

# Prevalence of Tinnitus in Early Stages of Ménière's Disease

Leonardo Manzari<sup>1</sup>, Rosella Tomassoni<sup>2</sup>, Eugenia Treglia<sup>2</sup>, Donatella Formisano<sup>2</sup>

<sup>1</sup>MSA ENT Academy Center, Cassino, Italy

<sup>2</sup>Department of Human Sciences, Social Sciences and Health, University of Cassino and Southern Lazio, Cassino, Italy

Email: lmanzari1962@gmail.com

Received 26 December 2015; accepted 12 March 2016; published 15 March 2016

Copyright © 2016 by authors and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

---

## Abstract

**Background:** The aim of this study was to identify the prevalence of tinnitus in a sample of people with early stages of Ménière's disease. **Material and methods:** A postal survey was sent to 256 patients all judged to fulfil the criteria of early unilateral Ménière's disease established by the American Academy of Otolaryngology Committee on Hearing and Equilibrium. Of these 256 patients, 136 had probable Ménière's disease and 120 had early possible Ménière's disease. The same questionnaire was mailed and administered to 60 control subjects with no history of vestibular dysfunction. A total of 158 subjects completed the questionnaire. **Results:** Tinnitus was found in 54 (63%) of the 72 members of the final unilateral vestibular Ménière's disease group and 61 (85 %) of the 72 members of the final unilateral probable Ménière's disease group. **Conclusion:** The prevalence of tinnitus as determined by a questionnaire survey was significantly greater in patients with probable Ménière's disease than in patients with early vestibular Ménière's disease or in control subjects. However, the prevalence of tinnitus as determined by a questionnaire survey was significantly greater in patients with early vestibular Ménière's disease than in control subjects.

## Keywords

Tinnitus, Ménière's Disease, Vestibular, Cochlear

---

## 1. Introduction

Ménière's disease is an idiopathic, chronic illness that affects humans. The disorder has a serious impact on the psychosocial status of affected subjects and their families.

Early studies suggested that there was a psychosomatic component in the etiology of this disorder. Now, it is generally accepted that the psychological aspects of the illness are in fact the consequence of the disease itself. A number of studies have shown that Ménière's disease is associated with anxiety, depression, and inability to concentrate.

For this reason, Ménière's disease leads to a significant decline in quality of life for patients with this disorder [1]. The degree of disability increases when 1 or more of the 4 cardinal symptoms (vertigo, hearing loss, tinnitus, and aural fullness) worsen. Among these symptoms, tinnitus is particularly disabling.

In 1995 [2], the American Academy of Otolaryngology Committee on Hearing and Equilibrium reviewed the disease and made recommendations on criteria for diagnosis.

In the academy's publication, tinnitus and aural fullness were discussed. The Committee reaffirmed that tinnitus and aural fullness in Ménière's disease were difficult to quantify independent of results for hearing and for control of vertigo.

Nevertheless, it is a common finding in clinical practice that patients diagnosed after some time as having Ménière's disease, in the early stages of the disease show nuanced symptoms of the cochlear sphere or vestibular sphere. In the first form cochlear symptoms, low-frequencies hearing loss, aural fullness, and tinnitus prevail. In the vestibular form, recurrent vertigo without hearing loss is most common. However, the clinical picture is not always well defined.

Many symptoms in the audiological sphere can be combined in various ways with those of the vestibular sphere. Of the four cardinal symptoms, tinnitus is the one that is variously represented in different stages of early Ménière's disease.

Several hypotheses have been described in relation to tinnitus pathophysiology. It is proposed that all levels of the nervous system are, to varying degrees, involved in tinnitus manifestation [3]. But among them, in Ménière's disease, it seems very likely that, according to auditory plasticity theory, damage to the cochlea, due to endolymphatic hydrops, enhances neural activity in the central auditory pathway.

It is intuitive that tinnitus is more prevalent in patients with a diagnosis of probable Ménière's disease.

The present study was undertaken to ascertain if there was a difference in prevalence of tinnitus in possible Ménière's disease.

