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Estimation of prevalence and severity of misophonia in adults from India

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Abstract: Misophonia, or "hatred of sound", is characterised by adverse reactions to a specific sound. Persons with misophonia might experience diverse symptoms like anxiety, rage, hatred, etc, from mild to severe. Little is known about the prevalence of misophonia in the adult population in the age range of 30 to 50 years, and existing prevalence studies include only college students or the clinical population - the present study aimed to estimate the prevalence and severity of misophonia in adults through standardised questionnaires. A total of 341 adults from all over India, aged 30 to 50 years, participated in the study. The Misophonia Assessment Questionnaire (MAQ), given by Marsha Johnson, was used to analyse the severity of misophonia in the participants. The questionnaire was administered individually through an online survey, where participants completed Google Forms containing demographic data and the Misophonia Assessment Questionnaire (MAQ). The present study revealed that, out of 341 subjects, the prevalence of misophonia was approximately 31.37%, with most subjects having subclinical misophonia. The results of the study show a high prevalence of misophonia among adults in the age range of 30-50 years. As misophonia is prevalent in the general population, appropriate assessment and management will help reduce the quality of life disruptions.

Keywords: Misophonia; Prevalence; Gender; Geography; Selective sound sensitivity syndrome.

1.0 INTRODUCTION

Misophonia, or selective sound-sensitive syndrome ("strong dislike of sound"), is characterised by the intensive reaction to specific sounds, causing autonomic arousal and troublesome emotional events like anxiety, depression, frustration, and rage with varying degrees of severity (Jastreboff & Jastreboff, 2001). Chewing or crunching, chalk scratching, spoon scratching on the plate, dripping water, sandpaper abrasion, nail scratching on hard surfaces, nose sniffing, pen clicking, ticking of the clock, whistling, and finger or foot tapping are some of the sounds that provoke misophonic individuals (Cavanna & Seri, 2015). The extent to which the patient reacts depends not only on the physical

features of the sound but also on the previous recollection of that particular sound (associating negative emotion with a sound, and it worsens whenever that sound is heard) (Jastreboff & Jastreboff, 2001).

Despite increased awareness of misophonia, it has been challenging to develop a precise, widely recognised description due to a lack of standardised vocabulary and evaluation techniques. Swedo et al. (2022) recently reached a consensus that misophonia is best described as a disease marked by a reduced tolerance to particular sounds or related stimuli. However, inconsistent descriptions and studies of the illness have impeded the development of effective treatments and limited research progress. Our understanding of the disease has been greatly influenced by clinical and case studies that examine people's experiences and emotional reactions. The development of neurophysiological and neuroaudiological models to explain the pathophysiological processes underlying misophonia has significantly advanced in recent years, offering compelling evidence of its neurological basis (Aryal & Prabhu, 2023; Jastreboff & Jastreboff, 2023). These models suggest that misophonia is not merely a psychological condition, but one that is deeply rooted in the brain's auditory processing networks and emotional regulation systems (Aryal & Prabhu, 2023; Jastreboff & Jastreboff, 2023). Research in this area points to specific cortical areas that are implicated in the experience of misophonia, highlighting the intricate relationship between auditory stimuli and emotional responses (Brout et al., 2018; Ferrer-Torres & Giménez-Llort, 2022; Hansen et al., 2022). Abramovitch et al. (2024) reported that misophonia may be linked to atypical sensory processing and emotional regulation, highlighting the need for targeted therapeutic interventions. Recent studies have focused on the neural mechanisms underlying misophonia, highlighting the involvement of brain structures associated with emotional regulation, attention, and sound processing. Functional neuroimaging studies have provided insight into how individuals with misophonia process trigger sounds. Research by Schröder et al. (2013) revealed that individuals with misophonia exhibit heightened activation in the anterior insular cortex and the amygdala, areas of the brain closely linked to emotion and sensory processing. These findings suggest that misophonia may result from abnormal connectivity between the auditory cortex and emotional processing centres.

