Survey of deaf mutes. Med J Armed Forces India. 2007;63(1):29-32.
5. Lemajic –Komazec S, Komazec Z, Vlaski L, Dankuc D. Analysis of reasons of late diagnosis of hearing impairment in children. Med Pregl. 2008;2:21-5.
6. Kalsotra P, Kumar S, Gosh P, Mishra NK, VermaIC. A Study of Congenital and Early Acquired Impairment of hearing. J K Sci. 2002;4:136-43.
7. Singh M, Gupta SC, Singla A. Assessment of deafmute patients:a study of ten years. Ind Jour Otolaryngol. 2009;61:19-22.
8. Wiley S, Arjmand E, Jareenmeinzen-Derr, Dixon M. Findings from multidisciplinary evaluation of children with permanent hearing loss. Int J Pediatr Otorhinolaryngol. 2011;75:1040–4.

9. Ozturk O, Silan F, Oghan F, Egeli E, Belli S, Tokmak A, et al. Evaluation of deaf children in a large series in Turkey. Ind J Pedi Otorhino. 2005;69:367-73.
10. Abolfotouh MA, AI-Ghamdi SA. The pattern of hearing impairment among schoolboys in an Institute for deaf subjects. Saudi Med J. 2000;21:873-6.
11. Elango S, Chand RP, Purohit GN. Childhood deafness in Malaysia. Int J Pediatr Otorhinolaryngol. 1992;24:11-7.

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