RELATIONSHIP BETWEEN NOISY ENVIRONMENT AND PSYCHOLOGICAL SYMPTOMS IN EMPLOYEES WITH TINNITUS

TİNNİTUS BULGUSU OLAN ÇALIŞANLARDA GÜRÜLTÜLLU ORTAM VE PSİKOLOJİK SEMPTOMLAR ARASINDAKİ İLİŞKİ

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Öz: “Tinnitus” bulgusu, bireyin yaşam konforunu etkileyen, verimsiz iş hayatına neden olan ve kişide psikolojik sorunları oluşturmaya neden olan önemli bir sağlık problemidir. Bu çalışmadada; gürültülü ortamın tinnitus’lu çalışanlarda oluşturduğu psikolojik semptomların belirlenmesi amacıyla; 27’si tinnitus’lu 181 çalışanı olan bir fabrikada bütün çalışanlara SCL-90-R testi uygulanarak hastalardaki tinnitus ilişkili psikolojik semptomlar belirlenmiştir. Hastalar ve çalışanlarda ki semptom dağılımı verileri, Mann-Whitney metodu ile istatistiksel olarak değerlendirilmiştir. İlk etapta, Tinnitus’lu çalışanlar ile Tinnitus problemi bulunmayan çalışanların psikolojik semptomları karşılaştırılmış ve Tinnitus’lu çalışanlarda Somatization, Anxiety, Depression, Pararanoia, Hostility, Phobic Anxiety ve Genel Semptom İndeksi değerlerinin artış gösterdiği gözlemlenmiştir. İkinci etapta, gürültülü ortamın Tinnitus’lu çalışanların psikolojik semptomlarına olan etkisini belirlemek amacıyla; 18’i gürültüsüz ortamda çalışan toplam 27 Tinnitus’lu çalışanın test sonuçları üzerinde istatistiksel hesaplama yapmıştır ve gürültülü ortamda çalışan Tinnitus’luların; Somatization, Anxiety ve Hostility ve Soğutma ve Sözelştirme açısından anlamlı bir artış olduğu gözlemlemiştir.

Anahtar Kelimeler: Gürültü, Kulak Çınlaması, SCL-90-R

Abstract: “Tinnitus” is an important health problem that affects patient comfort, leads to unproductive working life and causes psychological problems. In this explorative study, in order to specify the psychological symptoms due to tinnitus in employees working in a noisy environment, the SCL-90-R test was applied to all employees working in a factory with 181 employees, 27 of whom with tinnitus, and psychological symptoms related to tinnitus in the patients were determined. Symptom distribution data of patients and employees were statistically evaluated by the Mann-Whitney method. At the first step, psychological symptoms of the employees with and without a tinnitus problem were evaluated comparatively and Somatization, Anxiety, Depression, Paranoia, Hostility, Phobic Anxiety and General Symptom Index values were found to increase in employees with tinnitus. At the second step, in order to determine the effect of the noisy environment on the psychological symptoms of employees with tinnitus, additional statistical calculations have been made on the test results of total 27 employees with tinnitus, 9 of whom working in a noisy environment and 18 in a noiseless environment, and Somatization, anxiety and hostility have been observed to increase in frequency in employees with tinnitus working in the noisy environment.

Key Words: Noise Pollution, Tinnitus, SCL-90-R

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INTRODUCTION

Noise is generally defined as unpleasant, unwanted and disturbing sound. The sound is a physical and measurable concept, while noise is a subjective concept that can vary according to person perception. Noise is the most important physical pollutants that can cause serious and permanent damage in case of exposure. With today’s increasing population, developing technology and industrialization, noise is becoming a growing problem (Fernández et al., 2009).

The acceptance of any voice as noise varies according to the person and the person’s own psychological state. For example, a kind of music that is dulcet and relaxing for some people can be a cause of a boring, repulsive and disturbing noise for others. Likewise, the noise from street vendors is not a disturbing problem for their own ears but can be extremely repulsive and disturbing for a person at rest. Measurable sound with a high volume is sometimes found pleasant to the ears, but there are also researchers who point out that its unfavorable negative consequences may occur in the human body will be inevitable (Vehid et al., 1995). Depends on the duration and severity of exposure; it has been proven by the studies that noise may trigger cardiovascular, psychological and neuroendocrinological mechanisms negative effects on the nervous and endocrine systems, and direct effects on the blood pressure, thus establishing the basis for chronic health problems such as hypertension, may occur (Akan et al., 2012; Evans, 1994; Suter, 2009; Vehid et al., 1995).

