# Characteristics Of Presbicusis: A Literature Review

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| Article Info | ABSTRACT |
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| **Keywords:**<br>Characteristics,<br>Presbyacusis | Hearing loss or deafness is the partial or complete inability to hear sounds in one or both ears. Hearing loss can occur at any age. The most common cause of hearing loss in the elderly is presbycusis.1 Presbycusis or known as age related hearing loss (ARHL) is a loss of hearing ability that occurs slowly with age. The method used is literature review with Narrative Review design. The results obtained in this literature are that there are 10 articles obtained with restrictions from 2020 - 2024 and in-depth analysis of the strengths and limitations of each article on the characteristics of presbyacusis has been carried out. 10 articles that discuss the characteristics of presbyacusis, 8 articles mention the characteristics of presbyacusis based on age, 8 articles mention the characteristics of presbyacusis based on gender. Based on the results of the identification and review of several in this literature review, it can be concluded that there are several characteristics of presbyacusis including age, gender and history of chronic disease. Early recognition of the diagnosis of presbyacusis is very important, because if left untreated it can have serious consequences on mental health, cognitive, and even physical health. |
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## INTRODUCTION

Hearing loss or deafness is a partial or complete inability to hear sounds in one or both ears. 1 Especially if this happens without someone realizing it, so that they still feel fine. Hearing loss screening needs to be done, especially in the elderly, to determine the level of hearing loss that occurs, even if they say there is no problem with their hearing.2 Based on data from the World Health Organization (WHO) in 2018, it is stated that 466 million (6.1%) of the world's population suffers from hearing loss, of which 34 million are children and 432 million are adults, with a third of them aged over 65 years. According to WHO, if this case is not treated immediately, it is estimated that as many as 630 million people will experience hearing loss in 2030 and this number will continue to increase to more than 900 million in 2050.

Hearing loss can occur at any age. The most common cause of hearing loss in older people is presbycusis. 1 Presbycusis, also known as age-related hearing loss (ARHL), is a loss of hearing ability that occurs slowly with increasing age. 3,4 This hearing disorder is

bilaterally progressive, irreversible, and neurosensory. symmetrical caused by degeneration of the cochlea as an impulse-inducing organ in the cochlear neurons that convey information to the brain or loss of auditory nerve fibers.

It is estimated that approximately two-thirds of people over the age of 70 in the United States have presbycusis, and that by 2020, more than half of the people in the United States with hearing loss will be over the age of 70. The World Health Organization (WHO) states that more than 65% of adults aged over 60 years experience presbycusis. By 2025 it is estimated that there will be 1.2 billion adults over 60 years of age worldwide. Of this number, it is estimated that as many as 500 million people will experience prebiscusis disorders.

The pathophysiology of presbycusis is associated with complex interactions between genetic and environmental factors. In addition to biological age, underlying risk factors for presbycusis include gender, genetic predisposition, environmental exposures (e.g., ototoxic drugs, cigarette consumption, noise), lifestyle (e.g., diet, smoking, drinking), and comorbidities (e.g., diabetes , hypertension).

Symptoms and signs of presbycusis in general are: reduced ability to hear, reduced ability to understand conversations, ears become painful if the person speaking louder, physical and emotional disturbances. The diagnosis of presbycusis is confirmed by audiometric examination. The results of the audiometric examination showed that there was a perceptual type of deafness (sensory neural) with a sharp decline (slooping) after a frequency of 2000 Hz.

WHO, through the Sound Hearing Society, has launched the Sound Hearing 2030 (Healthy Hearing 2030) program, which is targeting all preventable hearing loss or preventable hearing loss to be overcome by 2030. One of the targets is the management of hearing loss in old age. There is no cure for presbiosis. Hearing aids are a mainstay of treatment and have been shown to have significant positive effects on quality of life and communication. Hearing aids do have limitations. Hearing aids do not improve normal hearing, they only amplify sounds. Hearing aids can be very expensive and are often not covered by the patient's insurance. The aim of the author is to look at the characteristics of presbycusis

