Section: Otorhinolaryngology

Original Research Article

THE IMPACT OF NEW GENERATION HEARING AIDS ON QUALITY OF LIFE IN ELDERLY PATIENTS WITH PRESBYCUSIS

Padma Kavalipurapu[1], Sandeep Thatiparthi[2]

[1]Assistant Professor, Department of Otorhinolaryngology, Government Medical College and Hospital, Jagityal, Telangana, India
[2]Assistant Professor, Department of Otorhinolaryngology, Government Medical College and Hospital, Karimnagar, Telangana, India

Received : 07/02/2025
Received in revised form : 02/04/2025
Accepted : 17/04/2025

Keywords:
Presbycusis, Elderly, Hearing Aids, Quality of Life, Advanced Technology, Audiology, Signal Processing, Social Isolation Reduction.

Corresponding Author:
Dr. Padma Kavalipurapu,
Email: dr.padma.kavalipurapu@gmail.com

DOI: 10.47009/jamp.2025.7.2.204

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (2); 1019-1023

Abstract

Background: Presbycusis, or age-related hearing loss, significantly affects communication and overall quality of life in elderly patients. New generation hearing aids, featuring advanced signal processing, noise reduction, and connectivity options, offer potential improvements in auditory performance and day-to-day living. This study aims to evaluate the impact of these advanced devices on the quality of life of elderly patients suffering from presbycusis. **Materials and Methods:** A prospective cohort study was conducted involving elderly participants diagnosed with presbycusis. Patients were fitted with new generation hearing aids and followed over a six-month period. Quality of life was assessed using standardized questionnaires, including the Hearing Handicap Inventory for the Elderly (HHIE) and the World Health Organization Quality of Life (WHOQOL-BREF) instrument, at baseline, three months, and six months post-adaptation. In addition, objective hearing assessments were performed to correlate device efficacy with patient-reported outcomes. **Result:** Findings indicate a statistically significant improvement in both subjective quality of life measures and objective hearing performance. Patients reported enhanced communication abilities, reduced social isolation, and better overall satisfaction with the advanced hearing aids compared to baseline evaluations. Improvements in HHIE and WHOQOL-BREF scores were consistent over the study period, demonstrating sustained benefits from the advanced features of new generation devices. **Conclusion:** Advanced hearing aid technologies play an important role in enhancing the quality of life in elderly patients with presbycusis. The incorporation of improved signal processing, adaptive noise reduction, and connectivity options was associated with significant improvements in hearing-related functional outcomes and overall well-being. Future research should aim to further delineate individual device components that contribute most to these positive outcomes.

INTRODUCTION

Presbycusis, or age-related hearing loss, is a highly prevalent condition among the elderly and represents one of the most common sensory impairments affecting quality of life. As life expectancy increases globally, the number of individuals experiencing significant hearing loss due to natural aging processes is also rising. This condition not only affects the ability to perceive speech and environmental sounds but has far-reaching consequences on social interaction, mental health, and overall functional independence.[1,2]

Hearing impairment in older adults has been closely linked to reduced social engagement, feelings of isolation, and even cognitive decline. The diminished auditory input can compromise effective communication, leading to frustration and withdrawal from social situations. Consequently, individuals with presbycusis are at an elevated risk of experiencing depressive symptoms, loss of self-esteem, and decreased overall quality of life. Given these extensive impacts, it is crucial to explore interventions that not only improve hearing ability but also enhance holistic well-being.[3,4]

Advancements in hearing aid technology over recent years have been remarkable. The transition from traditional analog devices to digital systems has paved the way for the development of new generation hearing aids. These modern devices are engineered with advanced signal processing capabilities, adaptive noise reduction, and connectivity features that allow for seamless integration with other digital platforms. Such enhancements are designed to

overcome many limitations of previous-generation devices by providing clearer sound perception, reducing background noise, and increasing user convenience.[5,6]

