

## **Knowledge and Skill Assessment on Use, Care, and Maintenance of BTE Hearing Aid Users**

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### **Abstract**

This study aims to evaluate the users of BTE hearing aids knowledge and maintenance and care skills. In order to make an unbiased assess hearing aid user's capacity to operate his or her hearing aids, a developed questionnaire was distributed to 40 hearing aid users. The findings indicate that hearing aid users had a good awareness of the range from using, caring for, and maintaining their hearing aids. 67% of interviewees had awareness about the aforementioned inquiry.

### **Introduction**

Hearing loss is a varying combination line in the auditory, vestibulocochlear nerve, outer, middle, or inner ear. It can be bilateral, unilateral, symmetrical. It can be present at birth or acquired. Based on the cause, type, degree, and configurations of hearing loss vary accordingly either it be a Conductive, sensorineural, or mixed hearing loss.

In 2018 worldwide, Prevalence rate of 7.6%, aged 15 and above have debilitating hearing loss greater than 40 dB was identified. By 2050, it is anticipated that one in four persons would have some degree of hearing loss (WHO, 2021).

Hearing aid picks up the sounds from environment through microphone and digital code is generated by a computer chip. Based on the loss and hearing requirements, the sounds are analyzed. Then the receiver transforms the amplified signals into sound waves which is transmitted into ears.

**BTE (Behind the Ear)** is a one type of hearing aid, hooks on top of the ear and rests behind the ear. A tube connects the hearing aid to a custom earpiece called an ear mold that fits in your ear canal. BTE is appropriate for people of all ages and those with almost any type of hearing loss. The main advantage of BTE hearing aid is, it has directional microphones which is capable of more amplification than other style.

Hearing aid usage, care and maintenance varies. Hearing aids should be handled carefully, should not drop down should be kept away from heat and moisture, dead batteries should be replaced immediately, should be cleaned as instructed. It is safe not use hairspray or other hair care products while wearing hearing aids, Turn off hearing aids when they are not in use.

Poor handling of any device will make it perform badly and will give it a shorter lifespan. Users must follow the instructions for maintenance for any gadget to ensure proper operation and greater performance with longer working life, just like other equipment. Anyone who wears hearing aids should be aware of how to take care of and maintain them. **Hence the goal of this study is to assess BTE users' knowledge of BTE care and maintenance.**

### **Review and Literature**

May and Battaglia (1989) (Published in 2009) examined the advantages and disadvantages of ITC (In The Canal), ITE (In The Ear) and BTE (Behind The Ear) hearing aids: Diary and interview reports from elderly users, and Findings indicated that for elderly clients there were no large practical advantages for one aid type over another. While ITC and ITE aids were rated more highly than BTE's in background noise, all three aid types were rated as relatively poor in background noise as well as in groups, in the wind, when using the telephone and in the localisation of sound. All three aid types were rated equally and well for performance in one-to-one conversation in quiet, and for listening to television and radio. Hours of use and reasons for non-use are presented, as are clients' reports on cosmetic issues, manipulative ease, and overall satisfaction level with their aids.

Meyer, Khan and Hickson (2016) investigated Evaluation of a Modified User Guide for Hearing Aid Management and Findings indicate that the need to design hearing aid user guides in line with best practice principles of health literacy as a means of facilitating improved hearing aid management in older adults.

Desjardins and Doherty (2009) assessed "Do Experienced Hearing Aid Users Know How to Use Their Hearing Aids Correctly" and Results from this study suggest that experienced hearing aid users range from having an excellent understanding of how to use their hearing aids to a poor understanding. The variability in performance among experienced hearing aid users highlights the importance of directly assessing a client's ability to use his or her hearing aids.

Sorri and Luotonen (British Journal of Audiology, 1984 published online: 2009) interviewed Use and non-use of hearing aids and A hundred and fifty hearing-handicapped were interviewed at home two years after their hearing aids had been fitted and the results of this study the policy of our hearing-aid fitting has been revised.

