SURVEY ON UTILISATION AND SATISFACTION OF HEARING DEVICES UNDER CENTRAL GOVERNMENT SCHEMES ON PARENTS OF CHILDREN WITH HEARING IMPAIRMENT

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20AUD001

This Dissertation is submitted as part of fulfilment for the Degree of

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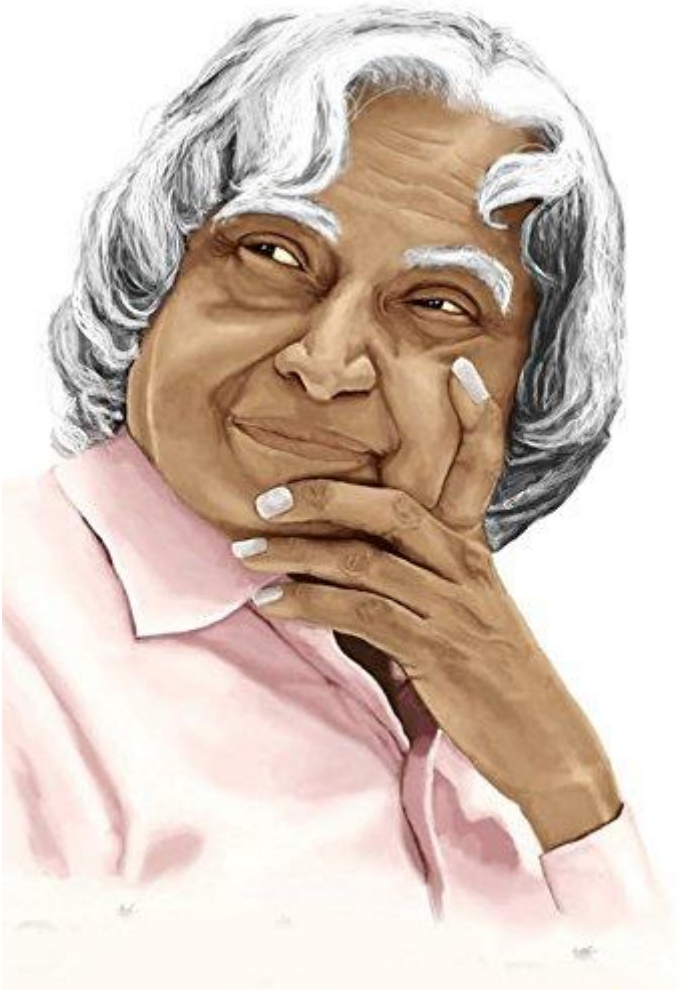
In honour of Dr APJ Abdul Kalam, I dedicate this to My family, parents, sisters, all teachers, friends, and beloved Guide.



"Learning gives creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes you great".

Dr APJ Abdul Kalam

CERTIFICATE

This is to certify that this dissertation entitled **"Survey on Utilisation and Satisfaction of Hearing Devices under central Government schemes on parents of Children with Hearing Impairment"** is the bonafide work submitted as part of fulfilment for the Degree of Master of Science in Audiology of the student with Registration No. 20AUD001. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other Universities for the award of any other diploma or degree.

Mysuru

August, 2022

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CERTIFICATE

This is to certify that this dissertation entitled **"Survey on Utilisation and Satisfaction of Hearing Devices under central Government schemes on parents of Children with Hearing Impairment"** has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier to any other Universities for the award of any other diploma or degree.

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DECLARATION

This dissertation entitled **"Survey on Utilisation and Satisfaction of Hearing Devices under central Government schemes on parents of Children with Hearing Impairment"** is the result of my own study under the guidance of Dr. Prawin Kumar, Associate Professor, Department of Audiology, All India Institute of Speech and Hearing, Mysore- 06 and has not been submitted earlier to any other Universities for the award of any other diploma or degree.

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Abstract

About 63 million individuals i.e., 6.3% population in India are having significant degree of hearing loss. Out of these 63 million populations, the prevalence of the adult-onset and childhood-onset hearing loss were found to be 7.6% and 2% respectively. The early identification and intervention of the hearing impairment is very crucial for the acquisition of the speech and language development. Most often, these individuals belonging from low socioeconomic status are having difficulty in procuring the hearing device and further deprived to enrol in the mainstream. Therefore, the government granted funding for the hearing aid and cochlear implant for those individuals who are financially poor to procure the same. Hence, the assistance to disabled persons for purchase/fitting of aids/appliances (ADIP) provide financial assistance for the purchase of hearing aids and cochlear implants whereas client welfare fund (CWF) provides financial assistance in purchasing hearing aid only for Below Poverty Line (BPL) families. The present survey study aimed to find out the utilisation and satisfaction of hearing device from the parent of children who purchase hearing aid as well as cochlear implant under central government schemes and client welfare fund.

Sixty parents of hearing-impaired children who got either a hearing aid and/or cochlear implant through a government-funded programme participated in the survey. Thirty participants (12 male & 18 female) were parents of children who had procured a cochlear implant as part of a government-funded programme i.e., ADIP. The remaining 30 (15 males & 15 females) were parents of hearing-impaired children who received hearing aids through the CWF scheme of AIISH. The utility questionnaire and satisfaction of amplification in daily life were administered to the parents of children using hearing aids and/or cochlear implants.

The Fisher exact test showed children using cochlear implant had more

significant utilisation in auditory awareness of sound, auditory discrimination skill, listening in background noise and auditory memory and sequencing in comparison to the children using hearing aids. Whereas no significant difference observed for identification skill, localisation skill, distance and directional skill. Similarly, children with cochlear implant had significant correlation in satisfaction among positive effect, negative feature, service and cost. Whereas personal image showed no significant difference between children using cochlear implant and hearing aids.

It is evident from the study that children using cochlear implant has more utilisation than the children using hearing aids. The parent satisfaction is reported to be more for cochlear implanted children than hearing aid children. Hence, study concluded that the fund provided by the central government for cochlear implant had effective utilisation and showed positive effect in providing the resource development of children with hearing impairment.

Key words

Cochlear Implant, Hearing Aid, Satisfaction, Utilisation

Chapter 1

Introduction

The development of excellent communication skills is a crucial step in early childhood. Hearing loss during infancy/early childhood is known to slow down speech and language development by limiting a child's access to speech and language input (Koehlinger et al., 2013; Tomblin et al., 2014). This restriction in access can range from slight in children with mild hearing loss to essentially total in children with moderate to severe hearing loss, with deleterious effects on speech and language development (Sininger et al., 2010)

Poor communication skills by the time a child completes preschool have long-term consequences for his or her future success in school, work, and social situations (Catts et al., 2002; Koehlinger et al., 2013). As a result, the intervention that protects children from speech and language development challenges significantly impacts the quality of life of children at risk of poor communication development due to hearing loss (Ruben, 2000; Tomblin et al., 2014).

The selection of interventions depends on the degree and underlying cause of hearing loss. Otitis media is frequently treatable and reversible by medicinal or surgical procedures. Other causes of hearing loss cannot be reversed (Akinpelu et al., 2014; Qureishi et al., 2014). However, its effects can be mitigated through the timely application of different approaches (Fulcher et al., 2012; Smith et al., 2005). These approaches use hearing devices such as hearing aids, implantable devices (cochlear implant, middle ear implant), hearing assistive technology, therapy for the development of speech language skills and non-verbal responses such as sign language, constitute non-verbal communication (Fulcher et al., 2012).

Hearing aids and cochlear implants are given to children with permanent hearing loss as soon as they are identified. Hearing aids are designed to boost sound levels above a listener's threshold. As a result, the user of hearing aids has more accessible access to a broader range of the speech spectrum, making speech more convenient. Hearing aids help many people with hearing loss, but individuals with severe-to-profound hearing loss do not get the same benefit. So, cochlear implants are the only way to restore their hearing impairment and learn speech and listening skills meaningfully (Sininger et al., 2010). Cochlear implants are electronic devices composed of two parts (external and internal), with the external part appearing like a hearing aid. In those with severe to profound sensorineural hearing loss, it transmits an electrical signal that bypasses missing or damaged hair cells and directly activates the remaining auditory nerve cells (Gaurav et al., 2019).

The geographical background of Indian population, according to the census 2011 reported that more than 70% of the population is in rural areas and there are more paediatric hearing loss babies in rural India (Rao et al., 2002). If one considers the economic feasibility of rural population purchasing hearing devices, most rural Indian population cannot afford to procure these devices especially cochlear implant.

A large section of the population in India cannot afford this device without government or other private funding due to the cochlear implant and hearing aid costs. Access to healthcare in India is significantly influenced by socioeconomic background. Financial problems frequently cause people to put off seeking medical care, which delays the intervention. (Arulalan et al., 2020).

So, the government has to assist these individuals in purchasing hearing aid and/or cochlear implants. The Union and State governments have to assist individuals with hearing disability, especially for children with hearing loss since their speech and language development depends on early rehabilitation. The major central government scheme to assist with hearing device is Assistance to Disabled Persons for Purchase/Fitting of Aids and Appliances (ADIP Scheme), Rashtriya Bal Swasthya Karyakram (RBSK), National Programme for Prevention and Control of Deafness (NPPCD) etc. The government institutions have fund like Client welfare fund which help in partial financial assistance to purchase hearing aid. Once the child procures hearing aid, auditory training/speech language therapy is an essential part of the rehabilitation.

