

SOME ASPECTS OF HEARING AID USAGE - A FOLLOW UP STUDY  
ON BTE USERS

REG. NO.M9401

AN INDEPENDENT PROJECT SUBMITTED AS PART FULFILMENT OF  
FIRST YEAR M.Sc. (SPEECH AND HEARING) TO THE UNIVERSITY OF  
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ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE 570 006

MAY 1995

DEDICATED TO

APPACHA, AMMACHI, PAPA AND MUMMY

"YOU HAVE MOULDED ME INTO WHAT I AM TODAY"

**CERTIFICATE**

This is to certify that this Independent Project entitled: **SOME ASPECTS OF HEARING AID USAGE - A FOLLOW UP STUDY ON BTE USERS** is the bonafide work in part fulfilment for the First year MSc, (Speech and Hearing) of the student with Reg.No.M9401.

Mysore  
May 1995

  
**Dr. (Miss) S. Nikan**  
Director  
All India Institute of  
Speech and Hearing  
Mysore - 6

**C E R T I F I C A T E**

This is to certify that this Independent Project entitled : **SOME ASPECTS OF HEARING AID USAGE - A FOLLOW UP STUDY ON BTE USERS** has been prepared under my supervision and guidance.

Mysore  
May 1995



**GUIDE**

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## DECLARATION

I hereby declare that this Independent Project entitled: **SOME ASPECTS OF HEARING AID USAGE - A FOLLOW UP STUDY ON BTE USRS** is the result of my own study under the guidance of Dr.(Miss) **S. Nikam**, Prof. and Head of the Department of Audiology, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier at any University for any other Diploma or Degree.

Mysore  
May 1995

**Reg.No.M9401**

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Anu, Luna and Lakshmi - we can cry together, laugh together, grouch together, goof off together and be happy together.

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## INTRODUCTION

The biblical writer once admonished that "He who hath ears to hear, let him hear" (Matt 11:15) the audiologist involved in aural rehabilitation must ascertain the extent to which those ".... ears to hear ...." can hear and be trained or retrained in the processing of auditory stimuli.

The inability to perceive and/or to understand because of hearing-impairment, the literal components of spoken language must substantially diminish the psychosocial behaviours which represent the foundation of human life. The ramification of inadequate auditory function will be viewed from the standpoint of aural rehabilitation procedures but especially as it relates to the uses and abuses of personal amplification.

When a hearing-impaired individual first puts on a hearing aid the problems related to comfort, satisfaction and usefulness he derives are dependant on a number of factors eg. degree of hearing loss, length of time he had a hearing loss before using the aid etc. From this it is apparent that a new hearing aid like a new pair of glasses

may often mean that the wearer must be first accustomed to it before he can secure maximum satisfaction and benefit.

A normal hearing person shuts his "mind's ear" to commonplace noises and listens only to the essential things. From long practice he unconsciously ignores repetitive and inconsequential sounds until they no longer bother him, A new user must relearn normal hearing and must practice evaluation of the various things he now hears until his mind trains itself to ignore the numerous inconsequential sounds.

Aural rehabilitation and the strategies utilized in the process of aural rehabilitation center around the impact of a loss on adults who are hearing-impaired.

The fitting and dispensing of hearing aids is one of the important aspects of the process of aural rehabilitation. Even though there are many different types and models of hearing aids available for fitting the basic components are the same. They possess (1) microphone (2) an amplifier (3) a receiver (4) a power house in the form of a battery.

Hearing aids can be broadly classified into those worn by the user and those not worn by the user. Under the group

not worn by the user we can subdivide them into individual (eg. auditory trainer) and group (eg. hardware system). Under the group worn by the user we can subdivide them into air conduction and bone conduction hearing aids. Air conduction can be subdivided into body level and ear level (behind the ear, in the ear and canal) hearing aids.

As the focus of the present study involves behind the ear hearing aids we should discuss its components, advantages and disadvantages. The ear level hearing aid rests behind the pinna with a plastic elbow fitting over the anterior edge of the ear, connecting with a plastic tube that leads to the concha. The microphone, amplifier and receiver are all housed within the casing of the instrument. Further various fitting adjustments are available including those for frequency configuration, gain and output limitation.

#### Advantages:

- 1) Elimination of clothing noise
- 2) Improved sound localisation particularly through binaural fitting
- 3) Convenience of comparatively smaller size and better aesthetical appearance.

**Disadvantages:**

1. Caters upto moderately severe hearing losses
2. Picks up wind noise
3. Cannot be prescribed to clients having dexterity problems.

The hearing health professional if he is to render a truly important function must learn to understand the problems which confront the individual in his daily life. Assessment of the benefits of amplification for individual client should be the second step in aural rehabilitation.

A hearing aid user particularly a new user needs more than a description and demonstration to fit, operate and maintain a newly selected hearing aid. To determine if orientation has been successful an assessment of user's ability to perform these tasks is essential.

It is essential for an audiologist to know his client's performance with the aid and also how the client cares for and maintains his hearing aid. A follow up program would provide him with the information.

The present study aims at conducting a survey on behind the ear hearing aid users to evaluate -

- 1) The benefit received from the usage of behind the ear hearing aids.
- 2) To evaluate the users knowledge about care and maintenance of behind-the-ear hearing aids.

## REVIEW OF LITERATURE

This chapter is a brief attempt to summarise articles quoted in literature pertaining to the study. The main areas of interest are as follows:

- I Satisfaction with fitted hearing aids.
- II Adjustment to the hearing aid.
- III Frequency of hearing aid usage.
- IV Reasons for dissatisfaction with fitted hearing aids/difficulties experienced by the hearing aid user.
- V Competency of handling hearing aids.
- VI Degree/type of hearing loss and hearing aid usage.
- VII Hearing aid usage in variety of listening situations.
- VIII Care of the hearing aid.

### **I. Satisfaction with fitted hearing aide:**

The earlier reported studies are those of Danish investigators (Ewertsen, 1958, 1974; Bentzen, et al. 1974) who investigated whether hearing aids were being used satisfactorily or not. Results of their studies indicated that 64 to 98 percent of the aids to be in satisfactory use. Lowest figures have been reported by British authors (Rice, 1966; Dicknell et al. 1963; Brooks, 1973). They reported that 6-18 percent of the aids were never used satisfactorily.

Survey studies conducted on children are limited. The following study was conducted on children. Rushford and Lowell (1960) mailed questionnaires to parents of deaf children. Parents reported that 52.6 percent of them were satisfied with the performance of their children's hearing aide. The major criticism of such studies are that reports are unsystematic and the information is not available from the user but is inferred from the parent's opinions.

Northern et al. (1960) mailed an attitude questionnaire to 337 male military personnel in the age range of 18-57 years, who had completed an aural rehabilitation program. 88.4 percent of the subjects reported satisfaction with fitted hearing aids. The high percentage of successful results are indicative of a successful rehabilitation program.

Hayes et al. (1983) sent 143 questionnaires to adult hearing aid users who were twenty years or older. Users were asked to rate their satisfaction on a four point scale ranging from helpful to unsatisfactory. Of them 48 percent rated the aid as very helpful, 28 percent found amplification satisfactory, 17 percent rated their aids as sometimes helpful and 6 percent found the hearing aid to be unsatisfactory.

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Briskey and Colo (1983) used a questionnaire to ascertain the success of fitting 87 individuals with binaural aids in a multiplicity of acoustic environments within each person's life style. Results of their study with regard to satisfaction are in accordance with those reported by Bentzen et al. (1974).

Alberti et al. (1984) evaluated an aural rehabilitation program by sending out questionnaires to 1000 people. In their study 80 percent of the users were totally satisfied or considered the aid to be adequate.

Studies done on Indian population are limited. The following is a report on an Indian study conducted by Manjula (1986) on 70 BTE users in the age range of 11 to 90 years. Results indicate that 60 percent of the subjects found the aid to be adequate and 26.6 percent of them were not satisfied with their hearing aids.

Henrichsen et al. (1988) used a questionnaire to evaluate the use and benefit of ITE hearing aids in elderly hearing-impaired subjects. Results of the study indicate that 43 percent of the users were satisfied with the aids and 18 percent were dissatisfied with their aids.



Richardson and Fox (1989) conducted a follow up study on 170 hearing aid users using a questionnaire method. Results of the study are in accordance with those reported by earlier investigators Bentzen et al. (1974), Briskey and Cole (1983). Results of the study support the use of a follow up questionnaire on a regular basis to ensure long term management and support for hearing-impaired wearers.

Klingler and Millin (1990) conducted a telephonic interview on 40 hearing aid users. Results were in accordance to that obtained by Alberti (1984).

Parving and Boisen (1990) investigated the use and benefit of in the canal hearing aids. A questionnaire was mailed to 256 hearing aid users. Results of the study revealed that 74.7 percent of them were satisfied with their aids and 19 percent were dissatisfied with their aids. Parving conducted another study (1991) on 138 hearing-impaired subjects with a median age of 93 years. Only 64 percent of the subjects were satisfied with their hearing aids and 9 percent were dissatisfied. This could be attributed to visual and dexterity problems in the elderly hearing-impaired population.

Austin (1992) sent 40,000 questionnaires to hearing aid users in the United States and he reported that 71 percent of his subjects were satisfied with their hearing aids.

Mulrow (1992) conducted a study on 87 elderly hearing impaired subjects who wore ITE hearing aids. Results of his study are in accordance to that reported by Austin (1992).

Davis et al. (1992) conducted a follow up study on 45 individuals in the age group of 50-65 years. Results of his study support the earlier findings of Northern (1960).

Schow et al. (1993) conducted a survey on 56 adult hearing-impaired who used BTE aids or eye glass aids. Results reported are in accordance to the previous findings reported by Austin (1992) , Mulrow (1992).

