

PSYCHOPATHOLOGIC DISEASES IN PATIENTS WITH TINNITUS: A CASE-CONTROL OF AN OUTPATIENT COHORT

FEDERICO SIRECI¹, ANTONELLA BALLACCHINO², MONICA AGRIFOGLIO², SERGIO FERRARA¹, MARIANNA MUCIA², PIETRO SALVAGO¹¹Università degli Studi di Palermo, Dipartimento di Biomedicina Sperimentale e Neuroscienze Cliniche, (BioNeC), Sezione di Otorinolaringoiatria, Palermo ²Università degli Studi di Palermo, Dipartimento di Biopatologia e Biotecnologie Mediche e Forensi (Di.Bi.Me.F.), Sezione di Audiologia, Palermo, Italy (IN INGLESE)*[Titolo in italiano]***ABSTRACT**

The goal of this work was to study if patients suffering from tinnitus, that affects 14.5% of Italian people, are more susceptible to psychological distress than those who are not affected by tinnitus; to evaluate the prevalence of psychopathological disorders among the cohort, their relationship with the severity of tinnitus and eventual correlation between the distress caused by tinnitus and age of patients.

191 cases and 237 controls were enrolled between 2009-2011. Cases were 80 females and 111 males with mean age of 48.06. Controls were 106 females and 131 males with mean age of 47.09. Overall subjects completed Symptom CheckList-90 R (SCL 90-R) and some brief questionnaire about audiological history while Tinnitus Handicap Inventory (THI) was compiled by cases.

Our study indicates that there is a significance correlation between tinnitus and psychopathological disorders, especially with anxiety ($\chi^2=8.08$; $p=0.004$) and sleep disturbance ($\chi^2=38.85$; $p=0.0001$) and there is a slight correlation between higher THI score and lower age subjects ($r=0.76$). Especially causing working impairment, the highest correlation resulted for ages 25-50 ($r=0.96$).

Key words: Tinnitus, SCL 90-R, THI, Sleep disturbance, Anxiety.*Received September 11, 2012; Accepted September 17, 2012***Introduction**

Tinnitus is an auditory phantom sensation, a “perception of a sound which results exclusively from activity within the nervous system without any corresponding mechanical, vibratory activity within the cochlea” with high prevalence rates in western societies⁽¹⁻⁸⁾.

Epidemiological studies showed that about one third of population experiences tinnitus at least once in their life and about 1-5% developed serious psychosocial complications; in Italy an epidemiologic study based on questions to general population upon auditory dysfunctions evidenced a tinnitus prevalence percentage in 14.5% (8% in normal hearing subjects, 30.5% in presence of auditory dysfunctions)^(9,10).

The presence of tinnitus progressively increases with increasing age (12% after the age of 60; 5%

in the 20–30 age group), and this is not so much correlated with senescence itself as with the frequent concomitant hearing loss^(3-7, 11,12,13).

All structures of the auditory system have been suggested as possible sites of generation for tinnitus, from periphery to auditory cortex^(14,15) even if in most cases the origin of tinnitus is unknown⁽¹⁶⁻²³⁾.

Tinnitus can be also due to other inner ear dysfunctions, such as those associated with sudden hearing loss or acoustic trauma⁽²⁴⁾, or part of otological and neurological diseases such as Ménière’s disease, conductive hearing loss, acoustic neuroma or severe head injury⁽²⁵⁾. As reported by Hoffman many aetiological factors can be considered as potential causes of tinnitus and/or cofactors: vascular disease, diabetes, hypertension, autoimmune disorders, and degenerative neural disorders^(16, 26, 27).

To date the knowledge on tinnitus onset and history, clinical presentation and audiological char-

acteristics is still incomplete, moreover besides the problems of aetiological mechanisms causing the tinnitus and its correlation with other ear disorders, there is the problem of psychiatric comorbidity in patients with chronic tinnitus. In fact persistent tinnitus may rapidly become a source of serious disturbance and handicap at psychological and socio-professional levels, affecting the quality of life, involving sleep disturbance, work impairment, and psychiatric distress^(28,29).