Walden, Cord, Olson and Surr (2000) analyzed 40 hearing-impaired adults with the GN ReSound digital BZ5 hearing instrument was compared with performance with linear hearing aids with input compression limiting (AGC-I) or two-channel analog wide dynamic range compression (WDRC) instruments and results was performance advantages for the dual microphones over the omnidirectional microphone were observed in the CST results in noise, but participants generally did not perceive these large advantages in everyday listening. The noise reduction circuit provided improved listening comfort but little change in speech understanding.

Verma, Sanju and Awasthi (2017) compared Study on Hearing Aid Benefits of Digital Hearing Aid Use (BTE) from Six Months to Two Years and results that measuring the hearing aid benefit with the self-assessment questionnaires will assist the clinicians in making judgments about the areas in which a patient is experiencing more difficulty in everyday listening environment and in revising the possible technologies.

Manchaiah, Danemark, Jones, and Goodwin (2015) explained the influence of culture on hearing help-seeking and hearing-aid uptake and highlights the importance of psychological models and cross-cultural research in the area of hearing help-seeking and hearing-aid uptake, and consequently some directions for future research are proposed.

Manchaiah and Taylor (2017) investigated the applications of direct-to-consumer hearing devices for adults with hearing loss. This review discusses three categories of direct-to-consumer hearing devices: 1) personal sound amplification products (PSAPs), 2) direct-mail hearing aids, and 3) over-the-counter (OTC) hearing aids and research of direct-to-consumer hearing devices is limited, and current published studies are of weak quality. Much effort is needed to understand the benefits and limitations of such devices on people with hearing loss.

Priyanka, Aravinda, and Chetan (2020) measured Hearing Aid Outcomes of Government Funded Hearing Aids in India and conclude, ADIP scheme hearing aids do satisfy the users in most of the features such as speech understanding, speaking over phone and enhanced hearing.

Adarsh, Kumar, Krishna, and Sanju (2016) studied the Efficacy of Hearing Aid Orientation on New Digital and Analog Hearing Aid Users and conclusion were Present study indicates that the digital hearing aid users were better oriented towards the program, showing greater percentage of people following the prescribed procedure for hearing aid maintenance and proper utilization compared to analog users.

## **Methodology**

### **Aim**

The study aims to assess the Knowledge and Skills on use, care and maintenance of BTE Hearing aid among the users, comparing the developed questionnaire regarding the year of experience, use, care and maintenance of BTE hearing aids.

### Phase- 1 Preparation of the Questionnaire

Questionnaire was developed with a set of 16 questions. Questionnaire was validated by 5 Audiologist who are currently in practice. All the 16 questions based on the Awareness on use, care, and maintenance of BTE hearing aid. The collected response was scored in 2-point rating scale, where 0 for NO and 1 for YES. The scored response was further statistically analyzed.

### Phase- 2 Participants

40 BTE users, using the hearing aid for more than 1 year participated the present study. People/Individuals using hearing aids like CIC (Completely in the Canal), RIC (Receiver in the Canal), ITE (In the Ear) were excluded from the study.

### Stimulus Used

The developed and validated questionnaire and sampling was used.

### Procedure

The questionnaire was circulated among the target population. The participants were instructed to read and understand the questions properly and mark for the response.

### Statistical Analysis

The collected data (awareness and years of BTE use) were summarized by using the Descriptive Statistics: frequency and percentage. To find the association between awareness and years of BTE use, the Likelihood ratio test was used. The p value < 0.05 was considered as significant.

Data were analyzed by using the SPSS software (SPSS Inc.; Chicago, IL) version 26.0.