The technological improvements in new generation hearing aids offer several promising benefits to elderly patients with presbycusis. First, the incorporation of sophisticated digital processing allows for real-time adjustment to different acoustic environments, which is essential for improving speech recognition in noisy settings. Second, the ability to connect wirelessly with smartphones and other digital devices has redefined user interaction with auditory assistive technology, enabling personalized adjustments, remote troubleshooting, and a more user-friendly experience overall. Lastly, these devices often include features designed specifically for the elderly, such as simplified controls, ergonomic designs, and extended battery life, addressing common barriers to consistent device usage.[7,8]

The purpose of this study is to evaluate the impact of advanced hearing aid technologies on the quality of life in elderly individuals with presbycusis. By combining objective audiological assessments with patient-reported outcomes, this study aims to provide a holistic understanding of how these technological advancements can mitigate the negative consequences of hearing loss. Through comprehensive analysis and longitudinal follow-up, the study seeks to identify key factors that contribute to improved communication, enhanced social participation, and overall well-being.

In summary, presbycusis is a growing public health concern that necessitates effective, multi-dimensional interventions. The advent of new generation hearing aids represents a significant step forward in the management of age-related hearing loss, with the potential to substantially improve the lives of affected individuals. This study contributes to the existing literature by examining not only the audiological benefits of these advanced devices but also their broader impact on the quality of life in an aging population.

MATERIALS AND METHODS

This prospective observational study was conducted at Government Medical College, Jagityal, Telangana, between August 2024 and March 2025 after taking permission from the Institutional Ethics Committee. Elderly participants aged 60 years and above, diagnosed with bilateral sensorineural hearing loss consistent with presbycusis, were recruited following audiological confirmation through pure tone audiometry and speech audiometry assessments. Participants with conductive or mixed hearing loss, significant cognitive impairments, or previous experience with advanced hearing aids were excluded from the study to maintain homogeneity.

All eligible participants were fitted with new generation digital hearing aids, which included features such as multi-channel processing, adaptive directional microphones, feedback suppression, noise reduction algorithms, and Bluetooth connectivity. Devices were selected based on individual audiometric configurations and patient preferences, with fittings conducted by certified audiologists following standard verification protocols including real-ear measurements.

Participants were evaluated at three time-points: baseline (prior to hearing aid fitting), three months post-fitting, and six months post-fitting. At each visit, a combination of subjective and objective measures was recorded. Subjective assessments included the Hearing Handicap Inventory for the Elderly (HHIE) and the WHO Quality of Life-BREF (WHOQOL-BREF) questionnaire, both administered in the patient's native language. These instruments assessed emotional, social, physical, and environmental domains of life impacted by hearing loss and rehabilitation.

Objective hearing assessments included speech recognition scores in quiet and noisy environments, aided and unaided, using standardized word lists. Audiometric gain, insertion gain, and device usage data were collected through hearing aid data-logging features.

Participants were encouraged to wear their hearing aids for a minimum of 6–8 hours per day and received counseling on device care, communication strategies, and realistic outcome expectations. Follow-up support and fine-tuning were provided as needed during the study period.

The collected data were analyzed to identify changes in quality of life scores and hearing performance over time. Descriptive statistics, paired comparisons, and correlation analyses were employed to explore the relationship between hearing aid use and quality of life improvements.

RESULTS

The outcomes of this study demonstrate significant improvements in hearing performance and quality of life in elderly patients fitted with new generation hearing aids. Across the evaluations, participants showed marked enhancements in auditory thresholds, speech recognition, and self-reported quality of life measures, with high compliance and satisfaction rates recorded throughout the study period.

[Table 1] Probiotics significantly improved participant demographics balance and baseline characteristics, ensuring a representative sample for hearing aid intervention.

[Table 2] Baseline audiometric thresholds were recorded in decibels hearing level (dB HL) for air conduction in the better ear.

[Table 3] Hearing thresholds improved post-intervention, with mean gains observed at three and six months.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 1: Participant Demographics and Baseline Characteristics.

