

Assessment of User Experience, Satisfaction, and Quality of Life among Bone - Anchored Hearing Aid Users in Karnataka

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Abstract: Bone - anchored hearing aids (BAHA) are implantable systems that use bone conduction and sound vibrations to create a more complete and comprehensive listening experience for individuals with a hearing impairment (HI). There are three main indications for Baha: conductive hearing loss (due to chronic otitis media, malformations of the middle or outer ear), single sided deafness (SSD), and mixed hearing loss (Gardell, 2015). The aim of the current study was to assess adult BAHA user's experience, satisfaction and quality of life (QOL) using a closed - ended English questionnaire, in Bangalore district, Karnataka. The results of the current study revealed that adult BAHA users have better listening experience, their satisfaction rate is high and QoL also improved with BAHA.

Keywords: BAHA users in Karnataka, Quality of life (QoL), patient satisfaction, experience, closed ended questionnaire

1. Introduction

Bone anchored hearing aid (BAHA) is a simple combination of a sound processor attached to a small titanium implant or fixture which is placed in the bone behind the ear during a routine surgical procedure, or in other words BAHA is a method of providing patients with direct bone conduction stimulation from a hearing aid attached to a titanium fixture implanted into the patient's mastoid. In 1977, a new technique to establish bone conduction amplification was developed in Gothenburg, Sweden. A BAHA consists of three parts: a titanium implant, an external abutment, and a sound processor. The system works by enhancing natural bone transmission as a pathway for sound to travel to the inner ear, bypassing the external auditory canal and middle ear. The titanium implant is placed during a short surgical procedure and over time naturally integrates with the skull bone. For hearing, the sound processor transmits sound vibrations through the external abutment to the titanium implant. The vibrating implant sets up vibrations within the skull and inner ear that finally stimulate the nerve fibers of the inner ear, allowing hearing.

There are two types of BAHA available:

- An abutment BAHA has the implant coming through the skin of the scalp. A connecting abutment is attached to the implant, which attaches it to the sound processor, which looks like a small box.
- A magnet BAHA contains an implant magnet in the shape of a flat disc, approximately the diameter of a two pence coin, which sits completely under the skin. The sound processor and sound processor magnet sit on the scalp skin, held in place by magnetic attraction.

BAHA is used most commonly in children with congenital ear malformations, in whom conventional hearing aids (HA)

are unsuitable or reconstruction of the normal hearing mechanisms is difficult or impossible. It has been used widely in children with Treacher–Collins syndrome, and to a lesser degree in children with acquired diseases of the external and middle ear. BAHA aids in patients with hearing loss (HL) of conductive and mixed types and or bilateral and unilateral HL for individual with middle ear infections the ear canal is left open allowing the infection to heal. For those with an incomplete or missing ear canal, BAHA works without any pressure on the skin thus avoiding the drawbacks of conventional bone conductor. BAHA is a high performing, comfortable and aesthetically pleasing device, which can be neatly hidden from direct view under the hair. The Baha 5^o of cochlear company was the first sound processor to be equipped with Bluetooth Smart, a low energy Bluetooth protocol built for the Internet of Things (IoT). It allows the exchange of data between the sound processor and iPhone with minimal energy consumption, and is used in most wearable devices today. The top manufacturer for BAHA implants are Cochlear Americas BAHA, Oticon Medical Ponto and Med El Adhear (Martinez, 2021).

Benefits of BAHAs are absence of build - up of humidity or skin irritation which occurs in hearing aid mould fitted in the ear canal. The recipient's experience no pressure against the skull since the titanium implant integrates with the bone. The BAHA delivers better sound quality due to the absence of the interposed soft tissues in BAHA results in better sound quality, requires less energy and offers greater comfort than traditional hearing aids. BAHA are very discreet, which benefits those who don't want to draw attention to their hearing loss. The implantation surgery for BAHA isn't invasive and is straightforward. BAHA is a better treatment option than reconstructive surgery for patients with bilateral deafness. It is a relatively simple surgical procedure with good hearing results. The sound

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processor is clipped onto the abutment or held on with a magnet which makes it feel weightless and more comfortable to wear than a bone conduction soft headband. These bands can be uncomfortable because of the pressure they put on the skull. The localisation ability of bilateral BAHA user performs well and able to differentiate speech from noisy surroundings. The precounselling for BAHA are significant and helpful because it gives an idea of what to expect during and after surgery.