From the above, it is seen that few studies support the earlier conducted studies. A range of satisfaction has been reported with fitted hearing aids. The lowest figures are those quoted by British authors in the 1970s. A higher percentage of satisfaction is seen in the studies conducted in the 1980s and the 1990s. Higher percentage of satisfaction reported is an indication of a successful aural rehabilitation program.

## II Adjustment to the hearing aid:

Berger and Hagberg (1982) sent out questionnaires to 553 patients to study hearing aid users attitudes and hearing aid usage. Results revealed that 30.6 percent of the users reported that they needed one to two weeks to adjust to their aids whereas 1-3 percent of them took 12 weeks or more to adjust to their aide.

Briskey and Cole (1983) reported that 66 percent of their subjects took less than a month to adjust to their hearing aids while 4 percent of them took more than six months to adjust to their hearing aids. Brook (1958) reported that 58 percent of the subjects took an adjustment time of less than a month to adjust to their hearing aids.

Rosedale (1992) developed a questionnaire to assess patient adjustment with fitted hearing aids. Questionnaires were sent to individuals in the age range of 16 to 85 years. All of them were ITE Users. Results indicated that the subjects took 16.7 days for adjustment.

Schow et al. (1993) reported that 81 percent of their subjects had adjusted well to their hearing aids and 19 percent reported an adjustment problem.

Studies which assessed adjustment to hearing aids are limited. Results obtained from the studies indicate that majority of the subjects took around two weeks to adjust to their hearing aids.

### **III Frequency of hearing aid usage:**

Rushford and Lowell (1960) reported that 45.8 percent of the hearing-impaired children included in their study made use of their hearing aids.

Northern et al. (1969) reported that only 6.5 percent of their subjects never used their hearing aids.

Blood and Danhauer (1976) mailed a 52 item questionnaire to their hearing-impaired subjects. Results indicated that 69.8 percent of the subjects used their aids for more than 8 hours per day.

Carstairs (1973) conducted an interview survey on 259 people who were issued hearing aids by the National Health Service. Results indicated that 86 percent of them used their aids regularly.

Pou et al. (1981) designed a questionnaire to study various aspects of hearing aid usage. Results reported on frequency of usage was similar to that reported by Blood and Danhauer (1976). Berger and Hagberg (1982) reported similar findings as the above studies conducted by Blood and Danhauer (1976) and Pou et al (1981). Berger and Hagberg also reported that 4.8 percent of their subjects used the hearing aids for one-two hours per day.

Briskey and Cole (1983) reported that 89 percent of their subjects used their aids for more than 8 hours per day and 3 percent used their aids for less than four hours a day.

Sorri et al. (1984) interviewed 74 hearing aid users at home two years after they had been fitted with hearing aids. The aim was to find out how many of the delivered aids were in use. Results revealed that 23 percent of the aids were seldom in use, 57 percent of aids were used regularly and 19 percent were used occasionally.

Manjula (1986) reported that 50 percent of the subjects in her study wore the hearing aid throughout the day.

Maya (1987) conducted a survey on 57 elderly hearing aid users in the age range of 44-93 years. Results indicated that 33.3 percent of the users used their aids for more than 8 hours a day and 36 percent used them for less than 4 hours a day.

Klingler and Millin (1990) reported that 72.5 percent of the subjects used their hearing aids for 9 hours or more and ten percent of them used their aids for less than five hours.

Parving and Boisen (1990) reported that 74 percent of the subjects used their aids everyday. 28 percent seldom used them and one percent did not use them at all. Parving (1991) conducted another study on elderly hearing aid users and reported that 53 percent of them used their hearing aids daily.

Mulrow (1992) reported that 60 percent of the subjects included in the study wore their aids for 40 hours a week whereas 10-15 percent wore them for less than 20 hours per week.

Gimsing (1992) interviewed 254 patients, 6 months after hearing aid issue. Results indicated that 86 percent of

their subjects used the hearing aids everyday and 8 percent were non users.

Rosedale (1992) reported that 8.8 hours was the mean hearing aid usage per day by the subjects included in his study.

Ovegard and Ramstrom (1994) summoned 50 new hearing aid users for an individual follow up about one year after hearing aid fitting. Results indicated that 30 percent of the subjects used their hearing aids for less than one hour per day. 88 percent of the subjects were BTE users and 12 percent of them were ITE users.

In conclusion it is seen that majority of the subjects in most studies used their hearing aids for eight hours per day.

#### IV. Reasons for dissatisfaction with fitted hearing aids/difficulties experienced by the hearing aid user:

Carstairs (1973) reported that 78 percent of the people who had complaints with their aid complained of background noise.

Tyler et al. (1983) used an open ended questionnaire to assess the difficulties experienced by 250 hearing aid users. They reported problems in the following areas (a) understanding speech when speechreading is normally used - 81 percent (b) understanding speech without speechreading - 43 percent (c) personal difficulties - 11 percent (d) audiological or medical difficulties - 34 percent (e) difficulties with hearing aids - 35 percent (f) difficulty in watching TV - 27 percent (g) difficulties in conversing over the telephone - 21 percent.

Smedley and Schow (1990) conducted a survey to find out why clients were dissatisfied with their hearing aids. Results revealed that 28 percent of them reported that it was due to background noise, 25 percent due to lack of fitting or maintenance problems and 17 percent felt that the cost of the aid, repairs and batteries were excessive.

The number of studies investigating reasons for dissatisfaction with fitted hearing aids/problems faced by the hearing aid users are limited. They throw light on the problems faced by the hearing aid users.



V. Competency of handling hearing aids:

Pou et al. (1981) reported that 96 percent of the subjects included in their study reported that they were competent in handling their hearing aids.

Lazenby et al. (1986) provided questionnaires to 28 hearing aid users who ranged in age from 65-85 years to evaluate their ability to manipulate the controls on the hearing aid. 65 percent of them had mastered the techniques of handling their hearing aids after two weeks. Lowered percentage could be because of the dexterity problems faced by the elderly hearing-impaired subjects.

Austin (1992) reported that 82 percent of the subjects included in his study found the hearing instrument easy to operate.

Limited number of investigators have investigated this aspect of hearing aid usage. Results indicate that a high percentage of subjects are competent in handling their hearing aids.

## VI. Degree/type of hearing loss and hearing aid usage:

Carstairs (1973) reported that 55 percent of subjects with a severe defect utilized their aids in comparison to 26 percent and 17 percent of the subjects with either a moderate or slight defect.

Kapteyn (1977) studied the relationship between satisfaction and degree of loss and found that it was poor.

Sorri et al. (1984) reported that hearing aids were used less frequently if the loss was mild or sensori-neural.

This aspect (degree/type of loss) and its influence on hearing aid usage has not been investigated by many authors. However, it is seen that aids are used less frequently if the loss is of a mild degree.

## VII Hearing aid usage in a variety of listening situations:

Henrichsen (1988) reported that elderly hearing-impaired users use their hearing aids predominantly in situations when listening to TV and in small group conversations.

### VIII Care of the hearing aid:

Schow et al. (1993) conducted a survey to find out how well adults took care of their hearing aids. The day-to-day condition of hearing aids used by 56 adult wearers were examined. While dispensers may assume that adults can monitor the status of their hearing aids this study indicates that hardware used by adults regardless of its sophistication and improvement will need professional monitoring to keep such amplification functioning at an optimum level.

The review of literature is indicative of the limited number of Indian studies that have been conducted and this provides the Justification and need for the present study to be carried out.

The purpose of the study was to conduct a follow up survey on BTE hearing aid users to assess the care, maintenance and benefit of their hearing aids.

### **Subjects**

Thirty hearing-impaired individuals who were recommended to use behind the ear hearing aids were taken up as subjects for the study. Twenty one out of thirty subjects were evaluated and prescribed hearing aids from the All India Institute of Speech and Hearing whereas nine subjects wore hearing aids prescribed by other audiologists working elsewhere.

There were 25 males and 5 females within the age range of 18 years to 80 years. The mean age of the subjects was 52.8 years and the median was 56.5 years.

The subjects were either students, housewives, professionals like doctors, engineers, accountants or retired individuals. All of them belonged to the upper middle class or above.

All subjects wore behind-the-ear hearing aids. 23 subjects wore monaural aids and 7 of them wore binaural aids. Similarly 26 subjects used Indian aids whereas 4 used imported aids.

The subjects formed a heterogenous group with respect to hearing loss. They either had sensori-neural or mixed loss. The degree of loss varied from moderate-profound.

About 10 different models of hearing aids were in use. The period of hearing aid use varied from a few months to 15 years.

#### **QUESTIONNAIRES USED IN THE STUDY:**

Three questionnaires were employed for the study (Appendix A, B, C). They were used to gather information in the following areas:

- Q I : dealt with general information regarding the user and his hearing aid.
- Q II : dealt with care and maintenance of the hearing aid.
- Q III : assessed the benefit derived from hearing aid usage.

A questionnaire was developed based on earlier survey studies conducted by Manjula (1986), Maya (1987) and also from the Hearing Handicap Scale (HHS) by High, Fairbanks and Glorig (1984) and the Hearing Measurement Scale (HMS) by Noble (1972).

The questionnaires were given to 10 qualified audiologists to be evaluated and they were requested to give their opinions and modifications regarding the questionnaire. The questionnaire was then modified based on the suggestions provided.

### Procedure

Data was collected via a direct interview by interviewing the subjects at their homes using the developed questionnaire. The subjects were also provided an explanation regarding why the data was being collected.

Results of the study are tabulated and discussed in the following chapter.