A multidisciplinary team approach, consisting of Otolaryngologists, Paediatricians, Audiologists, Speech Language Pathologists, Special Educators, and Parents or Family members, is crucial to maximising the usage of rehabilitation programmes. As such, the child's parents are regarded as essential team members. It relies on parents engagement in promoting their children's speech and language development whether the devices are used effectively or useful for children with hearing impairment.

Need for the Study

Many children have procured hearing aid under Client welfare fund and cochlear implant under ADIP scheme. The child's benefit from the Cochlear implant/Hearing aids is directly dependent on the effective utilisation of the hearing device. There is a dearth of literature reports on the effective utilisation of government funds and parental satisfaction (Dutta et al., 2020a; Mathur et al., n.d.; Sorkin, 2013; Sorkin & Buchman,

2016; Sujoy Kumar Makar et al., 2021). Therefore, it is necessary to analyse how efficiently funds utilised to procure hearing aids and/or cochlear implants under the central government schemes and the client welfare fund. Also, to study the level of satisfaction among the parents of children with hearing aid and/or cochlear implant.

Aim of the Study

To study the efficient utilisation of fund among parents of children who procured hearing device under central government schemes like ADIP and client welfare fund.

Objectives of the Study

- To study the effective usage of hearing aid and cochlear implant under the ADIP and CWF schemes.
- To evaluate the level of satisfaction in parents of children using hearing aids and cochlear implants procured under the central government scheme.

Chapter 2

Review of literature

With more than 1.5 billion people affected worldwide, hearing loss is one of the persisting sensory deficiencies in human populations. Around 63 million individuals (6.3%) in India alone suffer from hearing loss (Rasiah & Sulakshan, 2018). Hearing loss is still a sensitive topic, and some families do not seek intervention for their children with hearing difficulties. In developed countries, universal newborn screening efficiently identifies, diagnoses, and rehabilitates children with hearing impairment. The rehabilitation is effective and is decided based on the candidacy criteria. Comparing the socioeconomic profile of the residents of developed nations purchasing bilateral hearing aids for both ears is not difficult. However, cochlear implantation is economically difficult. So, different developed nation has different programs to create provision of cochlear implant device availability.

In the United Kingdom, cochlear implantation is free for all residents, including children and adults who fulfil the National Cochlear Implant Users Association (NICE) Criteria. Cochlear implantation is done under the National Health Service. Similarly, in United States of America (USA), cochlear implant is an approved treatment for severe-to-profound hearing loss, hence it is covered under insurance. Medicaid, Medicare, The Veteran's Administration are the major Health insurance schemes.

In India, as per National Sample Survey Office (2011), more than 70% of India's population lives in the rural areas (NSO, 2018), where paediatric hearing loss is more prevalent (Mishra et al., 2011). The prevalence of hearing loss in rural India is varied (Rao et al., 2002). Table 1 summarises the prevalence of hearing loss in India. In terms of re(habilitation), India's rural regions are severely lacking. Rural communities have

lower rates of early diagnosis, detection, and rehabilitation than urban regions. Compared to urban areas, rural communities in India lack health care facilities and professionals (Verma et al., 2022). Similarly, lack of knowledge among parents regarding hearing impairment and lack of financial support to purchase hearing devices are rural India's most significant challenges (Galhotra & Sahu, 2019; Parab et al., 2018).

Table 1

Prevalence of hearing loss in India

Author	**Rural**	**Urban**
Kalpana & Chamyal (1997**)**	6.62 %	11%
Jacob et al (1997**)**	11.9 %	-
Mann et al (1998)	32.8 %	6.3%
Rao et al (2002)	11.9 %	-
Mishra et al (2011)	15.10 %	5.9 %

To overcome the challenges and provide better quality of life among the hearing-impaired community, Government of India has introduced various programs and schemes. The Government of India implemented the NPPCD (MoHFW, 2006) and the RBSK (NHM, 2013) to detect and diagnose children with hearing loss at the earliest. The NPPCD programme was introduced in 2006. Its purpose was to begin universal hearing screening at the community level and give institutional assistance by making it easier to detect and treat hearing loss early. Under the NPPCD, the state and central health department is provided funding to manage the programme. The programme committee ensures that the methods to prevent and control hearing impairment are implemented efficiently (NPPCD, 2006). Similarly in 2013, the Indian government launched RBSK. This effort comprised health screenings and early intervention

services for 0 to 18-year-old children with birth defects (such as congenital hearing loss, illnesses, deficits, developmental delays, and disabilities) (NHM, 2013). Under RBSK, a mobile health team composed of a physician, paramedics, and nurses visits anganwadis to screen children. Children diagnosed with conditions and diseases are provided with free tertiary-level care. NPPCD and RBSK are key milestones in India's methodical implementation of national hearing screening programmes and help to create awareness in society. Both the programs are having great significance for the financially weaker section to enable their children with hearing impairment accommodated in mainstream school through early identification and intervention of hearing impairment.

Even if early identification and diagnosis are looked into, early rehabilitation is a critical challenge in the Indian population, particularly the rural population. This is primarily due to a lack of financial resources to purchase hearing devices and afford the cost of habilitation. According to the India social-economic and caste census (2011), 74.52% of India's rural population earns less than 5,000 rupees a month and an average monthly income ranges between 5000 to 10000 rupees, whereas 8.25% have a monthly income over 10000 rupees (SECC, 2011). Since the hearing loss is more significant in rural India and most Indians live in rural areas, the average monthly income for rural Indians is less than 10,000. Therefore, the family cannot afford to get a hearing aid or cochlear implant immediately on their own as and when needed. Therefore, the government must support them in purchasing hearing aids and cochlear implants. Both the central and state governments should provide support to individuals with hearing disability, specifically for children with hearing disability. Because the development of speech and language depends on early rehabilitation of the child. To assist the hearing impairment with hearing aid and cochlear implant, the ADIP scheme was introduced in

1981 and cochlear implant was added in 2014 to the scheme (ADIP, 2014). In this scheme, children below 12 years are eligible for bilateral digital BTE hearing aid which costs up to 15,000 rupees (ADIP, 2022). The eligibility for hearing aid under ADIP scheme is that the child should be citizen of India, have minimum 40% percentage of hearing disability and the family monthly income should not exceed 30,000 rupees per month (ADIP, 2022).

Children under the age of five who have severe-to-profound prelingual hearing loss and whose family income is less than 22,500 /- per month are eligible for a free unilateral cochlear implant through this programme, and families with annual incomes between 22,500/- and 30,000/- are provided with 50% assistance in unilateral cochlear implantation, which is handled by the Ministry of Social Justice and Empowerment of the Government of India. (MSJE, 2022).

Similarly, Ministry of health and family Welfare (MoHWF) of the government of India provided a Client Welfare Fund (CWF) to All India Institute of Speech and Hearing (AIISH) to take the welfare measures of the patients at AIISH. Under the CWF, AIISH provides financial assistance for hearing-impaired children in the procurement of hearing aid. Under this Fund, male children up to 12 years and females with no age limit are eligible. The family should have a below poverty line (BPL) card, then 40% subsidy of each hearing aid is provided by CWF, and if the family has Antyodaya Anna Yojana card, 75% of the cost of each hearing aid is taken care of under CWF.

From the above literature, it is seen that only ADIP and RBSK are central government funded schemes that provides funding for cochlear implantation for the children with severe-to-profound hearing loss. Other than the central government scheme, few state governments' schemes are available for funding of hearing devices.

Among the State government, the dispensing of hearing aid is majorly from ADIP, NPPCD and RBSK scheme. Under these schemes along with central government fund, additional fund is released by state government to provide hearing aid and cochlear implant for eligible candidates. ADIP scheme is known to be the major cochlear implant funding scheme across India. There are some of the state government schemes which will be discussed in the later section.

Sruthitharangam. -Kerala

The government of Kerala initiated the project called Sruthitharangam in 2018. The program's purpose is to provide free cochlear implant, including surgical care cost, to children within the age range of 0-5 years with severe-to-profound hearing loss. The funding under this scheme is provided to child with annual family income of the parents less than 2 lakhs. Under the scheme immediate cochlear implantation is provided for children between 0-3 years of age. Furthermore, above 3 years and until 5 years based on the recommendation from experts regarding the benefit from the device, cochlear implant is provided (Kerala Social Security Mission, 2018).

Tamil Nādu- Chief Minister's Comprehensive Health Insurance scheme.

The Chief Minister Comprehensive Health Insurance Scheme was introduced in Tamil Nadu on July 23, 2009. The programme offers qualified individuals access to high-quality medical treatment through accredited public and private facilities. Under this scheme, free cochlear implantation is provided for children below 6 years of age with family falling into below poverty line (BPL) (Tamil Nadu Health Systems Project, 2009).