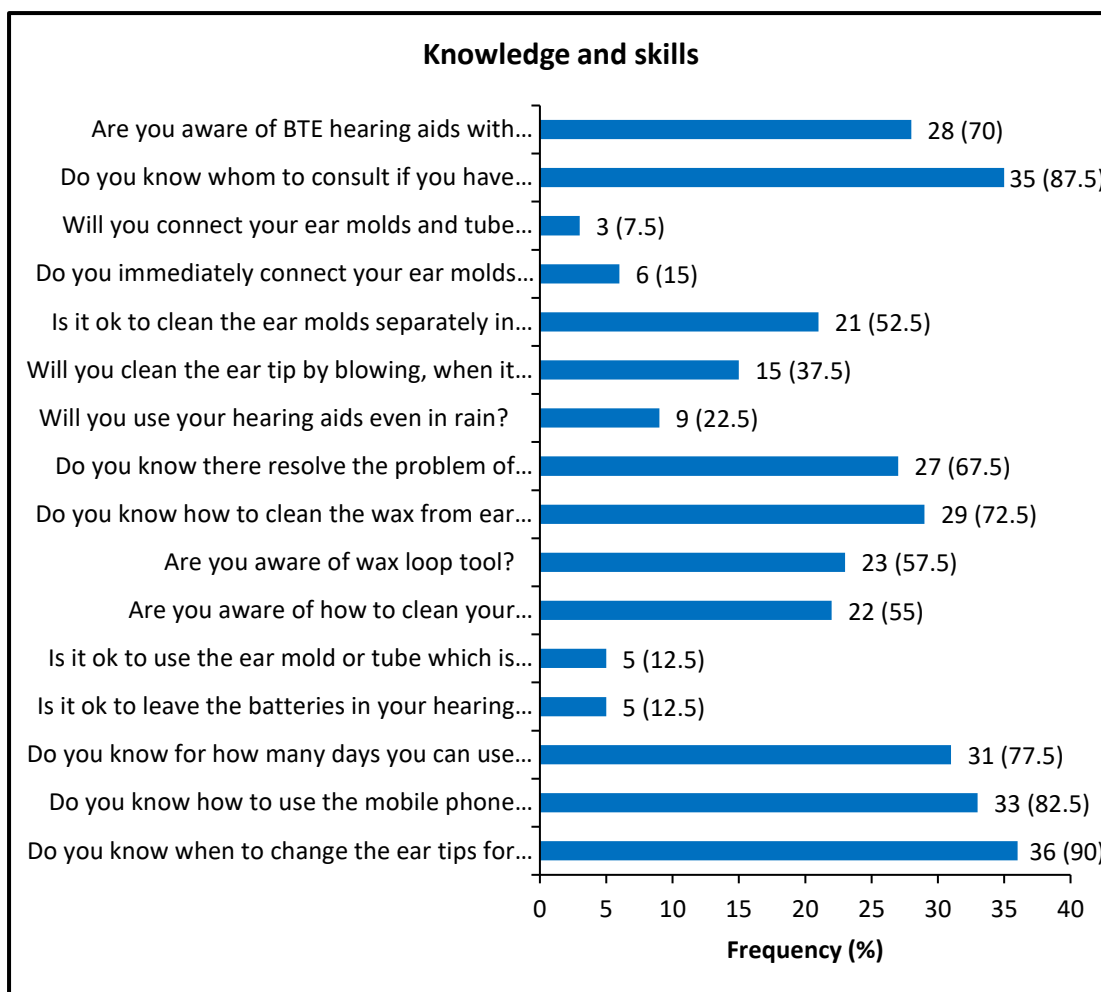
### Results and Discussion

|  | Yes       |      | No        |      |
|--|-----------|------|-----------|------|
|  | Frequency | %    | Frequency | %    |
| Do you know when to change the ear tips for your hearing aid?                  | 36        | 90   | 4         | 10   |
| Do you know how to use the mobile phone while using the BTE hearing aid?       | 33        | 82.5 | 7         | 17.5 |
| Do you know for how many days you can use the battery in your BTE hearing aid? | 31        | 77.5 | 9         | 22.5 |

