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PREVALENCE OF DEAFNESS AMONG PATIENTS 40 YEARS AND OLDER ATTENDING EAR, NOSE AND THROAT CONSULTATION CLINICS IN MOSUL CITY

[1]*Dr. Mays Shakir Mahmood, [2]Dr. Rakan A. Hamid and [3]Dr. Marwan F. Buraa

[1]M.B.Ch.B / D.O.H_ Nineveh.
[2]M.B.Ch.B,F.I.C.M.S(F.M) / D.O.H_ Nineveh.
[3]M.B.Ch.B,F.I.C.M.S(ENT) / D.O.H_ Nineveh.

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***Corresponding Author: Dr. Mays Shakir Mahmood**
M.B.Ch.B / D.O.H_ Nineveh.

ABSTRACT

Background: Hearing loss is a decreased ability of hearing thresholds of 26 db. or worse. Hearing impairment is one of the major disability in community, related to serious communication and psychosocial problem. Patients with suspected hearing loss should undergo in-out patient ear examination for cerumen impaction, exostoses, and other abnormalities of the external canal and tympanic membrane then hearing tests such as the tuning fork test or audiometry. Anatomical ear divided into three parts; external ear, middle ear and inner ear, each has its function Hearing loss has many risk factors like aging(one of the most significant), smoking, hypertension, cerebrovascular accident, noise exposure, diabetes mellitus, ototoxic medications, genetic, chronic ear infection, trauma to head and ear, chronic kidney disease and autoimmune disease. There are three types of hearing loss: conductive hearing loss, sensorineuronal hearing loss and mixed type hearing loss **Aim**: The aim of the study is to calculate the prevalence of deafness among patients 40 years and older attending ear, nose and throat consultation clinics in Mosul city. **Methodology**: A descriptive cross-sectional study design was been chosen. The study was conducted during 6 months from the1st of January to the 30th of June 2023, in ear, nose and throat consultations in AL-Salam Teaching Hospital and AL-Jamhorii Teaching Hospital. The total number of the patient were 450. **Results**: The overall prevalence of hearing loss in this study sample is(27.9%). On other hand we found that hearing loss increased with age as we see from this study that patients with 60 years and older(41.1%) are more prevalent with hearing loss than younger patients (40-59 years) and we found that sensorineuronal hearing loss(37.8%) are more common than other types. also in this study we found that. **Conclusion**: In this study we found that prevalence of haring loss among the study population is about one quarter of the study population and most of them has mild sensorineuronal hearing loss and more common in urban area.

INTRODUCTION

Hearing impairment is a wide spread unrecognized health problem considered as one of a major source of disability in community and it is related to serious communication and psychosocial problem. Hearing loss is defined as decreased ability of hearing thresholds of 26 db. or worse[1],[2] One or both two ears may be affected which leads to a problem in hearing conversational speech or loud sound so people with profound hearing loss imply very little or no hearing so they use sign language for communication.[3] It impacts many aspects of life:- * social isolation, stigma and lone less * speech and communication* cognition * effect on society and economy.[3] Patients may present with self-recognized hearing loss, family members or colleagues may observe abnormal behaviors (e.g., problem with understanding conversations, increasing television volume) that suggest hearing loss.[4] Patients with suspected hearing loss should undergo in-office ear examination and Computed tomography or magnetic resonance imaging is indicated in patients with asymmetrical hearing loss or sudden sensorineural hearing loss.[4]

Epidemiology:- Hearing loss is one of the most common chronic and sensory deficit worldwide and considered the fourth highest cause of disability globally and affect about 5%of population world, it has a significant personal effect and social cost.[5] Its prevalence increased markedly with age[6], According to WHO by 2050 nearly 2.5 billion people are projected to have some degree of hearing loss and at least 700 million will require hearing rehabilitation.[3]

Anatomy of the ear: External ear:- composed of auricle, external acoustic meatus and tympanic membrane[7]; **Middle ear:-** contain tympanic cavity, auditory ossicles and muscles of the ossicles[8]; **Inner ear:-** composed of bony labyrinth (vestibule, semicircular canals, cochlea) and membranous labyrinth (utricle, saccule, semicircular ducts, cochlear duct).[9] as in figure (1):