Snehasparsh-Assam

The Department of Health and Family Welfare of the Government of Assam has launched a programme called "Snehasparsha"– a health care initiative for children that would give financial help for specialised care. Children under the age of 14 years would be eligible for benefits under this programme if their family's yearly income is less than Rs 5 lakhs. Under the scheme, children with hearing impairment who are recommended for cochlear implant will be provided assistance of 5.35 lakhs.(NHM Assam, 2013).

Rajiv Aarogyasri, Andhra Pradesh

RAS (Rajiv Aarogyasri) is a health insurance scheme introduced in Andhra Pradesh on 1st April 2007. Families with a BPL card are eligible for cochlear implants under this programme. The cost per patient for cochlear implant surgery with auditory verbal treatment is Rs. 6.50 lakhs (J. Yellaiah, 2013).

These are the major state government schemes for availing cochlear implant. Along with it other fund like, Prime Minister fund, the Chief Ministers fund, Member of parliament fund and Member of the legislature of Assembly fund is also provided as and when patients approach these office.

Since there are lot of funds provisions available across the world to achieve the goal of early identification and intervention of children having hearing impairment. There are studies reported in the literature to assess the utility of these funds world-wide including in India.

Sorkin (2013) investigated cochlear implants utilisation and public awareness in the USA. They found that utilisation of cochlear implant scheme in USA is less comparatively than other European countries. They reported this could be due to a lack

of public understanding of the benefits of CIs, a lack of distinct referral pathways, some political concerns about the deaf community, and financial issues concerning health care supply. Such financial concerns create situations for low-income individuals enrolled in public healthcare programmes such as Medicaid (Sorkin, 2013).

Another study by Sorkin and Buchman (2016) analysed the cochlear implant access in six developed countries. The highest rate of CI utilisation (98%) in children was found in Australia which is due to the efficient universal neonatal hearing screening and the strong healthcare system. In Sweeden and the UK, the utilisation of funds for CI reported are 90%, whereas in Germany and USA, it was 65% and 50% respectively. The reason for less utilisation in Germany is the lack of counselling regarding the hearing device. In USA the lack of utilisation majorly due to reduced public understanding regarding and political concerns as stated by Sorkin and colleague in the previous study (Sorkin & Buchman, 2016).

In another study by Yiğit et al (2018) evaluated the satisfaction of life among mothers of cochlear implanted children. They had chosen 190 mothers of unilateral cochlear implanted children and performed a satisfaction in life scale questionnaire. Results had shown that satisfaction was greatly enhanced following the cochlear implantation of children (Yiğit et al., 2018).

In Indian population, study done by Aravinda et al (2020) to find the satisfaction and quality of hearing aid dispensed under government funded scheme. Total of 200 subjects in the age range 20-70 years participated in the study and SADSL was administered. They concluded that the hearing aids funded by the ADIP scheme do satisfy users in most categories, including conversing on the phone, comprehending speech, and enhanced hearing (Aravinda et al., 2020).

Mathur et al. (2020) investigated the attitudes of parents of ADIP-CI recipients concerning satisfaction and feedback about post-operative rehabilitation services such as listening therapy, mapping service, and other problems faced. A total of 400 parents of CI children participated in the study. For children with profound hearing loss, it was shown that cochlear implants combined with auditory verbal therapy offered through the ADIP scheme provided the highest hearing performance for families with limited funds and are an evidence-based treatment for speech and language development (Mathur et al., 2020).

In a similar line, Dutta et al (2020) studied about parental knowledge and maintenance of cochlear implant procured through ADIP scheme. In this study, 30 parents of cochlear implant recipients were interviewed and the result showed that there is a need for better training on care and maintenance to reduce the burden of repair cost of cochlear implant. This influences the effective utilisation of cochlear implants, which in turn changes parents' satisfaction (Dutta et al., 2020b).

Alqahtani and Luckner (2021) evaluated parents' perception of children with hearing impairment. They had selected 176 parents. They used a questionnaire with three sections: the first is demographic information about the parents, the second is demographic information about the child, and the third is about parent satisfaction in five types of services provided to the children: early identification, hearing technology, communication, educational option, and social support. They used Linkert 5-point rating scale to rate the satisfaction. The result found that the parent satisfaction on cochlear implant is more than hearing aid on the 5 services provided (Alqahtani & Luckner, 2021).

Sujoy et al (2021) evaluated the effectiveness of unilateral cochlear implants in children with profound sensorineural hearing loss. Ninety-three children who had been implanted under the ADIP scheme participated in the study. All the participants were from the rural part of India. The study used categories of auditory perception, receptive expressive emergent language skill, and auditory skill checklist. Children with profound hearing loss can benefit from cochlear implants and auditory verbal therapy through the ADIP programme (Sujoy et al., 2021).

It is evident from the above literature review that developed countries constantly monitor how well hearing aid and cochlear implant system provided to children are being utilised. Patients' and children's quality of life are evaluated similarly focusing on user satisfaction with hearing devices.

However, there is a gap in research on the utilisation of hearing devices received through central government schemes, particularly in paediatric populations in India. Also, there are limited studies to explore the satisfaction level among parents of children with hearing aids and cochlear implants.

Chapter 3

Methods

1.1 Participants

A total of 60 participants were selected for the survey. Out of 60 participants, 30 participants [12 male (Mean age ± SD: 33.2 years ± 6.6) & 18 female (Mean age ± SD: 31.8 years ± 6.5)] are parents of cochlear implanted children who were provided cochlear implant under central government scheme. The remaining 30 participants [15 male (mean age ± SD: 31.6 years ± 5.7) and 15 female (mean age ± SD: 31.4 years ± 5.7)] were parents of children who procured hearing aid under client welfare fund of AIISH, Mysore. Client welfare fund of AIISH is used for providing financial assistance in purchasing hearing aids.

The participated parents in the study were divided into six categories based on their educational qualification. The six categories were elementary education (schooling till 8^{th} standard), secondary education (9^{th} standard & 10^{th} standard), higher secondary, Diploma or, ITI, Under-graduation and Post-graduation. Among the 30 parents of children using cochlear implant, the education qualifications of parents were as follows: Bachelor's degree- 40%; Higher secondary education- 23%, Secondary education- 20%, diploma and elementary education- 7%, and postgraduate degree- 3% whereas for 30 parents of children using hearing aids had educational qualification of secondary education- 40%, Higher secondary education - 23%, Diploma-13%, Undergraduate and Elementary education- 10% and Postgraduate- 3%.

Further, two categories were made based on the family annual income i.e. family with annual income < Rs 10,000 and family with annual income between Rs 10,000 and Rs 22,500. Among the 30 participants who had received a cochlear implant

under the central government scheme, 11 had a family annual income of less than Rs 10,000 and 19 had an income of Rs 10,000-22,500. Among the 30 participants who received hearing aids through the client welfare fund, 23 had an average annual income of less than Rs 10,000 and 7 parents had annual family income of Rs 10,000 to Rs 22,500.

These 60 children with hearing impairment fitted with hearing aids/cochlear implants were in the age range of 0.1 to 8 years. These children were divided into two age groups: 0.1 to 5 years and > 5 years. Six boys (mean age ± SD: 4.5 ± 0.4 years) and four girls (mean age ± SD: 4 ± 1.2 years) were among the children who received cochlear implant between 0.1 to 5 years. Fourteen boys (mean age ± SD: 6.6±1 years) and six girls (mean age ± SD: 6.2 ± 1.1 years) participated in the group greater than five years.

Children fitted with hearing aids were in the 0.1 to 5 years age group, 11 boys (mean age ± SD: 3.6 ± 0.7 years) and 8 girls (mean age ± SD: 3.9 ± 1 years) participated. Among the age group > 5 years, 16 boys (mean age ± SD: 5.9 ± 0.9 years) and 8 girls (mean age ± SD: 6.8 ± 0.7 years) participated.

The age of identification of hearing loss and the age at which the child procured a hearing aid or cochlear implant were also descriptively tabulated. The age of identification was classified into two groups. The first group are those with age of identification between 0.1 to 5 years; the other group where the age of identification was after 5 years of age. Among the 30 Children who have undergone a cochlear implant, all were diagnosed before 3 years of age (mean age ± SD: 0.8± 0.8 years) and for those who procured hearing aid under the client welfare fund, among them under

the 0.1 to 5 years category 16 males (mean age ± SD:1.6 ± 1.3 years) and 11 females (mean age ± SD: 2.5 ± 1 years) participated.

Among the 60 children, the procurement of hearing devices varied across ages. Cochlear implant under Central Government Scheme were procured for 18 boys (mean age ± SD: 3.9 ± 0.9 years) and 9 girls (mean age ± SD: 3.8 ± 0.9 years) within five years of age and 2 boys (mean age: 6 year) and 1 girl (mean age: 6 year) were implanted after five years of age. Among the group of children who procured hearing aid under the CWF, 14 boys (mean age ± SD: 3.6 ± 1 years) and 11 girls (mean age ± SD: 3.3 ± 0.9 years) procured hearing aid before five years of age and 2 males (mean age ± SD: 7.6 ± 0.1 years) and 3 females (mean age ± SD: 6.3 ± 0.1 years) procured hearing aid above five years of age.

