Assessment of User Experience, Satisfaction, and Quality Of Life Among Younger Adults Fitted With Bone-Anchored Hearing Aids in Delhi

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ABSTRACT

This current study evaluated user experience, satisfaction, and quality of life among young adults fitted with bone-anchored hearing aids BAHA in Delhi. A total of 12 participants aged 18–30 years completed an 18-item closed-ended questionnaire assessing physical comfort, device handling, auditory performance, and overall satisfaction. Descriptive statistics and the exact binomial test were used for data analysis. Most participants reported positive outcomes related to comfort, ease of handling, communication ability, and overall hearing performance. Some participants experienced difficulty due to background noise and occasional whistling or feedback. All participants reported improvement in Quality of Life (QoL). Following BAHA use. The findings suggest that BAHA may be a beneficial rehabilitative option for young adults with Hearing Impairment HI. The role of the audiologist is crucial in BAHA rehabilitation, as they are responsible for fitting, counseling, device verification, troubleshooting, and ongoing follow-up to ensure optimal hearing outcomes and patient satisfaction.

Keywords: Bone-Anchored Hearing Aid (BAHA), Hearing Impairment, User Satisfaction, Quality of Life, Audiological Rehabilitation, Young Adults, Hearing Outcomes, Audiologist.

INTRODUCTION

Bone-Anchored Hearing Aids BAHA are implantable hearing devices designed to transmit sound through bone conduction by bypassing the outer and middle ear and directly stimulating the cochlea. Unlike conventional hearing aids that amplify sound through the air-conduction pathway, BAHA systems deliver sound vibrations through the skull bone, making them particularly useful in cases where traditional amplification methods are not suitable or effective. These devices have increasingly become an important rehabilitative option for individuals with conductive HL, mixed HL, and selected cases of single-sided deafness. The functioning of BAHA is based on the principle of bone conduction, in which sound vibrations are transferred directly to the inner ear, thereby reducing difficulties caused by disorders affecting the external or middle ear structures (Kompis & Caversaccio, 2011; Popelka, 2016).

The use of BAHA has expanded considerably due to advancements in hearing technology and increasing awareness regarding hearing rehabilitation options. Patients who are unable to obtain sufficient benefit from conventional hearing aids because of chronic ear infections, congenital malformations of the ear, or anatomical limitations may be suitable candidates for BAHA systems. The device can serve as an alternative for individuals who experience discomfort or reduced auditory benefit with conventional amplification. Previous

literature has suggested that BAHA provides improved access to speech signals and environmental sounds while reducing the limitations associated with certain hearing conditions (Kompis & Caversaccio, 2011).

The clinical relevance of BAHA extends beyond the correction of hearing deficits alone. Successful hearing rehabilitation is not limited to improving hearing thresholds but also involves supporting communication ability and enhancing participation in everyday activities. Hearing rehabilitation aims to reduce the functional difficulties experienced by individuals and promote better interaction in educational, occupational, and social environments. In many situations, particularly in urban settings where background noise and communication demands are high, hearing devices are expected to provide adequate speech understanding and listening comfort in real-life conditions (Katz et al., 2015; Taylor & Mueller, 2020).

HI can significantly affect communication, social interaction, and overall (QoL), particularly among young adults. It may occur due to congenital or acquired causes and can interfere with several aspects of daily functioning, including academic performance, occupational responsibilities, and interpersonal relationships. Young adulthood represents an important period characterized by educational demands, employment opportunities, and increased social participation. Difficulties in hearing during this stage may therefore result in challenges that extend beyond reduced auditory sensitivity and may influence emotional well-being and social confidence. Consequently, hearing rehabilitation for young adults should focus not only on restoring hearing ability but also on supporting effective communication and improving everyday functioning (Dillon, 2012; Eggermont, 2017).

Although audiological outcomes remain important indicators of treatment success, the everyday experiences of users also contribute substantially to the overall effectiveness of hearing rehabilitation. Factors such as comfort during prolonged use, ease of handling, maintenance requirements, and listening performance across different environments can influence user acceptance and satisfaction. Devices that provide clinical benefit but are difficult to manage or uncomfortable to use may affect long-term adherence and overall rehabilitation outcomes. Therefore, assessment of user experience provides additional information regarding the practical usefulness of hearing devices in real-world situations (Katz et al., 2015; Taylor & Mueller, 2020).