Recent neuroimaging data have demonstrated that individuals with misophonia also show increased connectivity between the auditory cortex and the prefrontal cortex, which may contribute to an exaggerated emotional response to sounds. In healthy individuals, the prefrontal cortex helps modulate emotional reactions to sensory inputs; however, in individuals with misophonia, this regulation may be impaired, leading to extreme emotional reactions to specific sounds (Kumar et al., 2021). Furthermore, there is emerging evidence suggesting that misophonia may be linked to hyperactivity in the central nervous system's autonomic branches, contributing to physiological responses such as elevated heart rate and blood pressure in response to triggering sounds (Kumar et al., 2021). Literature also provides neural evidence supporting the idea that mild misophonia can be triggered by non-orofacial sounds, expanding the understanding of the condition beyond typical triggers like chewing. It highlights the involvement of brain regions related to sound processing and emotional response, even for non-oral sounds (Hansen et al, 2022). There is a growing body of knowledge about the prevalence and severity of misophonia in many regions of the world. Wu et al. (2014) found that the prevalence of misophonia was 19.9% in a sample of 483 US undergraduates using an online questionnaire study. According to Jakubovski et al. (2022), 5% of the general population in Germany is affected by clinically significant misophonia symptoms. Patel et al. (2023) studied 328 undergraduate students to establish the prevalence and severity of misophonia in college students all over India. The study revealed that the prevalence of misophonia was approximately 15.85% with moderate to severe degrees, 33.84% with mild misophonia, and 50.3% with subclinical misophonia when assessed using the A-MISO scale. In addition, it was also found that there is no gender dominance among persons with misophonia.

Aryal and Prabhu (2022) surveyed the prevalence, impact, and comorbidity of misophonia among 172 students at Mysore University in India. Among the participants, 47.6% reported having misophonia. The results also showed that 25.93% had tinnitus and 27.16% had hyperacusis as a comorbid condition along with misophonia. Another study by Sujeeth et al. (2023) reported a prevalence of 34.67% among high school students, with the majority of cases having mild severity (52.65%).

In the present scenario, studies on the prevalence and severity of misophonia in the adult population are limited. Therefore, to overcome this limitation, more research studies are necessary. Hence, the study's primary objective is to determine the prevalence and severity of misophonia in adults aged 30 to 50. Additionally, taking into account India's varied urban and rural settings, this study aims to investigate the differences in misophonia prevalence and severity across genders and geographic areas. Furthermore, the purpose of this study is to examine how the severity of misophonia is affected by ear-related diseases such as vertigo, itching, hearing loss, and ear discomfort. By tackling these elements, the research hopes to provide insightful information that can support improved comprehension, diagnosis, and possible rehabilitation.

2.0 MATERIALS AND METHODS

2.1 Ethical consideration

In the present study, all the testing procedures were carried out on humans using non-invasive techniques, adhering to the guidelines of the Ethics Approval Committee of the institute. This study was approved by the Institutional Ethical Board AIISH, Ethical Institutional Review Board (REF/SH/IRB/2023/12).

2.2 Subjects

The total participants in the study were 341 adults from all over India with diverse cultural, educational, linguistic, and economic backgrounds. The participants ranged from 30 to 50 years, with a mean age of 39.48 and a standard deviation of 5.91. There were 232 female participants (68%) and 109 male participants (32%). Two hundred one participants in the study were from urban areas (58.9%), with a mean age of 39.23 and a standard deviation of 5.93, and 140 participants were from rural areas (41.1%), with a mean age of 39.85 and a standard deviation of 5.85. As the study also focused on knowing the difference in the severity of misophonia in people with or without ear-related problems and hearing loss, 315 participants did not have any otological problems, nor were they under medication, and 329 did not have hearing loss.

2.3 The survey

An online survey was conducted wherein the participants filled out the Misophonia Assessment Questionnaire (MAQ) using Google Forms. The researchers did not specifically pick the survey participants; rather, they self-selected, meaning they decided to participate voluntarily. The Google form included demographic details like name, age and gender, occupation, and questions regarding the participant's geographical location (rural or urban), hearing status (hearing loss if present), and other otological problems like ear pain, ear discharge, etc. Participants selected for this study are in the age range of 30 – 50 years, studied English till 12th standard, and were able to use Google Forms to respond to the questionnaire.