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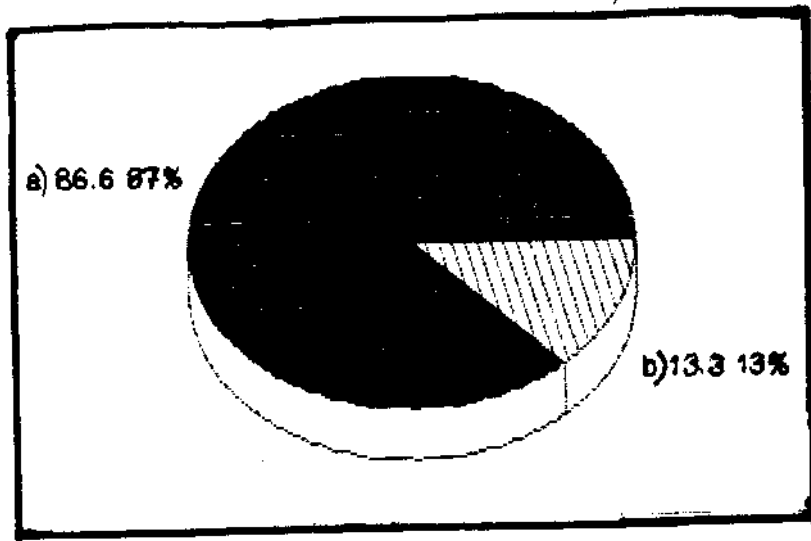
Questionnaire I and II were tabulated using descriptive statistics. Mainly percentage analysis was used to tabulate the data.

Questionnaire III was tabulated by initially scoring each question and then obtaining a total score for each subject. ANOVA was used to find out whether degree of loss was a contributing factor to the benefit derived from the hearing aid. 'T' test was used to find out whether type of loss or hearing aids from a specific company contributed to the benefit derived from the hearing aid.

#### **QUESTIONNAIRE I**

##### **1 (e) INDIAN VS. IMPORTED AIDS:**

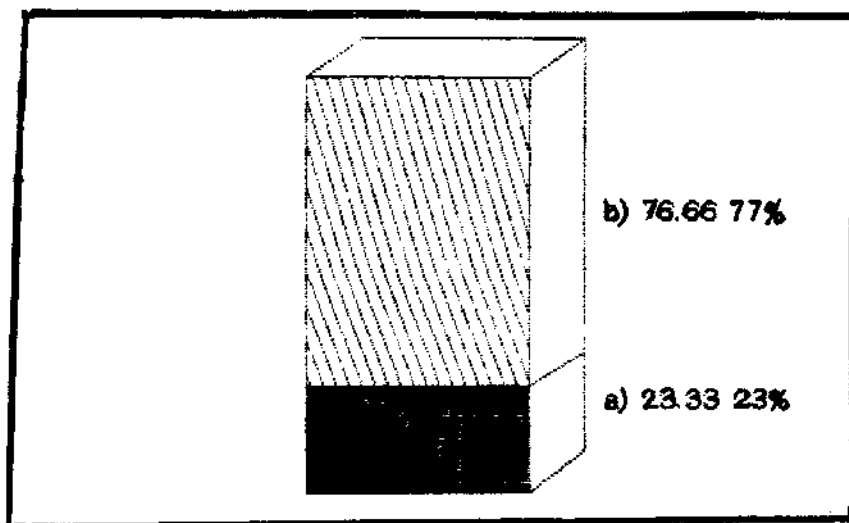
Type of aid	Number	Percentage
a) Indian	26/30	86.6
b) Imported	4/30	13.3



The above results indicate that majority of the subjects used Indian hearing aids.

**1 f) BINAURAL VS. MONAURAL USERS:**

Users	Number	Percentage
a) Binaural	7/30	23.33
b) Monaural	23/30	76.66



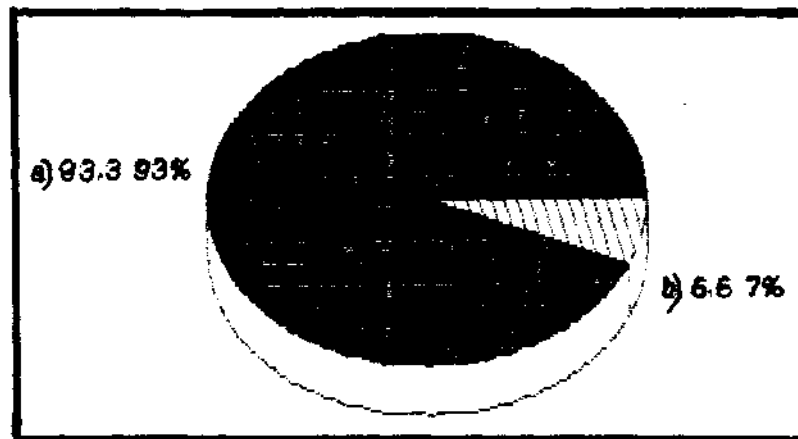


The above results indicate that majority of the cases are monaural users.

3. Hearing aid users reported that the amount it cost them to buy hearing aids ranged from Rs.1200/- to Rs.2500/-.

4. Since when is the hearing aid being used?

Options	Number	Percentage
a) From date of obtaining the aid	28/30	93.3
b) Sometime after obtaining the aid	2/30	6.6
c) Don't remember	0/30	0
d) Others	0/30	0

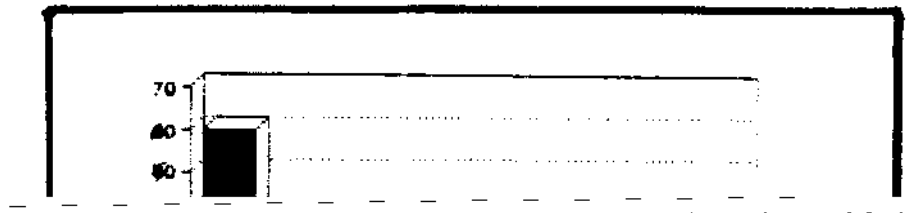


Majority of the hearing aid users used the hearing aid immediately after obtaining the hearing aid. Only a very small percentage of subjects did not use the hearing aid

immediately. This may be due to the fact that they did not obtain the earmolds immediately.

5. How long did it take to adjust to your hearing aid?

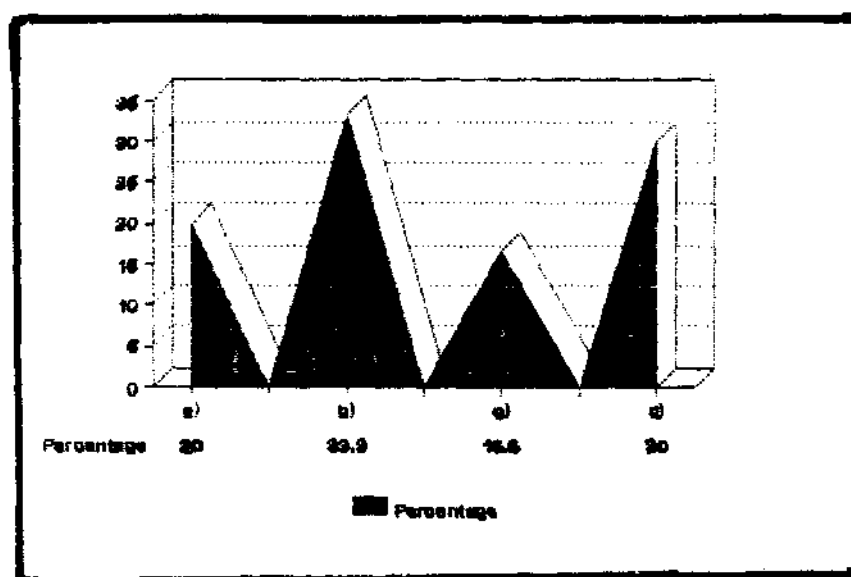
Options	Number	Percentage
a) 1-2 weeks	18/30	60
b) 1-2 months	6/30	20
c) More than 2 months	4/30	13.3
d) Others	2/30	6.6



associated problems, associated with hearing loss.

6. How many hours do you use the hearing aid in a day?

Options	Number	Percentage
a) Less than 4 hours	6/30	20
b) 4-8 hours	10/30	33.3
c) 8-12 hours	5/30	16.6
d) More than 12 hours	9/30	30

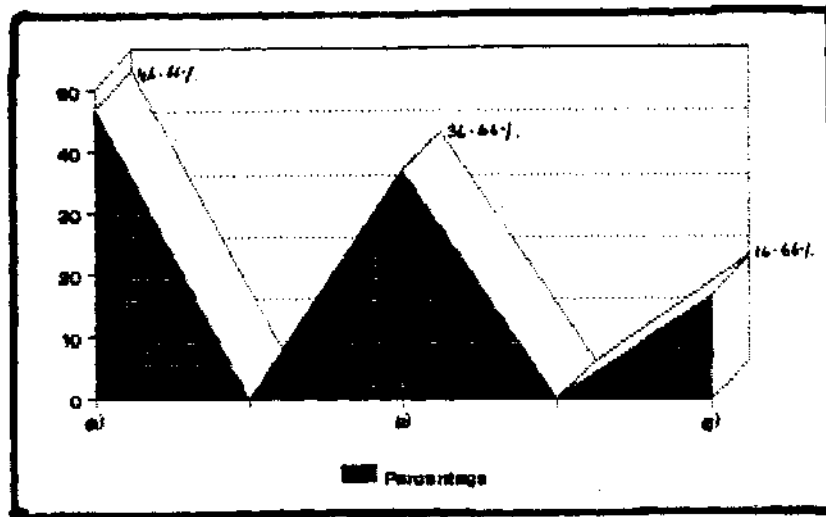


Majority of the users used their hearing aids for 8 hours a day. This is the optimum amount of usage per day. A small percentage of subjects used their hearing aids for less than 4 hours a day. This may be due to the fact that the subjects required to use their hearing aids in very few listening situations.

Eg. Watching TV, during group conversation.

