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Ménière's Disease: Epidemiology

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Abstract

Meniere's disease is a disorder of the membranous labyrinth of the inner ear manifesting as vertigo, tinnitus, sensory neural hearing loss and aural fullness of known or unknown origin. The aim of this chapter is to estimate the prevalence of Ménière's disease (MD) and its relationship with demographic factors, symptoms and conditions that are known. Few articles have been published on the epidemiology of Meniere's disease from 1975 to 1990, studies from Japan indicated a fairly constant prevalence of 17 cases per 100,000 population. These studies were undertaken by a Research Committee on Meniere's Disease. Kotimaki and colleagues analysed the Finnish population of five million people between 1992 and 1996. A prevalence of 43/100,000 and an average yearly incidence of 4.3/100,000 population were found by the authors. MD is 1–3 times higher in women than in men and also observed a higher prevalence in adulthood and white people. MD seems to be much more common in white adults with higher body mass index categories, in their fourth and fifth decade. However, in recent years, especially in the last decades, there have been several safe and effective medical and surgical therapies for the treatment of the disease and its sequels.

Keywords: epidemiology, prevalence, Ménière, incidence, hearing loss

1. Introduction

Symptom and disease definitions are a fundamental prerequisite for professional communication in clinical, research and public health settings. The need for structured criteria for epidemiologic, diagnostic and therapeutic research is more obvious for disciplines that rely heavily on syndromic diagnosis [1].

Accurate information about the occurrence and impact of balance disorders is also important for planning health services that meet the needs of the community they serve. It is essential to have a good understanding of the epidemiology of the conditions and their symptomatic

presentation in the community. Much literature in this area is based around specialist clinic and hospital experience that is likely to be subject to bias [2].

The challenge in diagnosing Meniere's disease continues, because usually in the early stages, only a few symptoms are present. Consequently, there is a difficulty in measuring the incidence and prevalence of the disease in any population. In the emergency department, it is common to see patients with Ménière's disease (MD) discharged with inaccurate labyrinthitis dignitariaries after sudden onset of vertigo [3].

Ménière's disease is characterised by recurrent attacks of vertigo associated with fluctuating sensorineural hearing loss, tinnitus and a sense of aural fullness. In 1861, Prosper Ménière correctly attributed the attacks to a disorder of the inner ear, suggesting that the mechanism of causation could be similar to migraine or inner ear vasospasm, a differential diagnosis which is still relevant for the disease today [4].

2. Studies review

Few articles have been published on the epidemiology of Meniere's disease [3].

Despite the large number of scientific contributions published annually on Meniere's disease, consistent epidemiologic information is sparse. To date, the true incidence and prevalence of Meniere's disease are not known [5].

Table 1 shows some articles published in the literature and the number of patients in each study presented.

Author	Journal	Year	Subject
Murdin [2]	Otology and Neurotology	2015	Studies were eligible for inclusion if they contained data on the epidemiology of symptoms of balance disorders (dizziness and vertigo) or balance disorders sampled from community-based adult populations. Twenty eligible studies were identified
Simo	American Journal of Otolaryngology	2015	Described the prevalence of Meniere's disease in the United States between 2008 and 2010 in patients >10 years old. Prevalence was highest in Caucasians 91 per 100,000 people
Tyrrell [15]	Ear and Hearing	2014	The aim of this study was to estimate the prevalence of Ménière's disease, which was more common in participants who were older, white, female and having higher body mass index categories. The authors used cross-sectional data from the UK Biobank to compare 1376 self-reported Ménière's participants
Angulo [13]	Acta Otorrinolaringológica Española	2003	We prospectively collected all patients diagnosed with Meniere's disease 'definitive' between 1992 and 2002 Sierrallana Hospital in Torrelavega (Cantabria). The incidence was 3/100,000 cases inhabitants/year prevalence of 75/100,000 (29 in men and 46 in women)
Shojaku [10]	ORL	2005	They conducted retrospective surveys for the period 1990–2004 of the Nishikubiki district and of the period 1980–2004 of Toyama Medical and Pharmaceutical University. The average annual prevalence was 34.5 per 100,000 population