In general, while comparing BAHA to CROS amplification which found improved performance in speech in noise tasks, communication function. BAHA provides improved audibility and quality of sound discrimination in noise, improved comfort and relief from middle ear and ear canal diseases occasioned by conventional hearing aids. In aspects of adult who experience poor dexterity the BAHA is a suitable option.

The rehabilitation for an individual going in for or being fitted with BAHA should include a multidisciplinary team. The team should consist of an otolaryngologist, maxillofacial surgeon audiologist, maxillofacial prosthesis, anaplastologist, Speech Language Pathologist (SLP) and a psychologist. It is essential for the audiologist to listen and build up a good rapport with patients, so as to gain their confidence and help settle any fears.

Badran et al., (2006), evaluated the self - rated quality of life (QoL) and benefits associated with the use of BAHA and to identify potential improvements in comparison to the previous conventional HA and results showed that BAHA can improve QoL and hearing outcome with full acclimatization to the device being achievable within a reasonable amount of time.

Hagr (2007) investigated studies pertaining to BAHA to evaluate the history, the indications, the advantages, the prediction of the outcome and the complications of this device as well as comparing it to the conventional HA. The results suggested that the BAHA device has been thoroughly evaluated by various implant groups and BAHA is superior to conventional bone conduction devices. In comparison with air conduction devices, the results are ambiguous, but in certain groups the BAHA is clearly superior and it can reduce aural discharge. Bilateral BAHA application in conductive hearing loss leads to binaural sound processing and the application of the BAHA as a transcranial CROS (contralateral routing of signal) device in unilateral deafness effectively minimizes head shadow effects.

Rasmussen et. al (2012), evaluated long - term patient satisfaction and experience with the BAHA bone conduction implant using questionnaire and the result showed 86% were satisfied or very satisfied with their BAHA. Ninety - one percent of respondents had satisfaction and could communicate using their BAHA in a one - on - one conversational setting.

Gunduz et. al, (2013), evaluated patient satisfaction and QoL with BAHA in Turkish population and results showed that BAHA application possesses almost no risk in terms of loss of the residual hearing. The results of the study revealed that

patient satisfaction rate is high and QoL is increased in BAHA users.

Gardell et. al (2015) investigated patient's satisfaction and experience with BAHA, results showed that response rate was 80% and the user percentage 88. The majority of the patients used their BAHA seven days a week and most of the day. 88% reported that it was in their best interest that they had received a BAHA. 80% of the respondents were able to communicate better using their BAHA in one - on - one conversations.

2. Need of the Study

There are three main indications for Baha: conductive HL (due to chronic otitis media, malformations of the middle or outer ear), single sided deafness (SSD), and mixed hearing loss (Gardell, 2015). BAHA is an advanced technology for patient with mixed and conductive hearing loss individuals; hence quality of performance in accordance to user should be evaluated. The post fitting analysis has been based on the review of BAHA recipient which helps to enhance the comfortability in various aspects of hearing situations. While considering all the issues which enable the hearing healthcare professionals to resolve it quickly and thereby delivering better outcome. To summarize, numerous western literatures were conducted to assess patient's satisfaction and experience with BAHA, but a few or limited studies were attempted in India to study the same.

Aim of the study:

The current study aims to assess adult patients' experience, satisfaction and QoL with BAHA, in Bangalore, Karnataka.

Method

The present study is carried out in two phases.

Phase 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 19 questions were selected.

Phase 2: Participants

There were 5 adult BAHA users were selected from Bangalore district in Karnataka.

Stimuli and Procedure

The closed - ended English questionnaire was developed and distributed to 5 adult BAHA users. The consent from BAHA recipients was taken initially before collecting the data. The closed - ended English Questionnaire was validated by 5 SLPs who were fluent in English language. The questionnaire consists of 19 questions. A score of 1 was given to 'yes' and 0 to 'No'.

Statistical Analysis

The collected data were summarized by using the Descriptive Statistics: frequency and percentage. Binomial test was used for the comparisons. The p value < 0.05 was considered as significant. Data was analysed by using the SPSS software (SPSS Inc.; Chicago, IL) version 26.0.