Among the cochlear Implant children, 13 were bimodal user, and 17 were unilateral cochlear implant user. All the children with bimodal fitting were using high gain digital BTE hearing aid in the contralateral to the implanted ear. Children were fitted with bilateral digital BTE hearing aid through client welfare fund. The hearing aid fitted were based on their degree of hearing loss and listening needs.

Similarly, among the cochlear implant using children, all 30 were diagnosed with bilateral severe-to-profound hearing loss. Of the children who are using hearing aid, 20 were diagnosed with bilateral severe-to-profound hearing loss, 5 children with bilateral moderate-to-moderately severe hearing loss, 3 children with bilateral moderately severe- to- severe hearing loss and two with bilateral mild to moderate hearing loss.

Inclusion criterion

- Parents of children aged between 9 months -8 years.
- Parents of children implanted with cochlear implant under any central government scheme and parents of children fitted with hearing aid under client welfare fund of All India Institute of Speech and Hearing, Mysore.
- All participants were chosen based on convenient sampling procedures and on their willingness to participate in the research.

Exclusion criterion

- Parents of Children of age above 8 years.
- Parent of children fitted with hearing aid or cochlear implant by self or any private organisation.

1.2 Study Design

The study involved a Survey Research study design. The case data of the client procured hearing aid under the client welfare fund and cochlear implants under central government scheme are collected from the Department of clinical service and the Department of Audiology at AIISH, Mysore. Those who fulfilled the study criteria were briefed about the study before participation.

A google form was created, which includes the participant consent, demographic data, utility checklist, satisfaction of amplification in daily life questionnaire. The demographic details of the parents include age, gender, annual family income, education and occupation. Similarly, the demographic details of the children with hearing impairment includes age, gender, age of identification of hearing

loss, age of procurement of hearing aids/cochlear implants, and the scheme through which the hearing aids/cochlear implants was purchased.

The self-reported responses were obtained by sending the Google form directly to the participants through WhatsApp/e-mail. Once the demographic details were obtained from the patients/care-givers, the remaining information were collected from the patient case file available in the medical record section of the Department of clinical service, AIISH, Mysore. Questionnaire was used to examine the utility of hearing device and the other questionnaire was used to assess the satisfaction of hearing device in daily life.

Utility Checklist

The utility checklist contains 18 questions from the listening age checklist of integrated scales of development questionnaire. The response to the questionnaires is of two points rating scale i.e., 'YES' or 'NO'. There are seven sub-categories in the questionnaire to check hearing device utility. The sub-categories and number of questions under each domain of the utility questionnaire are awareness of sound (Question 1 to 3), discrimination of sound (Question 4 to 6), identification skills (Questions 7 to 8), localisation skills (Questions 9 to 10), distance and directional listening (Questions 11 to 12), listening to background noise (Questions 13 to 15), and auditory memory and sequencing (Questions 16 to 18).

2.4 Satisfaction of amplification in daily life

The satisfaction of amplification in daily life (SADL) contains 15 questions categorised under four sub-scales i.e., Positive Effects (assess the acoustic and psychological features), Negative Features (e.g., background noise, feedback), Cost and Service, and Personal Image (cosmetics). The participants were given a 7-point rating

scale, ranging from "*not at all*" to "*very much*" satisfied. Out of 15 questions, 11 questions have rating scale as "*Very much*" indicated total satisfaction and obtained a score of 7, whereas "*not at all*" indicated complete dissatisfaction and obtained a score of 1. The remaining 4 questions (Questions 2, 7, 4, & 13) were inverted, with "*very much*" representing entire dissatisfaction and receiving a score of 1, and "*not at all*" representing overall satisfaction and obtaining a score of 7.

2.5 Statistical Analyses

Using descriptive statistics (mean, standard deviation, & percentage), the collected responses from the above questionnaire were quantitatively analysed. The data obtained were subjected to statistical analysis using SPSS (Version 25). Shapiro-Wilk test was done to check the normality of data. Since the normality was not achieved in comparing the utilisation of hearing device, non-parametric Fishers Exact test for association was done. Among the data for assessing the satisfaction of groups, it was found that Global score, Positive effect, Negative feature and Personal image normality was achieved. Hence, MANOVA was done. Since normality not achieved for service and cost, a non-parametric Man Whitney U-test was performed.

Chapter 4

Results

The present study aimed to compare the utility of cochlear implant and hearing aid purchased under central government scheme and satisfaction of parents of children with cochlear implants or hearing aids purchased under central government schemes. The analyses were done to compare utility and satisfaction across the groups (Cochlear implanted children & Hearing aid using children).

4.1 Comparison of utility of the hearing devices between group

Descriptive statistics were done to find out mean, standard deviation, and percentage for both the groups i.e., parents of the cochlear implant users and hearing aid users for the questionnaire administered which had 2-points rating scale (score of '1' for 'Yes'& '0' for 'No'). From the table 2, it is evident that the overall mean score for all the questions together of the cochlear implant user's parents are higher (better) compared to parents of the hearing aid users. The Fisher's Exact Test was done for each question to compare between groups, which showed statistically significant differences for question no. 2, 3, 4, 5, 6, 13, 14, 16, and 17, whereas remaining questions (1, 7, 8, 9, 10, 11, 12, 15 & 18) did not show significant differences between groups. The questions related to the discrimination task, listening to the background noise and auditory memory showed the differences whereas question related to awareness of sounds, identification task, localisation, distance and directional listening showed alike performance between groups (Table 2).

Further, Figure 1 explain the percentage of each question responded by the parents of the cochlear implant users and hearing aid users in different listening situations. The Figure 1 very clearly showed higher (better) percentage of performance by the cochlear implant group in comparison to the hearing aid users group for all the

questions between Q2 to Q18 except Q1 and Q7. The below section further explains each domain of the sub-categories of listening task response obtained from the participants in each group.

Figure 1

The percentage scores for Utility Question of both hearing aid and cochlear implanted children.

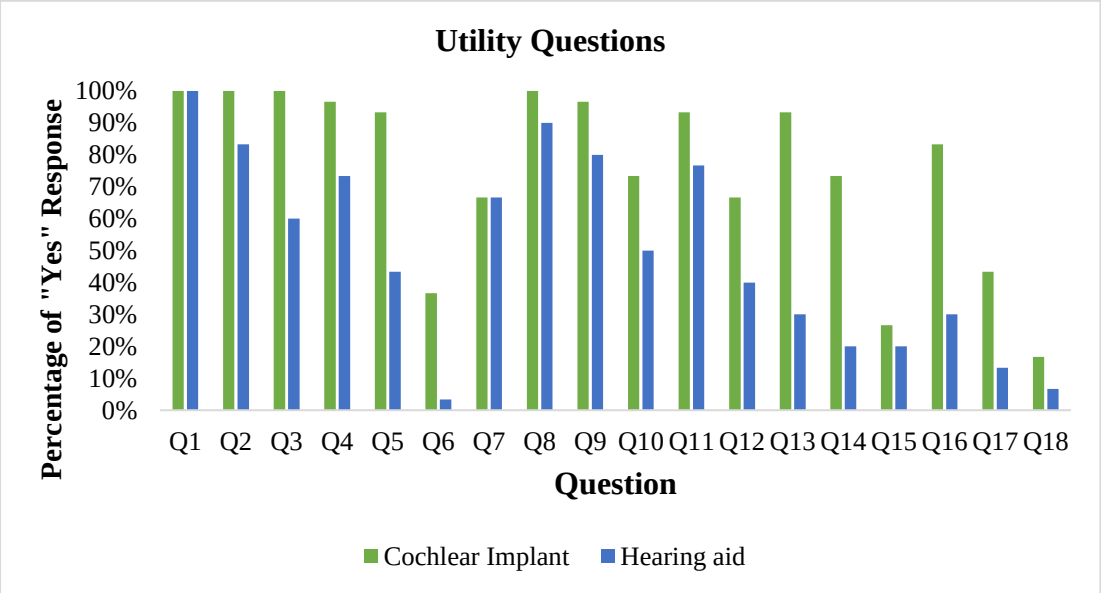


Table 2

Descriptive analysis of the utility questionnaire response of hearing aid and cochlear implanted children.

	Positive (Yes) Response		
Group	N	Mean	SD
Cochlear Implant	30	13.6	3.103
Hearing aid	30	8.9	4.498
Total	60	11.25	4.505

Note: SD: Standard deviation

Table 3

The Fisher's exact test and p-value of each question between the hearing aid and cochlear implant group.

