

# Benefits of Early Diagnosis and Early Management Helps in Speech and Language Development in Hearing Impaired Children

Early Diagnosis Helps in Speech and Language Development in Hearing Impaired Children

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## ABSTRACT

**Objective:** The objective of this study is to determine the age of diagnosis of hearing impairment in children and outcome of early management in linguistic acquisition in hearing impaired children.

**Study Design:** A descriptive cross-sectional study in cross section population.

**Place and Duration of Study:** This study was conducted at the Otorhinolaryngology department of Abbasi Shaheed Hospital. This study was conducted from January 2022 to June 2023.

**Methods:** Detail history and complete examination was done. Relevant investigations were performed. After fulfill the selection criteria, patients advised hearing amplification device and speech therapy. Patients called for follow-up and observe language development.

**Results:** Total number of patients selected for this study was 105 patients. Female were 57 (54%). Female male ratio was 1.18. 38 (36%) children were between the ages of 2-3 years came first time in ENT department with complaining of hearing impairment followed by 1-2 years 33 (31%). 59 (56%) patients showed improvement in speech and language development while 46 (43.8%) patients showed poor performance in development of speech and language. Highest frequency of improvement in language development was observed between ages of 0-1 years 15 (78.9%) patients out of 19 patients. Poor performance in development of speech and language was noted between 3-4 years 2 (13.3%) out of 15 patients.

**Conclusion:** Early diagnosis of hearing impairment and appropriate treatment observed good result in language development

**Key Words:** Hearing loss, hearing screening, hearing aid, rehabilitation, amplification device.

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## INTRODUCTION

Globally, Childhood hearing impairment is a serious problem for children and families, about 34 million children present with hearing loss and most of the cases are preventable<sup>1</sup>. According to WHO, hearing impairment defines as inability to hear threshold of 20dB or loss of 35 dB in the better ear<sup>2</sup>.

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All sense organs play an important role in life but vision and hearing have a vital in psychological growth and behavior. Hearing is one of the important senses of organ and helps in the development of language and speech. Hearing impaired child is at higher risk in speech – language development and weak in academic activities as compared to normal hearing child. Critical age in the development of speech and language till 3 years of age. Hearing problem is not only effects in academic activity but also effects in social and later in occupation<sup>3</sup>. Poor hearing threads to develop poor speech and language which affects the normal quality of life in long term<sup>4</sup>. Poor hearing child has poor Communication ability to maintain relationship in normal life<sup>5</sup>. In third world countries, about 10 infants with decreased hearing in every 1000 birth<sup>5</sup>. Hearing problem is one of the major problems of the third world countries. Local study shows, the incidence of hearing impairment in school going in Pakistan is 7.9%. The main reason for late diagnosis in third world countries is financial problem<sup>6</sup>, due to financial constraints the proper facilities of neonatal screening is not present<sup>7</sup>.

Most of the cases of mild cases of hearing impairment are missed which are treatable<sup>8</sup>.

Proper newborn hearing screening procedure should be adopted in those cases where risk factors are present. Before the invention of Newborn screening, most of the minimal or moderate hearing loss was not identified till school age. In screening procedure include detail history of prenatal, perinatal and postnatal information, complete ear examination with nose and throat examination. If any suspicious found in history or child sleeps through loud noises or fails to startle to loud sounds or fails to develop speech at 1-2 years should do hearing assessment. There are subjective test and objective test are available to assess the hearing. Subjective test depends upon the response of the patient while in objective test, no need of patient response. Objective test includes, Otoacoustics emission (OAE) and brainstem evoked response audiometry (BERA). OAE usually advise on the second day of birth and BERA performed 28 days after the initial hearing assessment<sup>9</sup>. BERA usually advise for high-risk neonates<sup>10</sup>.

Audiological rehabilitation considers one of the most effective way to improve hearing. Amplification device plays a vital role in aural rehabilitation. Residual hearing is required to use hearing aid. Now a day digital hearing aid is available to improve the quality of life. Hearing aids is a small electronic battery-operated device which amplify the sound. A hearing aid consist microphone which receives sound and convert it into electrical signals. Hearing aids are useful in hearing impaired child. It helps in improve hearing, speech, communications skill.