|   |    |      |    |      |
|---|----|------|----|------|
| Is it ok to leave the batteries in your hearing aid when not in use?                        | 5  | 12.5 | 35 | 87.5 |
| Is it ok to use the ear mold or tube which is cracked?                                      | 5  | 12.5 | 35 | 87.5 |
| Are you aware of how to clean your microphone from debris?                                  | 22 | 55   | 18 | 45   |
| Are you aware of wax loop tool?   | 23 | 57.5 | 17 | 42.5 |
| Do you know how to clean the wax from ear mold with the wax loop tool?                      | 29 | 72.5 | 11 | 27.5 |
| Do you know there resolve the problem of feedback (Squealing) from your hearing aid?        | 27 | 67.5 | 13 | 32.5 |
| Will you use your hearing aids even in rain?  | 9  | 22.5 | 31 | 77.5 |
| Will you clean the ear tip by blowing, when it is still attached to the hearing aid?        | 15 | 37.5 | 25 | 62.5 |
| Is it ok to clean the ear molds separately in warm and mild soapy water?                    | 21 | 52.5 | 19 | 47.5 |
| Do you immediately connect your ear molds and tube with the hearing aid before it gets dry? | 6  | 15   | 34 | 85   |
| Will you connect your ear molds and tube when it is still wet?                              | 3  | 7.5  | 37 | 92.5 |
| Do you know whom to consult if you have problem with your Hearing Aid?                      | 35 | 87.5 | 5  | 12.5 |
| Are you aware of BTE hearing aids with automatic telephone setting?                         | 28 | 70   | 12 | 30   |

**Table 1: Shows the Frequency and Percentage for Questions**

**Figure 1: Shows the Awareness on Knowledge and Skill of Hearing Aid Usage**



From Table 1 and Fig 1, 90% of people are aware of when to change the ear tips in their hearing aids. 82.5% of people know how to use a mobile phone while using a BTE hearing aid.

77.5% of individuals are aware of how many days a hearing aid battery can last.

87.5% of consumers are unaware that they should remove the batteries from their hearing aids while not in use.

87.5% of people are unaware that they should use an ear mould or tube if they crack.

55% of persons know how to clear a microphone of dirt and debris.

57.5% of People are aware of the wax loop.

72.5% of people know how to clean the wax from ear mould with the wax loop tool.

67.5% of people are aware of the solution to the feedback (squealing) issue when using hearing aids.

When it rains, 77.5% of people do not wear hearing aids.

When the ear tip is still attached to the hearing aid, 62.5% of people fail to blow-clean it.

52.5% of the populace It is acceptable to wash the ear moulds in mild soap and water.

85% of people are not aware that the hearing aid should be connected immediately to the ear moulds and tube before they dry out.

The fact that can connect the ear moulds and tube while they are still wet is unknown to 92.5% of individuals.

87.5% of consumers are aware of who to contact if they have a hearing aid issue.

70% of people are aware of BTE hearing aids with automatic telephone settings.

**Table 2: Shows comparative ratio score and P value across the year of usage.**

|  |     | How long using BTE (Years) |      |        |      |         |      |      |      | Likelihood ratio | p value |
|--|-----|----------------------------|------|--------|------|---------|------|------|------|------------------|---------|
|  |     | 0 to 3                     |      | 4 to 6 |      | 7 to 10 |      | > 11 |      |                  |         |
|  |     | n                          | %    | n      | %    | n       | %    | n    | %    |                  |         |
| Do you know when to change the ear tips for your hearing aid?            | Yes | 10                         | 76.9 | 7      | 100  | 13      | 92.9 | 6    | 100  | 4.756            | 0.191   |
|  | No  | 3                          | 23.1 | 0      | 0    | 1       | 7.1  | 0    | 0    |                  |         |
| Do you know how to use the mobile phone while using the BTE hearing aid? | Yes | 9                          | 69.2 | 7      | 100  | 11      | 78.6 | 6    | 100  | 6.502            | 0.090   |
|  | No  | 4                          | 30.8 | 0      | 0    | 3       | 21.4 | 0    | 0    |                  |         |
| Do you know for how many days you can use the battery in your BTE        | Yes | 9                          | 69.2 | 5      | 71.4 | 12      | 85.7 | 5    | 83.3 | 1.339            | 0.720   |
|  | No  | 4                          | 30.8 | 2      | 28.6 | 2       | 14.3 | 1    | 16.7 |                  |         |