Sub-categories	Question No.	Content of the Questions	Fisher's Exact Test
Awareness of Sound	Q1	Reacts to loud Environmental sounds	Nil
	Q2	Responds to Verbal Sounds	**0.05***
	Q3	Responds to Ling Six Sound	**0.00***
Discrimination of sound	Q4	Discrimination of parents' voice	**0.02***
	Q5	Discrimination of familiar and unfamiliar sounds	**0.00***
	Q6	Discrimination of similar phrase and sentences	**0.00***
Identification Skills	Q7	Associate word with object	1.00
	Q8	Vocalisation increases when device is on	0.23
Localisation skills.	Q9	Localises within 3 feet	0.10
	Q10	Understands sound from specific location	0.11
Distance and directional listening	Q11	Show awareness of sound in all direction	0.25
	Q12	Responds to own name from increasing distances	0.06
Listening to background noise	Q13	In noise child understands his name	**0.00***
	Q14	In noise child recognises familiar word	**0.00***
	Q15	In noise child follows single step command	0.76
Auditory memory and sequencing	Q16	Choose correct picture in a choice of two	**0.00***
	Q17	Selects two pictures or objects named correctly but not necessarily in order	**0.02***
	Q18	Selects 2 pictures/objects named correctly, in correct sequence	0.42

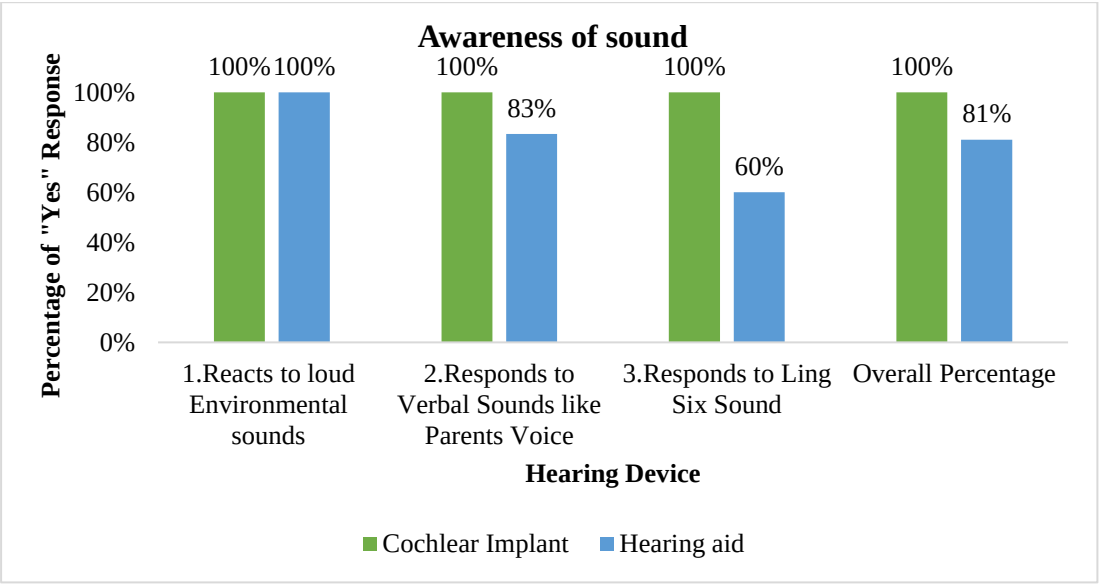
*$p < 0.05$

4.1.1 Awareness of Sound

Based on the responses obtained for question 1 to 3 i.e., awareness of sound, showed overall response of 100% for children with cochlear implants whereas 81% for hearing aid users. For Question 1 (reacts to loud environmental sounds such as televisions and mixers), parents reported 100% for both children using a hearing aid and cochlear implant users. The response rate for question 2 (responds to verbal noises such as parents' voices and animal noises) was 100% for children with cochlear implants whereas 83% for children with hearing aids. For question 3, (response to daily hearing test sounds such as /a/, /i/, /u/, /m/, /s/ & /sh/) parents reported that 100% response for cochlear implant users while 60% for hearing aid users. Figure 2 shows the percentage of respondents for each question. In the Fisher exact test, a significant difference was found between the responses of children with cochlear implants and those with hearing aids for question no. 2 and 3 whereas no significant difference between the hearing aid and cochlear implant observed for awareness of sounds (Table 3)

Figure 2

Response to Awareness of sound between hearing aid and cochlear implant group.

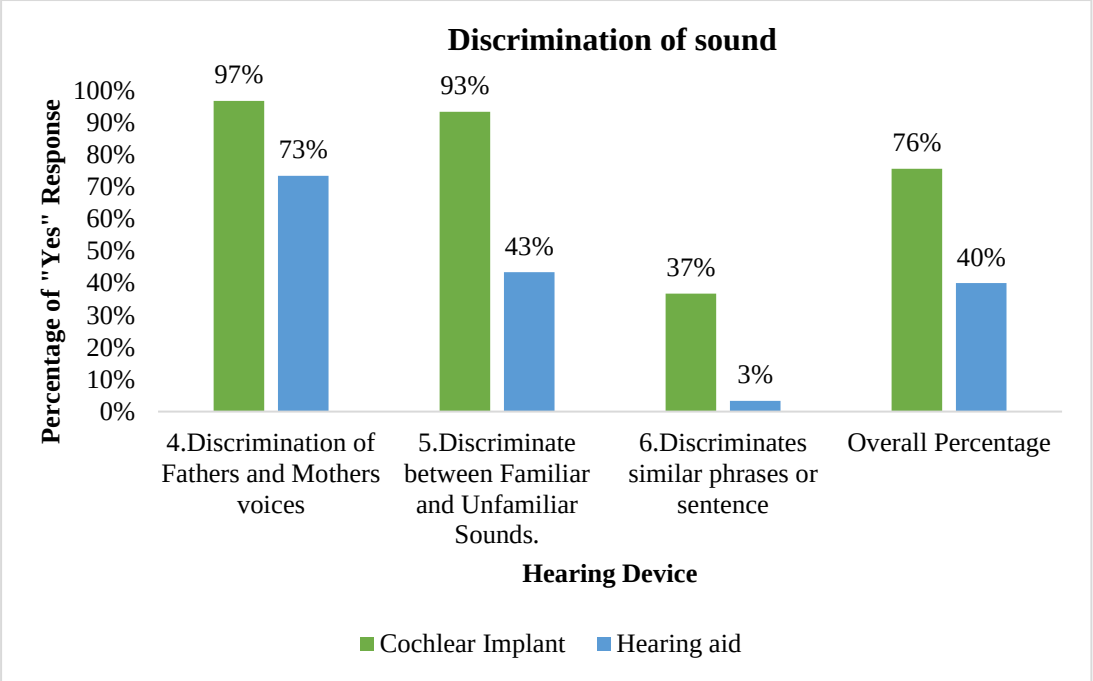


4.1.2 Discrimination of sound

Based on the responses obtained for questions 4 to 6 i.e., discrimination of sound, showed overall response of 76% for children with cochlear implants whereas 40% for children with hearing aid. For the fourth question, parents indicated that cochlear implant users have a 97% utility to distinguish between their father's and mother's voices, whereas hearing aid users have just a 73% utility. For question number 5, 93% of cochlear implant users and 43% hearing aid users utilise the hearing device to discriminate the difference between familiar and unfamiliar sounds. Similarly, question 6 analysed the capability to distinguish similar phrases and sentences where, 37% of cochlear implant users and 3% of hearing aid users utilised the hearing device. The result of Fisher exact test showed that for questions no. 4 to 6, there is statistically significant difference between groups (Table 3). The percentage response of each question is indicated in Figure 3.

Figure 3

Response to Discrimination of sound between hearing aid and cochlear implant group.

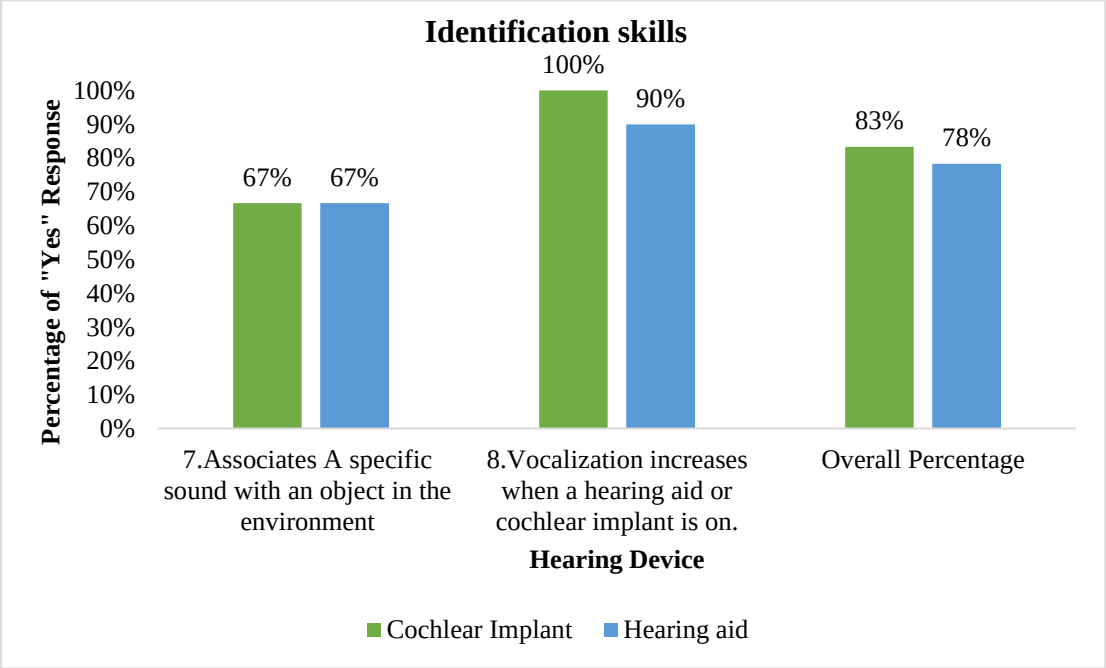


4.1.3 Identification Skills

Based on the responses obtained for questions 7 to 8 i.e., identification of sound, showed overall response of 83% for children with cochlear implants whereas, 78% for children with hearing aid. For question no. 7, which examined the child's ability to associate a specific sound to an object in the environment, parents reported 67% score for both the cochlear implant and hearing aid users. The question no. 8 explored the utility of children using hearing device to increase their vocalisation when the devices in use. The results indicated that 100% utilisation for cochlear implant users while 90% utilisation for hearing aid users. The result of Fisher exact test shows that questions 7 and 8 had no statistically significant difference in identification skill between groups (Table 3). The percentage response for each question is indicated in figure 4.

