

## Original Research Article

### IMPACT OF ASSISTIVE LISTENING DEVICES WITH HEARING AIDS

#### ABSTRACT

**Background:** Hearing aids play a significant role in management of hearing loss. Communication technologies when integrated with hearing aids leads to a better understanding of listening and a better outcome in their quality of life. **Objective:** To measure the quality of life with the use of Assistive Listening Devices (ALD) when paired with hearing aid. **Methods:** Cross sectional study conducted in the Delhi and NCR region across hospitals and clinics. Total 109 participants were included in this study over a period of one year. **Results:** Assistive listening devices when used with the hearing aids, participants reported a significant improvement in quality of life. **Conclusion:** It is recommended to use ALDs with hearing aids for a satisfactory listening quality which leads to a better quality of life.

**Key words** Hearing aids, Hearing loss, Assistive Listening Devices

#### Introduction

Human ear has vital function in the body, this includes balancing system of the body and hearing. Hearing plays a key role in communication. It helps us to mix in the society, express thoughts and emotions and keeps us aware of surrounding. Hearing sensitivity and awareness keep us safe from any risk. Sound waves are collected from environment and collected by pinna, the visible part of ear (**Brownell & Alford, 2010**). It transports the sound signal to tympanic membrane or ear drum through auditory canal, this collected signal strikes tympanic canal and enters the middle ear in form of mechanical vibrations. Middle ear has tiny bones which acts like a chain to send the signal to inner ear. This chain of middle ear bones is also known as ossicular chain. This mechanical signal now enters cochlea which is an organ in inner ear. Cochlea is a fluid filled compartment housed in petrous part of mastoid bone. The sent mechanical signal gets converted into electric impulses and the signals are transported to auditory nerve and further neural pathway for processing of the signal. Hearing loss or hearing impairment is cause due to damage or dead cells in cochlea. Sensory part of hearing is considered till cochlea.

Hearing loss or hearing impairment is a partial or total failure to hear. It may occur in one or both ears. In children hearing problems can affect the ability to learn spoken language and in adults it can cause work related difficulties. In some people, particularly older people, hearing loss can result in loneliness, and it can be temporary or permanent. **(Lasak et al. 2014)** Hearing loss is the most common sensory deficit in humans today. As per WHO estimates in India, there are approximately 63 million people, who are suffering from Significant Auditory Impairment: this places the estimated prevalence at 6.3% in Indian population **(Verma et al., 2022)**.

Hearing aids are non-implantable amplification device which fits on the ears, worn by a person with hearing impairment. Hearing aids provides amplification on each frequency on which an individual is in-capable of hearing sounds. Hearing aids lets you hear all the sounds which could not be heard due to hearing impairment. Hearing loss can be partial or complete, in both condition hearing aids are recommended. If hearing aids doesn't work, then further solutions for the management can be opted. Hearing aids are clearly associated with impressive improvements in the social, emotional, psychological, and physical well-being of people with hearing loss in all hearing loss **(Dawes et al. 2015)**. There are different types of hearing aids such as Behind the Ear (BTE), Receiver in the Canal (RIC), In the Ear (ITE), In the Canal (ITC), Completely in the Canal (CIC) and Invisible in the Canal (IIC). These are categorized based on the size. Based on technology these are Analog and Digital. There are many performances level in digital hearing aids which gives better quality of sounds when one proceeds from essential segment to premium segment **(Cox et al. 2016)**. There are still certain limitations in the hearing aids even if the user is using the highest technology. Problem faced are difficulty in listening in noisy environment, difficulty in listening distant speech, phone calls and mobile media streaming is again a problem for the hearing aid users. To cope up this problem, there are additional devices available which has been giving to be a life changing experience and users are very comfortable to use hearing aids. **(Lesner, 2003)**. These additional devices are connected to hearing aids and mobile or other external devices like microphone or TV connector etc. These are known as Assistive Listening Devices or ALDs. There are diverse types of amplification equipment designed to improve the communication of persons with hearing loss and to ensure optimal communication when individual hearing instruments are not sufficient. There used to be a time where ADLs were not so popular as it has only connectivity with iOS applications. **(Kim and Kim 2014)**. Made for All technology allows all kind of Bluetooth devices with the hearing aids.

Assistive Listening Devices are additional accessories which are used with Hearing devices to cope the limitations of the Hearing devices like listening through distance, listening in noisy environments, calling over phone and listening to music like a personal headphone. These functions of calling, media streaming can be solved through hearing aids alone, but maximum of the time, especially with severe to profound hearing loss it become difficult to give a comfortable listening in challenging situations. It is also seen all the hearing aid users who are using ALDs have better listening skills compared to non- ALD users (**Chen et al., 2021**).

