

ORIGINAL ARTICLE

The Prevalence of Misophonia and Its Relationship with Obsessive-compulsive Disorder, Anxiety, and Depression in Undergraduate Students of Shiraz University of Medical Sciences: A Cross-Sectional Study

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ABSTRACT

Background: Misophonia is a severe emotional response to repetitive sounds. This disorder may limit a person's communication, reduce his/her ability, or disrupt his/her social and personal life. This study aimed to determine the prevalence of Misophonia and its relationship with obsessive-compulsive disorder, anxiety, and depression in undergraduate students of Shiraz University of Medical Sciences.

Methods: The present study is an analytical descriptive study conducted in October 2020. The study samples consisted of 390 undergraduate students of Shiraz University of Medical Sciences. A relative and systematic sampling method was used. In this study, demographic questionnaire, misophonia questionnaire (A score of 7 or higher is considered as misophonia), Beck anxiety questionnaire, Beck depression questionnaire, and Maudsley obsessive-compulsive inventory questionnaire were used, and the data were analyzed using SPSS 24 software. In this study, chi-square test was used to examine the relationship between the variables. Due to the non-normality of the data, the Spearman correlation coefficient was used for data analysis. The significance level was considered equal to and less than 0.05.

Results: Of the 390 participants in the study, 93 (23.8%) had experienced misophonia. Among these 93 students, 37 (39.8%) had obsessive-compulsive disorder, 8 (8.6%) suffered anxiety, and 9 (9.7%) were depressed. There was a significant and direct relationship between misophonia and obsessive-compulsive disorder, anxiety and depression respectively ($P < 0.001$).

Conclusion: Due to the prevalence of misophonia among students and its direct relationship with obsessive-compulsive disorder, anxiety and depression, we recommend that future studies should be conducted to find the ways to prevent and reduce the incidence of misophonia.

Keywords: Misophonia, Obsessive-compulsive disorder, Anxiety, Depression

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INTRODUCTION

Misophonia can be a strong emotional response to the sounds that normally occur in the environment.¹ The term was coined at the beginning of the new millennium.² Misophonia is made up of a combination of the words Miso and phone, so misophonia means disgust or hatred of sound.¹ Misophonia is a term that does not include hatred from all sounds, but only certain sounds, which are called triggers, are disgusting.³

Triggers are repetitive and spacial sounds that are typically produced by another person, such as the sound of chewing, the jolting of a pen, the sound of tapping slowly on a surface, and the sound of Lips smacking.³ Annoying conditional reaction disorder, “selective sound sensitivity syndrome” or 4S and “soft sound sensitivity syndrome” are other conditions that indicate a state of hoarseness; However, the sound seems to be a more common term for this condition at the moment.^{2, 3} People with misophonia often have problems such as impaired concentration while studying or doing their work, isolation and alienation from certain environments, and limited ability to communicate with others.⁴ Such people have reported physical reactions such as chest tightness, muscle stiffness, increased heart rate, increased body temperature, and palm sweating. The problems that arise in these people can be divided into 1) physiological: muscle tension, headache and digestive problems; 2) emotional: anxiety, desire to escape, anger, disgust, panic and anxiety; 3) cognitive: concerns, difficulty concentrating, blaming themselves and others; 4) behavioral: in going, avoiding, getting out of a place, imitating others, asking others to stop moving and making a certain sound or word, being aggressive towards oneself or another, or inanimate objects.⁴

The most common reaction of sufferers can be intense anger, but it can also include feelings of anxiety, frustration, disgust, and the thought of hurting others.⁵ The disgusting reactions that people with voice

aversion experience are often so strong that they can dominate their lifestyle and career choices.⁶ People with this condition often hate and run away from people who are their closest relatives, and this leads to relationship breakdown, unemployment, and social isolation.