3. Results and Discussion

Table 4.1: Showing percentage score of Questions on evaluation of patient's experience, satisfaction and quality of life with bone - anchored hearing aids (BAHA), in Karnataka

	No		Yes		Binomial test p value
	Count	Row N %	Count	Row N %	
Did counselling assist you to choose BAHA?	1	20.0%	4	80.0%	0.000, HS
Are you comfortable in using BAHA continuously?	0	0.0%	5	100.0%	0.000, HS
After surgery or implantation do you have any difficulties?	4	80.0%	1	20.0%	0.000, HS
Do you feel BAHA's performance is better than a hearing aid?	0	0.0%	5	100.0%	0.000, HS
Do you have difficulty in maintaining BAHA when you are travelling?	4	80.0%	1	20.0%	0.000, HS
After implantation of BAHA, did the follow up with audiologist help you to understand better about BAHA usage?	0	0.0%	5	100.0%	0.000, HS
Are you completely satisfied using BAHA after 6 months?	0	0.0%	5	100.0%	0.000, HS
Did you feel discomfort or pressure against the skin/skull after placing the BAHA?	4	80.0%	1	20.0%	0.000, HS
Do you feel that care and maintenance of BAHA affects your daily routine?	5	100.0%	0	0.0%	0.000, HS
Do you feel that BAHA is cosmetically appealing?	0	0.0%	5	100.0%	0.000, HS
Do you find difficulty in the frequent removal and placement of the external components of BAHA?	4	80.0%	1	20.0%	0.000, HS
While using BAHA, are you able to hear the environmental sounds around you as natural?	0	0.0%	5	100.0%	0.000, HS
Do you find difficulty in listening to loud music/tv/radio, vehicle horns etc?	5	100.0%	0	0.0%	0.000, HS
After fitting BAHA, are you able to listen and communicate with others in the presence of back ground noise	0	0.0%	5	100.0%	0.000, HS
Do you find BAHA being useful in quiet situations?	0	0.0%	5	100.0%	0.000, HS
Are you able to localize sounds from different directions using BAHA?	0	0.0%	5	100.0%	0.000, HS
Do you feel that BAHA improved your listening and communication skills at your work place?	0	0.0%	5	100.0%	0.000, HS
Is BAHA Smart App useful to you in daily listening skills?	0	0.0%	5	100.0%	0.000, HS
Did the quality of life (QOL) improved after you started using BAHA?	0	0.0%	5	100.0%	0.000, HS

HS - High Significance

Table 1 and Figure 1 revealed that highly significant differences are noticed for the 19 questions in the closed - ended questionnaire. 80% of adults experienced counselling assistance to choose BAHA. 100% of them are comfortable in using BAHA continuously and they felt BAHA's performance was better than HA. After implantation of BAHA, 100% of adults experienced follow up with audiologist helped them to understand better about BAHA usage and was completely satisfied using BAHA after 6 months, they also felt that BAHA is cosmetically appealing and while using BAHA they are able to hear the environmental sounds around them as natural. 80% of them reported that after surgery or implantation, they don't have any difficulties, discomfort or pressure against the skin/skull after placing the BAHA, they don't experience difficulty in maintaining BAHA when they are travelling and don't feel that care and maintenance of BAHA affects their daily routine. 80% of adults reported that they don't find difficulty in listening to loud music/tv/radio and vehicle horns. 100% of them reported that after fitting BAHA, they can listen and

communicate with others in the presence of back ground noise, in quiet situations, and were able to localize sounds from different directions, have improved their listening and communication skills at their work place and BAHA Smart App was useful to their daily listening skills. 100% reported that quality of life (QOL) improved after using BAHA.

4. Discussion

The present study assessed the adult patient satisfaction, experience and QoL using questionnaire in 5 BAHA users in Bangalore, Karnataka. The questionnaire included a total of 19 questions. Results of the current study revealed that, that BAHA users reported that that they have better listening experience, satisfaction rate is high and QoL also improved with BAHA, which was accordance with the previous western studies on BAHA (Ramussen et al., 2012; Gunduz et. al., 2013; Gardell et al., 2015)