7. To what extent are you satisfied with your hearing aid?

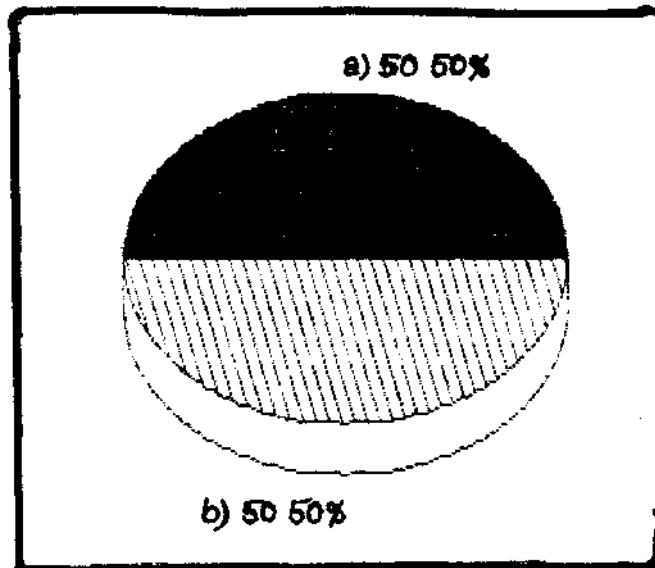
Options	Number	Percentage
a) Completely satisfied	14	46.66
b) Find it adequate	11	36.66
c) Not satisfied	5	16.66



Results indicate that majority of the subjects were satisfied with the hearing aid or found it to be adequate. A small percentage of them were not satisfied with their hearing aids, the reasons for which have not been investigated in the present study.

8. Have you kept in touch with professionals after the hearing aid has been recommended and procured?

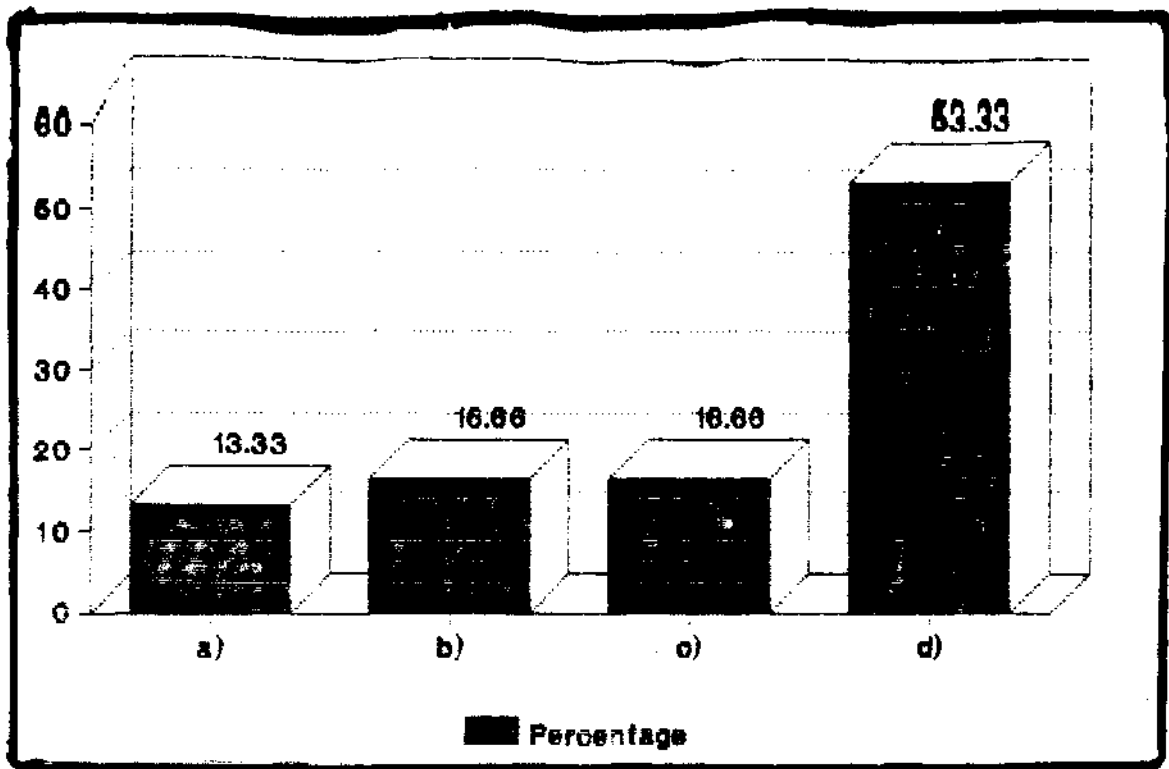
Option	Number	Percentage
a) Yes	15/30	50
b) No	15/30	50



One half of the subjects included in the study have kept in touch with professionals after the hearing aid had been procured. The other half of the subjects were not aware that they had to do so. This aspect should be included while counselling the case.

9. How often do you get your hearing evaluated?

Options	Number	Percentage
a) Once in 3 months	4/30	13.33
b) Once in 6 months	5/30	16.66
c) Once in a year	5/30	16.66
d) Have not got it evaluated after prescription of the aid.	16/30	53.3

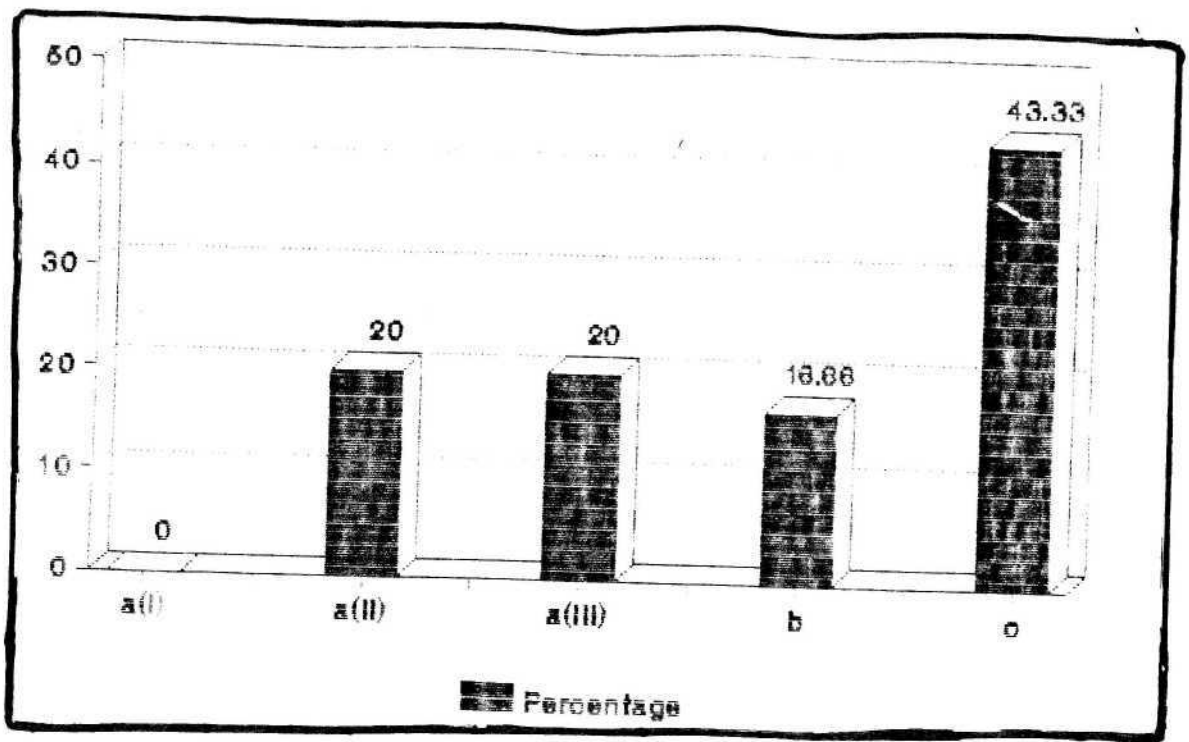


One half of the subjects included in the study got their hearing evaluated periodically. The other half were not aware that frequent hearing evaluation was a must. Patients must be instructed to do so at the time of counselling.

#### QUESTIONNAIRE II

1. Do you think that the hearing aid needs to be serviced frequently?

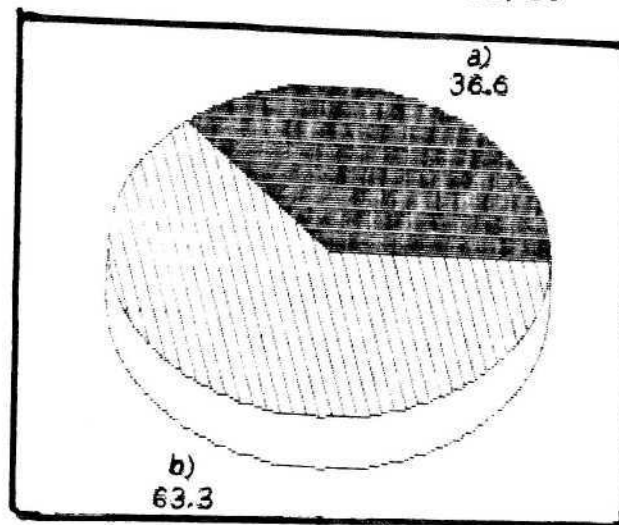
Options	Number	Percentage
a) Yes (i) Once in three months	0/30	0
(ii) Once in six months	6/30	20
(iii) Once in a year	6/30	20
		} 40%
b) No	5/30	16.66
c) Don't know	13/30	43.33



Only 40 percent of the subjects had the knowledge that hearing aids need to be serviced. A large majority were unaware that they need to be serviced frequently. This aspect should be stressed upon during counselling.