Author	Journal	Year	Subject
Vrabec [7]	Otolaryngology– Head and Neck Surgery	2007	Retrospective review in an academic referral practice. To define the prevalence of definite Ménière's disease (MD) among patients presenting with characteristic symptoms and examine the utility of published diagnostic guidelines. The prevalence of definite MD in these 295 individuals was 64%
Havia [11]	Otolaryngology– Head and Neck Surgery	2005	Prospective study based on population register data to study the prevalence of Ménière's disease in the general population of Southern Finland. The prevalence of 513 of 100,000 persons, but our population-based estimate of MD prevalence is much higher than in previous reports

Table 1. Articles published in the literature.

3. Epidemiology

Although Ménière's syndrome (MS) has been recognized as a clinical entity since 1861, when it was first described by Prosper Ménière, the epidemiology of the disorder is still uncertain [6].

In 1861, Prosper Ménière first described the clinical trial that bears his name. The knowledge of cochleovestibular function was primitive. Today, physicians are still grappling with the same questions regarding the pathophysiology of the syndrome that perplexed Ménière 145 years ago, in the age of high-resolution imaging, molecular diagnostics and single-cell physiology [7].

Several epidemiological studies of Ménière's disease have been performed over the past few decades with widely contrasting results. The wide range is likely to result from changes over time in criteria for the diagnosis of Ménière's disease, methodological differences, differences in the populations surveyed and difficulty in distinguishing Ménière's disease from related conditions such as migraine-associated vertigo [8].

Many of the epidemiologic studies have to rely on chart reviews or medical databases, each having their own flaws. Data collected during routine clinical care will vary in quality, and their interpretation is limited by the consistency, accuracy, availability and completeness of source records. Although more reflective of 'real life' than a contrived experiment, observational retrospective studies are susceptible to bias. Although studies of medical databases are relatively inexpensive and data often are already organized and computerized, these studies do not eliminate possible bias, often present high rates of missing data or errors, and have definitions by which data are encoded that may change over time (absolutely true in Ménière's disease) [5].

Published reports of the epidemiology of MS generally fall into two methodological categories. Most published studies are retrospective series that start with known cases of MS identified from patient records for a given group of hospitals and clinics. The population served by the hospitals and clinics then serves as the dominator for calculating incidence and prevalence. This methodology introduces sampling bias in that patients in the population with the disease may not have been treated at the hospitals and clinics surveyed for various reasons. Population-based cross-sectional studies reduce sampling bias by surveying a random sample of the general population [6].

In an effort to improve reporting of disease outcomes and ensure a uniform definition of the disease, the American Academy of Otolaryngology—Head and Neck Surgery (AAO-HNS)

Hearing and Equilibrium Committee has issued guidelines for diagnosis. The most recent version of the guidelines was presented in 1995 [7].

Prevalence is defined as the proportion of individuals in a population having a disease [9].

In 1973, Stahle and colleagues reported a prevalence of 46 cases per 100,000 population. From 1975 to 1990, studies from Japan indicated a fairly constant prevalence of 17 cases per 100,000 population. These studies were undertaken by a Research Committee on Meniere's Disease and a Committee on Peripheral Vestibular Disorders. Kotimaki and colleagues reported a prevalence of 43/100,000 and an average annual incidence of 4/3,000,000 inhabitants after analysing the Finnish population for a period of 4 years according to the AAO-HNS recommendations [3].

The study with the highest number of citations examining prevalence of MS in the United States was performed by Wladislawosky-Waserman and colleagues. These investigators identified cases of MS by examining medical records from 1953 to 1980 for the Mayo Clinic and Olmstead Medical Group, the major healthcare providers for the 40,000 inhabitants of Rochester, Minnesota. A prevalence of 218 per 100,000 in 1980 was reported. As Celestino and Ralli pointed out, one-third of patients included in the Rochester study had recurrent vertigo without cochlear symptoms and would not meet current criteria for MS. Therefore, prevalence was likely overestimated. Also, the population studied was homogeneous relative to the current United States population; 99% of the subjects were white [9].