Figure 4

Response to identification skills between hearing aid and cochlear implant group.

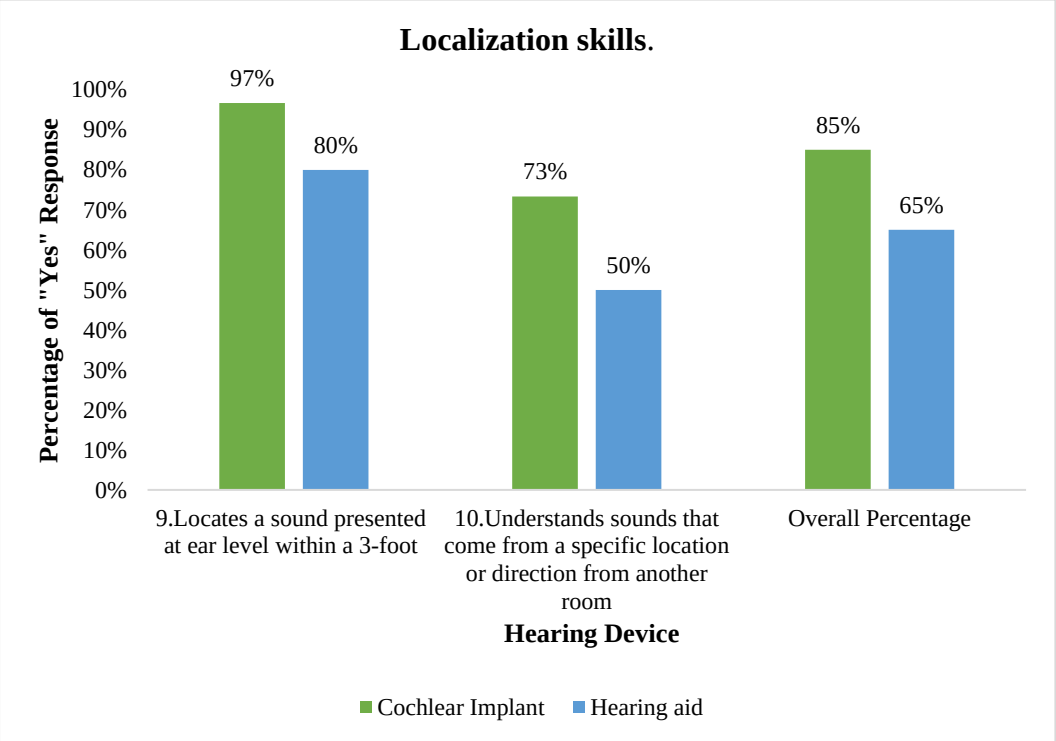


4.1.4 Localisation skills.

Based on the responses obtained for questions 9 to 10 i.e., localisation of sound showed overall 85% responses for children with cochlear implants whereas 65% for children with hearing aid. Question no. 9 assessed the utilisation of hearing devices in locating sounds delivered at ear level within a 1-meter radius from either side. The results suggested that cochlear implant users scored 97% and hearing aid users scored 80%. In a similar way, question no. 10 discloses that 73% of cochlear implant users and 50% of hearing aid-users utilise the hearing device to recognise the sound location in another room. The result of Fisher exact test shows that questions 9 and 10 showed no statistically significant difference in localisation skills between groups (Table 3). The percentage response of each question is indicated on figure 5.

Figure 5

Response to Localisation of sound between hearing aid and cochlear implant group

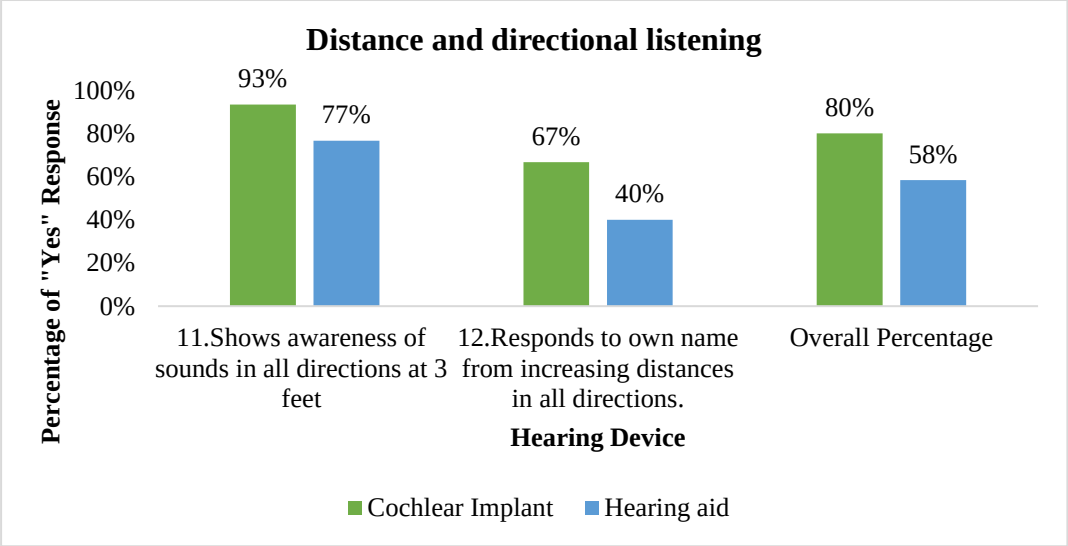


4.1.5 Distance and directional listening

Based on the responses obtained for questions no. 11 to 12 i.e., distance and directional listening of sound showed overall responses of 80% for children with cochlear implants whereas 58% for hearing aid users. For question no. 11, [Show awareness of sounds coming from all directions at 3 feet (1 metre), 6 feet (2 metres), and 9 feet (3 metres], cochlear implant users scored 93%, while hearing aid users showed 77%. For question no. 12 (responds to own name from increasing distances in all directions) cochlear implant users scored 67% while hearing aid users scored 40%. Further, the result of Fisher exact test showed that questions no. 11 and 12 had no statistically significant difference between groups (Table 3). Figure 6 shows the percentage response of distance and directional listening.

Figure 6

Percentage response of distance and directional listening between hearing aid and cochlear implant group



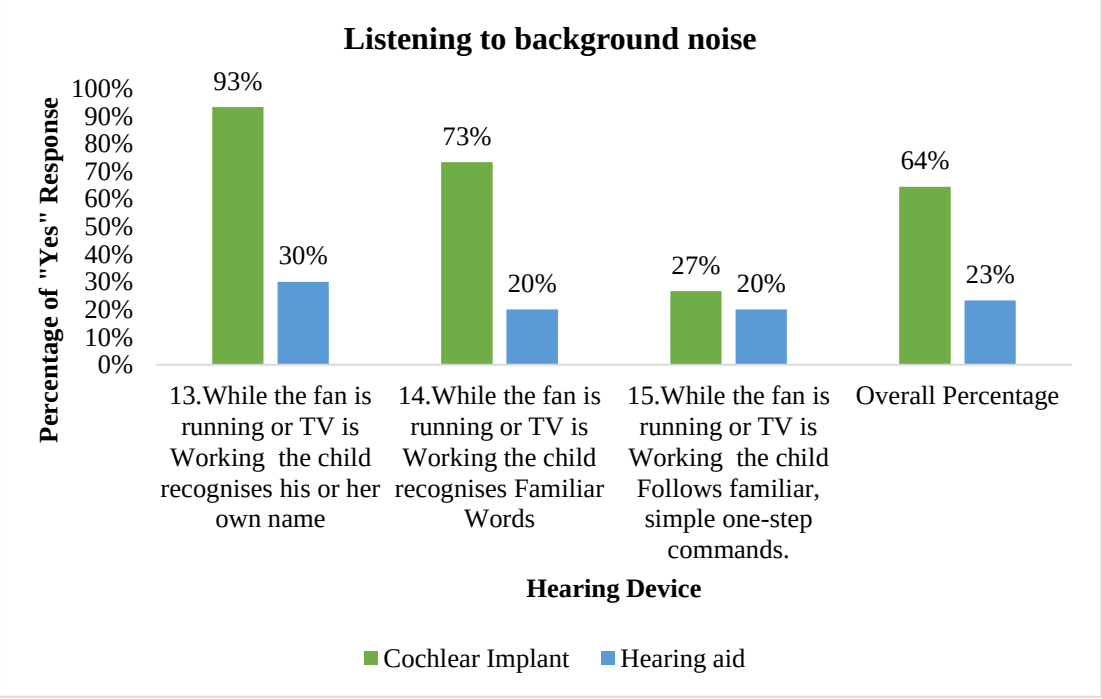
4.1.6 Listening to background noise

Based on the responses obtained for questions no. 13 to 15 i.e., distance and directional listening of sound showed overall responses of 23% for children with

cochlear implants whereas 64% for children with hearing aid. For question no. 13 (when the fan is on or the TV is on, does the child recognise his own name), cochlear implanted children have utility of 93%, while hearing aid using children has only 30% utility. For question no. 14 (When the fan is on or the TV is on, the child recognises familiar words), cochlear implanted children scored 73%, and a hearing aid using children scored 20% yes response. Question no. 15 checks the utility of hearing device when the fan is on or the TV is on, the child follows familiar, simple, one-step commands. Results show that the cochlear implanted children utilise only 27% while hearing aid using children utilises 20%. Further, from table 3 Fisher's exact test shows a significant association between hearing aid users and cochlear implanted children for question no. 13 and 14, while there is no significant difference noticed between groups for question no. 15. The percentage response of each question is indicated on the figure 7.