Misophonia is not classified as an auditory or psychiatric condition, so it is different from phonophobia (fear of sound) as there are no standard diagnostic criteria, and there is little research on how common it is or what its treatment is.⁷ Researchers have found that the anterior insular cortex (which plays a role both in emotions like anger and in integrating the input from outside, such as sound, with that from organs such as the heart and lungs) causes more activity in other parts of the brain in response to triggers, particularly in the parts responsible for long-term memories, fear, and other emotions.⁸ It has also been found that people with misophonia have higher amounts of myelin (a fatty substance that surrounds the nerve cells in the brain to provide electrical insulation). It is not clear whether myelin is a cause or an effect of misophonia and its triggering of other areas in the brain.⁹

Research in the field of misophonia and related factors is limited in the world, and this limited number have mostly been done on people who have referred to clinics.^{9, 10} In previous studies, misophonia has sometimes been associated with disorders such as anxiety, obsessive-compulsive disorder, depression, eating disorders, Tourette’s syndrome, and tinnitus.⁹⁻¹¹ Some studies suggest that while misophonia has unique clinical features with a neurophysiological mechanism, it may be associated with psychiatric symptoms.^{11, 12} In most of these studies, small samples have been used; therefore, it is necessary to determine the statistical relationship between misophonia and other disorders in large samples more precisely; also, the accurate identification of the factors related to misophonia can play an important role in preventing this disorder.^{10, 13}

Although misophonia is not mentioned in any recent psychiatric classification systems,

Schröder believes that misophonia should be considered as a new mental disorder in the spectrum of obsessive-compulsive disorders.¹⁰ Obsessive-compulsive disorder is characterized by a variety of symptoms, including disturbing thoughts, anxiety, and coercion that significantly interfere with a person's normal routine of life, job performance, routine social activities or relationships.¹⁴ Based on a study, the rate of obsession in the total population is 11.2%, and 35-40% of people with obsessive-compulsive disorder also suffer from depression and anxiety.¹⁵

Students are one of the most important groups experiencing misophonia. They play an important role in the future management of the country and their physical and mental health affects their work, activities, and society. Proponents suggest misophonia can adversely affect the ability to attain the life goals and enjoy social encounters.² Misophonia can greatly affect all aspects of the students' lives, such as their education, study, learning, social life, and communication, especially with people who do not understand their sensitivity.¹⁶ Based on a study, 22.8% of undergraduate students are often or always hypersensitive to certain sounds (e.g., chewing, sniffing, nasal sounds, and repetitive sounds).¹⁷

One of the basic measures in controlling misophonia is to estimate the number of people suffering from it. Due to the impact of anxiety, depression, and obsessive-compulsive disorders on people's lives, clarification of their relationship with misophonia, the key role of students in society, and insufficient information about misophonia in Iran, obtaining new information, including its prevalence among students who are active in society, can be an innovation and a new task. Although the prevalence of misophonia has yet to be formally determined, research suggests that it is not a rare condition.^{17, 18} This study aimed to investigate the prevalence of misophonia and its relationship with obsessive-compulsive disorder, anxiety, and depression

in undergraduate students of Shiraz University of Medical Sciences in 2020.

METHODS

This is a cross-sectional descriptive study with correlational design. The study population in this study consisted of undergraduate students of Nursing-Midwifery (Nursing, operating room, Anesthesia, Midwifery, Emergency Medical Technician (EMT), paramedical sciences (Laboratory sciences, Radiology) and Health (Health, Nutrition) at Shiraz University of Medical Sciences in October 2020. However, some disciplines and faculties, such as the Faculty of Rehabilitation, were not willing to cooperate. All students who met the criteria for entering the study and gave their consent to participate in the study were enrolled. Based on the results of a previous similar study, the sample size was determined.¹⁷ According to the prevalence of misophonia in that study (22.8%) with an error of 0.05, the sample size was determined; given a 10% drop, 390 students were finally considered as the sample in this study.

$$n = \frac{z_{1-\frac{\alpha}{2}}^2 p(1-p)}{d^2}$$

As some of the study variables, such as anxiety, might be affected by the field of students,¹⁹ relative sampling method was used in such a way that the required number of students in each field and each class was determined using relative stratified sampling, and in the next step in each class, the students were selected using a systematic method.

In 2020, the total number of students of Nursing-Midwifery, Paramedical Sciences and Health Faculties at the undergraduate level was 1190. Given that the sample size in this study was 390 and the total number of nursing students was 311, the number of nursing students required in this study was obtained 102. In the next stage, considering that the total number of nursing students was 311, the number of required nursing students was 102 and the number of first year students was equal to 57, so the number of required

nursing students who were studying in the first year was approximately 19. Then, using a systematic method, 19 first year nursing students were selected. The same process was used for other disciplines and education year. (Nursing: 102, Laboratory Sciences: 74, Operating Room: 51, Radiology: 48, Anesthesia: 41, Midwifery: 38, EMT: 20, Health: 13, and Nutrition: 3).