Estimated prevalence rates range from as low as 3.5 per 100,000 population to as high as 513 per 100,000 population. However, it is clear that Ménière's disease is more common in women [8].

The frequency of male/female prevalence in Meniere's disease has been noted to be generally equal with perhaps some slight female preponderance. Simo et al. described the prevalence of Meniere's disease in the United States. This study clearly provides evidence that currently a female preponderance is present. The findings of a female predominance is 1.51, but not unlike other reported rates of gender differences [4].

Harris also showed the prevalence of Meniere's disease by age group and sex, as shown in **Figure 1**.

A study was conducted to estimate the prevalence of Meniere's disease in the UK. This study investigated the relationship between some conditions such as mental health, diseases and demographic factors.

They used data from the UK Biobank to compare 1376 self-reported Ménière's participants with over 500,000 participants without Ménière's disease.

Ménière's disease was more common in participants who were older, having higher body mass index categories, white and female.

After World War II, to rapid increase in cases of MD occurred in Japan, but the reasons have not yet been clarified.

In Nishikubiki district, a retrospective survey of 15 years was conducted to evaluate epidemiological characteristics, such as sex and age. Some of the data in this study were analysed in a previous study. Three hundred and sixty-five patients were diagnosed with MD according to the diagnostic criteria. There was a slight increase in the prevalence of MD during the period 1990–2004 [10].

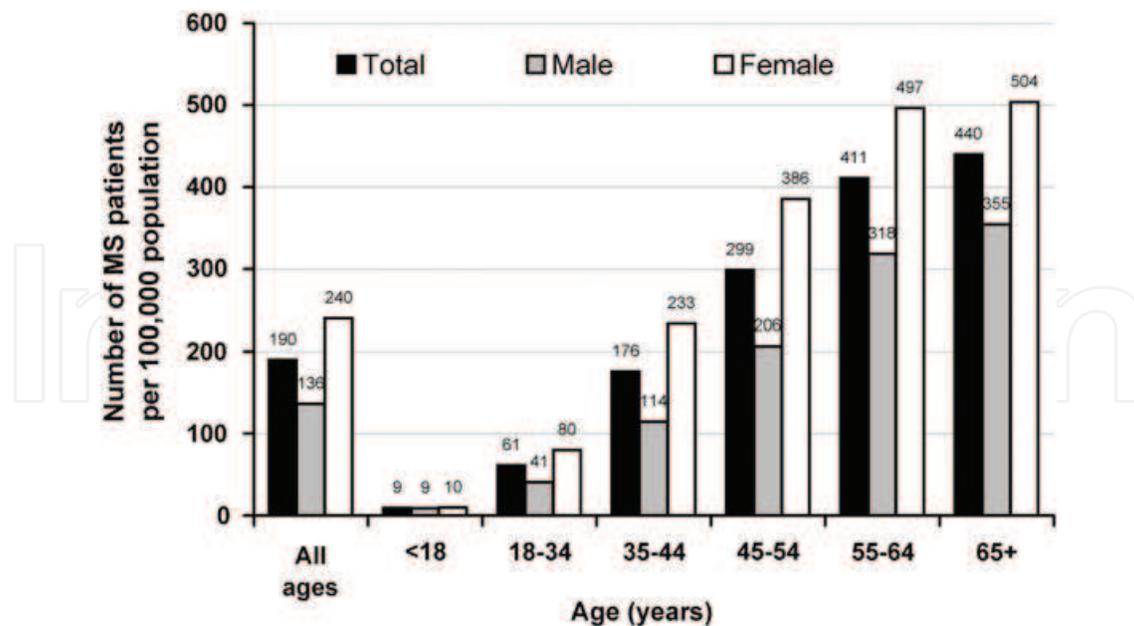


Figure 1. Prevalence in the United States of Ménière's syndrome by age group and sex. From Harris and Alexander [9].