The Misophonia Assessment Questionnaire by Marsha Johnson and revised by Tom Dozier (2015) was used to assess the severity, negative thoughts, and feelings a subject experiences. The MAQ is a 21-item questionnaire about the impact of misophonia on quality of life. It is a self-rating questionnaire with a four-point Likert-type rating scale in which 0 indicates not at all and 3 indicates almost all the time. The total score ranged from 0 to 63, and participants were categorised into subclinical (0-11), mild (12-14), moderate (25-37), severe (38-50), and highly severe (51-63). Total scores were calculated for each individual, and the severity of misophonia was estimated. The details of the survey questionnaire used in the study are provided in Appendix A.

2.4 Statistical Analyses

The data were analysed using the Statistical Package for Social Sciences (SPSS) version 21 (IBM Corp., Armonk, NY).

3.0 RESULTS

The results of the present study showed that out of 341 subjects, the prevalence of misophonia was approximately 31.37% (*N*=107). Among those with misophonia, only one had a highly severe degree of misophonia (0.93%), indicating that more emotional and physiological overwhelming reactions to specific sounds affected daily activities. 2.80% had a moderate degree of misophonia (*N*=3), suggesting lesser disruptions to sounds than the severe category, and 14.95% had a mild degree (*N*=16), indicating mild reactions to specific sounds. 81.30% (*N*=87) had sub-clinical misophonia, suggesting an occasional obvious misophonia that does not cause any distress due to sounds. The results are shown in **Figure 1.**

In addition, the prevalence of misophonia across genders was also studied. Of the 232 female participants, 31.89% had misophonia, and among the 109 males, 30.27% had misophonia, suggesting no notable gender dominance among individuals with misophonia. Among females, 82.43% had subclinical misophonia, 13.51% had mild, 2.7 % had moderate, and 1.35 % had extremely severe misophonia, and among

Table 1. Prevalence of misophonia across geographical location, gender, and different degrees

Category	Total (N)	Misophonia Cases (N)	Prevalence (%)	Subclinical (%)	Mild (%)	Moderate (%)	Highly Severe (%)
Overall	341	107	31.37	81.30	14.95	2.80	0.93
Gender							
Female	232	74	31.89	82.43	13.51	2.70	1.35
Male	109	33	30.27	78.78	18.18	3.03	0.00
Geographical Location							
Rural	140	33	23.57	81.81	9.09	6.06	3.03
Urban	201	74	36.81	82.43	16.41	1.35	0.00

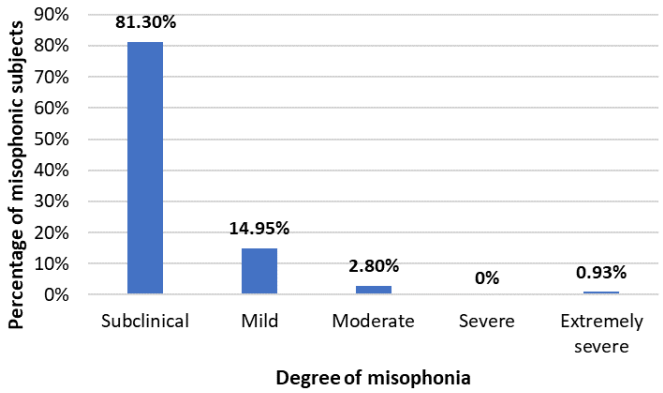

Figure 1. Percentage of individuals with misophonia across severity.

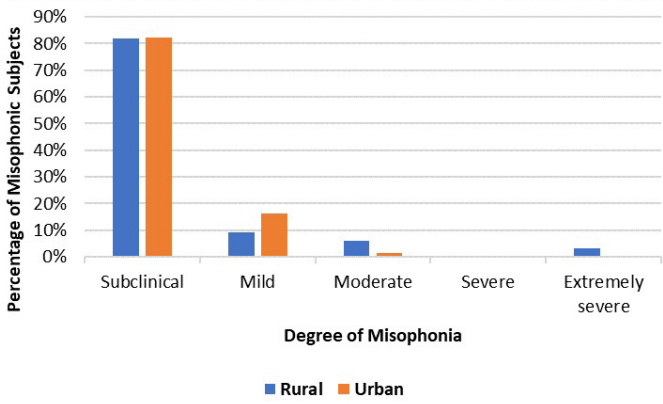

Figure 2. Percentage of individuals with misophonia across severity in urban and rural population.