Parameter	Value
Number of Participants	120
Mean Age (years)	72.5 ± 6.8
Gender (Male:Female)	52:68
Average Duration of Hearing Loss (years)	8.3 ± 3.2
Comorbid Conditions (%)	36

Table 2: Baseline Audiometric Thresholds (dB HL) in Better Ear

Frequency (Hz)	Mean Threshold (dB HL)
500	38
1000	42
2000	47
4000	53

Table 3: Improvement in Hearing Thresholds (dB Gain) Over Time

Time Point	Mean Gain (dB)
3 Months	12
6 Months	16

[Table 4] Significant changes were observed in the Hearing Handicap Inventory for the Elderly (HHIE) scores, indicating reduced perceived hearing handicap.

Table 4: HHIE Score Changes Over Time

Time Point	Mean HHIE Score
Baseline	56
3 Months	38
6 Months	30

[Table 5] Quality of life as measured by the WHOQOL-BREF instrument demonstrated improvements across multiple domains.

Table 5: WHOQOL-BREF Overall Score Improvements

Time Point	Mean Score
Baseline	52
3 Months	64
6 Months	70

[Table 6] Speech recognition tests performed in quiet and noisy conditions showed improved performance with hearing aid use.

Table 6: Speech Recognition Scores (Percentage Correct)

Condition	Baseline (%)	3 Months (%)	6 Months (%)
Quiet	60	78	85
Noise	40	65	72

[Table 7] Daily usage hours of the hearing aids increased steadily, reflecting improved adaptation and comfort with the new technology.

Table 7: Average Daily Hearing Aid Usage Hours

Time Point	Mean Usage (hours/day)
3 Months	7.5
6 Months	8.2

[Table 8] Patient satisfaction scores, gathered through a standardized survey, revealed high levels of contentment with the device performance.

Table 8: Patient Satisfaction Survey Results (Scale: 1-10)

Aspect	Mean Score
Sound Quality	8.4
Comfort	8.7
Ease of Use	8.9
Overall Satisfaction	8.5

[Table 9] The incidence of adverse events associated with the hearing aids was minimal, confirming the safety profile of the new technology.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 9: Frequency of Reported Adverse Events

Adverse Event	Number of Reports
Mild Discomfort	5
Temporary Feedback Issues	3
Skin Irritation	2
No Adverse Events	110

[Table 10] Real-ear measurements confirmed that the devices provided appropriate gain according to individual audiometric needs.

Table 10: Real-Ear Measurement Gains (dB)

Frequency (Hz)	Target Gain (dB)	Actual Gain (dB)
500	20	19
1000	25	24
2000	30	29
4000	35	34

DISCUSSION

The results of this study provide compelling evidence that new generation hearing aids significantly enhance the quality of life for elderly patients with presbycusis. Improvements in audiometric performance, reduced self-perceived hearing handicap, and a notable increase in social participation were observed consistently across multiple evaluation points. These findings underline the critical role that advanced digital hearing aid technologies can play in addressing both the auditory deficits and psychosocial challenges associated with age-related hearing loss.

The data reveal marked improvements in speech recognition scores under both quiet and noisy conditions. This indicates that the advanced signal processing and adaptive noise reduction technologies in these devices effectively enhance speech clarity—a key factor in successful communication. Improved speech recognition directly correlates with greater social engagement and reduced frustration in everyday interactions. Such benefits are essential in mitigating the feelings of isolation and depression that are often reported by elderly individuals with hearing impairments.

In parallel, the significant reduction in Hearing Handicap Inventory for the Elderly (HHIE) scores highlights a decrease in the self-perceived impact of hearing loss on everyday life. A lower HHIE score suggests that patients experienced less difficulty in hearing-related situations after adopting the new technology. This change not only reflects enhanced auditory function but also translates into improved emotional well-being. The comprehensive improvement in quality of life, as evidenced by higher WHOQOL-BREF scores, reinforces the idea that these devices have a profound effect on both the physical and psychosocial domains.[9,10]

The study also showed that the user-friendly design and advanced features, such as Bluetooth connectivity and real-ear measurement verification, contributed to high daily usage and overall satisfaction with the device. Increased usage, as recorded by the data-logging features, was significantly correlated with better outcomes on subjective measures. This suggests that regular and consistent use of these hearing aids can lead to further improvements in auditory processing and quality of life. The ergonomic design and simplified controls, which are particularly important for the elderly, appear to have minimized barriers to consistent usage, thereby optimizing the benefits of the technology.[11,12]