The goal of this work was to understand if patients suffering from tinnitus are more susceptible to psychological distress than those who are not affected by tinnitus, to evaluate the prevalence of psychopathological disorders among the cohort, their relationship with the severity of tinnitus and the present of a correlation between the distress caused by tinnitus and age of patients.

Materials and methods

The experimental design of the research was based upon a case-control study. Case patients were defined as those patients affected by tinnitus who were referred to the Audiology Section of the Palermo University. Controls were recruited randomly from the population and do not show any audiological disease. Overall subjects completed Symptom checklist-90 R (SCL 90-R) and some brief questionnaire about audiological history while Tinnitus Handicap Inventory was compiled by cases.

SCL 90-R is a 90-item self-report symptom inventory designed to reflect the psychological symptom patterns of community. Each item is rated on a 5 point scale of distress. The SCL 90-R has high validity and reliability in neuropsychiatric population. It has 10 primary symptom dimensions including: Somatisation, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, Psychotism and Sleep disturbance.

Tinnitus Handicap Inventory (THI) is a self-administered test use to help determine the degree of distress suffered by the tinnitus patient. It is a 25-item survey that is composed of three subscales: a functional subscale (12 items), an emotional subscale (8 items) and a catastrophic response subscale (5 items) which address role and physical functioning, psychological distress, desperation and loss of control, respectively. Each item has 3 potential answers with "yes" assigned 4 points, "sometimes" 2 points, and "no" 0 points. This leads to a

total score ranging from 0 indicating no tinnitus handicap and 100 the worst patients' annoyance. Classically it grades five categories of tinnitus severity: slight corresponding to a score 0-16; mild (18-36); moderate (38-56); severe (58-76); catastrophic (78-100).

Statistical analysis consisting of odds ratio (O.R.), confidence interval (C.I.95%), chi-square(χ^2), p-value and linear regression (r) was performed using Matlab[®] computer programme.

Results

191 cases and 237 controls took part to the study. Cases aged 18-78 years with mean age of 48.6 years + 12. Males patients are 111 (age range 18-78 years with mean age of 48.86) and 80 females (age range 19-74 with mean age 48.25). Controls are 106 females and 131 males with mean age of 47.09 years + 12.55. Age range of females controls is 19-74 with mean age of 46.64. Age range of males controls is 18-78 with mean age of 47.5 (Table 1 shows the main characteristics of cases and controls).

Variables	Cases (n=191)	Controls (n=237)
Age (mean) Gender	48.6 (+12)	47.9 (+12.55)
Males	111 (58.1%)	131 (55.2%)
Females	80 (41.8%)	106 (44.7%)

Table 1. Characteristics of cases and controls.

THI showed that 31% of the cases had a light tinnitus with a score of slight, mild and moderate grade. Patients with annoying tinnitus were 69% (severe or catastrophic) and, of them in 40% tinnitus hinders the daily activities; in the remaining 60% the patients refer to be able to mask the tinnitus maintaining unchanged daily activities. From linear regression analysis it could be seen a slight correlation between higher THI score and lower age subjects ($r=0.76$) (Figure 1). The highest r value was evidenced for cases between 25-50 years of age ($r=0.96$).

Regarding the results obtained by SCL-90-R, 25% of cases do not present any psychopathological disturbance, 16% only sleep disturbance and the remaining 59% have one or more disorders. In particular, patients present in 52% of cases sleep disturbance, in 35% obsessive-compulsive, in 33% depression, in 32% somatisation and in 30% anxiety.

About controls, SCL-90-R showed that 43% of subjects do not present any psychopathological

disturbance, 9% only sleep disturbance and 48% have one or more disorders. In particular, subjects present in 35% sleep disturbance, in 26% somatisation, in 25% obsessive-compulsive, in 23% depression, in 18% anxiety.