## METHODS

This research uses a literature review study to write this article. The author uses several international and national journals obtained from various sites such as Google Scholar, Pubmed and Science Direct. The keywords used for the literature search process were "characteristics" "presbycusis". Journals used in this research must meet the inclusion criteria, namely patients diagnosed with presbycusis, publication year since 2020, the study population is presbycusis patients. Meanwhile, the exclusion criteria are publication year before 2020 and populations other than those diagnosed with presbycusis, who have recovered. From search results on Google Scholar, we found 103 articles using the keywords we chose. Then, after we sorted according to the inclusion and exclusion criteria, we obtained 3 articles that we would review. Meanwhile, on Sciencedirect, 53 journal articles were found which were then sorted again so that there were 5 journals that met the

criteria, then on Pubmed there were 2 journal articles. The total number of journals that we will review is 10 journals.

# RESEARCH RESULT

## Age

**Table 1.** Characteristics of Presbycusis based on age

| No. | Title | Researcher Name / Year | Design | Results |
|---|---|---|---|---|
| 1. | Quality of Life of Presbycusis Sufferers at Sultan Syarif Mohamad Alkadrie Pontianak Regional Hospital in 2019 | Maisara Safitri, Eva Nurfarihah, Mitra Handini (2022) | Analytical research | The research results showed that the majority were in the age range 70-79 years, as many as 15 people (38.5%). |
| 2 | Characteristics of presbycusis in Sukawati District, Gianyar Regency in 2017 | I Gusti Ayu Mahaprani Danastri, Made Wiranadha (2021) | Study descriptive | Based on age group, the largest number of sufferers fell into the 65-69 age group, namely 24 sufferers (48%). |
| 3. | Increased Incidence of Presbycusis in Hypertensive Elderly at Kurai Taji Pariaman Community Health Center in 2021 | Irwan Triansyah, Anita Darmayanti, Desi Permata Sari (2022) | Analytical research | The results of this study were that presbycusis patients were mostly found in the 60-70 year age group (60.6%). |
| 4. | Characteristics of Presbycusis Sufferers in Bandung City in 2019 | Manuel M Ario, Ratna Anggraeni, Nur A Aroeman (2022) | Descriptive research | Based on age group, most sufferers were aged ≥65 years (57.95%) |
| 5. | Description of | Yanti Nurrokhma - | Descriptive | The average |

| No. | Title | Researcher Name / Year | Design | Results |
|---|---|---|---|---|
| | Presbycusis Cases in TNI Retirees at Dustira Cimahi Hospital | wati (2021) | research | age was 50.5 years with an age range of 49-80 years, |
| 6. | Description of the Characteristics of Patients with Presbycusis at Tangerang City Hospital for the Period 2014-October 2023 | Gustav Syukrinto, Lucyana Achwas, Hendrarto, Aris Mahfuzhi (2023) | Descriptive research | the largest age group is 70-79 years old at 42.5% |
| 7. | Etiological Classification of Presbycusis Based on Audiogram Results at the ENT-KL Polyclinic, Prof. Hospital. Dr. IGNG Addresses the January-December 2020 Period | Pande Nyoman Bayu Tirtayasa, I Made Wiranadha (2023) | Retrospective descriptive study | the largest age group was ≥ 60 years of 42 patients. |
| 8. | Characteristics of Presbycusis in A Super-Aged Society | Nakajima S, Sano H and Hara Y2 (2021) | Cross-sectional retrospective observational study | The elderly group consisted of 186 patients (93 men and 93 women) |
| 9. | Impact and Factors Associated with Presbycusis among 50 Years Old People of Parakou and Over in 2021 | Marius Claude Flatin, Alexis AWC do Santos Zounon, Cocouvi Bruno Ametonou, Fatiou Alabi Bouraima, Méré Roland Kimba, Spéro HR Hounkpatin, Wassi Adjibabi, Bernadette Vignikin- | Analytical, descriptive, and cross-sectional study with prospective data collection. | The largest age group was 50 - 60 years with 122 patients. |

| No. | Title | Researcher Name / Year | Design | Results |
|---|---|---|---|---|
| | | Yehouessi | | |

Conclusions of9 studies, 8 studies stated that the average age was at most ≥ 60, while 1 study stated that the average age was at most 50 - 60.