## 2. Material and Methods

The 1995 American Academy Committee criteria required that all subjects with early unilateral classic Ménière's disease fulfil the following criteria:

- 1) Episodic vertigo of the Ménière type without documented hearing loss or at least 1 definite episode of vertigo;
- 2) Sensorineural low-frequency hearing loss, fluctuating or fixed, with dysequilibrium but without definitive vertigo episodes, audiometrically documented on at least 1 or 2 occasions;
- 3) No neurologic symptoms or sequelae, such as syncope or seizures, that are unexplainable by peripheral vestibular disorders or labyrinthine disease;
- 4) Normal high-resolution CT scans and MRI of the posterior cranial fossa using paramagnetic contrast enhancement in all patients.

Daily lists of all outpatients seen in the MSA ENT Academy Center Clinic in Cassino (FR), Italy, from 1 February 2013 to 31 January 2015 were reviewed. Medical records were obtained for all those patients who reported vertigo or dizziness, aural fullness, or already diagnosed as Ménière's disease patients. We reviewed more than 1700 of these records in order to find patients who could be diagnosed with early unilateral Ménière's disease, defined as probable or possible (**Table 1**). A control group was formed by selecting healthy parents of subjects who were suffering from laryngeal disorders seen in the same period in the MSA Cassino Clinic.

A modified questionnaire, Tinnitus Sample Case History Questionnaire (TSCHQ) [4], was designed to verify and determine the prevalence of tinnitus in early Ménière's disease patients. The modified Tinnitus Sample Case History Questionnaire (TSCHQ) consists of 35 items, 14 of them defined as essential and 21 as highly desirable. We modified.

Case History Questionnaire offer advantages of standardized questions to provide reliable and complete information about the history and descriptive characteristics of the tinnitus and its relationships with Ménière's Disease.

Questionnaires were mailed to 256 patients judged to fulfil the criteria of early unilateral Ménière's disease established by the American Academy of Otolaryngology Committee on Hearing and Equilibrium, 136 probable

**Table 1.** Classification of Ménière's disease according to the 1995 guidelines of the committee on hearing and equilibrium of the American academy of otolaryngology and head & neck surgery.

Definition	Symptoms
Certain Ménière's Disease	Definite Ménière's disease plus histopathologic confirmation
Definite Ménière's Disease	≥2 definitive spontaneous episodes of vertigo 20 min or longer. Audiometrically documented hearing loss on at least 1 occasion. Tinnitus or aural fullness in the treated ear. Other causes excluded
Probable Ménière's Disease	One definitive episode of vertigo Audiometrically documented hearing loss on at least 1 occasion Tinnitus or aural fullness in the treated ear Other causes excluded
Possible Ménière's Disease	Episodic vertigo without documented hearing loss, or Sensorineural hearing loss fluctuating or fixed, with dysequilibrium but nonepisodic Other causes excluded

Ménière's disease patients, and 120 early possible Ménière's disease patients. The same questionnaires were mailed and administered to 60 control subjects with no history of vestibular dysfunction.

### 3. Results

#### 3.1. Early Possible Ménière's Disease

Eighty-six (72%) of the 120 early possible Ménière's disease patients who were mailed questionnaires responded to them.

Fifty-four (63%) of the 72 members of the final unilateral possible Ménière's disease group had tinnitus.

#### 3.2. Early Probable Ménière's Disease

Seventy-two (53%) of the 136 early probable Ménière's disease patients who were mailed questionnaires responded to them.

Sixty-one (85%) of the 72 members of the final unilateral probable Ménière's disease group had tinnitus.

#### 3.3. Control Group Healthy Subjects

Response rate in the control group was much lower than that of the other group. Of these 60, 12 (20%) responded to questionnaires.

Only 1 subject (8%) had tinnitus.

The prevalence of tinnitus in the two diagnostic groups, by final diagnosis, is shown in [Table 2](#).

### 4. Discussion

In the present investigation MD patients reported a high incidence of tinnitus in the early stages of the Ménière's disease and this suggests that tinnitus can be a symptom always coincident with the onset of the disease.

Tinnitus is common—nearly 36 million Americans have tinnitus and more than half of the normal population has intermittent tinnitus. The latter finding is not coincident with the percentage of our control group, in which only 8% has tinnitus ([Table 3](#)).

To our knowledge it is the first time that a type of survey is conducted in this way in a group of early (possible and probable) MD patients.

We defined the presence of tinnitus in the early stages of the disease with the modified question “Was the initial onset of your tinnitus related to.

The main finding of our database analysis is, that Ménière's disease patients with and without tinnitus differ in a large number of characteristics, but this is not the core of our investigation. Our survey was designed to detect the presence or absence of tinnitus symptom in the early stages of the Ménière's disease.