males, 78.78% had subclinical misophonia, 18.18% had mild, 3.03 % had moderate, and 0% had highly severe misophonia. The results are shown in **Table 1.**

The prevalence of misophonia across geographical locations (urban and rural) was also studied. Of the 140 rural participants, 23.57% had misophonia, and among the 201 urban participants, 36.81% had misophonia. Among rural participants, 81.81% had subclinical misophonia, 9.09% had mild, 6.06 % had moderate, and 3.03% had extremely severe misophonia. Among urban participants, 82.43% had subclinical misophonia, 16.41% had mild, 1.35 % had moderate, and 0 % had severe misophonia. Also, the study found that 11.21% of subjects with misophonia had ear-related problems and 4.67% had hearing loss of various degrees. The results are shown in **Figure 2.**

4.0 DISCUSSION

Misophonia is a disorder that severely impairs the quality of life for people who experience it. It is linked to numerous psychiatric symptoms and has neurological and physiological correlations, but an increasing amount of evidence points to it being a distinct condition (Erfanian et al., 2019). There is still a shortage of knowledge regarding its prevalence and related factors in the general population. The present study primarily focused on the prevalence and severity of misophonia among adults, as well as its impact across different genders and geographical locations.

The results of the present study indicate that misophonia was prevalent in 31.37% of 341 subjects, with most having sub-clinical misophonia. This shows a higher prevalence compared to a study by Zhou et al. (2017), which reported a prevalence of 20% in 415 Chinese graduates. These findings support the information already in existence from Patel et al. (2023) whose investigation into severity also revealed that the majority of them had subclinical misophonia. Among the subjects in the present study, 0.93% had extremely severe misophonia, 9.34% had moderate misophonia, and 5.60% had mild misophonia. The prevalence was approximately one-third (31.37%) in India, compared to 12.8% in Turkey and 20% of Chinese graduates. According to a recent study by Sujeeth et al. (2023) the prevalence of misophonia in high school students was

34.67%, with 52.65% having mild misophonia and 45.41% having moderate misophonia. This indicates that many high school students had more intense emotional reactions to particular sounds than the adult population.

The study analysed the prevalence of misophonia in adults across genders and geographical areas. The prevalence varied across genders, with 69.15% females and 30.84% males. Aryal and Prabhu (2022) examined the impact of gender and found no relationship between gender and the incidence of misophonia.

Misophonia is characterised by an extreme reaction to certain noises, such as noise from the workplace or surroundings or human sounds like breathing and chewing. The degree of noise irritation is mainly determined by the noise's properties, including its intensity, frequency, roughness, and how its source is perceived. These acoustic and psychological aspects may explain why different noise sources cause varying degrees of discomfort (Paunovic & Milenković, 2022). The duration of noise exposure and the environment in which it occurs may impact the link between noise exposure and noise annoyance, as noise in commercial and recreational settings may be perceived as more intense but less psychologically unpleasant than noise at home (Kou et al., 2020). Furthermore, noise annoyance depends on some personality traits. Several studies have shown high levels of noise in urban areas. A survey conducted by Bhosale et al. (2010) shows a higher noise level in Aurangabad city. The noise levels were higher on working days than on holidays and exceeded the acceptable standards. One of the main reasons for the noise in the urban environment includes noise from industry, transit, and nearby residences. Noise can disrupt complex work performance, alter social interactions, and irritate people. Research on noise exposure at work suggests a possible link with hypertension, although studies conducted in communities have found minimal noise effects. Our study showed a higher prevalence of misophonia in urban areas**.** As the acoustic spectra of rural areas are approximately 20 dB lower than those of any urban area, the prevalence of misophonia was lower in rural areas (Albert & Decato, 2017).