In the second stage, after final approval of the proposal and obtaining permission from the Vice-Chancellor for Research and Ethics Committee (ethical code "IR.SUMS.REC.1399.766") of Shiraz University of Medical Sciences, the surnames and mobile phone numbers were obtained from the faculty education office. Then, all the samples were contacted by phone or SMS. After contacting them, we explained the objectives of the study and after accepting the participation in the study, they signed the consent forms. Then, the link of the online questionnaire was sent to the student through WhatsApp.

Inclusion criteria were studying in nursing-midwifery, paramedical sciences and health faculties, being willing to participate in research and completing the informed consent form, having access to smartphones and the internet, and having a WhatsApp application on their smartphone.

The exclusion criterion was suffering from diseases related to hearing based on the person's statement in the questionnaire.

A demographic Information Questionnaire was prepared based on the objectives of the research, review of similar texts and studies, and opinion of the experts in this research project; it included data on age, gender, marital status, field of study, grade point average, residence status and hearing problems and was completed online by the students.

The misophonia questionnaire is a self-report tool developed by Monica Wu.¹⁷ It includes three subscales; Subspecies of Misophonia symptoms that measures the presence of Misophonia symptoms (7 items); Subscale of emotions and behaviours caused by Misophonia that measures emotional and

behavioural reactions due to Misophonia (10 items); and Subscale of the sensitivity intensity (1 item). The options related to the subscales of sound symptoms and the resulting emotions and behaviours are scored on a five-point Likert scale (never=zero, rarely=1, sometimes=2, often=3 and always=4) and the total score of the questionnaire ranges from zero to 68. The final question of the questionnaire was a general one used to determine the overall severity of misophonia symptoms on a scale of 1 (minimum) to 15 (very severe). A score of 7 or higher indicates significant clinical signs.¹⁷ In Iran, for the first time, the psychometric properties of the sound instrument questionnaire were studied by Mehrabizade Honarmand and Roshani (2020) on 350 students. Reliability of this instrument was measured using Cronbach's alpha and by halving; it was found that the internal consistency of both the subscale and the whole scale was desirable. The reliability coefficient was 0.79 for the subspecies of misophonia symptoms, 0.66 for the subscale of excitement due to misophonia, and 0.73 for the total scale. All the three correlation coefficients were significant at the level of $P < 0.001$. The convergence validity of this questionnaire was obtained using the correlation between sound echo score and subscales of sound echo symptoms and sound ejection emotion ($P < 0.01$, $r = 0.87$ and $P < 0.01$ and $r = 0.94$, respectively). This indicates the appropriateness of convergent validity of the misophonia questionnaire.²⁰

Maudsley obsessive-compulsive inventory was developed by Hodgson and Rachman (1977) with the aim of researching the type and scope of obsessive-compulsive disorder. This questionnaire reflects four types of obsessive-compulsive problems. These four components include inspection, cleanliness, Kennedy, and obsessive suspicion. The questionnaire contains 30 questions. The range of scores can be from zero to 30, and the scores above the average of 15 are considered as obsessive scores.²¹ This questionnaire has been translated into Persian and its validity

and reliability have been confirmed; Shams et al. for the first time in Iran reported the total reliability coefficient of the questionnaire as 0.84 and its convergence validity with the Yale Brown questionnaire as 0.87.²²

The second version of Beck anxiety questionnaire was developed by Beck (1993). This questionnaire contains 21 items in which the subject chooses one of the four options that indicate the severity of anxiety. The total score of this questionnaire can range from zero to 63. A score of 31 or higher is considered anxiety. In Beck's research, Cronbach's alpha coefficient was 0.92, and its reliability was 0.75.²³ In Iran, in the research conducted by Kaviani and Mousavi (2008), the validity, reliability, and internal stability of this questionnaire have been determined. In this study, the test-retest method was used. The results of calculating the correlation between the two variables of the scores obtained from the questionnaire and the assessment of the clinical specialist about the level of anxiety

in the anxious population showed that the test had a validity of 0.72 and a reliability of 0.83. It means that the calculation of interclass correlation between the test scores and retest showed that this questionnaire had acceptable validity and reliability. Also, Cronbach's alpha calculation was used to determine the internal consistency of the questionnaire, which showed to be 0.92.²⁴