Ménière's disease is a quadripartite symptom complex characterized by severe attacks of vertigo, low-frequency hearing loss, aural fullness, and tinnitus.

**Table 2.** Response rates.

	Questionnaires	Responses	Response Rate
Probable Ménière’s	136	72	53 %
Possible Ménière’s	120	86	72 %
Controls	60	23	38 %

**Table 3.** Prevalence of tinnitus.

Probable Ménière’s Disease	85%
Possible Ménière’s Disease	63%
Controls	8%

In more severe forms, these symptoms can cause total debilitation. It has always been believed that the hearing loss and tinnitus could be present in a fluctuating manner.

Ménière’s disease remains a difficult disease to diagnose, particularly in the early stages when it is possible that not all symptoms are present. It has been reported that early Ménière’s disease patients present to the Emergency Department with sudden onset of vertigo and are superficially diagnosed as having vestibulopathy or labyrinthitis [5].

For this purpose one of the symptoms, tinnitus, has been reviewed in this article in relation to the prevalence in the early stages of the Ménière’s disease.

Early possible and probable Ménière’s disease, as well as the more advanced stages of the disease, are characterized by fluctuations in labyrinthine function, which are well known and objectively established for both the auditory (hearing fluctuation) and vestibular symptoms. Rarely symptoms of both spheres are present in these stages. However, our study revealed that tinnitus is an important symptom in both early possible MD and in early probable MD.

Classically, tinnitus is considered as a symptom involving changes in timing and rate of spontaneous discharges in the auditory sphere at multiple levels [6].

It is also considered a deafferentation disorder triggered by loss of normal input from the auditory peripheral system. In confirming this idea, clinical and experimental observations support this theory. In fact, tinnitus is most commonly associated with hearing loss and 80% - 90% of patients that complain of having tinnitus have a documented hearing loss [7].

This sometimes is in sharp contrast to our early MD patients, who showed normal hearing level or very little low-frequency fluctuations.

The tinnitus in MD patients may be explained in another way. In fact, it is described by patients as a “roaring sound”, corresponding to the low-frequency sensorineural hearing loss, low pitched, narrow band of noise [7]-[9].

Hallam [10] suggested that tinnitus can be identified with another auditory stimulus. A person can get used to the tinnitus noise just as people get used to noises in everyday life. This process is called habituation and development of tolerance is the normal response. However, this process may take time to become consolidated. Habituation takes place when a new stimulus becomes “well know” and has no relevance for taking any action. On the other hand, if a negative evaluation prevails (e.g., anxiety or threat), the habituation process is doomed to fail. There is increasing evidence in the literature suggesting that tinnitus can be induced or exacerbated by emotional conditions such as stress and anxiety [10]-[13]. Patients with Ménière’s disease may become stressed and anxious after realizing that they will have the disorder for the rest of their lives. Their sadness and anxiety may worsen when they lose more of their hearing or if the other ear becomes affected. Having louder tinnitus can also cause more distress in a sort of vicious circle.

It seems to be obvious that early MD patients with symptoms of the cochlear sphere alone could have also tinnitus and this is in agreement with our results. Moreover it is surprising that even in early possible MD, tinnitus is present as a symptom of an incipient problem in the auditory pathways (Table 3 and Table 4).

Finally, this study differs from that of Belinchon *et al.* [14] because it was designed to investigate the sequence and correlation of symptoms of Ménière’s disease (MD) depending on order of manifestation.

**Table 4.** Chi-squared analysis.

Probable Ménière's Disease vs Vestibular Ménière's Disease	$P < 0.05$
Possible Ménière's Disease vs Controls	$P < 0.05$
Probable Ménière's Disease vs Controls	$P < 0.05$

This research instead focused on the evaluation of the prevalence of tinnitus when the disease began to manifest and, surprisingly, also in early possible Ménière's disease, probably due to the state of stress to which these individuals are subjected.

Limitations of this study are probably two. Firstly the findings cannot be generalized to all people with Ménière's disease, as the administration of the questionnaires was limited to early possible and probable Ménière's disease patients according to the 1995 criteria.

Secondly, limitations of the study, at this stage, are that due to the number of cases the study did not allow for an analysis stratified by gender and age.