QoL is another important consideration in hearing rehabilitation because improved hearing can influence multiple dimensions of daily life. Enhanced communication may contribute to increased confidence, improved social interaction, greater independence, and more active participation in routine activities. Previous studies among BAHA users have reported beneficial effects in communication ability, social engagement, listening comfort, and overall satisfaction. Improvements in these areas suggest that the impact of BAHA extends beyond hearing performance and may contribute positively to broader psychosocial outcomes (Arunachalam et al., 2001; Dutt et al., 2002; Badran et al., 2006).

Despite the reported benefits of BAHA, the outcomes associated with hearing rehabilitation may vary depending on individual characteristics, listening environments, and personal experiences with device use. Understanding the experiences of users in real-life conditions is therefore essential for evaluating the overall effectiveness of rehabilitation.

Snik et al. (1998) investigated the use of BAHA among individuals with HI and reported positive outcomes associated with binaural hearing performance. Their findings showed improvement in sound localization and speech perception in both quiet and noisy listening conditions. The study further reported that users preferred BAHA for daily listening activities due to improved communication ability and comfort.

Arunachalam et al. (2001) reported positive outcomes among BAHA users in communication ability and overall satisfaction. Dutt et al. (2002) also found beneficial effects of hearing rehabilitation on communication

and daily listening experience.

Badran et al. (2006) evaluated long-term outcomes and satisfaction among BAHA users. The authors reported high levels of patient satisfaction and demonstrated improvement in hearing performance and communication ability. The study also highlighted that users preferred BAHA because of its practical benefits and ease of use in daily situations.

Hagr (2007) reviewed the use of BAHA in individuals with conductive HI and chronic ear conditions. The study suggested that BAHA serves as an effective alternative when conventional hearing aids cannot be used successfully. The findings also emphasized improved hearing benefit and better QoL following device use.

Wazen et al. (2010) examined the functional outcomes associated with BAHA use and reported that users experienced improved communication and hearing ability in everyday listening environments. The study showed that BAHA users benefited particularly in situations where conventional amplification was less effective. The authors also highlighted improved user acceptance and satisfaction.

Hobson (2010) emphasized the importance of evaluating hearing rehabilitation outcomes beyond audiological measures alone. The study highlighted patient satisfaction and QoL as essential components of successful intervention. It was suggested that subjective experiences play an important role in understanding treatment effectiveness.

Roman (2011) reported that BAHA contributed positively to speech understanding and communication performance in routine listening situations. The study demonstrated that users experienced practical hearing benefits after implantation. Improved listening comfort and social participation were also noted.

Rasmussen et al. (2012) investigated long-term patient experiences with BAHA and reported positive overall satisfaction among users. The study identified several factors contributing to long-term benefit and adaptation. These findings supported the importance of follow-up evaluation in understanding patient outcomes.

Wazen et al. (2013) further examined hearing outcomes among BAHA users and reported improved hearing-related performance. Their findings showed enhancement in communication ability and listening experience across different environments. The study also reported high patient satisfaction levels.

Günduz et al. (2013) evaluated the clinical and audiometric outcomes of BAHA users. The study demonstrated significant improvements in hearing performance and speech understanding following BAHA implantation. The authors also highlighted the importance of assessing patient-reported outcomes, as they provide valuable insight into the real-world benefits and overall satisfaction associated with BAHA use.

Gardell et al. (2015) reported that BAHA users experienced high levels of satisfaction and frequently used their devices in daily life. Improvements in communication ability and social participation were observed among participants. The authors concluded that BAHA provided meaningful functional benefit.

Bosman et al. (2018) compared different generations of BAHA processors and found improvement in hearing performance with newer devices. Better speech understanding and stronger user preference were reported for the updated system. The study highlighted the role of technological advancement in improving hearing outcomes. Swami et al. (2018) reported positive experiences among hearing device users and emphasized patient-reported outcomes as valuable measures of rehabilitation success. Improvements in communication and satisfaction were identified among participants.

Azevedo et al. (2022) evaluated hearing-related QoL and patient satisfaction following use of BAHA. The

study reported improvement in hearing ability and positive patient-reported outcomes. Significant benefit in daily communication activities was observed.