Figure 7

The percentage response to Listening to background noise between hearing aid and cochlear implant group

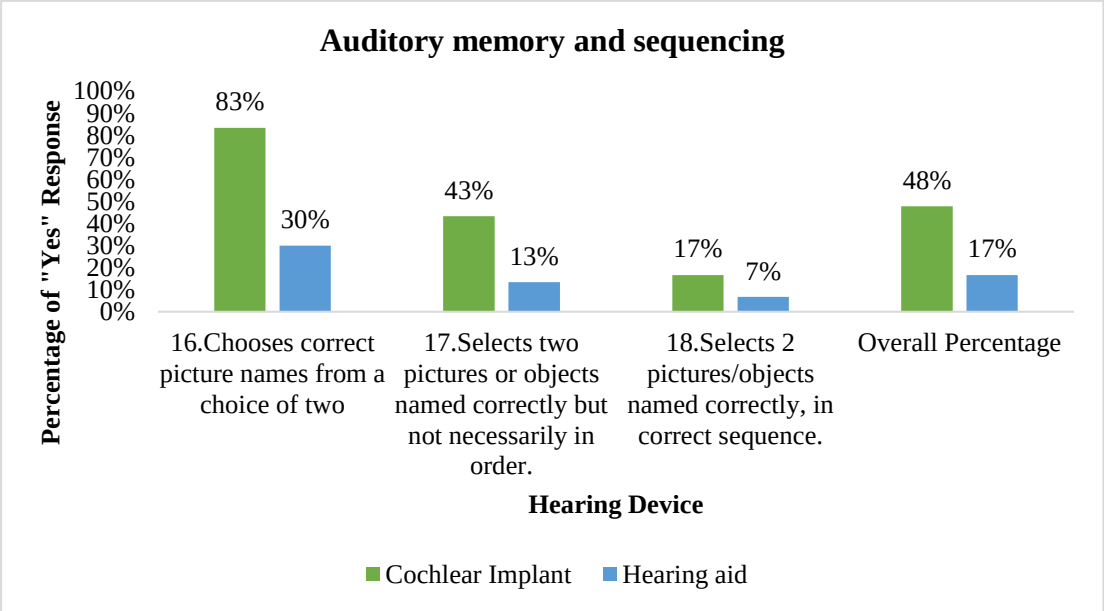


4.1.7 Auditory memory and sequencing.

Based on the responses obtained for questions no. 16 to 18 i.e., auditory memory and sequencing skill showed overall responses of 48% for children with cochlear implants whereas 17% for children with hearing aid use. For question no. 16 (choose the correct picture names from a choice of two), cochlear implant users have utilisation of 83%, and hearing aid users have 30% utilisation. For question no. 17 (choose two pictures or objects that are correctly named but not necessarily in the correct order), cochlear implant users have a utility of 43%, and hearing aid users showed 13%. For question no. 18 (choose 2 correctly named pictures/objects in the correct order.), cochlear implant users have 17% utility and hearing aid children showed 7%. Further, Fisher's exact test shows a significant association for question number 16 and 17, while the questions number 18 showed no significant difference between hearing aids and cochlear implant group. The percentage response to auditory memory and sequencing is shown in figure 8.

Figure 8

The percentage response to auditory memory and sequencing between hearing aid and cochlear implant group.



4.2 Comparison of satisfaction with hearing device between the groups

The satisfaction of amplification in daily life questionnaire was administered among both the groups. The above questionnaire consists of 7 points rating scale (*A-Not at all; B- a little; C -Somewhat; D-Medium; E-considerably; F-Greatly; G: Tremendously*) and four different domains (*positive effect, service and cost, negative feature, & personal image*). Descriptive statistics (mean & SD) was carried out to determine the difference in the satisfaction between the hearing aid users and cochlear implant users (Table 4). The mean scores of global scores (Mean ± SD: 5.20 ± 0.42), positive effect (Mean ± SD:5.63 ± 0.49), service and cost (Mean ± SD:4.50 ± 0.37), negative feature (Mean ±SD :4.96 ± 0.80) and personal image (Mean ± SD: 5.31±0.79) for cochlear implanted children. For children using hearing aid, the mean scores of the global score (Mean ± SD :4.22 ±0.94), positive effect (Mean ± SD: 4.13 ±1.34), service and cost (Mean ± SD: 3.72 ±0.51), negative feature (Mean ± SD: 4.02 ± 1.30) and personal image (Mean ± SD: 4.93 ± 1.13) were as mentioned.

Table 4

The mean distribution of scores of satisfactions of amplification in daily life for both hearing aid and cochlear implant group.

	Cochlear Implant users		**Hearing aid users**	
	Mean	SD	Mean	SD
Global score	5.20	0.42	4.22	0.94
Positive effect	5.63	0.49	4.13	1.34
service and cost	4.50	0.37	3.72	0.51
Negative feature	4.96	0.80	4.02	1.30
Personal Image	5.31	0.79	4.93	1.13

Note: SD: Standard deviation

Table 5

The categories of each domain of satisfaction of amplification in daily life for Cochlear implant-using Children.

	Cochlear Implant						
	A	B	C	D	E	F	G
Positive Effect							
1 -Help you understand people	0%	0%	0%	3%	17%	37%	43%
3 -Was in your best interests	0%	0%	0%	0%	0%	77%	23%
5 -Reduce asking for repetition	0%	10%	17%	13%	40%	20%	0%
6 -Worth the trouble	0%	0%	0%	0%	13%	57%	30%
9 -Improve your self-confidence	0%	3%	0%	0%	23%	57%	17%
10 -How natural is the sound	0%	0%	0%	10%	60%	30%	0%
Service and cost							
12 -Competent hearing aid provider	0%	0%	0%	0%	10%	87%	3%
14 -Cost seems reasonable	0%	0%	0%	3%	3%	57%	37%
15 -Pleased with dependability	63%	37%	0%	0%	0%	0%	0%
Negative Features							
2 -Frustrated with background sounds	0%	37%	30%	17%	13%	3%	0%
7 -Bothered by feedback	13%	40%	17%	20%	10%	0%	0%
11 -Helpful on the telephone	0%	0%	7%	17%	47%	30%	0%
Personal image							
4 -Others notice loss more	7%	30%	27%	20%	13%	3%	0%
8 -Content with the appearance	0%	0%	13%	10%	33%	40%	3%
13 -Makes you seem less capable	43%	43%	3%	3%	0%	7%	0%

(*A-Not at all; B-a little; C-Somewhat; D-Medium; E-considerably; F-Greatly; G: Tremendously*).

Table 6

The categories of each subscale, of satisfaction of amplification in daily life for Hearing aid using children

	Hearing Aids						
Positive Effect	A	B	C	D	E	F	G
1 -Help you understand people	0%	23%	13%	7%	3%	37%	17%
3 -Was in your best interests	3%	0%	30%	17%	23%	27%	0%
5 -Reduce asking for repetition	10%	43%	10%	10%	17%	7%	3%
6 -Worth the trouble	3%	23%	7%	10%	30%	20%	7%
9 -Improve your self-confidence	0%	30%	10%	13%	20%	20%	7%
10 -How natural is the sound	0%	10%	20%	30%	10%	30%	0%
Service and cost							
12 -Competent hearing aid provider	0%	0%	0%	0%	23%	57%	20%
14 -Cost seems reasonable	30%	40%	27%	3%	0%	0%	0%
15 -Pleased with dependability	3%	33%	27%	20%	13%	3%	0%
Negative Features							
2 -Frustrated with background sounds	0%	17%	10%	13%	37%	23%	0%
7 -Bothered by feedback	7%	27%	37%	10%	7%	13%	0%
11 -Helpful on the telephone	7%	27%	13%	20%	10%	20%	3%
Personal image							
4 -Others notice loss more	37%	27%	13%	7%	13%	3%	0%
8 -Content with the appearance	7%	20%	27%	20%	3%	17%	7%
13 -Makes you seem less capable	30%	20%	30%	13%	7%	0%	0%

(*A-Not at all; B-a little; C-Somewhat; D-Medium; E-considerably; F-Greatly; G: Tremendously*)

From the descriptive statistics, it is evident that there is a higher (better) mean score for each domain as well as global scores for children using cochlear implants compared to hearing aid users. For the different domain of the SDSL questionnaire, the Shapiro-Wilk test showed normal distribution of the data for global score, positive effect, negative feature, and personal image. Whereas service and cost showed non-

normal distribution of the data. Hence, both parametric and non-parametric test were done based on the distribution of data. MANOVA was done to compare the difference between the cochlear implant and hearing aid children for global score, positive effect, negative feature, and personal image. Results showed significant difference in satisfaction between the groups for global score [F(58,1)=33.16; p=0.000], positive effect [F (58,1) = 33.97; p=0.000] and negative feature [F(58,1) = 12.76; p=0.001]. However, satisfaction related to personal image showed no significant difference [F (58,1) = 2.66; p=0.108] between groups. For service and cost, non-parametric Mann-Whitney U test was performed which showed there is a significant difference (Z=5.608; p=0.05) between the groups.