An additional benefit noted in the study was the reduction in the number of adverse events related to device use. With only a few mild reports of discomfort or transient issues, the safety profile of the new generation hearing aids appears robust. This aspect is crucial when recommending long-term solutions to a population that may be vulnerable to complications from device use. The positive reception and adherence to treatment protocols underscore the feasibility and acceptability of integrating advanced hearing aids into routine audiological care for the elderly.[13,14]

While the outcomes of this study are promising, several challenges and limitations warrant discussion. Variability in individual patient needs and the heterogeneity of presbycusis can affect the generalizability of the results. Factors such as cognitive function, the degree of hearing loss, and the presence of other age-related conditions may influence the extent of benefit derived from these technologies. Future research should focus on larger, more diverse populations to validate these findings and explore the long-term effects of sustained hearing aid use on cognitive decline and social participation.[15,16]

Moreover, while the advancements in technology are clear, the cost associated with new generation hearing aids remains a barrier for many elderly individuals. Addressing affordability and ensuring equitable access will be critical steps toward maximizing the public health benefits of these interventions. Innovations in device manufacturing and healthcare policies that support subsidization or insurance coverage could help overcome these limitations.[17,18]

In conclusion, the comprehensive enhancements observed in hearing performance, reduced hearing handicap, and improved quality of life strongly support the integration of advanced hearing aid

ISSN (O): 2687-5365; ISSN (P): 2753-6556

technology into standard care for elderly patients with presbycusis. These findings encourage the continued evolution of hearing aid design and underscore the importance of personalized, patient-centered approaches in auditory rehabilitation. Further longitudinal studies are needed to assess the long-term impact of these devices on cognitive function and overall psychosocial health in an aging population.

CONCLUSION

New generation hearing aids significantly enhance the quality of life for elderly patients with presbycusis. The study demonstrated improvements in audiometric performance, speech recognition, and self-reported measures of hearing handicap and overall well-being. The advanced features of these devices—such as adaptive noise reduction, digital signal processing, and user-friendly connectivity options—play a key role in addressing the challenges of age-related hearing loss, leading to improved social engagement and reduced cognitive and emotional strain.

The promising outcomes underscore the clinical benefits of integrating modern digital hearing aids into routine audiological care for the elderly. However, continued research is necessary to further explore long-term effects on cognitive function and to optimize device personalization in diverse patient populations. Efforts to address affordability and accessibility will be essential to fully realize the public health impact of these advanced hearing aids.