2. When the hearing aid is not working can you identify the parts not working?

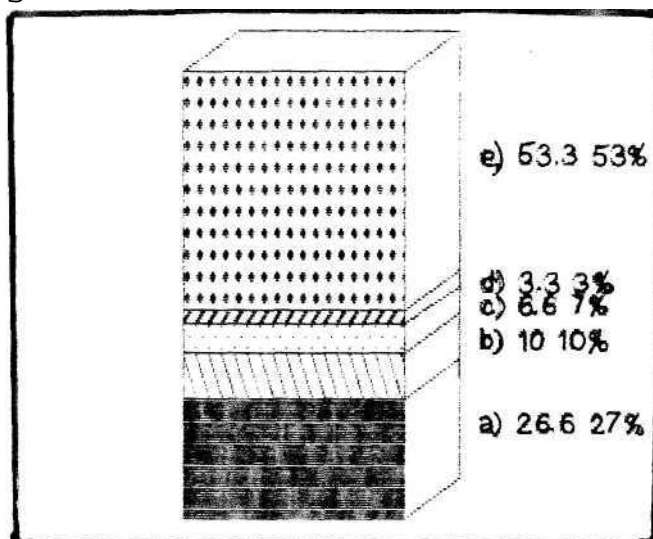
Options	Number	Percentage
a) Yes	11/30	36.6
b) No	19/30	63.3



A large majority of cases could not identify parts not working when the hearing aid was not working. Care should be taken to explain trouble shooting of the hearing aid during counselling.

3. How often do you check your hearing aid?

Options	Number	Percentage
a) Once a day	8/30	26.6
b) Once in few days	3/30	10
c) Once in few weeks	2/30	6.6
d) Once a month	1/30	3.3
e) Don't know how to check the hearing aid.	16/30	53.3

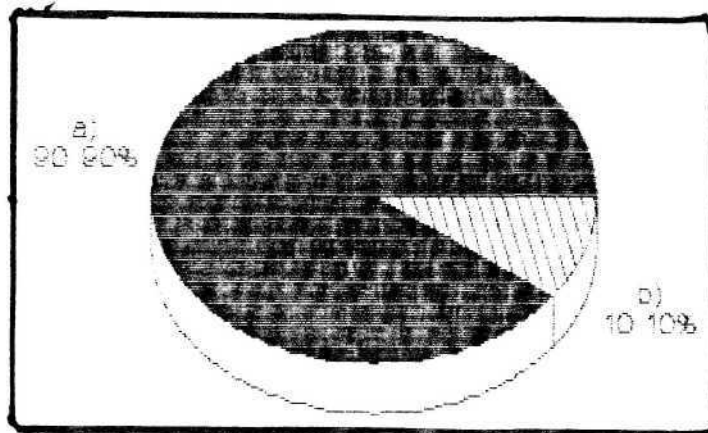


A large majority of cases reported that they did not check their hearing aids often, or that they did not know how to check the aid. Demonstrations on how the hearing aid has to be checked should be made during counselling.



4. How do you check the cell?

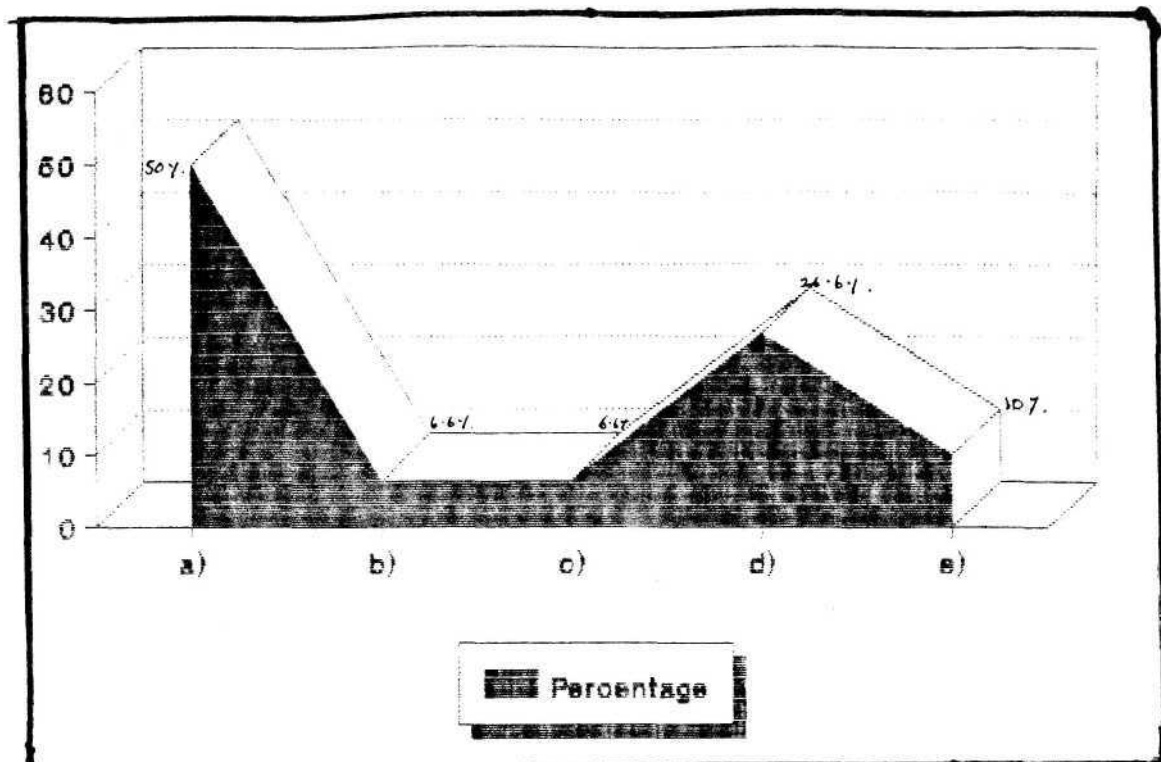
Options	Number	Percentage
a) By listening to the aid	27/30	90
b) By using a voltmeter	3/30	10



A large majority of cases checked the cell by listening to the hearing aid and a small percentage of them used a voltmeter to check the cell.

5. How often do you check the cell?

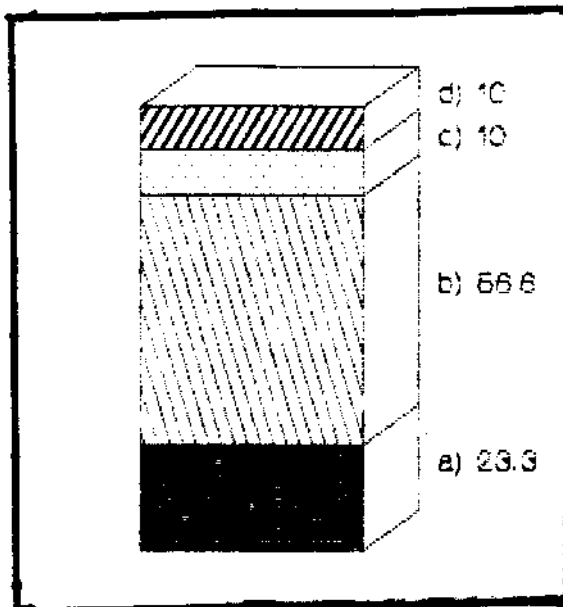
Options	Number	Percentage
a) Once in few days	15/30	50
b) Once in few weeks	2/30	6.6
c) Once in a month	2/30	6.6
d) Don't check	8/30	26.6
e) Others	3/30	10



One half of the subjects reported that they checked the cells once in a few days. A small percentage of them reported that they did not check the cell. This can be alleviated through thorough counselling.

6. When do you change the cell?

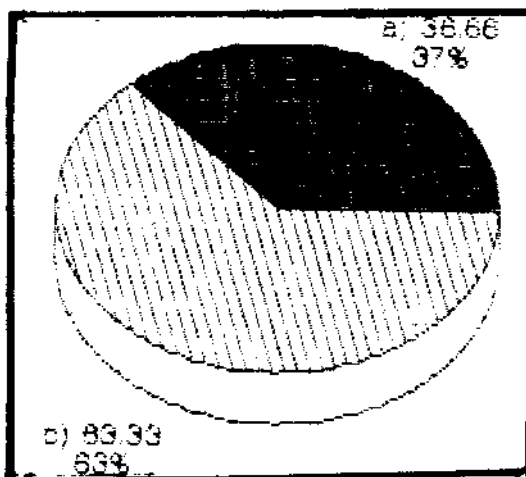
Options	Number	Percentage
a) When there is no sound from the hearing aid	7/30	23.3
b) When sound from the hearing aid is weak	17/30	56.6
c) When sound from the hearing aid is not clear	3/30	10
d) Not changed so far.	3/30	10



Majority of the subjects changed the cell when the sound from the hearing aid is weak. A small percentage of subjects reported that they had not changed the cell because they were using chargeable cells or they had just procured the aid two months back. Some of them used the aid for less than 4 hours a day.

7. Do you use chargeable batteries and a battery charger?

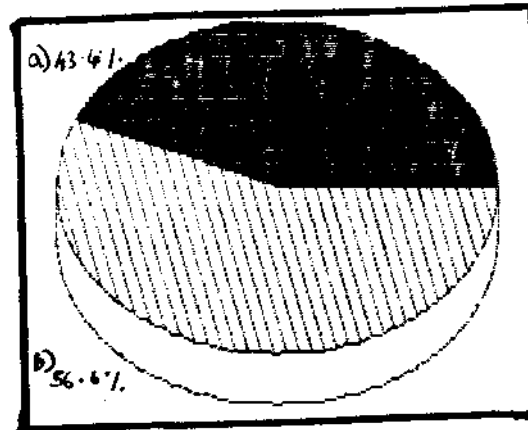
Options	Number	Percentage
a) Yes	11/30	36.66
b) No	19/30	63.33



A large majority of subjects did not use a battery charger and chargeable batteries with their hearing aids. Many of the subjects reported that they were not aware that they could use chargeable batteries with their aids. Subjects can be made aware of the same by telling them about this option during counselling.