The word tinnitus is known as the perception of sounds without an external stimulus and comes from the word tinnre in Latin meaning ringing (Malakouti et al., 2011). This symptom is particularly common in adults and is seen generally at the age of 50 (Hébert and Lupien, 2007). The condition may be due to a dysfunction of the auditory pathway and may lead to a false perception of the neuroacoustic process (Møller, 2006; Schaaf et al., 2010). Tinnitus is a disease of unknown etiology that is perceived by the patient as a humming or ringing noise and affects the social life of the exposed person negatively (Riedl et al., 2014). However, it is not possible to explain the entire picture of tinnitus on the basis of the related otologic disorders alone (Axelsson and Ringdahl, 1989). It is thought that most tinnitus cases observed in young adults may be due to listen to loud music (Gilles et al., 2016; Shore et al., 2016). In addition to the known acoustical indications, the tinnitus is also associated with cognitive and emotional dysfunction (Milerová et al., 2013). A new study reported that 48-60% and 45% of patients with chronic tinnitus developed major depression and anxiety disorder, respectively (Belli et al., 2012). There have been some studies directly investigating the relationship between the fre-
quencies of anxiety sensitivity and tinnitus, and a significant correlation was determined between these two conditions (Hesser and Andersson, 2009).

In this study, it was aimed to investigate the psychological problems in employees working in a noisy and noiseless environment who complain of ringing in the ears and to reveal the effects of noise on psychological problems in employees who have complaints of tinnitus.

METHOD

Participants

In this study, a factory which is actively producing is designated as a working area. After measurements made in different departments of this plant, environments with an average sound level of 85 dB (A) and above, were considered the noisy environment, while those below 85 dB (B) were considered noiseless. In any environment, the instantaneous rising volume does not exceed 135 dB (C). Of the total 181 employees in this plant, 139 were working in a noisy environment and 42 were working in a noisy environment and a total of 27 of these employees, 9 of whom working in a noisy environment and 18 in a noiseless environment, were known to have tinnitus. A total of 42 men were examined in the study group. The minimum age was 19. the maximum age was 56. and the mean age was 35.05 ± 8.00. There was no significant difference between the study group and the control group in terms of age, gender, smoking, duration of the study and use of ear protection. Exclusion criteria were including, accompanying physical or neuropsychiatric disorders. The Symptom Check List-90-Revised (SCL-90-R) test was administered and statistically interpreted for all psychiatric symptom and quality of life analyses of the employees.

The Symptom Checklist 90 Revised (SCL-90-R)

The SCL-90-R and SF-36 scales were utilized to evaluate the presence and severity of psychiatric symptoms and quality of life, respectively. The SCL-90-R scale by Derogatis consists of 90 multi-dimensional questions designed to analyze a wide range of psychological problems. Each of these 90 questions was rated between 0 (not at all) and 4 (extremely). The answers to these questions mainly describe nine symptoms which are classified as somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, anger-hostility, phobic anxiety, paranoid thought and psychoticism. Comparable statistical evaluations of the identified individual symptoms were performed with the Mann-Whitney Test using SPSS (SPSS for Windows, Version 21.0. SPSS Inc, U.S.A) package program. As
a result of two different statistical evaluations, the difference between the psychological symptoms of employees with tinnitus and those without tinnitus and the symptomatic difference between those with tinnitus and working in noisy and noiseless environments were evaluated.

RESULTS

A. Statistical significance between psychological symptoms of employees with and without tinnitus in working areas:

The SCL-90-R test results which were applied to 181 employees (27 with tinnitus), were evaluated comparatively by the Mann-Whitney Test, which allows statistical evaluation in two different groups determined as study and control groups. First of all, a statistical significance in psychological symptoms among the employees with and without tinnitus was investigated. The results are showed in Table 2.

Symptom averages in patients with tinnitus working in noisy and noiseless working areas were found to be as follows; Somatization(1.24), Anxiety(0.51), Obsessive-Compulsive(0.67), Depression(0.69), Interpersonal Sensitivity(0.86), Psychoticism(0.56), Paranoic(1.02), Hostility(0.79), Phobic Anxiety(0.50), Paranoid Ideation(0.79), General Symptom Index(0.78) (Figure 1).