## 5. Conclusion

In conclusion, the prevalence of tinnitus as determined by a questionnaire survey is significantly greater in the cochlear Ménière's disease than in early vestibular Ménière's disease or in control subjects. However, the prevalence of tinnitus as determined by a questionnaire survey is significantly greater in patients with early vestibular Ménière's disease than in control subjects.

## References

- [1] Anderson, J.P. and Harris, J.P. (2001) Impact of Ménière's Disease on Quality of Life. *Otology & Neurotology*, **22**, 888-894. <http://dx.doi.org/10.1097/00129492-200111000-00030>
- [2] American Academy of Otolaryngology-Head and Neck Foundation, Inc. (1995) Committee on Hearing and Equilibrium Guidelines for the Diagnosis and Evaluation of Therapy in Menière's Disease. *Otolaryngology—Head and Neck Surgery*, **113**, 181-185. [http://dx.doi.org/10.1016/S0194-5998\(95\)70102-8](http://dx.doi.org/10.1016/S0194-5998(95)70102-8)
- [3] Han, B.I., Lee, H.W., Kim, T.Y., Lim, J.S. and Shin, K.S. (2009) Tinnitus: Characteristics, Causes, Mechanisms, and Treatments. *Journal of Clinical Neurology*, **5**, 11-19. <http://dx.doi.org/10.3988/jcn.2009.5.1.11>
- [4] Langguth, B., Goodey, R., Azevedo, A., et al. (2006) Consensus for Tinnitus Patient Assessment and Treatment Outcome Measurement: Tinnitus Research Initiative Meeting, Regensburg. *Progress in Brain Research*, **166**, 525-536. [http://dx.doi.org/10.1016/S0079-6123\(07\)66050-6](http://dx.doi.org/10.1016/S0079-6123(07)66050-6)
- [5] da Costa, S.S., de Sousa, L.C. and Piza, M.R. (2002) Ménière's Disease: Overview, Epidemiology, and Natural History. *Otolaryngologic Clinics of North America*, **35**, 455-495. [http://dx.doi.org/10.1016/S0030-6665\(02\)00028-2](http://dx.doi.org/10.1016/S0030-6665(02)00028-2)
- [6] Vernon, J.A. (1997) Tinnitus: Treatment and Relief. Allyn & Bacon, Boston.
- [7] Nodal, R.H. and Graham, J.T. (1965) An Investigation of the Frequency of Characteristics of Tinnitus Associated with Ménière's Disease. *Archives of Otolaryngology*, **82**, 28-31. <http://dx.doi.org/10.1001/archotol.1965.00760010030007>
- [8] Graham, J.T. and Newby, H.A. (1962) Acoustical Characteristics of Tinnitus. Particularly Treatment. *Archives of Otolaryngology*, **75**, 162-168.
- [9] Reed, G.F. (1960) An Audiometric Study of Two Hundred Cases of Subjective Tinnitus. *Archives of Otolaryngology*, **71**, 94-104. <http://dx.doi.org/10.1001/archotol.1960.03770010088009>
- [10] Hallam, R.S. (1987) Psychological Approaches to the Evaluation and Management of Tinnitus Distress. In: Hazell, J., Ed., *Tinnitus*. Churchill-Livingstone, Edinburgh, 156-175.
- [11] Seydel, C., Reissauer, A., Haupt, H., Klapp, B.F. and Mazurek, B. (2006) The Role of Stress in the Pathogenesis of Tinnitus and in the Ability to Cope with It. *HNO*, **54**, 709-714. <http://dx.doi.org/10.1007/s00106-006-1445-0>
- [12] Schmitt, C., Patak, M. and Kröner-Herwig, B. (2000) Stress and the Onset of Sudden Hearing Loss and Tinnitus. *The International Tinnitus Journal*, **6**, 41-49.
- [13] Mazurek, B., Stöver, T., Haupt, H., Klapp, B.F., Adli, M., Gross, J. and Szczepek, A.J. (2010) The Significance of Stress: Its Role in the Auditory System and the Pathogenesis of Tinnitus. *HNO*, **58**, 162-172. <http://dx.doi.org/10.1007/s00106-009-2001-5>
- [14] Belinchon, A., Perez-Garrigues, H., and Tenias, J.M. (2012) Evolution of Symptoms in Ménière's Disease. *Otology & Neurotology*, **17**, 126-132. <http://dx.doi.org/10.1159/000331945>