Marszal et al. (2022) investigated the effectiveness of BAHA systems and reported improvements in QoL among users. Participants showed high satisfaction levels regarding hearing performance, aesthetics, and device usability.

Jacob and Gupta (2023) conducted a study in Bangalore, Karnataka, among BAHA users and reported high satisfaction levels and improved communication outcomes. Their findings suggested that BAHA contributed positively to the QoL and daily listening experiences. Nidish et al. (2023) emphasized the importance of multidisciplinary support during the rehabilitation process for improving patient adaptation and confidence.

Uthup and Gupta (2025) evaluated the impact of BAHA among nine young adults with conductive or mixed HI in Maharashtra. The findings demonstrated significant improvements in hearing ability, communication, and QoL following BAHA use. Participants reported high satisfaction, improved social confidence, and regular device usage, while only minor maintenance difficulties were noted. The study concluded that BAHA positively contributed to auditory experiences and daily functioning among users.

Overall, previous literature suggests that BAHA contributes positively to hearing performance, communication ability, user satisfaction, and QoL. However, limited studies have specifically focused on young adults in Delhi, indicating the need for the present study. Audiologists play an important role in the successful use of BAHA by conducting assessments, fitting and programming the device, providing counseling, and offering regular follow-up services. Their support helps improve hearing performance, communication abilities, and overall quality of life among BAHA users.

Need for The Study:

HI can have a significant impact on communication, social participation, academic performance, and emotional well-being, especially among young adults. This effect may be more evident in urban settings such as Delhi, where daily communication demands are high, and interactions are frequent. Although BAHA is widely used for the management of conductive and mixed HI, relatively few studies have examined user experience, satisfaction, and QoL among young adults in India. Young adulthood is an important stage of life, marked by higher educational expectations, employment responsibilities, and greater social involvement. In this period, even mild communication difficulties may affect day-to-day functioning and overall confidence. While previous studies have shown positive outcomes among BAHA users, there is still limited information about how young adults in busy urban environments experience and respond to this device. Therefore, the present study was undertaken to evaluate user experience, satisfaction, and QoL among young adults fitted with BAHA in Delhi.

Therefore, the present study was undertaken to evaluate user experience, satisfaction, and QoL among young adults using BAHA in Delhi. The findings of the study may help clinicians better understand the practical benefits and challenges associated with BAHA use and contribute to improved rehabilitation planning for this population.

Audiologists play an important role in the successful use of BAHA by conducting assessments, fitting and programming the device, providing counseling, and offering regular follow-up services. Their support helps improve hearing performance, communication abilities, and overall quality of life among BAHA users.

METHODOLOGY

AIM OF THE STUDY:

The present study aimed to evaluate user experience, satisfaction, and QoL among young adults using BAHA in Delhi.

1) Preparation Of Questionnaire

The closed-ended questionnaire to assess patients' experience, satisfaction, and QoL with BAHA was developed using a range of supporting literature. A set of 18 questions was selected and validated by 5 SLPs who were fluent in English.

2)PARTICIPANT SELECTION :

The present study is carried out in two phases.

PHASE 1: SELECTION OF PARTICIPANTS

Twelve adults, aged 18-30 years, from Delhi who use BAHA were selected for the study.

PHASE 2: Stimuli and Procedure

The stimuli for this assessment consist of 18 closed-ended questions focusing on the physical comfort, device management, and auditory performance of the BAHA system. The procedure involves adult recipients self-reporting their experiences through binary "Yes/No" responses, typically administered at least six months post-implantation to ensure proper habituation. This quantitative data is then scored and analyzed to evaluate the device's overall impact on the user's QoL and functional hearing ability.

Inclusion Criteria

- Adults aged 18–30 years
- Diagnosed with conductive or mixed HI, or single-sided deafness
- Using BAHA for at least 6 months
- Residents of Delhi
- Willing to provide informed consent

Exclusion Criteria

- Individuals with cognitive or neurological conditions affecting questionnaire responses
- Individuals unwilling to participate
- Participants with incomplete questionnaire responses

STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 30.0 (IBM Corp., Armonk, NY, USA). The collected data were summarized using descriptive statistics, including frequency and percentage. The exact binomial test was used for statistical comparisons, and a *p* value of less than .05 was considered statistically significant.