<table>
<thead>
<tr>
<th></th>
<th>Tinnitus</th>
<th>Non-Tinnitus</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatization</td>
<td>1.24</td>
<td>0.39</td>
<td>0.01</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.51</td>
<td>0.27</td>
<td>0.01</td>
</tr>
<tr>
<td>Obsessive-Compulsive</td>
<td>0.67</td>
<td>0.47</td>
<td>0.12</td>
</tr>
<tr>
<td>Depression</td>
<td>0.69</td>
<td>0.33</td>
<td>0.01</td>
</tr>
<tr>
<td>Interpersonal Sensitivity</td>
<td>0.86</td>
<td>0.44</td>
<td>0.11</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>0.56</td>
<td>0.25</td>
<td>0.23</td>
</tr>
<tr>
<td>Paranoic</td>
<td>1.02</td>
<td>0.55</td>
<td>0.01</td>
</tr>
<tr>
<td>Hostility</td>
<td>0.79</td>
<td>0.35</td>
<td>0.01</td>
</tr>
<tr>
<td>Phobic Anxiety</td>
<td>0.5</td>
<td>0.13</td>
<td>0.01</td>
</tr>
<tr>
<td>Paranoid Ideation</td>
<td>0.79</td>
<td>0.44</td>
<td>0.15</td>
</tr>
<tr>
<td>General Symptom Index</td>
<td>0.78</td>
<td>0.36</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Table 1. Mean of SCL-90-R Subscales Between Two Groups of Workpeople
In patients without tinnitus in the noisless working areas, the symptom averages were determined to be as follows; Somatization(1.06), Anxiety(0.38), Obsessive-Compulsive(0.61), Depression(0.58), Interpersonal Sensitivity(0.81), Psychoticism(0.32), Pararxonoid(0.91), Hostility(0.53), Phobic Anxiety(0.33), Paranoid Ideation(0.79), General Symptom Index(0.63) (Figure 2).

In patients without tinnitus in the noisy working areas, the symptom averages were
determined to be as follows; Somatization (1.60), Anxiety (0.78), Obsessive-Compulsive (0.81), Depression (0.91), Interpersonal Sensitivity (0.97), Psychoticism (1.06), Paranoid (1.25), Hostility (1.30), Phobic Anxiety (0.84), Paranoid Ideation (0.79), General Symptom Index (1.06) (Figure 2).

Additional statistical calculations were made on the test results of a total of 27 employees with tinnitus, 9 of whom working in a noisy environment and 18 in a noiseless environment, in order to determine the effect of the noisy environment on the psychological symptoms of employees with tinnitus. As a result of the calculations and according to the results intended to have a significance with p<0.05 value, there was a statistically significant increase in Somatization, Anxiety, and Hostility values in employees with tinnitus working in the noisy environment compared to those working in a noiseless environment (Figure 2).

![Mean of SCL-90-R Subscales Between two Groups of Workpeople](image-url)
DISCUSSION

Many studies in the literature have reported that the noisy environment causes or triggers physiological and psychological symptoms in individuals working in such areas (G. W. Evans et al., 1995; Kryter, 1994). In this study based on the work environment, it was proven that the negative effects of the noisy environment on the psychological symptoms of employees were compatible with the other studies (Figure 1).

Unlike other studies, in our study, psychological symptoms were evaluated among employees with tinnitus working in a noisy and noiseless environment. It is an accepted fact which is supported by many studies nowadays that tinnitus affects people’s psychology negatively and may also be one of the contributing factors in the development of tinnitus (Andersson, 2002; Dineen et al., 1997). In a study involving 146 patients with tinnitus, a significant relationship was determined between anxiety sensitivity and tinnitus (Hesser and Andersson, 2009). These studies reveal that anxiety sensitivity is a very important mediating variable that affects the tinnitus complaint. Anxiety sensitivity is usually the
The most important vulnerability factor in the development of psychopathology (Zinbarg et al., 2001). However, in this study, the behavior of people with known tinnitus complaints was investigated in a noisy and noiseless environment and a statistically significant difference was observed for the effect of noise on the psychological symptoms of the people with tinnitus. This finding correlates significantly and positively with scores on the somatization subscale of SCL-90-R, which showed high levels of somatic anxiety in patients with tinnitus (Figure 2).

In the literature, a significant relationship between tinnitus or sensitivity to noise and mental health was found by some research groups (Harrop-Griffith et al., 1987). In our study, three scales using SCL-90-R were shown to be significantly higher than those of the control group as indicated by the scores in terms of the distress due to psychiatric symptoms. The scores of somatization, anxiety, hostility subgroup scale in SCL-90-R was determined to be comparatively higher in the tinnitus group ($p<0.05$). In conclusion, patients with chronic tinnitus are more likely to develop psychiatric disorders such as anxiety sensitivity, anxiety, and depression, suggesting that multidisciplinary approaches are essential in the treatment of these patients. The fact that these studies are carried out in the work environment and on the employees also provides important data in terms of occupational health and safety and also created a basis for minimizing personal exposures by evaluating employees with tinnitus working in a noisy environment.

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**Ethics committee:** Protocol of this study was approved by the ethics committee.

**REFERENCES**


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