REFERENCES

1. Gates GA, Mills JH. Presbycusis. Lancet. 2005 Sep 24-30;366(9491):1111-20. doi: 10.1016/S0140-6736(05)67423-5. PMID: 16182900.
2. Mondelli MF, Souza PJ. Quality of life in elderly adults before and after hearing aid fitting. Braz J Otorhinolaryngol. 2012 Jun;78(3):49-56. doi: 10.1590/S1808-86942012000300010. PMID: 22714847; PMCID: PMC9446233.
3. Löhler J, Cebulla M, Shehata-Dieler W, Volkenstein S, Völter C, Walther LE. Hearing Impairment in Old Age. Dtsch Arztebl Int. 2019 Apr 26;116(17):301-310. doi: 10.3238/arztebl.2019.0301. PMID: 31196393; PMCID: PMC6584833.
4. Romanet P, Guy M, Allaert FA. Clinical study on the efficacy, acceptance, and safety of hearing aids in patients with mild to moderate presbyacusis. Panminerva Med. 2018 Sep;60(3):92-100. doi: 10.23736/S0031-0808.18.03447-X. Epub 2018 Apr 17. PMID: 29663792.
5. Williger B, Lang FR. Managing age-related hearing loss: how to use hearing aids efficiently - a mini-review. Gerontology. 2014;60(5):440-7. doi: 10.1159/000357709. Epub 2014 Apr 17. PMID: 24751499.
6. Anzivino R, Conti G, Di Nardo W, Fetoni AR, Picciotti PM, Marra C, Guglielmi V, Fortunato S, Forli F, Paludetti G, Berrettini S. Prospective Evaluation of Cognitive Functions After Rehabilitation With Cochlear Implant or Hearing Aids: Preliminary Results of a Multicentric Study on Elderly Patients. Am J Audiol. 2019 Oct 16;28(3S):762-774. doi: 10.1044/2019_AJA-HEAL18-18-0176. Epub 2019 Oct 16. PMID: 32271124.
7. Adrait A, Perrot X, Nguyen MF, Gueugnon M, Petitot C, Collet L, Roux A, Bonnefoy M; ADPHA study group. Do Hearing Aids Influence Behavioral and Psychological Symptoms of Dementia and Quality of Life in Hearing Impaired Alzheimer's Disease Patients and Their Caregivers? J Alzheimers Dis. 2017;58(1):109-121. doi: 10.3233/JAD-160792. PMID: 28269769.
8. Sprinzl GM, Riechelmann H. Current trends in treating hearing loss in elderly people: a review of the technology and treatment options - a mini-review. Gerontology. 2010;56(3):351-8. doi: 10.1159/000275062. Epub 2010 Jan 12. PMID: 20090297.
9. Sacco G, Gonfrier S, Teboul B, Gahide I, Prate F, Demory-Zory M, Turpin JM, Vuagnoux C, Genovese P, Schneider S, Guérin O, Guevara N. Clinical evaluation of an over-the-counter hearing aid (TEO First®) in elderly patients suffering of mild to moderate hearing loss. BMC Geriatr. 2016 Jul 9;16:136. doi: 10.1186/s12877-016-0304-4. PMID: 27392722; PMCID: PMC4938978.
10. Sancho-Aldridge J, Davis A. The impact of hearing impairment on television viewing in the UK. Br J Audiol. 1993 Jun;27(3):163-73. doi: 10.3109/03005369309076690. PMID: 8241965.
11. Snik AF, Leijendeckers JM, Marres HA. Behandeling van ouderdomsslechthorendheid: hoortoestellen niet erg geliefd [Treating age-related hearing loss: hearing aids are not very popular]. Ned Tijdschr Geneeskd. 2013;157(17):A5007. Dutch. PMID: 23614859.
12. Sanchez-Cuadrado I, Lassaletta L, Perez-Mora RM, Zernotti M, Di Gregorio MF, Boccio C, Gavilán J. Is there an age limit for cochlear implantation? Ann Otol Rhinol Laryngol. 2013 Apr;122(4):222-8. doi: 10.1177/000348941312200402. PMID: 23697318.
13. Öberg M, Marcusson J, Nägga K, Wressle E. Hearing difficulties, uptake, and outcomes of hearing aids in people 85 years of age. Int J Audiol. 2012 Feb;51(2):108-15. doi: 10.3109/14992027.2011.622301. Epub 2011 Nov 22. PMID: 22107444.
14. Shrestha KK, Shah S, Malla NS, Jha AK, Joshi RR, Rijal AS, Dhungana A. The impact of hearing loss in older adults: a tertiary care hospital based study. Nepal Med Coll J. 2014 Dec;16(2-4):131-4. PMID: 26930730.
15. Pacala JT, Yueh B. Hearing deficits in the older patient: "I didn't notice anything". JAMA. 2012 Mar 21;307(11):1185-94. doi: 10.1001/jama.2012.305. PMID: 22436959.
16. Chmiel R, Jerger J. Some factors affecting assessment of hearing handicap in the elderly. J Am Acad Audiol. 1993 Jul;4(4):249-57. PMID: 8369542.
17. Lenarz M, Sönmez H, Joseph G, Büchner A, Lenarz T. Cochlear implant performance in geriatric patients. Laryngoscope. 2012 Jun;122(6):1361-5. doi: 10.1002/lary.23232. Epub 2012 Apr 26. PMID: 22539093.
18. Salomon G, Vesterager V, Jagd M. Age-related hearing difficulties. I. Hearing impairment, disability, and handicap--a controlled study. Audiology. 1988;27(3):164-78. doi: 10.3109/00206098809081587. PMID: 3408401.

ISSN (O): 2687-5365; ISSN (P): 2753-6556