In developing countries like Pakistan proper screening protocol does not exist at the national level. The main reasons are lack of infrastructure, financial constraints, no proper patient data available, and limited access to health care units, parents and health workers are unaware for early referral benefits<sup>11</sup>. The main aim of this study is to determine the age of hearing impairment in children and benefits of early identification of hearing impairment in linguistic acquisition in children.

**METHODS**

This study was conducted in Otorhinolaryngology department of Abbasi Shaheed Hospital. This study was conducted from January 2022 to June 2023. After informed consent complete history was taken, which included pre-natal, peri-natal and post-natal problems. In history also asked about the age of detection of hearing loss and age of treatment start. Complete examination was done which included ENT examination and systemic examination. Relevant investigations were performed where required (Otoacoustic emissions, behavior observation, visual reinforcement audiometry, brain stem evoked response audiometry and auditory steady state responses).

**RESULTS**

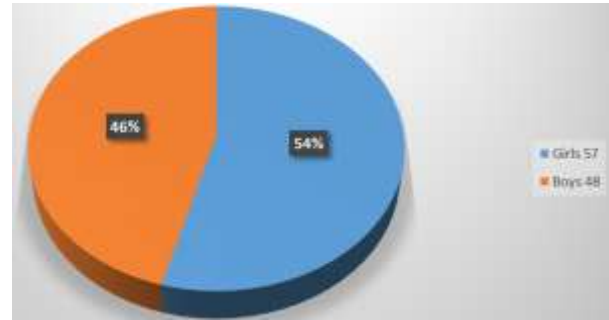


Figure No. 1: Pi Chart (Gender)

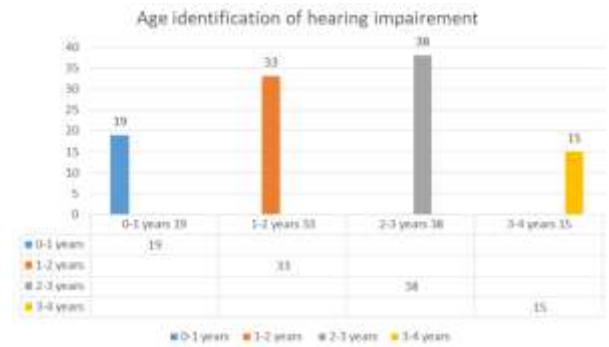


Figure No. 2: Bar Chart (Age)

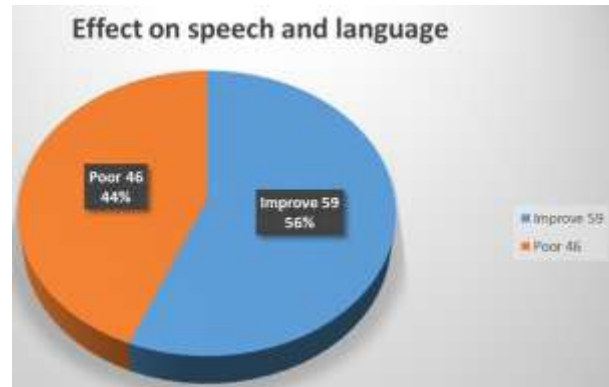


Figure No. 3: (Pi Chart) Speech and language development



Figure No. 4: (Bar chart) Improve speech and language development vs poor speech and language development according to age groups

Children came with hearing loss were included in this study. Patients with history of previous ear surgery, children with intellectual deficit, above 4 years of age, not proper follow-up, not taken proper speech therapy session, in-consistent use of hearing aid, conductive hearing loss improve after treatment and profound hearing loss. After fulfilling the selection criteria, patients called for follow-up and noted speech and language development.

Total number of patients selected for this study was 105 patients. Male were 48 (45.7%) and female were 57 (54%). Female male ratio was 1.18. Bar chart 2 showed the age group in which hearing problem was noted. In 38 (36%) children hearing impairment was noted between the ages of 2-3 years followed by 1-2 years 33 (31%). Only 19 (18%) children were below the age of 1 year. 15 (14.2%) patients were between 3-4 years of age. 59 (56%) patients showed improvement in speech and language development while 46 (43.8%) patients showed poor performance in development of speech and language. Highest incidence of improvement in speech and language development was observed between 0-1 years of age, 15 (78.9%) patients out of 19 patients showed improvement. In 1-2 years of age, 25 (66.6%) patients out of 33 patients showed improvement in language development. Poor performance in speech and language development was noted between 3-4 years only 2 (13.3%) out of 15 patients showed better performance in speech and language development.

