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Survey of Deaf Children Using Individual Hearing Aid

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Objective: Hearing impairment (HI) is a serious disabling condition; its impact on childhood is crucial. It can result in long lasting communication, social and educational deficits. The aim of the study is to identify the impact of middle ear pathology on the benefit of hearing aid and impact on hearing impaired verbal communication.

Design: This study was conducted during the period of March 2001 to June 2002 at Al-Amal institute for deaf boys. Clinical examinations of the ear by otoscope were performed. Tympanometry using Grason Stadler Incorporation (GSI 33) equipment and pure tone results were collected from their files. The tympanograms were divided into type A, B, and C.

Subject: A cohort of 150 hearing impaired children of median age 9.9 years, (range 6.1 to 13.7) from Al-Amal institute for deaf (boys) in Riyadh city.

Result: The result showed that 55 ears were type B, 18 ears with impacted wax. Seventy percent children were diagnosed at age of 2 years.

Conclusion: This study indicates that there is a need for qualified audiologists and speech therapists, since speech therapy is essential in rehabilitation process. For many hearing impaired persons, hearing aid provides a re-entry into the hearing world.

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Hearing impairment (HI) is a serious disabling condition; its impact on childhood is crucial. It can result in long lasting communication difficulty, social and educational deficits. The one whose hearing is impaired, cannot express his feelings and desire as well as his needs. In general, this will lead to isolation from others. Most of the problem arises as a result of identifying the impairment late in our society, as it is an unseen handicap and very difficult to identify at an early stage[1]. Most families discover this impairment very late[2]. People always see other disabling condition such as blindness, paralysis etc. and react quickly because they are clear while deafness is not[3]. Therefore, people hardly look at the needs

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of these deaf children, due to lack of communication, especially if hearing loss occurs before acquiring speech[4]. Children acquire speech by imitation, if they cannot hear; they will not be able to talk unless appropriate early intervention is undertaken[5]. The clinical ear examination should be done routinely among hearing impaired children to treat any middle ear pathology or remove wax from external auditory meatus[6]. The prevalence rate of type B tympanograms in the survey of 9540 Saudi children of preschool and school age below 15 years of age were 8.2% and the prevalence of otitis media with effusion was 7.5 %[7].

Hearing loss (HL) types can by categorized by site of the auditory system damaged. There are three basic types of hearing loss: conductive HL, sensorineural HL and mixed HL[8.]

The aim of this study is to identify the impact on middle ear pathology of the benefit of hearing aid (HA) and to identify the causes, degree and time of diagnosing the HL and also to obtain the opinion of parents and children regarding the usefulness of HA and other services available to them.

METHODS:

The studied population was 150 Saudi boys. The age distribution of these children ranged from 6.1 to 13.7 years. Three children were excluded from tympanometry examination because of perforated drums and ear discharge.

This study was performed from March 2001 to June 2002 at Al-Amal institute for deaf boys. A questionnaire was sent to the parents of the hearing impaired children with particular emphasis on the use and benefits of HA used by their children and its impact on their verbal communication.

1. **Questionnaire**

Time of diagnosing HL, does he wear a HA, age at which HA was prescribed, provision of HA, improvement after using HA, complaints of children using HA, children's attitude, parent's attitude, and cost of HA. The data were collected from the questionnaire and translated into English.

2. **Clinical examinations**

Clinical examinations of the ear by otoscope were performed. Children with perforation of tympanic membrane and those with active discharge were excluded. Tympanometry was done using Grason Stadler Incorporation (GSI 33) equipment. Pure tone results were collected from their files. The tympanograms were divided into type A (0-99 mm H_2O pressure), type C1 and type C2 (- 100) to (-199), (-200) to (- 350) mm H_2O), and type B (flat curve without an impedance at minimum).

RESULTS

Tympanometry ear examination showed that 33 right ears and 22 left ears are suffering from middle-ear problems. Four ears of three children were excluded because of discharge and perforated ear drum. Children with middle ear disease must have treatment before they are fitted with HA. Twenty two children had moderate HL. Therefore, they were put under intensive speech training and transferred to integrated school for the deaf. The percentage of the age of amplification before entering the institute was 52 % and after entering the institute was 48 %, as well as 51.3 % has a negative attitude towards HA. The hereditary factor in this study was 46 %, see table 1 and 2.

Table 1. **Tympanometry, Degree of HL, Causes of HL, Age of diagnosis**

Type of tympanometry	**Number of ears**	**%**
A right	110	37.162
A left	113	38.175
B right	33	11.148
B left	22	7.432
C right	12	4.054
C left	6	2.027
Total	296	100.000

Degree of HL	**No.of children**	**%**
Moderate	22	14.66
Severe	98	65.33
Profound	30	20
Causes of HL		
Hereditary	69	46
Prenatal	12	8
Pernatal	8	5.3
Post natal	26	17.3
Unknown	35	23.3
Age of Diagnosis		
0-2 years	105	70
2-4 years	32	21.3
4-6 years	10	6.7
6-8 years	3	2

Table 2. **Time of amplification, Using HA, Improvement after using HA, Parents Attitude towards HA, Children attitude towards HA, Parents attitude towards the cost of HA**

