



CORRELATION BETWEEN STENOSIS OF CAROTID ARTERY AND HEARING.

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Article history:	Abstract:
<p>Received: June 20th 2024 Accepted: July 14^h 2024</p>	<p>Carotid artery stenosis is a condition caused by the narrowing or constriction of the carotid arteries, which are responsible for supplying blood to the head. This condition often develops due to atherosclerosis and can lead to disruptions in blood circulation. Symptoms related to stenosis include headaches, dizziness, vision problems, and neurological signs. Hearing impairment may also occur as reduced blood flow to the inner ear can damage the auditory nerves, leading to hearing loss.</p> <p>Diagnostic methods include ultrasound, MRI, and angiography, which help assess the condition of the arteries. Treatment options range from medication and lifestyle changes to surgical procedures if necessary. Early detection and treatment of carotid artery stenosis are crucial for preserving hearing and improving overall health.</p>

Keywords: Hearing , Carotid artery stenosis, Stroke · Audiological tests

INTRODUCTION

Hearing disorders are a major interdisciplinary clinical problem, particularly in elderly patients. They affect about 30% of people over 65 years of age and 50% of those over 80 years of age [1].

Clinical studies have demonstrated a connection between carotid artery stenosis and hearing impairment. Research confirms that the narrowing of the carotid arteries can reduce blood circulation, affecting the blood flow to the inner ear. As a result, this may damage the auditory nerves or decrease hearing ability.

Several studies have revealed the following:

- Narrowed carotid arteries can reduce the blood supply to the inner ear and brain regions, negatively affecting hearing.
- Patients with stenosis frequently experience hearing loss along with symptoms such as headaches and dizziness.
- Some studies have utilized large-scale statistical data to explore the relationship between vascular diseases associated with carotid artery stenosis and hearing impairment.

Narrowing of the carotid artery can cause various hearing problems associated with impaired blood supply to the brain and structures responsible for hearing.

The degree of stenosis is then calculated using the following formula:

$$\text{Degree of Stenosis (\%)} = [1 - (\text{Minimal luminal diameter} / \text{Diameter of normal distal ICA})] \times 100$$

Depending on the degree of narrowing, the following hearing problems may occur:

Minor stenosis (up to 29%): Usually does not cause significant hearing problems. There may be little or no hearing loss.

Mild stenosis (30–49%): Mild hearing problems may occur, such as slight hearing loss or noise in the ears (tinnitus).

Severe stenosis (50–69%): More severe hearing problems, such as significant hearing loss or constant tinnitus. There may be problems with sound perception.

Critical stenosis (70–99%): Severe hearing problems, including significant hearing loss and constant tinnitus. There may be problems with the perception and interpretation of sounds.

Occlusion (100%): Complete cessation of blood flow, which can lead to severe hearing impairment such as sudden hearing loss or complete deafness on the affected side.

OBJECTIVE

The objective of this paper was to present information hearing impairment related to stenosis carotid artery and discuss the literature.

METHODS

We present information followed by the authors and present a literature review on the subject. The earliest reported case of hearing impairment with cerebrovascular disorders Speech audiometry is from 1981. Therefore, a retrospective review of the literature between the years 1981 and 2024 was conducted using key words such as "hearing impairment ", "stenosis carotid artery and hearing "



and "Tinnitus and carotid artery " was conducted on the Medical Literature Analysis and Plos one and Cochrane databases.

RESULTS

According to the study's purpose, in the initial search with keywords, 1204 articles were found. We found 592 references in Medical Literature Analysis , 598 references in Plos one and 14 references in Cochrane In the first step of selecting studies, 14 studies were selected to review the abstracts. Then, studies that did not meet the inclusion criteria were excluded from the study. In the second step, the full text of the three

studies was reviewed. Finally, three studies were selected (Figure1).