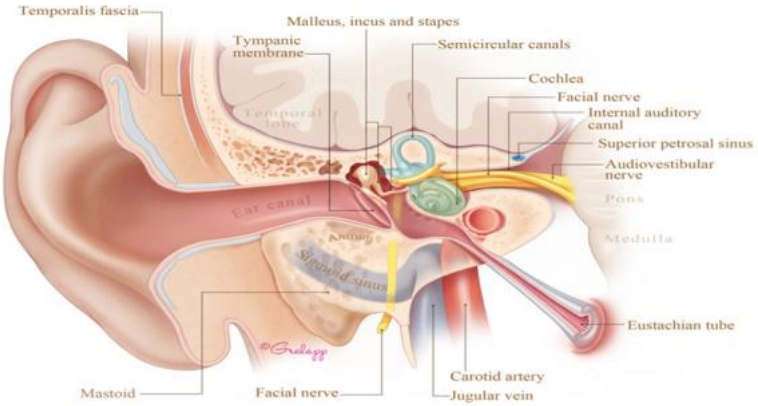

Figure 1: Anatomy of the ear.[10]

Physiology of the auditory system: External ear:- (1)Pinna aids in sound localization.(2)With the external ear canal it increases acoustic pressure at the tympanic membrane in the 1.5 to 5 kHz range, which is the frequency range most important for speech perception[9],[11]; **Middle Ear:-** considered a transmission pathway from tympanic membrane to oval window of the cochlea[9],[11]; **Cochlea:-**translates sound energy to the dendritic endings of the auditory nerve.[11] The Organ of Corti located in the inner ear within the cochlea which assists to audition.[12]

Risk factor of hearing loss:- Age related hearing loss (presbycausis) is hearing loss that occurs gradually as we grow older[13]; Smoking found that both nicotine and carbon monoxide lower oxygen blood levels{14][15]; Hypertension All living cells in the human body depend on a proper supply of oxygen and nutrients in order to maintain their function, and such supply depend on the functional and structural integrity of the heart and blood vessels[16]; Cerebrovascular accident[17], Noise exposure may be due to one-time exposure to an intense sound such as an explosion or continuous exposure to loud sounds like listening to a concert[18]; Diabetes mellitus, over time blood sugar levels that are too high or too low can damage nerves that affect the hearing[19]; Ototoxic medication like Salicylates, loop diuretics and aminoglycosides{20}; Genetic like Treacher Collins Syndrome and Pendred Syndrome[1],[21]; Chronic ear infection[22]; Trauma to head and/or ear{23}; Chronic kidney disease{24} and Autoimmune disease[25b,v].

Types of hearing loss (1)Sensorineural Hearing Loss occurs when the inner ear or the vestibulocochlear nerve becomes damaged like Meniere's disease, Noise exposure, Trauma and tumor such as neuroma[26] (2) Conductive Hearing Loss occurs in the external or middle ear where sound waves are not able to reach the inner ear may be blocked by wax, foreign body located in the ear canal, infection or a bone abnormality usually can be treated either medically or surgically[43] (3)Mixed Hearing Loss.[27]

How to asses hearing loss:-normal people can perceive frequencies between 20-20000 Hz.[28] which can be assessed by using (1)Tuning fork tests are the Rinne and Weber{29}(2) Puretone audiometry is the mainly clinical used hearing test The American National Standards Institute(ANSI) define the threshold of audibility as "the minimum effective sound pressure level of acoustic signal producing an audiometry sensation".[30]

Classification of hearing loss:-There are five degrees of hearing loss calculated from the average of thresholds for 500, 1000 and 2000 Hz according to goodman(1965)criteria :-[1]
*Mild(26 – 40 db.) *Moderate(41 – 55db.) *Moderately severe(56 – 70db.) *Severe(71 -90 db) *Profound(>90 db.)

PATIENTS AND METHODS

Ethical Consideration:-The official approval has been obtained from the Arab Board of Health specializations and the official approval of Nineveh health directorate had been taken before the beginning of data collection. Administration of Al-Jamhurii Teaching Hospital and Al- Salam Teaching Hospital was informed about the nature of the study and written consent was obtained from them prior to participation and before filling up the questionnaire. Verbal consent from each patient participate in this research had been taken.

Study Design:-Across sectional study design had been chosen in order to achieve the aim and objectives of the present study.

Period of the Study- Data collection and analysis occurred over six months started from 1st of January to the 30th of June 2023.