Time of amplification	No. of children	%
Before entering deaf institute	78	52
After entering deaf institute	72	48
Using H.A		
Yes	134	89.3
No	16	10.7
Improvement after using H.A		
Yes	76	50.66
No	74	49.33
Parents attitude towards HA		
Positive	124	82.7
Negative	26	17.3
Children's attitude towards HA		
Positive	73	48.7
Negative	77	51.3
Parent's attitude towards the cost of HA		
Expensive	117	78
Reasonable	33	22

DISCUSSION

The general specification of HA has changed by time, but the basic theoretical issues and the overall process of hearing aid selection and fitting have not changed significantly. The hearing aid selected by any procedure should be assessed for its performance by ear testing and the decision should not be based on manufacturers specifications alone. Hearing aids prescribed on the basis of manufacturers specifications have some practical problems[9]. They may not work according to specifications, as one study[10] reported that only 69% of new hearing aids evaluated met the manufacturer's specifications. It must be taken into consideration that the gain and output of a hearing aid measured in a 2-cc coupler are not the same as the gain and output when a person is wearing the aid. Due to this reason many researchers[11] have suggested correction of 2-cc coupler measurement. For the success of any aural rehabilitation process it is still necessary to take into account, selection and verification of the electro-acoustic characteristics of hearing aid, pre-fitting considerations, patient factors like degree of hearing loss and audiometric configuration, the loudness growth function, speech recognition ability, central auditory function, listening environment and motivation to use hearing aid[12].

The prevalence of otitis media with effusion (OME) and the type B tympanogram was more in children up to 8 years of age, which decreased with the increasing age. Maw[13] had demonstrated high incidence of OME in males than females. Since one of the aims of this study was to highlight the middle ear pathology impact on the HA benefit, the result showed that tympanogram type A 223 ears, type B 55 ears, type C18 and 18 ears required wax removal. Recent study by Spremo also emphasized the clinical importance of tympanometry in the diagnosis of OME with a sensitivity of 96%[14].

According to Sergei et al, 90-95% of the hearing impaired population who have 5-10% correctable HL can be helped medically or surgically[15]. It should be noted that, HA cannot totally restore hearing, but it can make a big difference in improving the quality of life for people with HL[16] Most people with HL could be helped medically, surgically or with hearing aids[17,18].

Many surveys show that one out of ten people suffers from hearing loss (HL) and there is unspecific statistics of hearing-impaired people in the world, but experts estimate that the figure is about 500 million[19].

Hearing impairment in Saudi Arabia was found in 13% of the children surveyed. Sensorineural hearing loss (SNHL) was 1.5% of all children surveyed, whereas mixed hearing loss was 1.1%[20]. This percentage is high when compared to other developed countries.

In this study, 50.6% gained benefits from using hearing aid. It improved their daily life social activities as well as improved their verbal communications. In a

research conducted to find out the benefits of HA used in special schools in Karachi, Pakistan, the age of amplification was less than 5 years in 55% of children and above 5 years in 45% of cases[21].

Comparing the high prevalence, in this study, of the children diagnosed early, 70% at age 2 and, 21.3% at age 4, are in urgent need for HA, but most of them did not get HA until they reach the age of 6 years (the primary school). This is because the majority obtain HA from the institute, as they cannot afford it financially, or limited parent's awareness towards the benefits of early usage HA. The majority of the children in the present study were manual communicators. This is in accordance with the teaching in the institutes for the deaf in Saudi Arabia. Theoretically, that can support the finding in this study of 51.3% (n=77) have negative attitude towards using HA as it does not help them meet their expectation for oral communication. These findings agree with the findings of a study by Vibeke which indicated that 72% from their sample communicated orally and children with HL at 0.5 - 4 kHz 60 - 89 dB were significantly better user of the HA than children with hearing loss less than 56 dB and profoundly hearing loss greater than 90 dB[22] . Thus it seems that the children who have the best outcome of aided conditions most probably will develop speech and adequate oral communication skills.

Early detection and intervention is required to provide a hearing aid for a child. Selection of hearing aid for the hearing impaired child must not be undertaken by inexperienced clinician or unqualified individual. It challenges the ultimate skill of even the most experienced person. The selection of hearing aid for a child should be considered to be the responsibility of an audiologist[23]. The probability of rejection of amplification remains high among hearing impaired individuals who are not ready to accept the need for and use of hearing aids[24]. In case of children, parents play a major role in the rejection of an aid. Professionals must never underestimate the importance of parent's role in the successful application of the rehabilitation program. Medal et al stated that "kids do better when their aids are working"[25].

CONCLUSION

The parents are the ones who would fit and carry out day to day management of hearing aids, it is obvious that they need to be motivated, assisted to do this and convinced of its importance. This study indicates that there is a need for qualified audiologists and speech therapists, since speech therapy is essential in rehabilitation process. Hearing and speech centers should provide the services for the hearing impaired children, training of personnel, better parent‘s education and other programs to increase public awareness. For many hearing impaired persons, HA provides a re-entry into the hearing world. Hearing aid should be prescribed free of charge or at least at affordable price.

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