**Gender**

<center>Table 2. Characteristics of Presbycusis by gender</center>

| No. | Title | Researcher Name / Year | Design | Results |
|---|---|---|---|---|
| 1. | Quality of Life of Presbycusis Sufferers at Sultan Syarif Mohamad Alkadrie Pontianak Regional Hospital in 2019 | Maisara Safitri, Eva Nurfarihah, Mitra Handini (2022) | Analytical research | There were more female research subjects than men, namely 24 people (61.5%). |
| 2 | Characteristics of presbycusis in Sukawati District, Gianyar Regency in 2017 | I Gusti Ayu Mahaprani Danastri, Made Wiranadha (2021) | Study descriptive | Of the entire sample, there were 30 female sufferers (60%) and 20 male sufferers (40%). |
| 3. | Increased Incidence of Presbycusis in Hypertensive Elderly at Kurai Taji Pariaman Community Health Center in 2021 | Irwan Triansyah, Anita Darmayanti, Desi Permata Sari (2022) | Analytical research | Of the entire sample, there were 30 female sufferers (60%) and 20 male sufferers (40%). |
| 4. | Characteristics of Presbycusis Sufferers in Bandung City in 2019 | Manuel M Ario, Ratna Anggraeni, Nur A Aroeman (2022) | Descriptive research | Of the entire sample, 87 patients were women (64.44%) and 48 men (35.56%). |
| 5. | Description of Presbycusis Cases in TNI Retirees at | Yanti Nurrokhma - wati (2021) | Descriptive research | Of the entire sample, 59.9% were men and |

| No. | Title | Researcher Name / Year | Design | Results |
|---|---|---|---|---|
| | Dustira Cimahi Hospital | | | 40.4% women |
| 6. | Description of the Characteristics of Patients with Presbycusis at Tangerang City Hospital for the Period 2014-October 2023 | Gustav Syukrinto, Lucyana Achwas, Hendrarto, Aris Mahfuzhi (2023) | Descriptive research | The largest gender is male at 62.8%, |
| 7. | Description of the Characteristics of Patients with Presbycusis at Tangerang City Hospital for the Period 2014-October 2023 | Gustav Syukrinto, Lucyana Achwas, Hendrarto, Aris Mahfuzhi (2023) | Descriptive research | The largest gender was 35 male patients (72.92%), 13 female patients (27.08%). |
| 8. | Characteristics of Presbycusis in A Super-Aged Society | Nakajima S, Sano H and Hara Y2 (2021) | Cross-sectional retrospective observational study | The largest gender is 29 men, 27 women. |
| 9. | Impact and Factors Associated with Presbycusis among 50 Years Old People of Parakou and Over in 2021 | Marius Claude Flatin, Alexis AWC do Santos Zounon, Cocouvi Bruno Ametonou, Fatiou Alabi Bouraima, Méré Roland Kimba, Spéro HR Hounkpatin, Wassi Adjibabi, Bernadette Vignikin-Yehouessi | Analytical, descriptive, and cross-sectional study with prospective data collection. | The most common gender is male as many as 166 (55.52%) |

Conclusions from 9 studies, 5 studies stated an averageThe most common gender is male, while 4 studies state that the average gender is mostly female.

### Chronic Disease

Table 3. Characteristics of Presbycusis based on chronic disease

| No. | Title | Researcher Name / Year | Design | Results |
|---|---|---|---|---|
| 1. | Quality of Life of Presbycusis Sufferers at Sultan Syarif Mohamad Alkadrie Pontianak Regional Hospital in 2019 | Maisara Safitri, Eva Nurfarihah, Mitra Handini (2022) | Analytical research | A total of 16 people (41%) had presbycusis accompanied by a history of chronic disease, namely 7 people with hypertension, 5 people with type II DM, 3 people with type II DM with hypertension, and 1 person with type II DM with a history of heart disease. |
| 2. | Increased Incidence of Presbycusis in Hypertensive Elderly at Kurai Taji Pariaman Community Health Center in 2021 | Irwan Triansyah, Anita Darmayanti, Desi Permata Sari (2022) | Analytical research | Presbycusis accompanied by a history of chronic disease, namely grade 2 hypertension, was 57.6% |
| 3. | Description of Presbycusis Cases in TNI Retirees at Dustira Cimahi Hospital | Yanti Nurrokhma-wati (2021) | Descriptive research | Hypertension was the most common risk factor (71.5%). |
| 4.. | Description of the haracteristics of Patients with Presbycusis at Tangerang City Hospital for the Period 2014-October 2023 | Gustav Syukrinto, Lucyana Achwas, Hendrarto, Aris Mahfuzhi (2023) | Descriptive research | History of chronic disease, namely hypertension at 66.4%, diabetes mellitus at 30.1%. |