Study Population:- The study included all patients suffering from hearing impairment 40 years and older, both sexes, from any race whose diagnosed by ENT consultant by audiogram according to hearing loss definition. At the beginning the specialist examine the patient who suffer from hearing impairment by autoscope to see if there is any cerumen impaction to clean it or foreign body to remove it, then examine them by tuning fork and after that send them to audiologist to do pure tone audiometry for them and they are diagnosed with either conductive hearing loss, sensorineural or mixed hearing loss, as shown in the introduction, (figure 7,8and9) by audiologist then the patient return back to the ENT clinic to manage them accordingly. In the period of the study whole patients whose 40 years and older visit ENT clinic were(1612) and patients had hearing impairment were (450) (280 male and 170 female).

Study setting:- The study has been conducted in ear, nose & throat consultations clinic in Al-Jamhurri teaching hospital (right side of the river) and Al- Salam teaching hospital (left side of the river). The study was conducted in Mosul City, which is located in the north of Iraq & it is the center of Nineveh Governorate.

sample Size:- The study include all available cases in the period of study whose are 40 years and older suffering from hearing impairment which consult ear, nose and throat consultation clinic.

Inclusion Criteria:- Patients of both gender suffering from hearing loss whose are 40 years and older.

Exclusion Criteria:- Patients younger than 40 years old, Patients with abnormal behavior like(mental retardation, Autism, etc.) and Patients with treatable cause of the external ear like wax, foreign body and etc.

Data Collection:- Samples has been carried out in Al-Jamhurii teaching hospital and Al-Salam teaching hospital by using organized questionnaire which is filled by researcher after the consultant diagnosed the patient as hearing impairment which was occurred by direct interview with the patients after make a good explanation to them about the goals of the research. A questionnaire was in Arabic language, it contain information about the age, gender, socio-demographic, Academic achievement, chronic diseases, Smoking ototoxic medications like (aspirin, diuretics, antimalarial drugs, aminoglycoside) duration of hearing loss, degree of hearing loss, type of hearing loss, and associated symptoms.

Statistical Analysis:- Statistical package for social science (spss26)were used for analytic statistic. Descriptive statistics (frequencies and percent) for demographic data of the patients and clinical criteria represented by tables.

According to the formula of the prevalence

$$\frac{\text{All new and pre-existing cases during a given time period}}{\text{Population during the same time period}} \times 100\%$$

RESULTS

Prevalence of Hearing Loss and Sex Distribution:- Through this research it was found that the total number of patients who visited the ENT consultant at Al-Jumhorii Teaching Hospital and at Al-Salam teaching hospital, whose ages are 40 years and over, was (1612), and that the number of patients suffering from hearing problems was (450) so according to the definition of prevalence "is the proportion of persons in a population who have a particular disease at a specified point in time or over a specified period of time."[31] So the prevalence of hearing impairment in Mosul city is(27.9%), from the study found that male are more frequent with hearing loss(62.2%) than female.

Table 1: Sex Distribution and Their Prevalence.

Gender	No.	%	Prevalence
Male	280	62.2	17.36
Female	170	37.8	10.54
Total	450	100	27.9

Socio-demographic characteristics of the study: It is clear from table 2 the table that age of the population that 60 years and older have more frequent hearing loss (41.3%). also this table show that about three quarter of the study population(72.4%)are from urban. on the other hand unemployment and retired constitute (59.6%) more than half of the study population. Also this table show the primary school constitute near the half(53.3%) of the study population compared with bachelor degree constitute (10.7%), the least, of the study population.

Table 2: Socio-demographic characteristics of the study.

Characteristic		Sample = 450	
		No.	%
1-Age in year	40-49	136	30.2
	50-59	128	28.5
	>= 60	186	41.3
2-Residency	Urban	326	72.4
	Rural	124	27.6
4-Education	Illiterate	96	21.3
	Primary school	240	53.3
	Secondary school	66	14.7
	bachelor degree or more	48	10.7

History of associated diseases: It is clear from the table (3) that (40.9%) of the study sample have hypertension, also show less than one fifth (19.1) of the study sample suffering from D.M and it is clear that only (4.9%) of the

study population have CVA and only (9.3%) of the sample have chronic ear infection.

Table 3: History of Associated Diseases.

Symptoms		Sample=450	
		No.	%
History of hypertension	Present	184	40.9
	Absent	266	59.1
History of diabetes mellitus	Present	86	19.1
	Absent	364	80.9
History of stroke	Present	22	4.9
	Absent	428	95.1
History of chronic ear infection	Present	42	9.3
	Absent	408	90.7

Degree of hearing loss: From table (4) it is clear that mild degree (24.9%) most common degree of the study population and profound degree (16.2%) the least one.

Table 4: Degree of hearing loss.

