



# INCIDENTAL FINDING OF HEARING LOSS IN PATIENTS BEFORE THE INTRA-ARTERIAL HEPARIN FLUSHING (IAHF) PROCEDURE

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## Abstract

**Background:** Hearing loss is often not addressed by the patient. Patients underwent pure tone audiometry test before the Intra-arterial Heparin Flushing (IAHF) procedure, and some patients had hearing loss.

**Objective:** The purpose of this study is to find out how patients describe their hearing loss before the IAHF procedure at Gatot Subroto Central Army Hospital.

**Methods:** The study was a cross-sectional descriptive study from November 2021 to May 2022 on 220 patients subjected to pure tone audiometry tests before the IAHF procedure at Gatot Subroto Central Army Hospital. Patient characteristics were recorded, and audiometric results were grouped based on the information provided which are the type and degree of hearing loss.

**Results:** Pure tone audiometry results for patients before the IAHF were 37.7% normal and 62.3% abnormal (with hearing loss). Based on the hearing loss type, there were 50.4% sensorineural type, 29.9% conductive type, and 19.7% mixed type. There were mild (55.5%), moderate (29.2%), moderate-severe (8.0%), severe (6.6%), and very severe (0.7%) based on hearing loss degree.

**Conclusion:** This study found that most patients are unaware of their hearing loss because it is modest and generally sensorineural. Attention is required for the early detection of hearing loss.

**Keywords:** audiometry, deafness, hearing, IAHF, sensorineural

## Introduction

Hearing loss is the most prevalent loss of sensory function worldwide (1). Hearing loss is common in adults, and its incidence increases significantly with age (2). According to WHO, more than 1.5 billion people are experiencing decreased hearing capacity, with a minimum of 430 million requiring treatment (3). Areas with the highest incidence of hearing loss are countries in Southeast Asia, the Western Pacific, and Africa. An epidemiological study published in 2007 found that the prevalence of hearing loss in Indonesia was 4.2%, affecting more than 9 million persons of various ages. (4).

Hearing loss often goes unnoticed due to minor symptoms and stigma in society. Untreated hearing loss affects people of all ages, families, and economies around the world. It is the third leading cause of disability in the world. (3). Hearing loss can affect the quality of life and increase the risk of dementia and cognitive deterioration in old age. Experiencing hearing loss may lead to feelings of loneliness, isolation, depression, and anxiety (5, 6).

The intra-arterial heparin flushing procedure, often known as IAHF, is an example of an endovascular procedure that was aimed for reperfusion performed at the Gatot Subroto Central Army Hospital, Indonesia. The IAHF procedure in patients with chronic ischemic stroke resulted in clinical improvement associated with increased cerebral blood flow by magnetic resonance imaging (MRI) results

before and after the procedure (7, 8). Pure tone audiometry test is a routine examination for patients before the IAHF procedure at Gatot Subroto Central Army Hospital.

The Intra-arterial Heparin Flushing is performed with various indications, and frequently patients do not come with complaints of hearing loss. However, some patients admit that hearing is getting clearer after the IAHF procedure. The researcher intended to know the characteristics of the pure tone audiometry tests results of patients at the Gatot Subroto Central Army Hospital before the IAHF procedure.

## Methods

The study was a cross-sectional descriptive study from November 2021 to May 2022 that describes the results of pure tone audiometry tests of patients before the IAHF procedure at Gatot Subroto Central Army Hospital. During the study period, 220 patients met the inclusion criteria, namely patients who will undergo the IAHF procedure and perform pure tone audiometry test before the IAHF procedure. The sample was obtained using a non-probability consecutive sampling technique. Patient characteristics were tabulated, and audiometric results were grouped and tabulated based on the type and degree of hearing loss.

## Results

In this study, 220 patients underwent pure tone audiometry test before the IAHF procedure. **Table 1** shows that there were 161 (73.2%) male patients and 59 (26.8%)

female patients based on gender. There were 118 (53.6%) patients under 60 years old compared to patients of the same age as or above 60 years which is 102 (46.4%) patients.

**Table 1. Frequency distribution of the features of the patients who had pure tone audiometry tests before IAHF treatment at Gatot Subroto Central Army Hospital**

Characteristics	n (%)
<b>Gender</b>	
Male	161 (73.2)
Female	59 (26.8)
<b>Age (years old)</b>	
<60	118 (53.6)
≥60	102 (46.4)
<b>Comorbidity</b>	
No	131 (59.5)
Yes	89 (40.5)
<b>Hearing Loss</b>	
No	83 (37.7)
Yes	137 (62.3)
<b>Total</b>	220 (100)

Based on comorbidities, there were 131 (59.5%) patients without comorbidities and 89 (40.5%) patients with comorbidities. In this study, there were 83 patients without hearing loss or normal (37.7%) and 137 (62.3%) patients with hearing loss.

