

# Misophonia:

## A Detailed Case Series and Literature Review

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**M**isophonia, also known as selective sound sensitivity syndrome, is a term coined by the American neuroscientist and professor Dr Pawel Jastreboff in 2000.<sup>1,2</sup> It is used to describe an intense aversive reaction to particular sounds or a form of decreased tolerance to certain sounds. Unlike hyperacusis, which is sound intolerance causing pain at specific sound frequencies, and phonophobia, which is an irrational fear of sounds, misophonia is selective and specific for certain sounds. Those who suffer from misophonia are often annoyed or frustrated by sounds made by other people, such as breathing, coughing, chewing, eating, sighing, lip smacking, or other ordinary sounds, in addition to repetitive movements including leg tapping, nail biting, and typing. This condition is not well recognized in medicine. There were few published case reports and limited treatment studies specific for misophonia in the published literature prior to 2010.<sup>3–5</sup> Within the past 10 years, misophonia has received increased attention with over 10 published articles describing a high estimated prevalence, ranging from 10% to as high as 60%,<sup>6–8</sup> and a high burden of psychiatric comorbidities.<sup>9–12</sup> We present 5 cases, including specific treatments that were attempted, and also review the existing literature and evidence for specific treatment options in misophonia, and we hope to promote awareness of this condition.

A PubMed search was conducted until February 1, 2021. This review aimed to target articles focused on the search term *misophonia*, restricted to available full text, human,

English language, and access to full articles. Thirty-nine articles were found, and after reviewing the titles and abstracts, 31 remained that were related to misophonia and were included in this literature review.<sup>1–31</sup>

Cases were identified at the outpatient clinic at the North York General Hospital and the Frederick W. Thompson Anxiety Disorders Centre at the Sunnybrook Health Sciences Centre in Toronto, Canada by different psychiatrists from 2010 to 2016.

### Case 1

Mr A, a 38-year-old single computer office manager with no prior psychiatric history, was referred to the psychiatric outpatient clinic secondary to hypersensitivity to certain sounds with accompanying intense irritation and frustration. He described a longstanding history of being bothered by noises made by other people including chewing, sighing, teeth cleaning, shoe tapping, throat clearing, nose sniffing, and keyboard typing. He recalled the onset of this aversion to particular sounds as early as childhood, which was triggered at the age of 5 years when his older brother began to sniffle frequently and chronically. He then became annoyed and frustrated by sounds made by his brother, his parents, and others thereafter. He started noticing his father's particularly loud chewing and shoe-tapping sounds, which made him feel very uncomfortable in his father's presence. Initially, he believed that people were deliberately making noises to bother him. However, when he began working, he realized that everyone made keyboard typing sounds and recognized he was selectively bothered by just one specific coworker's typing sounds. Because of his difficulty concentrating and emotional distress from hearing noises made by others, he had not been as productive at work. Furthermore, he had tended to avoid visiting his parents after moving out on his own. His coping strategies included using ear plugs, listening to his iPod with headphones, and removing himself from the situation and location. He explained that when he heard a specific noise, he was unable to focus on anything else, and he became extremely frustrated. Moreover, he had been experiencing anticipatory anxiety about hearing certain noises throughout the day even when they were not present. Nonetheless, he had good social functioning, identifying many friends and volunteering his time to produce and take part in musical plays. He had a girlfriend who was aware of his noise hypersensitivity.

Mr A had no significant family history or prior personal psychiatric history including obsessive-compulsive disorder

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(OCD), but he did have a past childhood history of trichotillomania, which was currently in remission without treatment. He had been medically healthy throughout his life. His audiology testing was normal, thereby ruling out a diagnosis of hyperacusis.

At the time of his psychiatric assessment, he was given a diagnosis of mild OCD, based on this symptom and impact on personal and occupational functioning. Mr A attended 11 individual sessions of structured cognitive-behavioral therapy (CBT). The content of CBT included learning about his emotional response to triggering sounds, particularly frustration, anger, and anxiety. He learned about distress tolerance, as well as becoming aware of and challenging his automatic thoughts. He was taught relaxation techniques such as box breathing, imagery, progressive muscle relaxation, and mindfulness-based techniques. Initially, his Beck Depression Inventory<sup>32</sup> and Beck Anxiety Inventory<sup>33</sup> scores were 9 and 8, respectively; at his last session, they were rated as 5 and 10, respectively. His Yale-Brown Obsessive-Compulsive Scale<sup>34</sup> severity score was initially 15, which decreased to 10 at the end of treatment. At the end of CBT, he felt he had been able to decrease his stress level. He was able to utilize mindfulness techniques to expand awareness of his surroundings, to apply relaxation techniques to control his emotions, and to use thought records to decrease his anger toward the bothersome sounds. He reported offending noises as being more tolerable, and he noted an improved ability to utilize acquired skills to regulate his emotions.

Mr A later opted to experiment with hypnotherapy, which included neurolinguistic programming, timeline therapy, and hypnosis, in addition to personal coaching (setting goals, stress relief methods, and positive mindset). At the end of 5 sessions, he reported feeling at peace and experiencing less intense panic attacks and anxiety when subjected to sounds that had previously caused him difficulties. He continued to describe having trouble when stressed by thoughts of “not obsessing” about sounds in addition to being “bothered” by them. He reported his anxiety level as much reduced with therapy.