RESULTS AND DISCUSSION

Table 1: Showing the percentage score of Questions on the evaluation of patients' experience, satisfaction, and QoL with BAHA in Delhi

Research Category / Question	No (Count)	No (Row N %)	Yes (Count)	Yes (Row N %)	Binomial Test (*p*-value)	Significance
Physical Comfort & Integrity						
Comfortable using BAHA continuously?	1	8.30%	11	91.70%	.006	S
No difficulties after surgery/implantation?	1	8.30%	11	91.70%	.006	S
No discomfort/pressure at the implant site?	1	8.30%	11	91.70%	.006	S
Sound Quality & Performance						
Are environmental sounds perceived as natural?	1	8.30%	11	91.70%	.006	S
Satisfaction when listening to music?	3	25.00%	9	75.00%	.146	NS
No high-pitched whistling/wind noise?	8	66.70%	4	33.30%	.388	NS
Performance better than the previous hearing aid?	0	0.00%	12	100.00%	< .001	S
Ease of Handling & Maintenance						
Easy removal/placement of components?	1	8.30%	11	91.70%	.006	S
No challenges in care/maintenance routine?	1	8.30%	11	91.70%	.006	S
No maintenance difficulty while traveling?	1	8.30%	11	91.70%	.006	S
No difficulty replacing batteries?	2	16.70%	10	83.30%	.039	S
Is the BAHA Smart App useful daily?	1	8.30%	11	91.70%	.006	S
Functional Auditory Benefit						
Is communication possible in background noise?	4	33.30%	8	66.70%	.388	NS
Able to localize sounds from	1	8.30%	11	91.70%	.006	S

directions?						
Improved clarity/efficiency at work?	1	8.30%	11	91.70%	.006	S
Is BAHA useful in quiet situations?	0	0.00%	12	100.00%	< .001	S
Global Satisfaction						
QoL improved?	0	0.00%	12	100.00%	< .001	S
Would you recommend BAHA to others?	1	8.30%	11	91.70%	.006	S

Statistical significance was set at $p < .05$

Table 1 and Figure 1: *Percentage distribution of yes and no responses for the questionnaire assessing user experience, satisfaction, and QoL among BAHA users.*

