Case study

Prevalence of presbycusis in Casablanca

Abstract :

Presbyacusis or age-related hearing loss (ARHL)is characterized by high-frequency-dominated hearing loss, reduced speech understanding and impaired localization of sound source.

Presbycusis is correlated with decreased quality of life, retirement leading to depression. Furthermore, the association between hearing loss and cognitive function is widely accepted, it increases the risk of dementia and cognitive impairment

In several countries, mass screening has been adopted to deal with early presbycusis and prevent its consequences , unlike in Morocco where presbycusis is still under-diagnosed. However, no prevalence study has been conducted so far in Morocco to assess the extent of this condition.

The aim of our study is to assess the prevalence of presbycusis during the year 2017 in Casablanca and to identify the influence of general factors on the prevalence of presbycusis.

We conducted a cross-sectional epidemiological study among people over 60 in 2017 at the level of 8 CDS randomly selected in Casablanca. A questionnaire was completed and the audiogram was conducted at 411 people who came to see health centers.

The data from the study allowed us to highlight the relationship between presbycusis and other neurosensory deficits. Apart from age, no link could be established between presbycusis and demographic factors or health status. After the multivariate analysis, it was found that taking medication reduced the risk of developing presbycusis ($p<0.001$, OR = 0.197 IC95 [0.093-0.415]), but could not determine exactly which drug was responsible for it.

Keywords :presbycusis, prevalence, determining factors, neuro-sensory deficit

Introduction :

Presbycusis is a sensorineural deafness associated with age. It is a symmetrical and progressive bilateral sensorineural deafness predominant in high frequencies with difficulty in understanding speech (especially in a noisy environment) and a slowdown in the interpretation of sound information [**1,2] .**

It is the most common age-related neurosensory deficit [3], and the third chronic disease of the elderly **[4],** affecting nearly 2/3 of people over 70 **[5,6].** The date of onset of deafness, its evolution and its impact are characterized by significant interindividual variability **[7,8].** Treatment depends on the type and severity of presbycusis **[9].**The seriousness of this pathology lies in its consequences which can be severe and multiple: not only is it responsible for the isolation of the hearing impaired, leading to depression, but it also deteriorates their quality of life, affects their cognitive and motor functions, and increases the risk of dementia **[12–14].** In the absence of treatment, the economic impact of hearing loss would amount to 213 billion euros per year in Europe, while the target device would reduce it by 40 % **[15].** In several countries **[16,17]** mass screening has been adopted to treat presbycusis early and prevent its consequences, unfortunately, in Morocco, presbycusis remains under-diagnosed.

Methods :

It is a cross-sectional epidemiological study carried out in people over the age of 60 in 2017 at 8 randomly selected health centers in Casablanca. A questionnaire was completed and the audiogram was performed in 411 people who came to consult at the health centers. Presbycusis was retained according to

the classification of the World Health Organization (hearing threshold greater than 25dB HL) and the International Bureau of Audio-Phonology (hearing threshold greater than 20dB HL).

Results :

In people aged between 60 and 65, the loss of hearing mainly affected the 4 and 8 kHz frequencies. Over time, the loss of hearing also reached the low frequencies. The prevalence of presbycusis (according to WHO) was 6.3%, 13.1%, 25.3% and 36.7% for 60-64 year olds, 65-69 year olds, 70-74 year olds and over 75 years respectively. The data from the study allowed us to highlight the relationship between presbycusis and other neurosensory deficits. Apart from age, no link could be established between presbycusis, demographic factors and state of health. After the multivariate analysis, it turned out that taking medication reduced the risk of developing presbycusis ($p<0.001$, OR=0.197 IC95 [0.093-0.415]), without being able to determine which medication exactly was responsible.

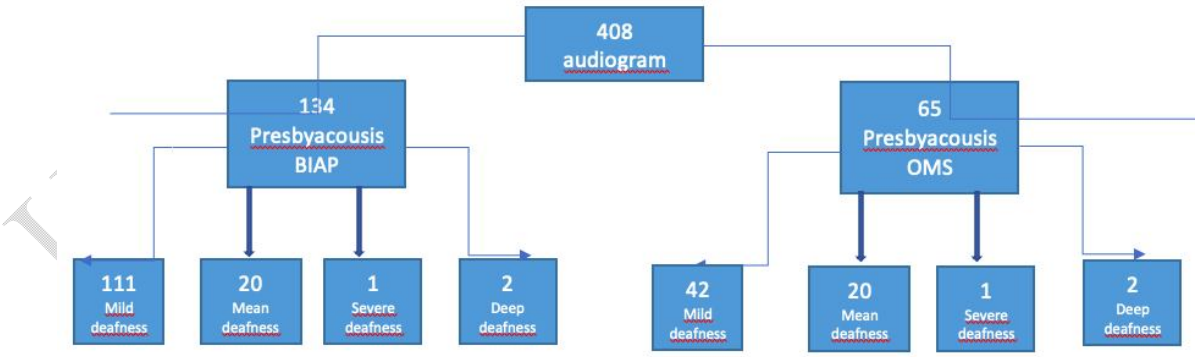

Figure 01 : Representative diagram of the overall results of our study

Discussion :

According to studies, 6.17% of patients with presbycusis would require a hearing aid **[17]** compared to 5.4% in our study.