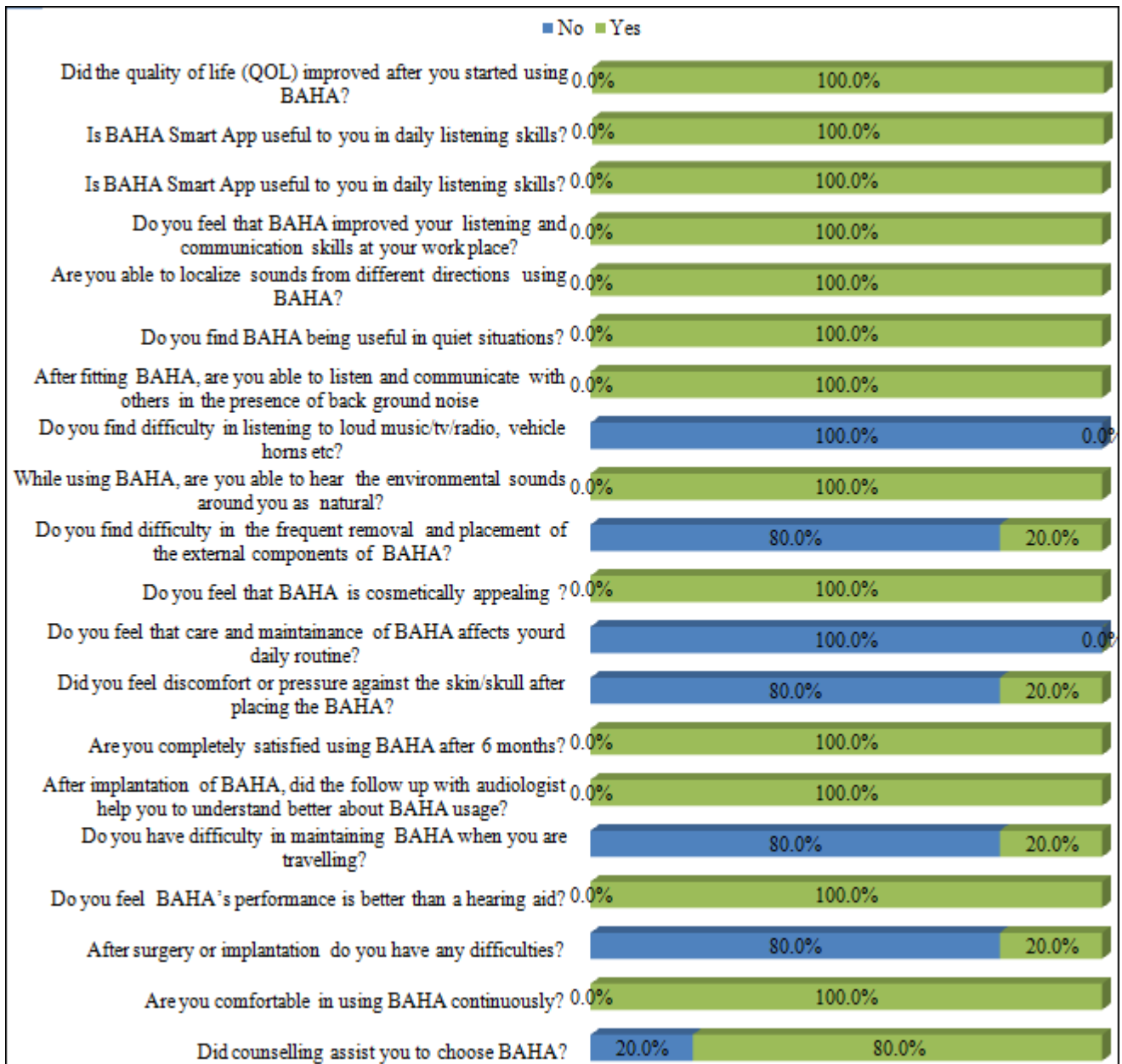


Figure 1: Showing percentage score of Questions on evaluation of patient's experience, satisfaction and quality of life with bone - anchored hearing aids (BAHA), in Karnataka

5. Summary and Conclusion

The study concludes that Bone - Anchored Hearing Aids BAHA significantly enhance the daily listening experience and communication abilities of adults with conductive and mixed hearing loss. The high satisfaction rate and reported improvement in quality of life among BAHA users in Karnataka underscore the effectiveness of this technology. Future research should continue to explore the long - term impacts of BAHA usage and its potential applications in different demographic groups.

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