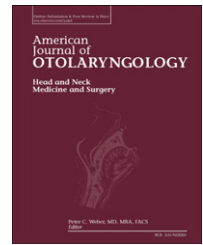


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Meniere's disease: importance of socioeconomic and environmental factors



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ABSTRACT

Study objectives:

1. Describe the prevalence of Meniere's disease in the United States.
2. Recognize important patient and environmental factors in Meniere's disease.

Methods:

- Discharge data from the Nationwide Inpatient Sample, the largest US all-payer inpatient care database was analyzed for Meniere's disease between 2008 and 2010 in patients >10 years old. Patient characteristics including prevalence, age, sex, race, household income, and geographic location were studied to determine any correlation with disease prevalence.
- T-test, Chi-square and logistic regression testing was used to compare the differences between groups for continuous and categorical data.

Results:

- The lower limit of Meniere's prevalence in the United States population was 73 per 100,000, females 84 per 100,000 compared to 56 per 100,000 among males (OR = 1.51, 95% CI 1.48–1.54, $P < 0.01$).
- Prevalence was highest in Caucasians 91 per 100,000, and was significantly higher than other ethnic groups ($P < 0.05$).
- Prevalence increased as age with the highest prevalence found in 81–90 year age group.
- Midwest prevalence (94 per 100,000) was significantly higher than other regions ($P < 0.001$).
- Meniere's is more common in less populated locations and the prevalence decreased as population increased.
- Meniere's prevalence increased with household income. The highest prevalence was found among the 76th–100th quartile with rates of 86 per 100,000 for MD.

Conclusions: Environmental factors, race and ethnicity, gender and age appear to be important factors in the prevalence of Meniere's disease.

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1. Introduction

Dr. Meniere's [1-3] description of an otologic balance disorder in 1861 identified two important factors associated with the condition: its greater prevalence in women and association with migraines. Despite this important start, the role of other socioeconomic, environmental, and patient factors in the prevalence of Meniere's disease has not been well elucidated in the subsequent 150 years. One limited area of study of Meniere's disease is the role of socioeconomic, environmental, and patient factors in the prevalence of Meniere's disease. The interplay of these factors is unclear due to the limited populations previously studied. Using a national database, the role of these factors in Meniere's disease is explored [4].

2. Materials and methods

Discharge data from the Nationwide Inpatient Sample (NIS) which is part of the Healthcare Cost and Utilization Project (HCUP) sponsored by the Agency for Healthcare Research and Quality (AHRQ) were analyzed to study all patients with a diagnosis of Meniere's disease. The NIS is the largest all-payer inpatient care database in the United States that provides information regarding the index hospital admission, which includes patient demographic data, primary and secondary diagnoses, primary and secondary procedures, hospital characteristics, and inpatient and discharge mortality rates. The International Classification of Disease, 9th Revision (ICD-9) codes was used to identify all patients with a diagnosis of Meniere's disease between the years of 2008 through 2010. Patients with a diagnosis of Meniere's disease were analyzed by specific demographic characteristics to determine if there was any correlation between these factors and disease prevalence. Demographic characteristics studied included age, gender, race, household income, and geographic location. IBM® SPSS® statistics ver.19 (SPSS Inc., an IBM Company, Chicago, IL) and SAS 9.3® (SAS Institute, Cary NC) were used to conduct all the statistical analyses. Rank-sum test and Chi-square test were used to compare the differences between groups for continuous and categorical data respectively. The absence of clinical data precludes us from distinguishing possible, probable, or definite Meniere's disease. The adjustment for possible confounding factors, such as age, gender, race, median household income (MHI) of the patients as well as the size, ownership, location, region and teaching status of the hospital, was done by logistic regression analysis.

3. Results

From 2008 to 2010, there were 73,753 cases of Meniere's disease reported in the NIS inpatients discharge database. Among these hospitalized patients older than 10 years of age, the prevalence of Meniere's disease was 73 per 100,000. The prevalence was higher in 2009 compared to 2008 but there were no significant differences in prevalence between 2008 and 2010. The prevalence in 2009 and 2010 was slightly higher than that in 2008 ($P < 0.01$). There was no significant difference in prevalence between 2009 and 2010 ($P = 0.568$) (Table 1).

Table 1 – Annual prevalence table. The prevalence of Meniere's disease in 2009 and 2010 was slightly higher than that in 2008 ($P < 0.01$). There was no significant difference in prevalence between 2009 and 2010 ($P = 0.568$).

	Annual prevalence (N/per 100,000) in patients >10 years old			
	2008	2009	2010	Overall
Meniere	24,151/71	24,970/74	24,632/73	73,753/73
All hospital admissions	34,231,302	33,825,698	33,543,832	101,600,832

In comparison of disease prevalence by sex, Meniere's disease was found to be higher among females with a rate of 84 per 100,000 compared to a rate of 56 per 100,000 among males (OR = 1.51, 95% CI 1.48-1.54, $P < 0.01$). The incidence of rate of Meniere's disease among females was significantly high than that of males in all the age groups that were older than 41 years old and in the age 11-20 group ($p < 0.05$ in all cases). No significant difference was found in the incidence rate between males and females in age 21-30 and 31-40 groups ($p > 0.05$). The median age of patients was 70 years with a minimum age of 13 years and a maximum age of 107 years. The prevalence increased as age increased with the highest prevalence found among the 81-90 year age group (Fig. 1). Among different racial groups, disease prevalence was highest in Caucasians with rates of 91 per 100,000, and was significantly higher than any other ethnic group ($P < 0.05$) (Fig. 2). Regressions demonstrated that both race and socioeconomic status to do independently affect the rate of Meniere disease ($P < 0.001$).

The prevalence of Meniere's disease was studied in relation to geographic region, location, and household income. In the Midwest the prevalence was highest (94 per 100,000), with the other 3 regions significantly lower (67, 65 and 66 per 100,000 in Northeast, South and West, respectively; $P < 0.001$). There was no significant difference in the prevalence among Northeast, South and West regions. Meniere's disease is more common in less populated locations. The highest prevalence was found in micropolitan or non-metro, non-micropolitan counties (82 per 100,000) and the prevalence decreased when the population increased. Increasing income was associated with an increased prevalence and was independent of race (Fig. 3). The highest prevalence was found among the 76th-100th quartile with the rates of 86 per 100,000 roughly equivalent to racial differences (Fig. 4).

4. Discussion

4.1. Limitations

Ideal comprehensive statistics on the prevalence are lacking for Meniere's disease. A number of prevalence numbers have been published from different countries by different authors. The discussion about the prevalence and incidence is hampered by the lack of understanding of the difference between prevalence and incidence reflected in the literature. Prevalence, the frequency at which a condition is found within a population at a particular time, is its commonness. As such it is a reflection of the burden of the condition without a specific reference to time. Incidence reflects the risk of developing a condition within a specific time frame. Methodologically, Meniere's disease studies often suffer from a lack of a well-defined population. Other limitations

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