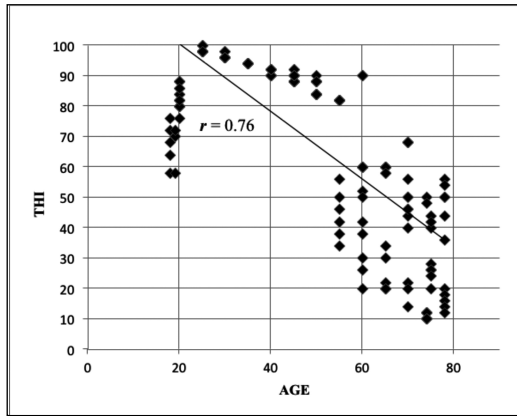


Figure 1: Linear regression analysis of THI and age.

Table 2 shows association between psychopathological disorders and tinnitus, comparing cases and controls. Statistical analysis revealed a significant difference between cases and controls only for anxiety (OR=1.92; IC95%= 1.22-3.02; $\chi^2=8.08$; $p=0.004$) and sleep disturbance (OR=3.65; IC95%= 2.41-5.53; $\chi^2=38.85$; $p=0.0001$). Even if the percentage rate of Obsessive-Compulsive and Depression disorders showed a difference between cases and controls it resulted no statistical differences among the cohorts.

SCL 90 (Symptoms)	Cases N(%)	Controls N(%)	Odds ratio O.R.	Confidence interval C.I. 95%	χ^2	P
Somatisation	61(32)	62(26)	1.32	0.87-2.02	1.72	0.19
Obsessive-Compulsive	67(35)	59(25)	1.63	1.07-2.48	5.28	0.02
Interpersonal Sensitivity	43(22.5)	44(18.5)	1.27	0.80-2.04	1.02	0.31
Depression	63(33)	55(23)	1.64	1.07-2.51	5.06	0.02
Anxiety	57(30)	43(18)	1.92	1.22-3.02	8.08	0.004*
Hostility	43(22.5)	46(19)	1.21	0.76-1.93	0.62	0.43
Phobic anxiety	41(21.5)	54(23)	0.93	0.58-1.47	0.11	0.74
Paranoid ideation	40(21)	50(21)	0.99	0.62-1.58	0.002	0.97
Psychotism	40(21)	54(23)	0.9	0.57-1.43	0.21	0.65
Sleep disturbance	99(52)	54(23)	3.65	2.41-5.53	38.85	0.0001*

Table 2. Association between tinnitus and psychopathological disorders of the SCL 90.

Discussion

The results of our study show that anxiety and sleep disturbance are significantly associated with tinnitus. It could be explained because during the night increases the gap between environmental sounds and tinnitus, so even patients who do not perceive the tinnitus during the day, in which the tinnitus not interfere with daily activities (25% of the cases evidenced from THI results) are more disturbed during the night. In addition, the sleep disorders appear to be consequence of anxiety disorders rather than associated with the severity of tinnitus.

According to previous studies^(30,31,32,33), the anxiety is significantly associated with tinnitus (30% of cases Vs 18% of the controls with $p=0.004$) but while for some people anxiety may be a consequence of tinnitus, it is also possible that high levels of anxiety may exacerbate the perception of tinnitus. Therefore, in both cases, it is important that therapy with the TRT (Tinnitus Retraining Therapy) help the patient to manage the disorder. Also, the study of a correlation between severity of tinnitus and the patient’s age resulted statistically significant ($r=0.96$) evidencing how the higher THI scores were associated to lower age subjects in particular for age range 25-50. It could be explained because these patients are still workers and so during daily activities they are more disturbed from tinnitus respect to the others who were retired.

Conclusions

Tinnitus is a distressing symptom and significantly associated with psychopathological disorders. In particular anxiety and sleep disturbance were significantly higher in tinnitus patients than in normal control subjects. Also, tinnitus causes a high distress for young patients hindering their daily work activities.

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 Dr. FEDERICO SIRECI
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