8. Do you check the tubing of your hearing aid?

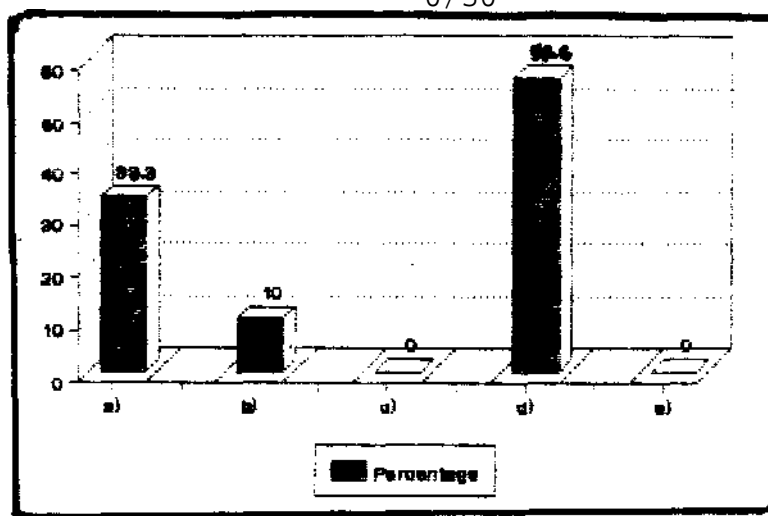
Options	Number	Percentage
a) Yes	13/30	43.4
b) No	17/30	56.6



Many of the subjects reported that they did not know how to check the tubing of their hearing aids. This aspect should be mentioned during counselling.

9. How often do you check the tubing?

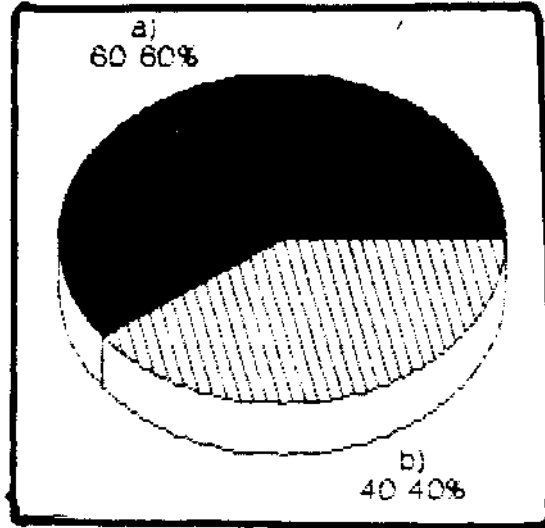
Options	Number	Percentage
a) Once in few days	10/30	33.3
b) Once in few weeks	3/30	10
c) Don't remember	0/30	0
d) Not at all	17/30	56.6
e) Others	0/30	0



From the results it is seen that a majority of cases did not check the tubing at all. This aspect should be demonstrated during counselling.

10. Do you use an earmold or ear tip with your hearing aid?

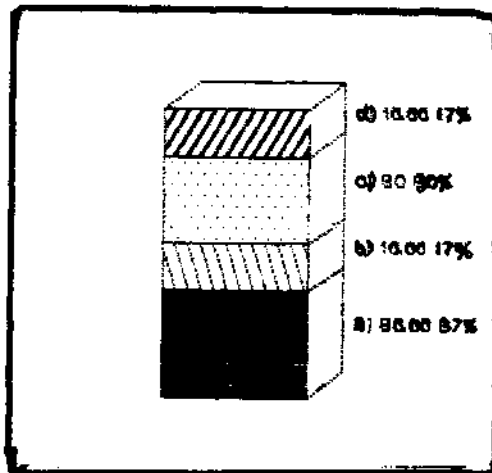
Options	Number	Percentage
a) Earmold	18/30	60
b) Eartip	12/30	40



Majority of the users use an earmold with their hearing aid.

11. How often do you clean your earmold or eartip?

Options	Number	Percentage
a) Once a week	11/30	36.66
b) Once in 15 days	5/30	16.66
c) Once a month	9/30	30.0
d) Don't clean	5/30	16.66



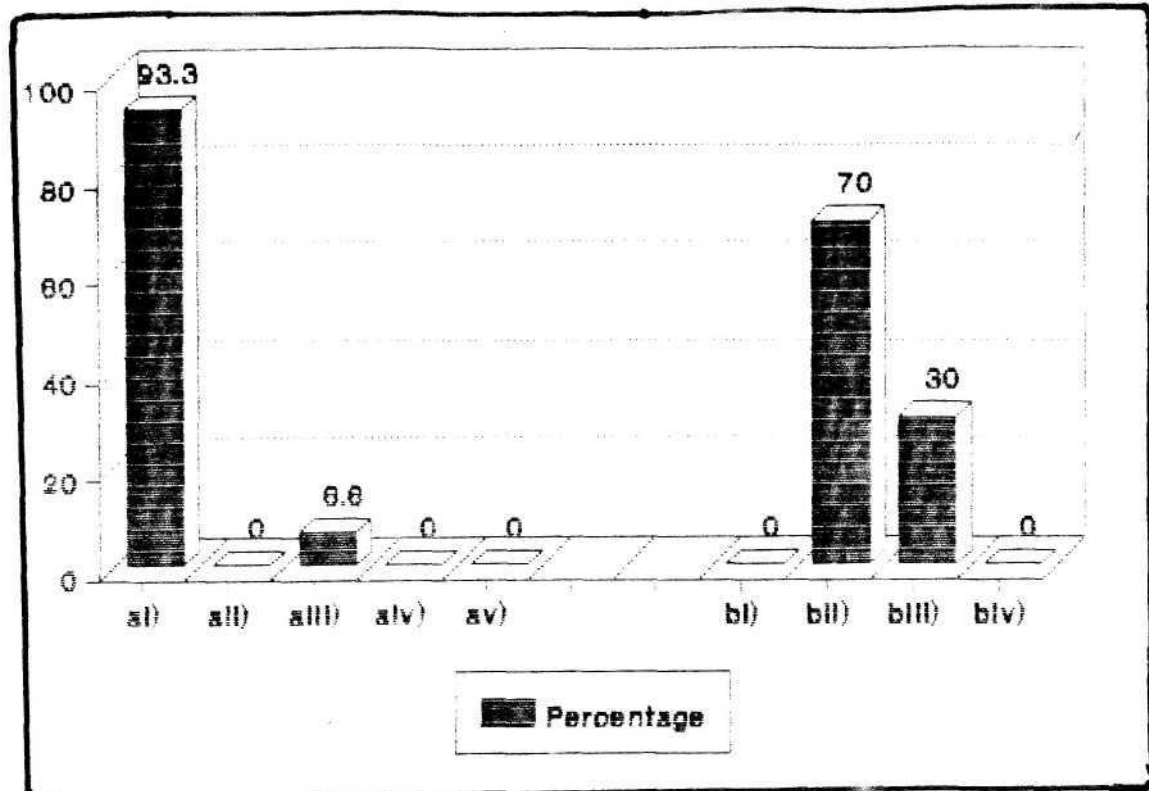
Majority of the users cleaned their earmolds at least once in two weeks. A small percentage of them did not clean their earmolds. This number also can be reduced by way of counselling the patient and telling them the importance of cleaning the earmold/tip.

12. At which setting of tone and volume control is the aid being used? What was recommended?

All the users were using the tone and volume control at the recommended setting. This is indicative that counselling regarding this aspect is adequate.

13. When do you change the volume control settings?

Options	Number	Percentage
a) To a higher number		
i) When battery is weak	28/30	93.3
ii) When battery is new	0/30	0
iii) In a noisy place	2/30	6.6
iv) In situations such as...	0/30	0
v) Not at all	0/30	0
b) To a lower number		
i) When battery is weak	0/30	0
ii) When battery is new	21/30	70
iii) In a noisy place	9/30	30
iv) In situations such as ...	0/30	0



Majority of the users changed their volume control setting to a higher number when the battery was weak and to a lower number when the battery was new. This is indicative that subjects have been counselled adequately regarding this aspect.

14. For how many days/weeks/months do the following components of the hearing aid last in your experience?

Component	Answer (range)
a) Cell	5 days - 15 days
b) Tubing	3 months - 3 years
c) Switch	6 months - 4 years

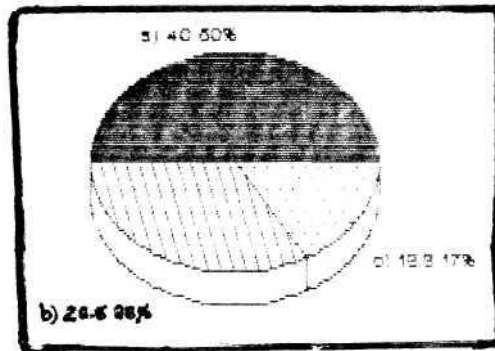
15. How often have you sent the hearing aid for repair?

Results of the study indicate that 46.6 percent of the subjects sent the hearing aid for repair once a year.



16. Which of the following parts of the hearing aid have been replaced?

Part	Number	Percentage
a) Tubing	12/30	40
b) Switch	8/30	26.6
c) Body of the aid	4/30	13.3



Results indicate that 40 percent of the subjects changed the tubing of their hearing aid. This also means that it is a part which requires frequent replacement. A small percentage of subjects had replaced the switch and body case of the hearing aid.

17. Should the hearing aid be removed in the following situations?

Options	Number	Percentage
a) Washing your face		
i) Yes	30/30	100
ii) No	0/30	0

b) When it is raining		
i) Yes	30/30	100
ii) No	0/30	0
c) When you are conversing with someone		
1) Yes	0/30	.00
ii) No	30/30	100
d) While you are asleep		
i) Yes	30/30	100
ii) No	0/30	0

Results indicate that all the subjects were aware when the hearing aid had to be removed or not. This is also indicative that counselling has been adequate regarding this aspect.