In Houston—TX, a retrospective chart review was conducted to identify outpatient visits coded using the ICD-9 codes for Ménière's disease during the years 2001–2003. The prevalence of definite MD in these 295 individuals was 64%. For this study, the 1995 American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) Committee on Hearing and Equilibrium guidelines were used for diagnosis and classification. The largest group (23%) consisted of patients with only cochlear symptoms. Of those with definite MD, the mean duration of disease at last follow-up was 7.6 years, 56% were female, 19% had bilateral disease and 34% required surgical management for vertigo. Those initially classified as probable are usually reclassified as definite with extended follow-up [7].

The prevalence of Ménière's disease was evaluated in the general population of Southern Finland through a prospective study based on population register data. A prospective MD prevalence study was conducted in the general population of Southern Finland. A questionnaire on vertigo associated with a sensation of movement, hearing loss or tinnitus was sent to 5000 people from the age of 12 years randomly selected in the city. The patients were clinically examined in our vestibular unit. The clinical examination was supplemented by audiological and otoneurological examinations [11].

The response rate was 63%. In the final sample of 3116 people, 216 reported the triad of vertigo, hearing loss and tinnitus. Using the most recent criteria of the Hearing and Balance Committee of the American Academy of Otorhinolaryngology-Head and Neck Surgery, we were able to identify 16 patients with definite DM of the total sample, obtaining a prevalence of 513 of 100,000 people. Of the 16 patients with MD, nine patients had already been diagnosed with MD and one patient was diagnosed during the clinical examination. A peak prevalence of 1709 of 100,000 was seen in the age range of 61–70 years. However, MD prevalence in Southern Finland is overvalued relative to the rest of the world. However, the MD prevalence in Southern Finland is much higher than the prevalence estimations based on hospital registers around the world as suggested [11].

MD is associated with several comorbid conditions such as arthritis (OR 1.8), psoriasis (OR 1.8), gastroesophageal reflux disease (OR 1.5), irritable bowel syndrome (OR 2.1) and migraine (OR 2.0). The development of cochlear and vestibular symptoms has a variable course and can take years in individual patients [12].

Depending on the series, the male/female ratio varies curiously. Some reports point out that Meniere's disease affects both sexes equally or there is a slight female preponderance, up to 1.3:1. Wladislavosky-Waserman and colleagues reported a slight (though not statistically significant) preponderance of females. Following the three decades covered by the study, there was a progressive decline over time in numbers of women affected. In contrast, for men, there was a slight (but not significant) increase in rates for the same period [5].

Most studies suggest a slight female preponderance of up to 1.3 times that of men. MD seems to be much more common in white adults with higher body mass index categories, in their fourth and fifth decade. However, it can also be observed in children. A prevalence of 3% of MD was observed by Meyerhoff and colleagues in the paediatric population. Many studies have shown the existence of a positive family history for Meniere's disease with an index of relatives affected up to 20%.

The prevalence increases dramatically with age, peaking in the 60–69 years age group. It is very rare in people younger than 20 years [7]. This increase is shown in the graph in **Figure 2**. Already the incidence rate of Meniere's disease by gender according to age groups can be seen in **Figure 3**.

	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90
Prevalence (per 100,000)	3	7	23	56	84	100	111	118	110