## DISCUSSION

Hearing loss causes poor effects in the daily routine life<sup>12</sup>. Hearing impairment in school going children is a common problem which usually ignores by general practitioner. This affects the ability in spoken language<sup>13,14</sup>. Most of the causes of hearing loss are treatable if timely detect. Proper newborn hearing screening procedure should be adopted in those cases where risk factors are present.

This study is tried to determine the benefits of early detection and early management of hearing loss in children and its outcome in speech and language development. In the current study, frequency of hearing loss in female were more. 57 (54.2%) children were female while 48 (45.7%) children were male. Female male ratio was 1.18:1. In Preeti Chaudhary study, 51.83% children were female. In Milan Maharjan study, ratio of hearing loss in female is slightly more as compared to male<sup>15</sup>. In the current study, the most common age group in which hearing impairment was diagnosed between 2-3 years, 38 (36%) children came with hearing impairment were between the ages of 2-3 years followed by 1-2 years 33 (31%). Only 19 (18%) children were below the age 1 year. Study conducted in South Africa showed, median age of identification of hearing impairment was 28 months<sup>16</sup>. Similarly, two

studies which were done in India and west Bengal showed the average age of confirmation of hearing impairment were 24.3 months and 2.4 years respectively<sup>17</sup>. There are multifactorial reasons for late diagnosis of hearing loss from both parents and professional. Mostly health professional is unaware about benefits of early detection of hearing loss in children, usually not advised any relevant test to assess the hearing and do not refer the case to otorhinolaryngologist. In developing countries, lack of facilities of rehabilitation center play important role in late diagnosis<sup>18</sup>. On the other hand, parents don't accept that child has hearing problem and they don't take any advice from relevant doctor. Both factors cause delay in diagnosis of hearing problem. Therefore, it is important to start awareness programme among health professional and parents for benefits of early detection of hearing impairment and early intervention<sup>19</sup>.

In above study, 15 (78%) patients showed improvement in speech and language development were below 1-year of age while 4 (21%) showed poor performance in development of speech after proper use of hearing aid and speech therapy. Between 1-2 years, improvement observed in 25 (75.7%) children after proper use of hearing aid and speech therapy. The improvement in speech and language development drastically decreased with age. Between 2-3 years the percentage was decreased, out of 38 patients 17 (44.7%) children showed improvement while 21 (55%) showed poor performance in language development. The ratio of poor development of speech further decrease between 3-4 years of age, only 2 (13%) children improved in speech and language and 13 (86.6%) children showed poor performance in speech and language development. Overall improvement was observed in 59 (56%) patients while poor performance was noted in 46 (43.8%) patients. Early identification and intervention in rehabilitation of hearing-impaired child observed fundamental role in development of speech and language. Mostly parents are unaware regarding hearing problem of their child. Health professionals also fail to recognize the hearing problem in suspected cases which result delayed in diagnosis and fitting of amplification devices in the first 3 years of age<sup>17</sup>. One study compared phonological skills in two groups, one in early identified and intervention and other was late identified and intervention in hearing impaired children, showed early identified and intervention children showed positive effect in phonological skills as compared to late diagnosis and intervention<sup>20</sup>.

First three years of age is crucial age of speech development, delay in diagnosis and interventions causes failure in speech and language development<sup>20</sup>. Early identification and intervention before the 6 months of age affects good result in development of language in hearing impaired children. The development of language is the same way as normal

hearing children and reduces the language defect in these children. According to Lisa study, more than 80% of children with hearing impaired found good in language levels with age-matched peers when diagnosed early and appropriate intervention<sup>21</sup>. Hearing loss children show poor performance in education, social and language development.

## CONCLUSION

Early identification of hearing impairment in children and proper management play an important in speech and language development. Most of the parents and health professionals are unaware about this hearing impairment. Parents and health professional play a vital role in early identification of hearing impairment. Awareness programme should be improved specially among parents and health professional to prevent unnecessary delay in diagnosis of hearing impairment and management.

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