18. Do you have difficulties manipulating the controls?

Option	Number	Percentage
a) Yes	0/30	0
b) No	30/30	100

All the subjects reported that they had no difficulty in manipulating the controls of the hearing aid. From this we can infer that difficulty in manipulation of the hearing aid cannot be considered a factor that causes dissatisfaction with the fitted hearing aid.

19. The amount it cost you to buy spares.

- a) Battery -> Rs.15/- to Rs.30/-
- b) Tubing -> Rs.2/- to Rs.5/-
- c) battery charger -> Rs.150/- to Re.300/-
- d) Switch -> Rs.200/-

20. Expenses towards the hearing aid per month.

Majority of the users reported that on an average they spent Rs.50/- on expenses towards the hearing per month.

### **QUESTIONNAIRE III**

A three point rating scale was used for all the questions. Every question was scored and the answers were given scores of 2, 1 or 0 wherever appropriate. eg. Can you hear a dog barking from a distance of 8 feet? An answer 'Most often' will receive a score of 2 whereas an answer 'sometimes' will receive a score of 1 and an answer 'never' a score of 0.

Another question Do you have difficulty understanding what is being said inspite of hearing it? Here the answer 'most often' will receive a score of 0, 'sometimes' a score of 1 and 'never' a score of 2.

The maximum score that can be obtained by a subject is 42. All the subjects were given scores based on the answers provided. The maximum score obtained by a subject in the present study was 40 and the minimum score was 22. The score provides us with an indication of the benefit derived from hearing aid usage.

Recent audiometric data was available from 21 subjects and they were included in a test for significance between degree of loss and benefit derived. The 21 subjects were divided into three groups based on degree of loss as mild, severe and profound. ANOVA was applied to study relation between benefit derived and degree of loss. The value obtained was significant at the 0.01 level indicating that degree of loss is a variable that affects benefit derived from the hearing aid.

Two other factors were tested to see if they contributed to the benefit derived. The first was type of hearing loss (sensori-neural or mixed) and the second usage of a hearing aid belonging to a particular company. The second factor was included since 11/30 users used hearing aids from a particular company and 11/30 users used hearing aids from another company. 'T' test was applied at it was seen the values obtained were not significant at the 0.05

level suggesting that type of loss, or company of hearing aid manufacture was not a significant contributing factor to the benefit derived from the hearing aid.

## DISCUSSION

This chapter deals with a discussion of results obtained in the present study.

### **QUESTIONNAIRE I**

The first aspect investigated was whether the hearing aid was used immediately after it was obtained or not. In the present study 6.6 percent of the subjects reported that they began using the hearing aid some time after it was obtained. This may be due to the fact that there was a delay in obtaining the earmold. Manjula (1986) reported that 30 percent of her subjects reported a delay in hearing aid use as they had obtained the earmolds after a while. It is a much higher percentage than that quoted in the present study and may be attributed to the fact that subject's in the present study had increased awareness regarding this particular aspect.

The next aspect studied was adjustment to the hearing aid. The present study reports that 60 percent of the users took one-two weeks to adjust to their hearing aids. This seems to be the optimum time for adjustment. Only two subjects did not adjust to the aid and they were elderly

subjects (82 years, 89 years). Similar percentage of adjustment to the aid were reported by Briskey and Cole (1983) Lazenby (1986), Manjula (1986) and Rosendale (1992).

The next aspect studied was the hours of hearing aid usage per day. The present study reveals that 46.6 percent of the users use the hearing aid for more than 8 hours a day and 20 percent of them use the aid for less than 4 hours a day. Those who UBed the aid for less than 4 hours a day had very limited listening needs. Maya (1987) reported that 33.3 percent of her subjects used the aid for more than 8 hours a day and 36 percent of them used the aid for less than 4 hours a day. However, western studies revealed that 64 to 89 percent of the users used the aid for more than 8 hours a day (Pou et al. 1981; Briskey and Cole, 1983 and Henrlchsen et al. 1988). Percentage of users using the aid for less than 4 hours per day ranged from 3 to 15 percent (Briskey and Cole, 1983; Schow et al. 1993).

In the present study 46.6 percent of the subjects were completely satisfied with their hearing aids and 16.6 percent were not satisfied. This is an improvement over the previous study by Manjula (1986) who reported that none of the users were completely satisfied with their hearing aids,

60 percent found them to be adequate and 26.6 were not satisfied with their aids. This improvement may be attributed to better selection procedures used during hearing aid selection. A higher percentage of satisfaction has been reported in Western literature. A range of 67 to 95 percent has been reported (Northern et al. 1969; Briskey and Cole, 1983; Alberti et al. 1984; Klingler and Millin, 1990; Parving and Boisen, 1990; Davis et al. 1992). The only western study which has quoted a satisfaction rate which is in accordance with our study is a survey study on ITE hearing aids by Henrichsen et al. (1988). Reasons for dissatisfaction were not investigated in the present study but it was noticed that the dissatisfied users had a severe profound degree of loss and had a speech discrimination score of 50 percent or less than 50 percent.

The next focus of the investigation was whether the subjects had kept in touch with professionals after the hearing aid was obtained and whether they had come back for hearing evaluations after obtaining the hearing aid. In the present study 50 percent of the subjects had kept in touch with professionals after the hearing aid had been obtained and an equal number of subjects may not have received adequate counselling regarding hearing aid care, maintenance and benefit that can be derived from it. This is indicative



that the audiologist must emphasize during hearing aid prescription itself that the subject should return for adequate counselling. It was also noted that 53.3 percent of the subjects did not come back for hearing evaluations after procurement of the aid. The importance of hearing evaluations should be stressed upon during counselling.

## **QUESTIONNAIRE II**

The first aspect to be dealt with was hearing aid servicing. In the present study 40 percent of the subjects reported that the hearing aid needs to be serviced periodically. But a high percentage of subjects 43.3 percent of them reported that they did not know whether the aid needs to be serviced frequently or not. This indicates that the subjects lack knowledge regarding this particular aspect and need to be counselled regarding this aspect. j

In the present study 36.6 percent of the subjects reported that they could identify parts not working when the hearing aid is not working. Manjula (1986) reported that 26.6 percent of them could identify parts not working. The present study shows a slight improvement over the previous one. This is indicative that there is an increase in

awareness regarding this aspect but it is inadequate and can be made adequate by counselling the case regarding trouble shooting the hearing aid.

With regard to checking the hearing aid 53.3 percent of the subjects in the present study reported that they did not know how to check the hearing aid. This aspect also should be included during counselling the hearing aid user. The results of the present study with regard to checking and changing the cell are in accordance with that of Manjula (1986). 26.6 percent of the subjects did not know how to check the cell and they had to be counselled regarding how to check the cell.

In the present study only 36.6 percent of the subjects used a battery charger and chargeable batteries. Manjula (1986) reported that 60 percent of the subjects used a battery charger and chargeable batteries with their hearing aid. Many of the subjects in the present study were unaware that they could use chargeable batteries and a battery charger with their hearing aids. During prescription of BTE hearing aids subjects should be made aware that they can use a battery charger and chargeable batteries along with their aids as they are more economical in the long run.

Results of the present study revealed that 56.6 percent of the subjects reported that they did not know how to check the tubing of their hearing aids. A similar percentage of users (60 percent) was reported by Manjula (1986) who reported that they did not know how to check the tubing. This is indicative that counselling was inadequate in the above aspect.

The next aspect studied was cleaning of the earmolds 53.32 percent of the subjects in the present study cleaned their earmolds once in two weeks, 30 percent of them cleaned them once a month and 16.6 percent did not clean them at all. This is a slight improvement compared to the previous study by Manjula (1986) who reported that only 40 percent of her subjects cleaned their earmolds once in two weeks. There is an increase in awareness regarding this aspect but a small percentage of them need to be counselled regarding this aspect. The importance of cleaning the earmold should be stressed during counselling.

All the users in the present study were using the tone and volume control at the recommended setting. This is indicative that counselling regarding this aspect is adequate. Similarly a large number of subjects were aware

of the situations in which the volume control setting should be changed to a lower or higher number.

The next area of focus dealt with repairs and replacements. In the present study 46.6 percent of the subjects sent the hearing aid for repair once a year. This is in accordance with a study conducted by Pou et al. (1981). In the present study 40 percent of the subjects reported that they had replaced the tubing of the hearing aid, 26.6 percent had replaced the switch and 13.3 percent of them had replaced the body case of the hearing aid.

Results of the present study also demonstrated that the subjects were well aware (100 percent of the users), in which situations the hearing aid had to be removed/worn. counselling regarding this aspect is also adequate.

Expenditure towards the maintenance of the hearing aids and purchase of spares obtained in the present study are in accordance with the findings reported by Manjula (1986). Expenditure towards the hearing aid per month was an average of Rs.50/- quoted by most users. The amount it costed to buy spares were as follows - Cost of batteries ranged from Rs.15/- to Rs.30/-. Cost of tubing ranged from Re.2/- to 5/-.Cost of battery charger ranged from Rs.150/- to Rs.300/-. Cost of switch was Rs.300/-.

### QUESTIONNAIRE III

This questionnaire assessed the benefit derived from the hearing aid. It was also studied whether degree of loss, type of loss and hearing aids from a specific company were significant contributors to benefit derived from the hearing aid.

Taking the first aspect degree of loss, results of the present study on ANOVA indicated that degree of loss was a significant contributing factor to the benefit derived from the hearing aid. People with a mild defect scored better than those with a severe or profound defect. This is in disagreement with a study by Kapteyn (1977) who reported that he did not find a relationship between degree of loss and benefit derived from the aid.

The second factor studied was type of loss. In the present study 'T' test was used and it was seen that no significant difference was seen in the values obtained from subjects having a sensori-neural or mixed loss. Had we included subjects having conductive hearing loss then type of loss may have been a contributing factor to the benefit derived.