**Table 2. Frequency distribution of the type and degree of hearing loss of patients who will have IAHF treatments at Gatot Subroto Central Army Hospital**

Characteristics	n (%)
<b>Hearing Loss Type</b>	
Sensorineural	69 (50.4)
Conductive	41 (29.9)
Mixed	27 (19.7)
<b>Hearing Loss Degree</b> (Based on the worst ear)	
Mild	76 (55.5)
Moderate	40 (29.2)
Moderate-Severe	11 (8.0)
Severe	9 (6.6)
Very Severe	1 (0.7)
<b>Total</b>	137 (100)

**Table 2** demonstrates the type and degree of hearing loss of patients who will undergo IAHF procedures based on the results of pure tone audiometry. Of the 137 people, there were 69 (50.4%) people with sensorineural hearing loss, 41 (29.9%) people with conductive hearing loss, and 27 (19.7%) people with mixed-type hearing loss.

Depending on the severity of hearing loss from the worst ear side, it was found that hearing loss in IAHF patients was a generally mild degree hearing loss with 76 (55.5%) patients. Patients with moderate degree hearing loss were 40 (29.2%) patients, 11 (8.0%) patients were moderate-severe, 9 patients (6.6%) were severe, and 1 (0.7%) patient was very severe.

## Discussions

Patients who will undergo IAHF majority do not come with complaints of hearing loss. In this study, 137 of 220 (62.3%) patients with hearing loss were found by pure tone audiometry tests. Hearing loss is often undiagnosed or unnoticed by sufferers (9). This statement is also in line with what was found globally. As many as 83% of hearing loss sufferers are unaware of hearing loss (10, 11).

In this study, sensorineural type and mild degree hearing loss were the most common cases, exceeding 50% of cases. The 2019 global burden of disease study found that most of the population with hearing loss globally suffer mild hearing loss (6). The study by Margolis and Saly found that more than 50% of hearing loss cases were the sensorineural type based on audiometric data from the Minnesota Hospital Audiology clinic (12).

A study by Cruickshanks et al. on a population aged 48-92 years found that the hearing sensitivity of that population decreased with increasing frequency based on audiometric results. The pattern of decline suggests presbycusis. Presbycusis is a type of sensorineural hearing loss associated with increasing age and is more frequent in males (13, 14). This recent study also showed male patients account for more than 50% of cases. Based on age, the percentage difference between patients under 60 years and above or equal to 60 years is not too far, namely 53.6% compared to 46.4%. This study is consistent with the study found by Dillard et al., which demonstrated a higher prevalence of hearing loss in males and an increase with age (15). Cochlear abnormalities commonly cause sensorineural hearing loss. Abnormalities of the internal acoustic meatus, the vestibulocochlear nerve, or central auditory system also cause sensorineural (16). The degenerative process with age can cause damage to ear hair cells, the lateral wall of the cochlea, and primary auditory neurons (14).

Endothelial dysfunction and decreased blood flow can result in sensorineural hearing loss (17). Some diseases, such as hypertension, dyslipidemia, diabetes mellitus, and stroke can cause reduced cochlear blood flow resulting in hearing loss (18-21). In this study, the patients who underwent pure tone audiometry test before the IAHF were mostly without comorbidities. However, 40.5% of patients had comorbidities such as hypertension, diabetes mellitus, stroke, or dyslipidemia. The study of Kang et al. showed that patients who met the criteria for the metabolic syndrome, such as increased blood pressure, impaired glucose tolerance, obesity, increased triglycerides, or decreased high-density lipoprotein (HDL) levels, had higher hearing thresholds than people without metabolic syndrome (22).

In this study, males under 60 years old without comorbidities were the dominant characteristics in patients who will undergo the IAHF at Gatot Subroto Central Army Hospital. Sensorineural and mild hearing loss are the most prevalent varieties of hearing loss. This study shows that the patient often does not address hearing loss and is detected incidentally through pure tone audiometry test. This should be a concern because the decline in hearing function that continues with age can produce clinical manifestations later in life. The absence of complaints about hearing function is not always mean that there is no hearing loss from the audiometric tests results. This study shows that a pure tone

audiometry examination before the IAHF procedure is helpful.

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