Chapter 5

Discussion

The present study was an attempt to look into the satisfaction and utilisation of hearing devices of parents of children with hearing aids (HA) and cochlear implants (CI) in India. The first objective of the study was to understand the difference in the utilisation of hearing device among the HA and CI users. Results shows that overall utilisation of hearing device is better in cochlear implanted children than hearing aid children. It is very evident from the differences observed between the two kinds of devices based on the results of awareness of sound, identification of sound, discrimination, localisation, distance and directional hearing, listening to background noise and auditory memory and sequencing.

The reason for lack of better utility of hearing aid in comparison to CI could be due to the fact that majority of the participants are having severe-to-profound hearing loss. So the benefit with profound hearing loss is limited with hearing aid but at the same time cochlear implant is more acceptable and boon for these children (Niparko et al., 2010). This could be a major factor for getting the better results with cochlear implant compared to hearing aid users. The above finding is also supported by Said in year 2017. They studied the factors affecting the benefit of hearing aid in children and found that degree of hearing loss as one of the major factor (Said, 2017). Since most of the children in present study also had severe-to-profound hearing loss, the CI was expected to be a better amplification option as compared to high-gain HAs.

Fitzpatrick et al. (2013) analysed the auditory performance of 2- 5 years old children using either hearing aid and/or cochlear implants. Children using hearing aids had moderately severe-to-severe hearing loss, whereas children with cochlear implants had severe-to-profound hearing loss. They found that children using hearing aid

performed better than children using cochlear implant in various listening situations. The result also reflected that hearing aid users could able to achieve the speech and language proficiency similar to typically developing children. This study indicates that the utilisation of hearing aid is better for moderate to moderately severe hearing loss than profound hearing loss (Fitzpatrick et al., 2013).

Among the awareness of sound there was a significant difference in awareness of Ling six sounds between two groups of children using CI and hearing aids. Those children using CI could detect the presence or absence of sounds better in comparison to hearing aid users. Present study finding is in consonance of the study done by Shivprakash in year 2019. They also reported that children with hearing aids have difficulty listening sounds especially high-frequency sound, which in turn affects them in the production of these sounds (Shivaprakash, 2019).

Discrimination of sounds were statistically significant different between the groups of children. Among discrimination of sound, there was significant difference in discriminating the sound of parent, familiar and unfamiliar sound, sentences and phrases. The better performance with cochlear implant group over hearing aid could be due to direct stimulation of the auditory nerve with the former device. Also the cochlear implant provides better pitch encoding features which enable the better auditory discrimination (Ashori, 2020). This is also supported by the study of Mildner et al in year 2006 (Mildner et al., 2006).

Present study reported no differences between groups for localisation, distance and directional hearing skills. Literature showed that the limited benefits in localisation ability with unilateral CI (Dorman et al., 2016). Localisation ability is comparatively poor for unilateral cochlear implant users, and the localisation ability has been seen to

improved when a hearing aid is worn in the contralateral side. This advantage may be due to the binaural interaction that occurs with the combination of electrical stimuli from the implant and acoustical stimuli from the hearing aid. According to Dorman et al. (2016), localisation is particularly important for cochlear implant users as they have difficulty in using other cues for speaker identity since voice pitch and intonation are diminished.

Study reported better performance of CI group compared to HA for the listening to background noise. This can be due to the better speech processing capabilities of cochlear implant than hearing aid. Listening in background noise using cochlear implant reported better perception using familiar word and name call than hearing aid children. The above finding is in consonance with Hamzavi (2001) that is better speech perception ability in presence of noise for CI in adult than with hearing aid (Hamzavi et al., 2001). Similarly, auditory memory and sequencing abilities are reported to be better with cochlear implant group to select from a choice of two, and select two pictures correctly not in an order.

Comparison of satisfaction among hearing aid and cochlear implanted children.

The second objective of the study was to compare parental satisfaction of children using hearing devices. It is clear that the satisfaction level of parents of children with cochlear implants is higher than that of hearing aid users which is evident from the global score of SADL. In the support of the present finding, study done by Alqahtani and Luckner (2021) reported the comparison in terms of the satisfaction in service in Saudi Arabia population and they found that satisfaction is more with cochlear implant children than hearing aid users (Alqahtani & Luckner, 2021). Among the domains,

more satisfaction was found in positive effect which analyses the acoustic and psychological levels of satisfaction.

The positive effect subscale showed the highest mean among other subscales indicating the high satisfaction of hearing-impaired children with cochlear implant than hearing aid. The positive effect analyses the acoustic and psychological factors contributing to satisfaction of hearing device. Professionals need to understand the fact that majority of patients were severe-to-profound hearing loss which might be the reason for less satisfaction with hearing aids (Cohen et al., 2004). The reason for better satisfaction in CI parents as they are having better speech understanding using cochlear implant than hearing aid (Arya et al., 2019; Geers, 1997; Meyer et al., 1998; Mildner et al., 2006).

The poor satisfaction in service and cost as reported in the present study could be because of the low socio-demographic profile of the participants. Since per capita income is lesser in India, most often they cannot afford money for the purchase of hearing aid. However, in comparison to the two different types of hearing device, the satisfaction in cost and service reported to be higher in CI group than HA group. Another reason could be because of the nature of the scheme such as procurement of CI through ADIP scheme provide full funding up to the family monthly income of 22,500 and 50% financial assistance for the family monthly income up to 30,000 whereas CWF provided only 40% (for below poverty line card holders) and 70% (for Antyodaya anna yojana card holders) financial assistance for the hearing aids and remaining cost to be paid by the client. Further, they also opined that the cost of hearing aids is not reasonable to them.

The low score in negative factor subscale showed more disturbances with the hearing aids in comparison to the CI. Parents of those children using hearing aids reported frustration while using the HA due to presence of unwanted sound in the background. This could be one of the reasons for children with hearing aids reported less satisfaction compared to CI children. This probably indicating towards better speech understanding ability in noise among children with cochlear implants and leads to higher satisfaction (Torkildsen et al., 2019).

There is no significant difference in satisfaction of personal image between parents of children using hearing aids and cochlear implants. The alike opinion between two groups of parents could be because of similar appearance of the hearing device. The physical and cosmetic elements have been identified as a major obstacle to the acceptance of hearing aids (David & Werner, 2016; Wallhagen, 2010). In case of cochlear implant users compared with the necessity to improve communication, surgical and rehabilitative issues, they are less concern about the cosmetic appearance of cochlear implant (Bierbaum et al., 2019).

Summary and Conclusion

The present study aimed to find the utilisation and satisfaction of Hearing devices purchased under the Central government scheme. There are 30 participants in each group (Hearing aid users & CI users) in the study in which the utility and satisfaction of amplification in daily life were assessed. The present study result showed that the utilisation among cochlear implant children were better compared to hearing aid children. Further, there were better performance among CI children for the auditory awareness skill, auditory discrimination skill, listening in presence of noise, auditory memory and sequencing compared to children using hearing aid. Whereas the performance was similar for identification skill, localisation skill, distance and directional hearing between hearing aid and cochlear implant children. The satisfaction with the CI hearing device were more in parents of children with cochlear implant compared to hearing aids. The study also reported better performance for CI children for positive effect, negative feature, service and cost compared to HA children. However, personal image was reported to be alike between hearing aid and cochlear implant children's parents. Hence, to conclude, it is evident that parents of the cochlear implant children are superior in terms of utilisation and satisfaction compared to the children using hearing aids.

Implication of the study

- Based on the present study, it can be inferred that the fund provided by the Government for procurement of hearing device is utilised effectively by the children with hearing impairment.
- The satisfaction level of parents of cochlear implant children are higher compared to hearing aid children.

Future Direction

- The utilisation and satisfaction might differ with different degree of hearing loss, which is not compared in this study and can be considered for future study.
- Comparison between unilateral/bilateral cochlear implant, bimodal cochlear implant and bilateral hearing aid user were not analysed and can be considered for future study.

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