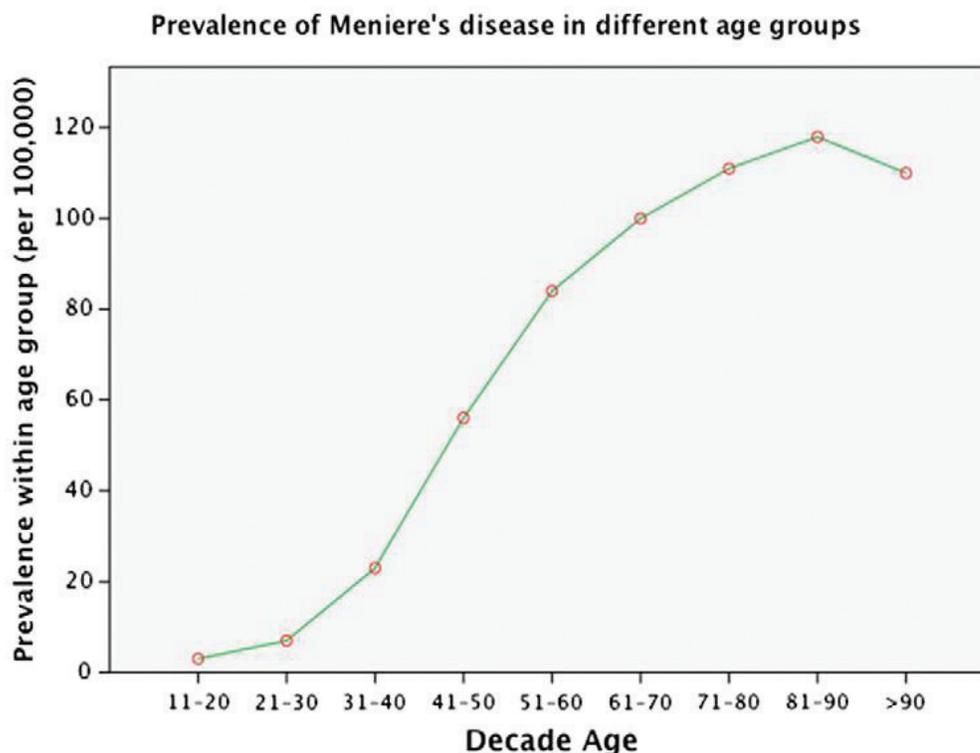


Figure 2. Prevalence of Meniere's disease at different decade age in inpatients population.

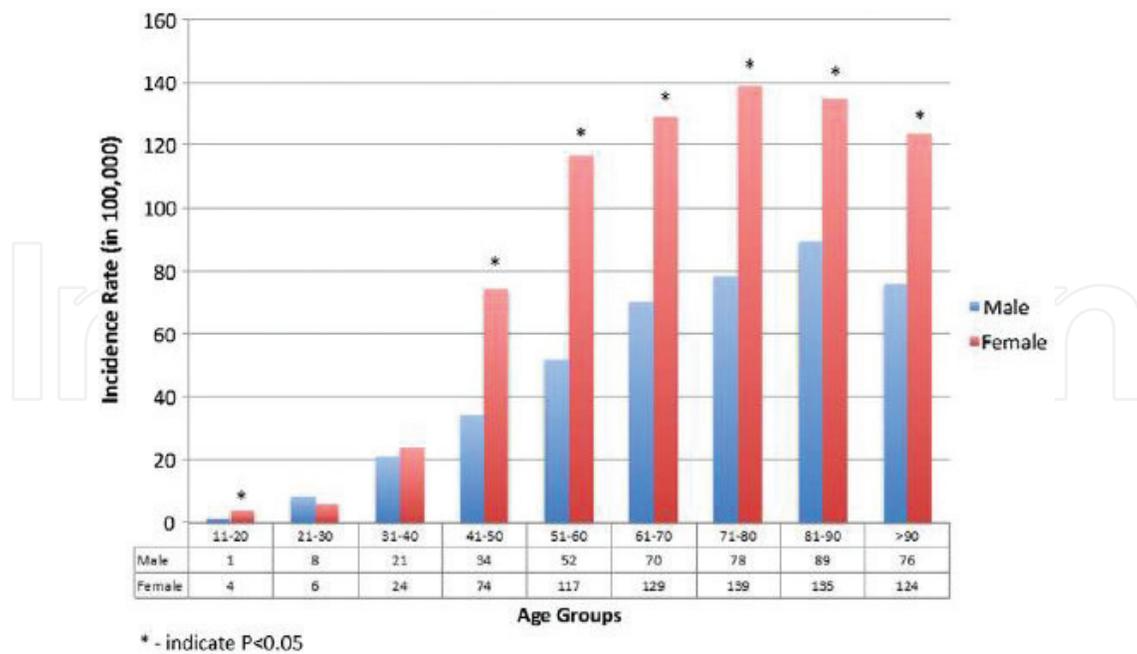


Figure 3. Incidence rate of Ménière's disease by gender according to age groups.