Beck Depression Inventory Second Edition was developed by Beck and has 21 items. Each substance (a symptom of the disease) can be divided into four grades based on its severity and scores from zero to three. The sum of the scores of each questionnaire can range from zero to 63. A score of 31 or higher can be considered depression.²⁵ In Iran, Toosi (2017) conducted a research on undergraduate and graduate students at Shiraz University to assess the validity, reliability, and internal stability of the questionnaire. To calculate the reliability of the questionnaire, they used retesting methods and internal stability, and to

Table 1: Frequency distribution of demographic information in the study participants

Variables	Frequency N (%)
Gender	
Male	163 (41.8)
Female	227 (58.2)
Marital Status	
Single	329 (84.4)
Married	60 (15.4)
Divorced	1 (0.2)
Field	
Operating room	51 (13.1)
Nursing	102 (26.2)
Midwifery	38 (9.7)
Health	13 (3.3)
Radiology	48 (12.3)
Laboratory sciences	74 (19)
Emergency Medical Technician (EMT)	20 (5.1)
Anaesthesia	41 (10.5)
Nutrition	3 (0.8)
Employment Unemployed	274 (70.3)
Employed	116 (29.7)
Place of Residence	
Private house	248 (63.6)
Dorm	125 (32.1)
Living alone	10 (2.6)
Other	7 (1.7)

determine the validity, they used simultaneous validity methods and factor analysis; it was found that the questionnaire had a reliability of 0.78 and a validity of 0.73. Cronbach's alpha coefficient was used to measure the internal stability, which was 0.87.²⁶

Data analysis was performed using SPSS software, version 24. Descriptive tests (frequency distribution, mean and standard deviation) were used to describe the data and analytical tests including Spearman correlation and chi-square test were used to test the hypotheses. The significance level was considered equal or less than 0.05.

RESULTS

The majority of the participants in the study were female (58.2%) and single (84.4%) and studied in nursing and laboratory sciences (26.2% and 19%, respectively). 274 students were unemployed (70.3%), the majority lived in private accommodations (63.6%) (Table 1). This study was performed on 390 students and it was found that 23.8% of them were suffering misophonia, 21.3% obsessive-compulsive disorder, 5.1% anxiety, and 4.4% depression (Table 2). Out of 390 participants in the study, 93 had experienced misophonia. Among these

Table 2: Frequency of misophonia, obsessive-compulsive disorder, anxiety, and depression among the study participants

Variables	Frequency N (%)
Misophonia	
No	297 (76.2)
Yes	93 (23.8)
Obsessive-Compulsive Disorder	
No	307 (78.7)
Yes	83 (21.3)
Anxiety	
No	370 (94.9)
Yes	20 (5.1)
Depression	
No	373 (95.6)
Yes	17 (4.4)

Table 3: The relationship between misophonia and obsessive-compulsive disorder, anxiety and depression in students

Variables	Misophonia		N (%)	P value *
	No N (%)	Yes N (%)		
Obsessive-Compulsive Disorder	46 (15.5)	37 (39.8)		0.05
Anxiety	12 (4)	8 (8.6)		0.05
Depression	8 (2.7)	9 (9.7)		0.008

* Chi-Square Test

Table 4: Correlation between misophonia and anxiety, depression, and obsessive-compulsive disorder among the study participants

	Misophonia	Obsessive Compulsive Disorder	Anxiety	Depression
Misophonia	1			
Obsessive Compulsive Disorder	0.30* (<0.001)**	1		
Anxiety	0.40 (<0.001)	0.41 (<0.001)	1	
Depression	0.35 (<0.001)	0.40 (<0.001)	0.59 (<0.001)	1

*Spearman's correlation; **P value

93 patients, 39.8% had obsessive-compulsive disorder, 8.6% had anxiety, and 9.7% had depression. The results also showed that there was a significant relationship between misophonia and obsessive-compulsive disorder, depression and anxiety. (Table 3).

Spearman correlation test was used to evaluate the correlation between misophonia and obsessive-compulsive disorder, anxiety, and depression ($P \leq 0.05$). The results showed a positive and significant relationship between the mentioned variables (Table 4).

DISCUSSION

The results of the present study showed that about a quarter of the students were suffering misophonia. It also revealed the direct relationship of misophonia with obsessive-compulsive disorder, anxiety, and depression.