While the rate of hearing aid use for people with presbycusis varies from 18.4% to 55% depending on the country **[13,15,20],** none of the participants in our study benefited from them.

The lack of hearing aids can easily be explained by the cost of hearing aids, which remains quite high for a cohort of which more than half are of low socio-economic level. In addition, some studies have shown the benefit of family support in the purchase and wearing of devices by 53%, while the demand by audiologists, ENT or family doctors has an influence of 20.18 and 12 % respectively **[22]**

There is still no universal recommendation for the treatment and management of presbycusis, primarily because of the many incriminated factors, the different sites affected and especially because of the significant lack of information on the issue **[18**,**21].**

Individual psychological factors directly influence the impact of presbycusis and therefore justify management on a “case by case” basis **[2,7].**

Fitting both ears remains the usual treatment **[13,22]** with positive effects on cognition and other functional domains **[19].** But first, vocal audiometry is necessary to explore the central auditory pathways and the difficulties of verbal discrimination **[2].** Acoustic self-emission can also be proposed to study the

viability of the inner and outer hair cells of the cochlea, supplemented by auditory evoked potentials to study the central auditory pathway **[2].**

The WHO offers auditory rehabilitation from a deafness threshold above 41dB, qualifying it as disabling**[23],** others state the indication as soon as the functional impairment is obvious and the average deficit in vocal audiometry exceeds 30dB with impairment of intelligibility related to speech audiometry of more than 50%**[7]**. However, some researchers recommend auditory rehabilitation at an earlier, so-called infra-clinical stage, through "audio-verbal" rehabilitation (prosthesis and auditory rehabilitation) **[24].** Hence the importance of just as early screening, which can even begin from the age of 50 **[25].**

Unfortunately, hearing aids show limited success**[2,7],** and in cases of profound deafness that cannot be corrected with a hearing aid, a cochlear implant may be offered. In the elderly, cochlear implants give very good results**[2].** Indeed, the device remains focused on the peripheral auditory system, while presbycusis can have a central component, as mentioned above (damage to the inner hair cells, synapses, auditory nerve, and fronto-temporal cortex), that only the cochlear implant can correct **[2**,**10**,**11]** .

Table 1: Comparison of study subjects to the target population (elderly people from Morocco and Casablanca)

	Morocco (HCP 2017)		**Casablanca (HCP 2017)**		**Our study (2017)**	
	In thousands	**%**	**In thousands**	**%**	**n**	**%**
60-64 years old	1247		137		175	
Male	642	51,5	69	50,4	50	28,6
Women	605	49,9	68	49,6	125	71,4
65-69 years old						
Male	895		77		99	

Women	451	50,4	36	46,7	32	32,3
70-74years old	444	49,6	41	53,3	67	67,7
Male						
Women	552		60		76	
75 years and +	261	47,3	26	43,3	33	43,4
Male	291	52,7	40	56,7	43	56,6
Women						
	851		83		61	
	391	46	36	43,4	25	41
	460	54	47	56,6	36	59
Schooling						
None		36,9		22,3		58,9
Primary		28		25,5		14,1
College secondary		14,2		17,5		11,2
Qualifying secondary		10		18,2		2,7
Superior		6,1		11,9		13,1
Previous occupation						
None		16,2		18,9		49
Employee		28,9		58,8		20
For his own account		48,4		20,8		16
Other		6,5		1,5		15

Table 2: Prevalence of presbycusis in different countries (age and hearing threshold mentioned)

Références	**Studies**	**Prevalence of presbycusis (age and retained hearing threshold)**
Our study	Morocco ; Prevalence of presbycusis in Casablanca. 2017	15,9%(≥60 ans, PAM≥26dB) 32,8%(≥60 ans, PAM≥20dB)
Lin et al. (2011) [28]	USA; Hearing loss prevalence and risk factors among older adults in the united states. 2005-2006	63,1%(≥70 ans, PAM≥26dB)
Simonica de Sousa et al. (2009) [27]	Brésil; Risk factors for presbycusis in a socio-economic middle-class sample. 2001-2005	36,6%(≥40 ans, PAM≥26dB)

Chang et al. (2007) [32]	Taiwan ; Presbycusis among older Chinese people in Taipei, Taiwan : A community-based study	99% (≥65 ans, PAM≥26dB)
Gopinath et al. (2009) [5]	USA; Prevalence of age-related hearing loss in older adults: Blue Mountains study. 1992-1994	33% (≥50 ans, PAM≥26dB)
Liu et al. (2001) [35]	Chine; Epidemiological studies on hearing impairment with reference to genetic factors in sichuan. 1986-1987	12,8%(≥60 ans, PAM≥20dB)
Borchgrevink et al. (2005) [36]	Norvège ; Unscreenedthresholds and prevalence of hearingimpairment for adults >20 years. 1996-1998	14,2% (≥60 ans à 35dB)
Hietman et al. (2005) [24]	Danemark, suède, norvège; Hearing among 75-year-old people in three Nordic localities: a comparative study. 1989-1991	16,5%(≥75 ans, PAM≥40dB)

Conclusion :presbycusis is common in Morocco, its prevalence is estimated between 16% and 33% in Casablanca, it can bealso associated with greater risk of cognitive disorders and depression and yet no screening measure was undertaken to take into account early charge this pathology.

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