Degree of hearing loss	Sample = 450	
	No.	%
Mild (26 – 40) db.	112	24.9
Moderate (41– 55) db.	99	22
moderate to severe (56 – 70) db.	87	19.3
Severe (71– 90) db.	79	17.6
Profound (>90) db.	73	16.2

Types of hearing loss: From the research found the sensorineuronal is the most common type (37.8%) and conductive hearing loss then mixed type.

Table 5: Types Of Hearing Loss.

Type of hearing loss	Sample = 450	
	No%	%
sensorineural hearing loss	170	37.8
conductive hearing loss	152	33.8
mixed type hearing loss	128	28.4

DISCUSSION

Hearing impairment is a wide spread unrecognized health problem, it is considered as one of a major source of disability in community.

Prevalence of Hearing Loss: In this study the prevalence of hearing loss was (27.9%), while in a study in University of Washington study from 2009 – 2019 had been done by ML Haile et al shows People had hearing loss in accounting for (20.3%)[32], Also in 2007 in Egypt a study conducted by O. Abdel Hamid et al shows that the prevalence of hearing impairment was (16%)[33], the difference here may be due to large sample (whole age group was participate) and may be due to exposure to an intense impulse sound such as an explosions or by continuous exposure to a loud sounds.

Socio Demographic Characteristics:- (1) Gender, this study presented that there was male predominant with hearing impairment which constitute of the study sample, Also in study for the prevalence of hearing impairment from 2008 through 2011 in Hispanic/Latino which was conducted by Karen J. Cruickshanks et al found that there was predominant in male[34], The higher percentage of hearing loss in males than in females may be due to the fact that men are more exposed to loud sounds during their work and bombs and explosions.(2)Age, this study showed that old age 60 years and more developed hearing impairment more frequent (41.3%) from age 40-49 years and 50-59 years, And this coincides with a lot of research around the world like in Malaysia according to study in 2018 which was conducted by Abdul Aziz Harith et al showed patients 60 years and older were more frequent with hearing impairment.[35] (3) Residency, most of the study sample (72.4%) was from the urban while rural constitute only (27.6%), Also many studies showed the same results like a study in America in 2023 which was conducted by Jorgensen Erik et al showed the older patients with hearing impairment were more common in urban area.[36] (4) Education, this study found that about half of the patient with hearing loss are completed primary school and only (10.7%) have bachelor degree which is the least one, Also the same in 1998 in Beaver Dam, Wisconsin a study which was conducted by Karen J. Cruickshanks et al found most of the patients with hearing loss were in less than high school and found that patients had collage or greater are the least one.[37]

History of associated disease(1)Hypertension, this study showed that (40.9%) of the study population with hearing loss had hypertension and (59.1%) of them without hypertension, Also in 2011in the Beaver Dam, a study by Scott D. Nash et al found that(38.4%) of the patients with hearing impairment had hypertension.[21] (2)Diabetes mellitus, this study found that (19.1%) of the study population with hearing problem, had diabetes mellitus and (80.9%) of them did not have it, while in 2011in the Beaver Dam, there was a study by Scott D. Nash found that (6.3%) of the patients with hearing impairment have diabetes mellitus[21], the difference here may due to strict control of diabetes.

Degree of hearing loss: In this study the mild degree of hearing loss was the most common form of hearing loss in the study population, followed by moderate, moderately severe, severe and profound respectively, Also in a study in Egypt in 2007 which was conducted by O. Abdel Hamid et al found that the mild degree was the most common of the hearing impairment and the profound degree was the least form.[33]

Types of hearing loss: This study showed that sensorineuronal hearing loss was the most common (37.8%), and the least one was the mixed type (28.4%), The same in the other research like in rural area of Himalaya according to a study in 2017 which conducted by Trilok C. Guleria et al found that sensorineuronal hearing loss was the most common type[38], Also in Egypt in found that sensorineuronal hearing loss was the

most common type and the mixed type was the least one.[33]

CONCLUSIONS AND RECOMMENDATIONS

From the result of the present study the prevalence of hearing loss among the study population is more than one quarter of the study population, Hearing loss is predominant in male, Older patients have more frequent in hearing loss, Mild degree hearing loss had the most common degree and profound was the least and sensorineuronal was the most common type of hearing loss.

From the available data on prevalence of hearing loss and hearing in Nineveh is limited so it is recommended to support and conduct studies, including longitudinal studies, in diverse populations to better understand the:

The natural history of hearing loss, Risk factors and comorbidities of hearing loss, Hearing health care needs and the impact of hearing loss and its treatment on health, function, economic productivity and quality of life.

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