Conclusions ofOf the 4 studies, 4 studies stated that the average chronic disease was mostly hypertension, while 2 studies stated that the average chronic disease was mostly diabetes mellitus, and 1 study stated that the average chronic disease was mostly heart disease.

## Discussion

### Age

Hearing loss occurs starting from young adulthood and decreases with age due to cell damage caused by oxidative stress which increases and accumulates over a long period of time. This causes a degenerative process that causes hearing dysfunction, but environmental factors such as the use of ototoxic drugs, exposure to sound and a history of ear disease can also cause presbycusis to occur more quickly.6

Maria Fernanda said that 40-50% of the population aged 65-75 years will experience presbycusis. Chou in his research stated that the prevalence of presbycusis at 60 years was around 16%, at the age range 70-79 years the prevalence was 70%, at the age range 80-89 years it was 92%, and at the age 90 years it was almost 100%.9 These results show that as age increases, the risk of experiencing hearing loss increases

### Gender

Gender differences also influence hearing loss and the incidence of presbycusis. Sex differences in high-frequency thresholds are often attributed to the possibility that men are exposed to more occupational and recreational noise than women. Then women are also known to have smaller leaf shapes and ear canals, which can have a noise masking effect at low frequencies. 12

In a study conducted by Kathleen et al. There was a difference in prevalence between men and women, where the prevalence in men was greater than in women. Another study conducted by Quaranta et al found that the prevalence of presbycusis was 55% in men and 45% in women.

### Chronic Disease

One of the risk factors for presbycusis is hypertension. Hypertension is when the systolic blood pressure is more than or equal to 140 mmHg and the diastolic blood pressure is more than or equal to 90 mmHg. This high vascular pressure can cause rupture of blood vessels in the inner ear, namely the cochlear artery and anterior vestibular artery which are supplied by the inferior cerebral artery, resulting in sudden hearing loss.1

Hypertension and type II DM can trigger the process of hearing loss in the elderly. Potential mechanisms for hearing loss in diabetes mellitus include cochlear damage due to impaired inner ear blood circulation, retrocochlear hearing loss caused by auditory nerve neuritis, diabetic neuropathy, and mitochondrial DNA mutations. Hypertension stimulates hearing loss through high pressure in the blood vessel system which causes inner ear bleeding, namely in the anterior inferior cerebellar artery which is transmitted to the inner ear arteries (cochlear artery and anterior vestibular artery), which can cause progressive or sudden hearing loss.12

One of the strengths of these articles is the use of internationally representative data with the latest edition and a large sample size sufficient to analyze the characteristics of presbyacusis. In addition, several variables may be significant risk factors for presbycusis. This is important so that interventions can be carried out to reduce the risk of presbycusis and to know whether these factors influence the occurrence of presbycusis.

One limitation that needs to be considered in several of these articles is that the use of literature review data can experience bias in the selection of data sources used. Researchers

may tend to select data that fits their hypothesis, which can influence research results and introduce bias in the study. The data sources available in a literature study may not be complete to answer all research questions. In addition, some articles use less population coverage. Thus, the authors suggest future research with better methodology, larger sample sizes, and more variables. Further research is needed to discuss the characteristics of presbycusis by implementing interventions to reduce risk factors.

## CONCLUSION

Based on the results of identification and several studies in this literature review, it can be concluded that there are several characteristics of presbycusis, including age, gender and history of chronic disease. Although the cause of presbycusis is not yet known with certainty, many factors are thought to influence the occurrence of presbycusis, such as age, family genetics, gender, exposure to noise, unhealthy lifestyles and complications from other diseases such as hypertension, diabetes and hypercholesterolemia.

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