In the Indian context, sociocultural factors play a significant role in the experience and prevalence of misophonia. The traditional family structure in India, particularly the prominence of joint and extended families, means individuals with misophonia may be more frequently exposed to triggering sounds within family settings. This often makes coping mechanisms and understanding the condition within the family unit crucial to the individual's ability to manage their symptoms. Additionally, the cultural emphasis on respect for elders and authority figures can make it challenging for individuals to express their discomfort with specific sounds, potentially exacerbating feelings of distress or social withdrawal. Environmental noise also plays a key role in the manifestation of misophonia in India. High ambient noise from traffic, festivals, and religious ceremonies often characterises the country's densely populated urban areas. Such widespread exposure to auditory stimuli may influence how misophonia presents and is perceived. Certain sounds, such as religious chanting, loudspeakers during festivals, or the calls of street vendors, may be common triggers, further complicating the diagnosis and treatment of the condition.

In India, mental health awareness is still evolving, and conditions like misophonia may often be misinterpreted as simple irritability, hypersensitivity, or even a personality trait rather than being recognised as a neurophysiological disorder. This lack of recognition within mainstream healthcare can lead to underreporting or misdiagnosis, thereby skewing the prevalence estimates of the condition (Aryal & Prabhu, 2023). Furthermore, culturally specific coping strategies often emerge, with individuals relying on practices such as meditation, religious chanting, or seeking guidance from familial networks. When comparing the prevalence of misophonia in India to global studies, it is essential to consider these sociocultural influences. Cultural perceptions, societal expectations, and available resources shape how misophonia is diagnosed, reported, and managed.

Neurologically, misophonia is associated with hyperconnectivity between the auditory cortex and limbic structures, particularly the anterior insular cortex (AIC), which plays a role in processing emotional and interoceptive responses to stimuli (Kumar et al., 2017). Research using fMRI indicates that individuals with misophonia exhibit heightened activity in the AIC, amygdala, and prefrontal cortex when exposed to trigger sounds (Neacsiu et al., 2022; Kumar et al., 2017, 2021; Schröder et al., 2015, 2019). This suggests an abnormal limbic and autonomic response, reinforcing the strong emotional reactions seen in individuals with misophonia. Additionally, the involvement of the amygdala and anterior cingulate cortex may contribute to the heightened threat perception and stress response associated with trigger sounds.

From a psychological perspective, misophonia has been linked to anxiety, obsessive-compulsive traits, and emotional dysregulation (Schröder et al., 2013). The condition often coexists with psychiatric disorders such as generalised anxiety disorder and depression, with some studies indicating a shared underlying neural mechanism involving hypervigilance and maladaptive coping strategies. Cognitive-behavioural factors, including attentional bias toward trigger sounds and catastrophic thinking patterns, further exacerbate the distress associated with misophonia (Brout et al., 2018).

Kiliç et al. (2021) found that approximately 70% of individuals with misophonia symptoms were female. We did not find any discernible gender differences. Similarly, Aryal and Prabhu (2022), who looked at misophonia in a sample of 172 Indian students, found no variation in the prevalence of misophonia based on gender. Comparing our findings to Wu et al. (2014), who observed no correlation between gender and misophonia symptoms, we have also not discovered any connections between gender and misophonia symptoms. The association between misophonia and characteristics related to hearing is not evaluated in published studies. Our research found that 11.21% of subjects with misophonia experienced ear-related problems, and 4.67% had varying degrees of hearing loss**.** Theoretically, misophonia may be impacted by hearing loss. High-frequency components often dominate the spectrum of misophonia-triggering noises. Such noises would be less audible on a steeply sloping audiogram, with the largest loss occurring at high frequencies. This could decrease the likelihood of misophonia in a given person or lessen the severity of already present misophonia. It is possible to determine whether hearing loss affects the probability or severity of misophonia by analysing the audiometric features of individuals who have the condition. Anxiety and sadness may rise in people with distressing tinnitus and hyperacusis, increasing the likelihood that they may experience a strong reaction to trigger sounds or misophonia (Aazh & Moore, 2017). However, it is unclear if having bothersome tinnitus and hyperacusis is associated with a higher chance of developing misophonia. Therefore, further research is needed in this area for a more comprehensive analysis.