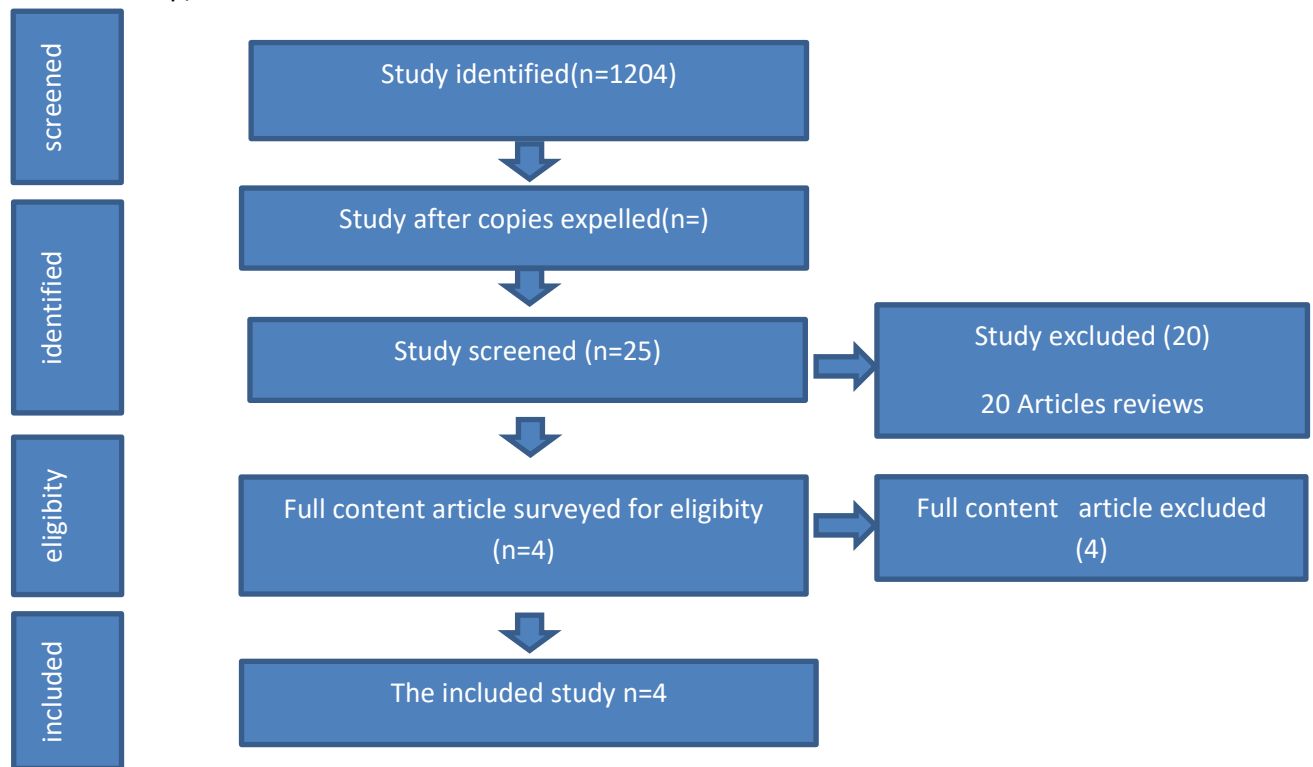


Figure 1. Study research

DISCUSSION;

Hearing dysfunction is often attributed to issues within the ear or auditory nerve, but it can also arise from problems with blood flow to areas of the brain and structures involved in hearing. One such condition is the stenosis (narrowing) of the carotid sinus, a part of the carotid artery that plays a crucial role in regulating blood pressure and blood flow to the brain. When this area becomes narrowed or obstructed, it can potentially affect the auditory pathways, leading to hearing dysfunction.

Hearing dysfunction is often associated with atherosclerotic carotid artery stenosis of the internal carotid artery , a phenomenon described in the neurology and vascular surgery literature. Sismanis

[2].reported that carotid artery atherosclerosis should be highly suspected in patients more than 50 years old and who have risk factors for atherosclerosis. In another study by Sismanis, mild to severe carotid artery stenosis due to atherosclerotic carotid artery stenosis of the internal carotid artery was the cause of pulsatile tinnitus in 16% of their 145 study patients[3]. According to several studies, the frequency of tinnitus increases in older individuals. Furthermore, as the older population and the risk factors for atherosclerosis, i.e., smoking, stressful life style, and lack of exercise increase, more people with pulsatile tinnitus caused by carotid artery atherosclerosis will be identified.



In other study by Dorobrizs, The study comprised of 63 patients (32 men, 31 women) aged from 45 to 75 years (mean age $M = 62.6$; standard deviation $SD \pm 7.4$ years). These were patients with carotid artery stenosis, referred to the Clinic of Vascular Surgery of the University Hospital in Wrocław. The study group included patients with internal carotid artery stenosis in the range of 70–90%, or the speed of peak systolic flow in the vertebral artery above 60 cm/s. As a result of examination, 48 (76.2%) patients from the study group gave the medical history of carotid artery stenosis symptoms. Among the ENT symptoms, unilateral hearing loss was reported by six (9.5%) patients, while bilateral hearing loss by nine subjects (14.3%)[4].

As a results of investigate Operativ treatment(carotid endarterectomy)is effective in improving pulsatile tinnitus in patients with unilateral symptoms and severe ipsilateral carotid stenosis.

According to the research conducted by the scientist Navpreet,A 58-year-old woman presented to the ear, nose and throat clinic with acute onset of right ear pulsations and high-pitched tinnitus. An audiogram demonstrated mild sensorineural hearing loss in the right ear. Her computed tomography angiogram revealed moderate stenosis of the right internal carotid artery and she underwent revascularization with angioplasty and stent placement. A repeat audiogram demonstrated improvement in sensorineural hearing loss in the right. [5].

We believe that atherosclerotic carotid artery stenosis should be considered a possible cause of pulsatile tinnitus, particularly in patients with cardiovascular risk factors. Endovascular treatment of arterial stenosis is effective for improving pulsatile tinnitus in patients with severe carotid stenosis.

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