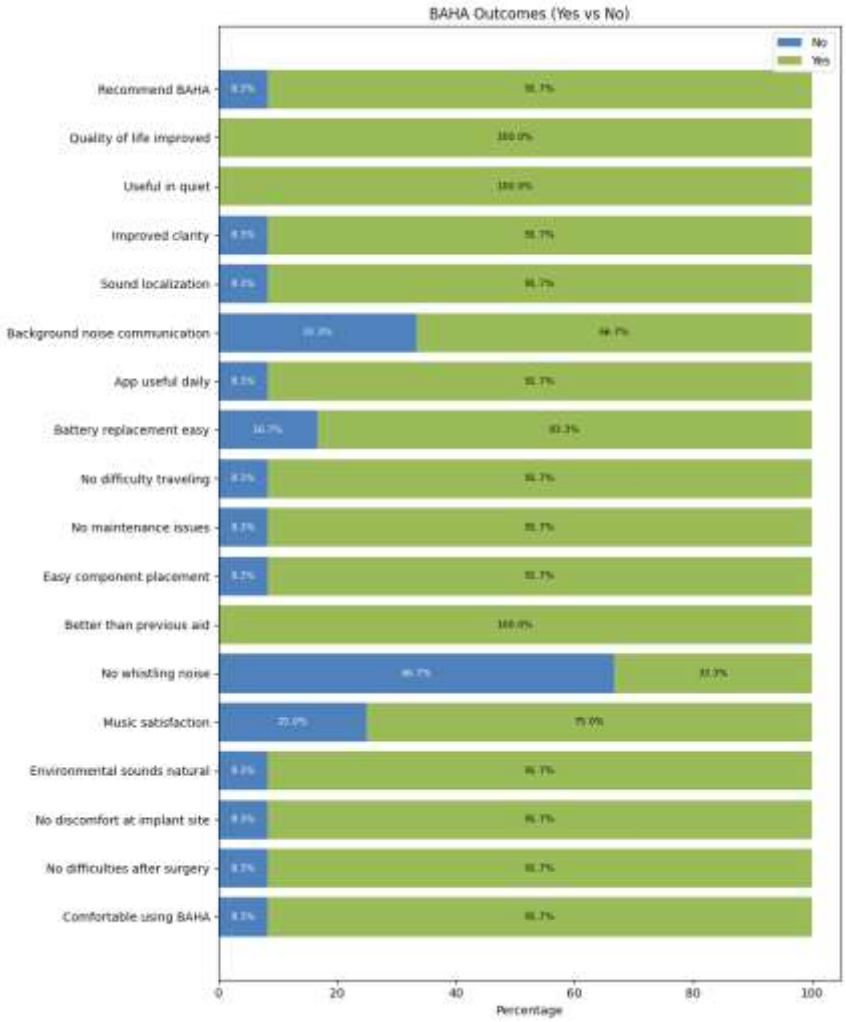

Table 1 and Figure 1 revealed that 100% of the participants are comfortable using the BAHA Q1, and 100% of them did not find difficulty in the frequent removal and placement of the external components (Q6). After fitting the BAHA, 100% of the users can listen and communicate with others in the presence of background noise (Q7). Additionally, 100% of participants reported that the BAHA is useful in quiet situations (Q12), and 100% of them were ready to personally recommend the BAHA to others having unilateral HL or single-sided

deafness (Q15). The data also showed that 100% of BAHA users did not find any difficulty with replacing batteries (Q16). Furthermore, 100% of participants reported that the BAHA Smart App was useful for daily listening skills (Q17), and 100% reported that the BAHA has improved their overall QoL (Q18). Thus, a highly significant difference was noticed in Q1, Q6, Q7, Q12, Q15, Q16, Q17, and Q18.

Results indicated that 88.9% of the BAHA users felt that the device had improved their listening and communication skills at their workplace (Q10). Furthermore, 88.9% of participants felt the BAHA's performance is better than a conventional hearing aid (HA) for patients like them (Q13). Hence, a significant difference was noticed in Q10 and Q13.

After BAHA implantation, 77.8% of the participants reported that they did not have any difficulties following the surgery (Q2). Results showed that 66.7% of them experienced no discomfort or pressure against the skin or skull after placing the BAHA (Q3), while 77.8% felt that the care and maintenance of the BAHA had not affected their daily routine (Q4). Only 44.4% of the users were able to perceive environmental sounds as natural after using the BAHA (Q5). Additionally, 55.6% of participants were satisfied using the BAHA with the experience of listening to live or recorded music, including concerts like jazz or alternative rock (Q8), and 55.6% were able to localize sounds from different directions using the BAHA (Q9). However, 77.8% of users noticed squealing, whistling, or wind noises from the BAHA (Q11). Finally, 66.7% reported there is no difficulty in maintaining the BAHA while traveling (Q14). Therefore, no significant differences were noticed in Q2, Q3, Q4, Q5, Q8, Q9, Q11, and Q14.

Summary and Conclusion

The current study done in Delhi demonstrates that BAHA is an effective hearing solution for young adults in Delhi, with a high level of user satisfaction and improvement in QoL. Most participants reported better communication, ease of use, and improved performance in daily activities compared to their previous hearing aids. Although minor challenges such as background noise and device feedback were reported by some individuals, the overall benefits of the device were substantial. These results support the use of BAHA as a reliable and beneficial intervention for adults with HI.

Limitations

- The present study included a small sample size of only 12 participants, which limits the generalizability of the findings to the wider population of BAHA users.
- The study was restricted to young adults from Delhi; therefore, the results may not represent the experiences of individuals from other age groups or geographical regions.
- The study relied on self-reported responses obtained through a closed-ended questionnaire, which may be influenced by individual perception and response bias.
- The cross-sectional nature of the study limited the assessment of long-term outcomes and changes in satisfaction over time.

Future Recommendations

- Future studies should include a larger sample size and participants from different regions to improve the generalizability of findings.
- Longitudinal studies should be conducted to evaluate long-term satisfaction, adaptation, and quality of life among BAHA users.
- Further research can compare outcomes across different age groups and different types of

hearing impairment.

- The inclusion of standardized quality-of-life measures and objective audiological assessments, alongside self-reported questionnaires, may provide a more comprehensive understanding of the benefits and challenges associated with BAHA use.
- Future studies may also explore the role of audiological rehabilitation, counseling, and follow-up services in improving user satisfaction and overall outcomes with BAHA devices.

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