Unfortunately, for disorders such as MS that are relatively rare at the population level, very large sample sizes are needed to achieve sufficient power to accurately estimate epidemiological characteristics in population-based studies [6].

4. Estimates of incidence

Incidence is defined as the number of new cases occurring over a specified period of time, usually 1 year [9]. Incidence rate represents the number of new cases of a disease over a specified period of time divided by the population at risk [5].

The incidence and prevalence in the general population are inferred from the exact values in the sample group [6].

Only prospective studies (subjects are identified prior to an outcome or disease; future events are recorded) have the power to measure incidence [5].

In 1954, Cawthorne and Hewlett attempted to estimate the incidence of MS by examining a register of clinical records for eight clinical practices in Great Britain serving a population of 27,365 people; they arrived at an annual incidence of 157 per 100,000. As pointed out by Wladislavsky-Waserman and colleagues, this number most likely represents a combination of incidence and prevalence, as some patients may have had onset of symptoms in preceding years.

In 1973, Stahle and colleagues examined records from a standard, nationally administered record system to determine the incidence of MS in a patient population from two cities in Sweden; they found an annual incidence of 46 per 100,000. Celestino and Ralli reviewed

the records from 1973 to 1985 from a hospital and outpatient clinic serving a community of 1,03,797 people in Italy. The 1972 American Academy of Ophthalmology and Otolaryngology guidelines were applied for diagnosis of MS, and an incidence of 8.2 per 10,00,000 people per year was found [9].

A study in Cantabria evaluated epidemiological data. Incidence was determined by the number of patients diagnosed Meniere's disease with per 100,000 inhabitants/year during the 11 years of the study and residents in the area having a health study excluding Meniere previous diagnosis of disease. The incidence was 3/100,000 cases inhabitants/year prevalence of 75/100,000 (29 in men and 46 in women). The most common age of diagnosis was between 40 and 60 years [13].

In Japan, the average annual incidence was 5.0 per 100,000 population. Incidence and prevalence predominated in females. With respect to age at disease, the incidence in elderly patients was increased when we corrected for age distribution in the overall population [10].

5. Meniere familial

Familial MD should be considered if at least one other relative (first or second degree) fulfills all the criteria of definite or probable MD. Familial MD should be considered if at least one other relative (first or second degree) fulfills all the criteria of definite or probable MD. Familial MD is observed in 8–9% of sporadic cases in populations of European descent. This was also described in Caucasians from Brazil, Sweden, Finland, United Kingdom, Spain and Germany. Although most families described have an autosomal dominant pattern of inheritance, familial MD shows genetic heterogeneity, and mitochondrial and recessive inheritance patterns are also observed in some families [12].

5.1. Associated symptoms

The symptom triad of vertigo, tinnitus and hearing loss all contribute to the disabling nature of the condition. Ménière's disease is an unpredictable illness that affects mental health. Ménière's disease is an unpredictable illness that affects mental health. Tyrrell et al. investigated the mental health of 1376 Ménière's disease patients. Participants answered 38 questions to mental health. They utilized crude and adjusted linear to investigate the association between Ménière's disease and mental health.

Ménière's disease was associated with increased frequency of tenseness, depression, tiredness and unenthusiasm in the 2 weeks before recruitment. Ménière's disease was associated with longer periods of depression than controls. Reduced health satisfaction was associated with Ménière's disease, but in other aspects of life (general happiness, work, family, financial), individuals with Ménière's disease were as happy as controls. Mental health and SWB in individuals diagnosed for longer was better than in those who were recently diagnosed suggesting at least adaptation.

The results show that Ménière's disease has a negative impact on the individual's satisfaction with life, their mental health and emotional state.

These results raise the importance of supporting social relationships, since long-term patient adaptation strategies can help those with new diagnoses. This is the largest population study investigating the mental health impact of Ménière's disease [14].

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