A study was conducted in Florida to determine the prevalence of misophonia and its association with related disorders; it was shown that about 22.8% of the students had misophonia. The present study results are consistent with those of the mentioned study.¹⁷ However, another study carried out in the United Kingdom (UK) to determine the prevalence of misophonia among British university graduates found that approximately 50% of them had misophonia.¹⁸ The findings of the present study were not in the same line with those of the British research. This difference in outcomes might be due to differences in the environmental conditions in which the students studied. In addition, the use of different tools in research and differences in the criteria of each structure could be another reason for the high rate of misophonia among English students.

The results of the present study showed that 21.3% of the students had obsessive-compulsive disorder. A cross-sectional study carried out on the students in Sri Lanka showed that 34% of them had obsessive-compulsive disorder, which is almost close to the results of the present study.²⁷ The results of a study in India which aimed to determine the prevalence

of obsessive-compulsive disorder among Indian students showed that the prevalence rate of this disorder among students was about 3-4%; the result of the present study does not agree with those of the mentioned study.²⁸ One of the main reasons for this can be the differences in the culture, facilities in the two countries, or the educational conditions between the samples of the two studies, which have led to the differences in the results.

The results of the present study showed a direct and significant relationship between misophonia and obsessive-compulsive disorder. A study showed the positive and significant effect of cognitive behavioral therapy in people with misophonia who also showed obsessive-compulsive disorder symptoms.¹⁰ Another study was conducted in the Netherlands to examine treatment challenges for misophonia associated with mood and anxiety disorders; it was shown that symptoms of misophonia overlapped with several disorders, including obsessive-compulsive disorder²⁹ which is consistent with the results of the present study.

The present study also showed that 5.1% of the students were suffering from anxiety. In this regard, a study in France found that 4.8-10.9% of the students suffered from anxiety symptoms.³⁰ The result of the mentioned study is consistent with that of the present study. However, the findings of a review study on the students' anxiety in different continents showed that the prevalence of anxiety among students in Asia was 33%.³¹ The results of the present study are not in the same line with those of the mentioned research. This difference in results may be due to the differences in the time of assessment and use of different instruments.

The present study showed a direct and significant relationship between misophonia and anxiety in students. Based on the results of a study conducted in the United States to determine the effect of anxiety on misophonia and aggression, it was found that the use of anxiety reduction strategies in individuals reduced misophonia and

aggression.³² According to these results, it can be concluded that the decrease or increase of anxiety in individuals can be directly related to the decrease or increase of misophonia, and the results of the present study are consistent with those of the above-mentioned research.

In the present study, it was found that 4.4% of the students suffered from depression. A study in Germany revealed that 5.6% of the students suffered from symptoms of depression.³³ The result of the mentioned study is consistent with that of the present study. However, a study in San George, USA, which aimed to determine the prevalence of anxiety and depression among students showed that the prevalence of depression among students could be 18.4%.³⁴ This is not consistent with the results of the mentioned study. This difference in results may be due to the use of different tools in research and differences in the criteria of each structure.

Moreover, the results of a study in Poland showed that the prevalence of misophonia was high among people with depression.³⁵ In this regard, another study in China showed that there was a significant and direct relationship between misophonia and depression.³⁶ The results of the present study showed a direct and significant relationship between misophonia and depression. Similar results were presented in the mentioned studies.

The strengths of this study were a high sample size of the study population and investigation of the prevalence of 4 important mental disorders. On the other hand, the limitation of this study was the lack of cooperation of some faculties (such as the Faculty of Rehabilitation). Other limitations of the study include not examining the relationship between some demographic variables such as living in metropolitan or other cities, daily use of music and caffeine, sleep per day, number of family members, etc. with the the incidence of misophonia, which needs to be examined in future studies to better understand behavioural and neurological conditions and characteristics.

CONCLUSION

The results of the present study showed that about a quarter of the students had misophonia. Also, a significant direct relationship was found between misophonia and obsessive-compulsive disorder, anxiety and depression. Researchers can use the findings of this study as a basis for further studies to improve the people's health. Due to the prevalence of misophonia among the students and its direct relationship with obsession, anxiety and depression, it is recommended that future studies should be performed to identify ways to prevent and reduce the incidence of misophonia. It is also suggested that the prevalence of this disorder should be investigated in different age groups.

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