|  |     |    |      |   |      |    |      |   |      |       |        |
|--|-----|----|------|---|------|----|------|---|------|-------|--------|
| hearing aid?   |     |    |      |   |      |    |      |   |      |       |        |
| Is it ok to leave the batteries in your hearing aid when not in use?                 | Yes | 0  | 0    | 0 | 0    | 3  | 21.4 | 2 | 33.3 | 7.955 | 0.047* |
|  | No  | 13 | 100  | 7 | 100  | 11 | 78.6 | 4 | 66.7 |       |        |
| Is it ok to use the ear mold or tube which is cracked?                               | Yes | 0  | 0    | 0 | 0    | 3  | 21.4 | 2 | 33.3 | 7.955 | 0.047* |
|  | No  | 13 | 100  | 7 | 100  | 11 | 78.6 | 4 | 66.7 |       |        |
| Are you aware of how to clean your microphone from debris?                           | Yes | 8  | 61.5 | 2 | 28.6 | 8  | 57.1 | 4 | 66.7 | 2.592 | 0.459  |
|  | No  | 5  | 38.5 | 5 | 71.4 | 6  | 42.9 | 2 | 33.3 |       |        |
| Are you aware of wax loop tool?  | Yes | 9  | 69.2 | 4 | 57.1 | 6  | 42.9 | 4 | 66.7 | 2.180 | 0.536  |
|  | No  | 4  | 30.8 | 3 | 42.9 | 8  | 57.1 | 2 | 33.3 |       |        |
| Do you know how to clean the wax from ear mold with the wax loop tool?               | Yes | 9  | 69.2 | 4 | 57.1 | 12 | 85.7 | 4 | 66.7 | 2.323 | 0.508  |
|  | No  | 4  | 30.8 | 3 | 42.9 | 2  | 14.3 | 2 | 33.3 |       |        |
| Do you know there resolve the problem of feedback (whistling) from your hearing aid? | Yes | 9  | 69.2 | 5 | 71.4 | 10 | 71.4 | 3 | 50.0 | 0.953 | 0.813  |
|  | No  | 4  | 30.8 | 2 | 28.6 | 4  | 28.6 | 3 | 50.0 |       |        |
| Will you use your hearing aids even in rain?   | Yes | 1  | 7.7  | 2 | 28.6 | 4  | 28.6 | 2 | 33.3 | 2.837 | 0.417  |
|  | No  | 12 | 92.3 | 5 | 71.4 | 10 | 71.4 | 4 | 66.7 |       |        |
| Will you clean the ear tip by blowing, when it is still attached to the hearing aid? | Yes | 3  | 23.1 | 2 | 28.6 | 6  | 42.9 | 4 | 66.7 | 3.744 | 0.290  |
|  | No  | 10 | 76.9 | 5 | 71.4 | 8  | 57.1 | 2 | 33.3 |       |        |
| Is it ok to clean  | Yes | 7  | 53.8 | 5 | 71.4 | 5  | 35.7 | 4 | 66.7 | 3.144 | 0.370  |



|   |     |    |      |   |      |    |      |   |      |       |        |
|---|-----|----|------|---|------|----|------|---|------|-------|--------|
| the ear molds separately in warm and mild soapy water?                                      | No  | 6  | 46.2 | 2 | 28.6 | 9  | 64.3 | 2 | 33.3 |       |        |
| Do you immediately connect your ear molds and tube with the hearing aid before it gets dry? | Yes | 0  | 0    | 2 | 28.6 | 3  | 21.4 | 1 | 16.7 | 5.486 | 0.139  |
|   | No  | 13 | 100  | 5 | 71.4 | 11 | 78.6 | 5 | 83.3 |       |        |
| Will you connect your ear molds and tube when it is still wet?                              | Yes | 0  | 0    | 2 | 28.6 | 1  | 7.1  | 0 | 0    | 5.730 | 0.126  |
|   | No  | 13 | 100  | 5 | 71.4 | 13 | 92.9 | 6 | 100  |       |        |
| Do you know whom to consult if you have problem with your Hearing Aid?                      | Yes | 13 | 100  | 4 | 57.1 | 13 | 92.9 | 5 | 83.3 | 7.969 | 0.047* |
|   | No  | 0  | 0    | 3 | 42.9 | 1  | 7.1  | 1 | 16.7 |       |        |
| Are you aware of BTE hearing aids with automatic telephone setting?                         | Yes | 10 | 76.9 | 2 | 28.6 | 12 | 85.7 | 4 | 66.7 | 7.327 | 0.062  |
|   | No  | 3  | 23.1 | 5 | 71.4 | 2  | 14.3 | 2 | 33.3 |       |        |