### **Objective**

To measure the quality of life with the use of Assistive Listening Devices when paired with hearing aid.

### **Methodology**

**Type of Study:** Quantitative, Cross sectional

**Study Area:** The study was conducted in through different Audiology clinics across Delhi and National Capital Region.

**Study period:** Data was collected from January 2018 to January 2019 (i.e., 1 year).

**Study Population:** Total 109 participants were included in this study from the clinics for a duration of 1 year.

### **Tools & Technique:**

1. pre-tested questionnaire was used for collecting the data.
2. face to face interview was conducted.

**Data analysis:** The data was entered in Microsoft Excel and analysed using statistical software IBM SPSS version 21.

The categorical variables related to Demographic profile, quality of life measured and presented using frequency and percentages. The quantitative variables such as age and duration of ALD use in month were summarized using Mean and standard deviations. Comparison tests such as Chi square test was applied. P value less than 0.05 was considered as statistically significant.

### **Inclusion**

- Age of 15 years or above
- Mode of communication must be verbal
- Using ALD technology for both calling media streaming and remote microphone.
- User of binaural fitting
- Minimum experience of 3 months
- Hearing aid wearing time should be minimum of 10 hours per day

### **Exclusion**

- Patients with unilateral hearing
- Children below 15 years of age were excluded from the study

### **Results**

To measure the quality of life with the use of Assistive Listening Devices when paired with Hearing aid for the quality-of-life section, the responses were recorded as Yes, or No.

### **Discussion**

There have been many developments happening in Audiology and Hearing aid industry but integrating communication technology with hearing aids has significantly changed quality of life of persons with hearing impairment (**Anon and Edwards 2007**). The study consisted of 109 participants. Minimum age of the participant was 18 years maximum age of the participant was 79 years with a mean age of 43.7 years. Out of total study subjects, majority was of male participants with a weightage of 73% and 28% of the females took part in the study. It was found 88% were confident enough in talking to people on call, 84% could speak comfortably with people in public place in presence of noise. (**Maidment and Amlani 2020**) stated in his study that patients with Bluetooth featured hearing aids gives several benefits including enhancements in social involvement and better quality of hearing through hearing aids. They also observed the old hearing aid users who were using conventional hearing aids, showed significant improvement.

Fifteen percent of the total participants needed others to assist them while having one to one conversation and 9% subjects needed others to assist them while having group conversation. One to one conversation requires active participation which may result in missing out some information whereas in group conversation an individual may not be focus on every detail and hence he reports less requirement of others for assistance. In a similar study. (**Chen et al. 2021**) showed a significant improvement in challenging listening environment when remote

microphone was used along with the hearing aids. Lack of hearing, hearing aid use, and sign language. They are unable to participate in conversations due to stigma, making hearing impaired feel lonely, unexpressed, and socially marginalized. This results in chronic stress and depression (**Mousley and Chaudoir 2018**) and (**Wallhagen 2010**). When hearing aids were fitted with ALDs, only seven participants reported they feel ashamed while talking to people and 6 avoid talking to strangers.

Ninety-three percent of the participant reported they don't ask people to repeat what they said. It was seen that 100 participants which constitute 92% who were attending their workplace/ school/college or meeting with peers on regular basis. Ninety-three percent were meeting friends, and 91% attended social gatherings. Also, only 5% of all had negative feelings like such as blue mood, despair, anxiety, depression. (**Shukla et al. 2020**) studied on social isolation due to hearing loss and showed that a strong association between hearing loss, and loneliness and social isolation. A significant fall in perceptions of loneliness after four to six weeks of hearing aid usage. Subjects with moderate-to-severe hearing loss experienced the highest reduction in perceived loneliness with hearing aid use. (**Weinstein, Sirow, and Moser 2016**)

Eighty-seven percent were able to concentrate. This has increased their participation and involvements in social gatherings. Also, 87% of the respondents reported that they are satisfied with their life with hearing impairment that mean they are enjoying their life, 87% of the subjects have future plannings which significantly shows an improved quality of life where they are not grieving about their hearing loss, but they have planned their future overcoming the hurdles. Eighty-seven percent were comfortable to use public transports which is again showing the confidence to come of their houses without any hesitations. Ninety eight percent participants reported that they were satisfied with the present condition of life. People often see persons with hearing impairment in a sympathetic eye but, hearing aids user with the use of assistive listening devices have been living a satisfactory life where they are happy with their present. Therefore, it is recommended to use ALDs with hearing aids for a satisfactory listening quality which leads to a better quality of life.

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