In the present study 11 out of the 30 subjects used hearing aids manufactured by the same company (A) and 11 used aids manufactured by another company (B). Therefore, benefit derived was compared between users of aids from the two different companies A and B. Results on 'T' test indicated that whether the hearing aid was from company 'A' or 'B' the benefit derived was the same and hence it was not a contributing factor to benefit derived.

To conclude it is seen that results obtained in the present study indicate a slight improvement over the previous Indian studies but further improvement is required to meet results quoted in western literature. This improvement can be brought about by adequate counselling. Furthermore, the percentage of improvement is restricted by the limitation of the Indian set up in terms of literacy level, financial constraints and language problems. From Questionnaire III we can conclude that benefit derived from the aid is dependant on the degree of loss. Therefore a person with a milder loss will obtain more benefit compared to some one else with a greater severity of hearing loss.

## SUMMARY, CONCLUSION AND RECOMENDATIONS

The aim of present study was to evaluate users knowledge about the care and maintenance of behind the ear hearing aids and to evaluate the effect of degree and type of hearing loss on benefit derived from the hearing aid.

Three questionnaires were employed in the study and data was collected by a direct interview.

Thirty hearing-impaired subjects who were using BTE hearing aids were included in the present study. The subjects were in the age range of 18 years to 80 years with a mean age of 52.8 years and median age 56.5 years. The first two tests of variance significance were used in the third questionnaire.

On the basis of the responses the following conclusions were drawn:

**1. Hearing aid care and maintenance:** Results are indicative that one half of the subjects had adequate knowledge regarding care and maintenance of the hearing aid. This also indicates that one half of the subjects did not have also adequate knowledge regarding care and maintenance of their hearing aids.

2. Satisfaction with fitted hearing aide: Around 46 percent of the subjects were satisfied with their hearing aids. This may be due to the better selection procedures adopted during hearing aid selection. It was also seen that 36 percent of them found the aid to be adequate. A small percentage of them were not satisfied with their aids. This may be due to the fact that they had a severe - profound hearing defect and 50 percent speech discrimination scores.

(i) Benefit derived: It was noticed that persons with a milder defect derived more benefit from the aid than a person with a severe - profound defect. Benefit derived from the aid was not dependant on the type of loss or company of hearing aid manufacture.

(ii) It was also noticed that the optimum time for hearing aid adjustment was 1-2 weeks and the optimum amount of hearing aid usage was 8 hours per day.

#### RECOMMENDATIONS

Based on the results and conclusion the following recommendations are made:

1. The hearing aid user should be counselled regarding all aspects of hearing aid care and maintenance, and trouble shooting the hearing aid.



2. The importance of regular follow ups and periodic hearing evaluation should be stressed during counselling.
3. Follow up camps should be conducted regularly for the benefit of hearing aid users.
4. Users should be made aware of the availability of battery charger and rechargeable cells that can be used with their hearing aids.
5. Limitations of the type of hearing aid being used should be explained adequately to the subject so that he does not expect too much from the aid.
6. Self assessment questionnaires should be developed and administered to subjects to obtain information about the listening ability of patients before hearing aid selection.
7. Further survey studies should be conducted on the Indian population to rate the success of our aural rehabilitation programs.

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APPENDIX A

QUESTIONNAIRE - I (GENERAL INFORMATION)

Date: Serial No.  
Case Name: Reg.No.  
Age: Occupation: Language:

1. Information about the hearing aid:
  - a) Name of the hearing aid
  - b) Type
  - c) Model No.
  - d) Serial No.
  - e) Indian or imported
  - f) Monaural or Binaural
2. When was the hearing aid obtained?
3. Where did you purchase the hearing aid from? At what cost did you purchase it?
4. Since when the hearing aid being used?
  - a) From date of obtaining the hearing aid
  - b) Sometime after obtaining the hearing aid
  - c) Don't remember
  - d) Others
5. How long did it take to adjust to your hearing aid?
  - a) 1-2 weeks (b) 1-2 months (c) more than 2 months
  - (iv) others

6. How many hours do you use the hearing aid in a day?
  - (a) Less than 4 hours
  - (b) 4-8 hours
  - (c) 8-12 hours
  - (d) More than 12 hours
7. To what extent are you satisfied with your hearing aid?
  - a) Completely satisfied
  - b) Find it adequate
  - c) Not satisfied
8. Have you kept in touch with professionals after the hearing aid has been recommended/procured?
  - a) Yes
  - b) No
9. How often do you get your hearing evaluated?
  - a) Once in 3 months
  - b) Once in 6 months
  - c) Once in a year
  - d) Not got it evaluated

APPENDIX B

QUESTIONNAIRE II - CARE AND MAINTENANCE INVENTORY

1. Do you think that the hearing aid needs to be serviced frequently?
  - a) Yes. If yes how often
    - i) Once in 3 months
    - ii) Once in 6 months
    - iii) Once in a year
  - b) No
  - c) Don't know
2. When the hearing aid is not working? Can you identify the parts not working?
  - a) Yes (which parts)
  - (b) No
3. How often do you check your hearing aid?
  - a) Once a day
  - b) Once in few days
  - c) Once in few weeks
  - d) Once a month
  - e) Don't know how to check.
4. How do you check the cell?
  - a) By listening to the aid
  - b) By using a voltmeter
5. How often do you check the cell?
  - a) Once in few days
  - b) Once in few weeks



- c) Once in a month
  - d) Don't check
  - e) Others.
6. When do you change the cell?
- a) When there is no sound at all from the hearing aid
  - b) When sound coming from the hearing aid is weak
  - c) When sound from the hearing aid is not clear
  - d) Not changed so far.
7. Do you use chargeable batteries/battery charger with your hearing aid?
- a) Yes
  - b) No.
8. Do you check the tubing of your hearing aid?
- a) Yes
  - b) No
9. How often do you check the tubing?
- a) Once in few days
  - b) Once in few weeks
  - c) Don't remember
  - d) Not at all
  - e) Others
10. Do you use an earmold or ear tip with your hearing aid?
11. How often do you clean your earmold or ear tip?
- a) Once a week

b) Once in 15 days

c) Once a month

d) Don't clean.

12. At which setting of tone and volume control is the aid being used? What was recommended?

13. When do you change the volume control settings?

a) To a higher number

i) When battery is weak

ii) When battery is new

iii) In a noisy place

iv) In situations such as

v) Not at all

b) To a lower number

i) When battery is weak

ii) When battery is new

iii) In a noisy place

iv) In situations such as .

14. For how many days/weeks/months do the following components of the hearing aid have lasted in your experience?

a) Cell (b) Tubing (c) Switch

15. How often have you sent the hearing aid for repair?

16. Which of the following parts of your hearing aid have been replaced and how often?

- a) Tubing
- b) Switch
- c) Others.

17. Should the hearing aid be removed in the following situations?

- |                                        |        |
|----------------------------------------|--------|
| a) Washing your face                   | Yes/No |
| b) When it is raining                  | Yes/No |
| c) When you are convrsing with someone | Yes/No |
| d) While you are asleep                | Yes/No |

18. Do you have difficulty manipulating the controls?

19. The amount it costs you to buy spares?

- a) Battery
- b) Tubing
- c) Battery charger
- d) Switch

20. Expenses towards the hearing aid per month

APPENDIX C

**QUESTIONNAIRE III : HEARING AID BENEFIT SCALE**

- A. NON-HEARING (While you are wearing the hearing aid)
1. Can you hear a dog barking from a distance of 8.
    - a) Most often (b) Sometimes (c) Never
  2. Can you hear when someone rings the door bell?
    - a) At 8 ft (i) Most often (ii) Sometimes (iii) Never
    - b) At 15 ft. (i) Most often (ii) Sometimes (iii) Never
  3. Can you hear the telephone ring?
    - i) From 5 ft. a) Most often (b) Sometimes (c) Never
    - ii) From 8 ft. a) Most often (b) Sometimes (c) Never
  4. Can you hear a vehicle horn?
    - i) At 8 ft. a) Most often (b) Sometimes (c) Never
    - ii) At 15 ft. a) Most often (b) Sometimes (c) Never
    - iii) At 25 ft. a) Most often (b) Sometimes (c) Never
- B. SPEECH HEARING (While you are wearing the hearing aid)
1. Do you have difficulty understanding what is being said inspite of hearing it?
    - a) Most often (b) Sometimes (c) Never
  2. Do you face any tolerance problem in day to day situation?
    - a) Most often (b) Sometimes (c) Never

3. How often do you ask people to talk slowly/repeat when you cannot understand what is being said?
  - a) Most often (b) Sometimes (c) Never
4. Can you identify familiar voices?
  - a) Most often (b) Sometimes (c) Never
5. Do you increase the volume control setting of your TV from that set for others at home?
  - a) Most often (b) Sometimes (c) Never
6. Do you have difficulty in understanding speech from a distance of 3 ft. at home?
  - (i) With visual clues
    - a) Most often (b) Sometimes (c) Never
  - (ii) Without visual clues
    - a) Most often (b) Sometimes (c) Never
7. Do you have difficulty in group conversation?
  - (i) With visual clues
    - a) Most often (b) Sometimes (c) Never
  - (ii) Without visual clues
    - a) Most often (b) Sometimes (c) Never
8. Do you have difficulty understanding speech of an unfamiliar person?
  - a) Most often (b) Sometimes (c) Never

9. Do you have difficulty in understanding familiar person's speech?
- a) Most often (b) Sometimes (c) Never
10. Can you understand what is being said in TV programs?
- a) Most often (b) Sometimes (c) Never
11. Can you understand what is being said in Radio programs?
- a) Most often (b) Sometimes (c) Never
12. How do you understand in a meeting with a speaker?
- Ex. In a lecture hall, theater or church?
- a) Most often (b) Sometimes (c) Never