(\* Significant)

Table 2 shows comparison the year of hearing aid usage with the knowledge, Likelihood ratio scale was used. Significant difference was seen for questions like Is it OK to leave the batteries in your hearing aid when not in use, Is it OK to use the ear mold or tube which is cracked? And do you know whom to consult if you have problem with your Hearing Aid and other questionnaire no significant scores.

## Discussion

This study aims to investigate the Knowledge and Skills on use, care, and maintenance of BTE Hearing aid among the users. A questionnaire was developed on basis of objectives of the study. All the users were experienced from 1 to more than 11 years with BTE hearing aid.

32.5% of participants were used 1- 3 years of BTE hearing aid.

17.5% of participants used BTE for 4 to 6 years.

35% of participants were using BTE for 7 to 10 years.

15% of participants were using BTE for more than 11 years.

The results revealed that the users were aware of use, care, and maintenance of BTE hearing aids. The study concluded that experienced BTE hearing aid users range from having an excellent understanding of how to use, care and maintain their hearing aids. On the above investigation 67% of participants were knowledgeable.

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### References

Adarsh, H. K. S., Kumar, N., Krishna, R., & Sanju, H. K. (2015). Efficacy of Hearing Aid Orientation on New Digital and Analog Hearing Aid Users. *Indian Journal of Anatomy and Surgery of Head, Neck and Brain*, 19-25.

Aravinda, H. R., Chetan, K., & Priyanka, N. Measuring Hearing Aid Outcomes of Government Funded Hearing Aids in India.

Caposecco, A., Hickson, L., Meyer, C., & Khan, A. (2016). Evaluation of a modified user guide for hearing aid management. *Ear and Hearing*, 37(1), 27-37.

Mayo Clinic. Hearing aids: How to choose the right one, 1998.

Desjardins, J. L., & Doherty, K. A. (2009). Do experienced hearing aid users know how to use their hearing aids correctly.

Manchaiah, V., Taylor, B., Dockens, A. L., Tran, N. R., Lane, K., Castle, M., & Grover, V. (2017). Applications of direct-to-consumer hearing devices for adults with hearing loss: a review. *Clinical interventions in aging*, 12, 859.

May, A. E., Upfold, L. J., & Battaglia, J. A. (1990). The advantages and disadvantages of ITC, ITE and BTE hearing aids: diary and interview reports from elderly users. *British journal of audiology*, 24(5), 301-309.

National Institute on Deafness and Other Communication disorders (NIDCD) - September 2013.

Jennifer Robinson, MD on November 04, 2021. Tips for Taking Care of Hearing Aids-WebMD.

Sorri, M., Luotonen, M., & Laitakari, K. (1984). Use and non-use of hearing aids. *British Journal of Audiology*, 18(3), 169-172.

Verma, L., Sanju, H. K., Scaria, B., Awasthi, M., Ravichandran, A., Kaki, A., & Prakash, S. G. R. (2017). A comparative study on hearing aid benefits of digital hearing aid use (BTE) from six months to two years. *International archives of otorhinolaryngology*, 21(03), 224-231.

Walden, B. E., Surr, R. K., Cord, M. T., Edwards, B., & Olson, L. (2000). Comparison of benefits provided by different hearing aid technologies. *Journal of the American Academy of Audiology*, 11(10), 540-560.

Zhao, F., Manchaiah, V., St. Claire, L., Danermark, B., Jones, L., Brandreth, M., ... & Goodwin, R. (2015). Exploring the influence of culture on hearing help-seeking and hearing-aid uptake. *International journal of audiology*, 54(7), 435-443.

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