Since there is a significant prevalence of misophonia in our study, which supports other studies, there is a need for appropriate rehabilitation methods to improve the quality of life and reduce the dislike towards specific sounds in persons with misophonia. Large-scale empirical treatment studies have not been conducted to assess the effectiveness of therapeutic approaches for misophonia. Furthermore, identifying efficient management strategies has been hampered by the absence of a cogent theoretical and etiological framework. Analysing the coping mechanisms used by people with misophonia has shown that more constructive methods can take the place of avoidance, which involves removing oneself from upsetting circumstances and other socially dysfunctional behaviours, such as confronting the source of the trigger noise. These include self-distraction, using music, earplugs, or headsets to block out trigger sounds, and engaging in constructive internal dialogue (Cavanna & Seri, 2015). The study highlights the need for further research to generalise better the prevalence of misophonia in India, a country with a large population.

4.1 Strengths and limitations

The current study considered only participants who were proficient in English. Hence, the study findings cannot be generalised to the non-English-speaking population of the country. Future studies can consider these variables and study the effects of these on the prevalence of misophonia. However, to date, no standardised assessment questionnaires for misophonia are available in all the native languages of India, and we must determine the essential diagnostic procedures or tests that could lead to the appropriate recognition of the condition. Hence, future studies should focus on the development and cultural validation of these questionnaires, estimating the prevalence and severity of misophonia in various age groups and geographical locations with larger sample sizes. Another significant drawback of this research is its dependence on the Misophonia Assessment Questionnaire (MAQ), a self-report instrument that could potentially create bias in responses. Memory recall mistakes, subjective symptom interpretation, and social desirability bias can all affect participants' subjective perceptions, which could result in an underestimation or overestimation of symptom severity. Furthermore, self-reported data are not objectively verified, which makes it challenging to distinguish misophonia from other types of aural sensitivity.

4.2 Clinical implications and future directions

The findings of this study highlight the need for greater professional awareness and training to ensure that individuals experiencing misophonia receive appropriate evaluation and intervention. By identifying individuals who require further attention, this study provides a foundation for developing targeted

screening and referral mechanisms within audiology and allied healthcare fields.

From a public health perspective, increasing awareness about misophonia is essential for both professionals and the general public. In the Indian context, research on misophonia is scarce, resulting in a limited understanding of its prevalence, severity, and impact across different populations. One potential barrier to appropriate diagnosis and care is the limited knowledge among audiologists, resulting in missed or incorrect referrals. Public health awareness campaigns should aim to bridge this gap by educating not only healthcare professionals, including audiologists, psychologists, and general practitioners, but also individuals experiencing misophonia symptoms.

Additionally, the development of accessible support services is critical. Many individuals with misophonia struggle with social, occupational, and emotional challenges due to the condition, yet there are few structured support systems available in India. Integrating audiologists into multidisciplinary teams for diagnosing and managing misophonia can enhance patient care and ensure that individuals receive appropriate treatment. Public health initiatives should focus on establishing referral networks, helplines, and support groups to provide guidance and resources for individuals with misophonia. These efforts would contribute to improved recognition, early intervention, and better quality of life for affected individuals.

5.0 CONCLUSIONS

Misophonia is a disorder on the edge of audiology and psychology. In audiology, it is a relatively recent term that is poorly understood. However, over time, misophonia is becoming more common. The results of our study show a high prevalence of misophonia among adults in the age range of 30-50 years. Given the high prevalence of misophonia, appropriate assessment and management strategies are essential to mitigate its impact on quality of life. However, individuals are still not seeking assistance from concerned professionals, as they are unaware of misophonia management, despite being affected by it in their daily lives.

Consequently, emphasis on further epidemiological information will aid in identifying misophonia as a distinct and real condition. This would offer a way to treat misophonia as a team approach, including audiologists. However, even professionals are unaware of the role audiologists play in diagnosing and treating misophonia, and their contribution to this disorder is little recognised. In the audiology clinics, many cases of hyperacusis and tinnitus are diagnosed and treated effectively as understanding of these conditions grows over time.

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