## Case 2

In contrast to case 1, case 2 was highly complex with multiple, unclear provisional and differential diagnoses. Ms B was a 33-year-old single lesbian woman who was financially supported by working in the family business. She had an extensive longstanding history of OCD since early childhood. She recalled that her OCD symptoms included being “extremely tidy” and having intrusive thoughts of the names of certain people repeating hundreds of times per day in addition to egodystonic sexual thoughts about her aunt. Furthermore, she reported a high sensitivity to sounds, especially to eating noises since early childhood. She had been diagnosed with OCD as well as depression approximately 10 years earlier, as well as borderline personality disorder and schizotypal personality disorder traits. She described a 3-month

history of psychotic symptoms including referential and paranoid delusions related to religious themes, intermittent auditory hallucinations, and thought insertion. She had been treated with CBT and mirtazapine 30 mg for 5 years with no significant response, and her condition worsened when given risperidone 1 mg daily and sertraline 50 mg daily. She reported zopiclone was effective at temporarily diminishing her obsessions. She recalled a past diagnosis of premenstrual dysphoric disorder and noted worsening of her OCD and mood symptoms 1 week prior to her menses. She had a remote substance use history of cannabis and tobacco in her early 20s but denied recent or current substance use. Her family history was significant for her mother and brother having likely undiagnosed OCD. Her mother also suffered from intense anger and affective dysregulation. She reported no relevant medical history.

Ms B presented for assessment because of increasing severity of OCD symptoms including recurrent and distressing religious and blasphemous thoughts and minor contamination compulsions, in addition to ongoing high sensitivity and distress triggered by the sounds of other people eating. She denied other OCD spectrum disorders. She was diagnosed with severe OCD, schizophreniform disorder, and schizotypal personality traits, in addition to major depressive disorder (MDD) with psychotic features in partial remission. Mirtazapine 30 mg was restarted, and she continued taking zopiclone for sleep, and she reported some relief.

## Case 3

Case 3 presented with typical OCD symptomatology with misophonia as part of the reported symptoms. Mr C was a 37-year-old married heterosexual male working as a graphic designer with a 20-year history of chronic OCD. His OCD symptoms were stable, and he was most disturbed by ongoing ruminations regarding noises at home. He reported using either white noise in his bedroom or leaving the TV on to try to drown out the occasional background noises he would hear, which he perceived as extremely stressful, disturbing, and distracting. Noise was not an issue for him at work; however, his anxiety would increase while walking home, with the anticipation of unavoidable noises upon his return. He estimated his obsessions about noise as constant throughout the evening for approximately 4 hours with a subjective intensity of 50%–60%.

His past OCD symptoms included obsessions about contamination, particularly of contracting AIDS/HIV, schizophrenia, or a brain tumor, and compulsions, including handwashing up to 50 times daily and checking himself for physical symptoms. He reported previous checking behaviors, including checking the stove 30 times before leaving his house, checking for items dozens of times every morning, and checking his collection of photographic negatives every night for hours. He reported a need for symmetry, and he was constantly reorganizing things, placing them in alphabetical order. Rewriting and repeating rituals made it difficult for him to complete school/work assignments and to socialize

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because of repeating himself to people to ensure that he was heard correctly. He endorsed occasional sexual obsessions. He denied symptoms of OCD spectrum disorders including tics, trichotillomania, hoarding, or excoriation disorder. He identified his obsessions and compulsions as irrational and senseless. He reported a major depressive episode, which had recently resolved. He had no prior history of psychiatric hospitalizations, suicide attempts, aggression, violence, substance use, or addiction. His previous medication trials included clomipramine up to 250 mg with good response but intolerable side effects, fluvoxamine causing a brief episode of delirium, and paroxetine with good response but causing a rash and sexual side effects.

He reported a significant family history of mood disorder in his mother, whom he believed had depression or bipolar disorder. His family history was also significant for obsessive-compulsive behavior in one of his younger sisters and his father who was said to be an obsessional man with noticeable attention to cleanliness. From a medical standpoint, he suffered from head injuries at the ages of 2 and 6 years old, which resulted in loss of consciousness. Otherwise, he was physically healthy with no apparent sequelae from his head injuries. He reported low self-esteem as a child and significant social isolation. His level of functioning had improved following a happy marriage and securing a stable job. He was treated with sertraline 200 mg and reported limited but meaningful improvement in his OCD and misophonia symptoms.

#### Case 4

Mr D was an 18-year-old single bisexual man living with his family and currently working full-time in retail after completing high school 1 year previously. He described a longstanding “extreme sensitivity” to sounds, and he had self-diagnosed misophonia. He reported experiencing strong anger and disgust in response to loud noises and eating and chewing noises, and he tried to avoid situations in which he might hear these sounds. His anger and irritability around eating noises were heightened when eating with his family members. He had received no treatment for this condition.

Mr D reported a lifelong history of atypical OCD symptoms involving obsessions about tropical plants and a compulsive need to buy materials related to this, as well as to water the lawn often for hours every day. This had led to financial strain as well as family conflict. He also had a history of generalized anxiety disorder (GAD), panic disorder with agoraphobia, social anxiety disorder (SAD), and mood lability, with past major depressive episodes mostly in the fall and winter. He was sexually abused during his teenage years, resulting in symptoms of posttraumatic stress disorder (PTSD), not meeting full criteria. He had a history of binge eating once weekly, especially when under stress. He described himself as a perfectionist. He reported trials of supportive therapy, CBT for 8 sessions, and emotional freedom therapy, with no clear effect. He had 1 past psychiatric admission for severe anxiety and had no history of suicide attempts, self-harm, forensic involvement, or substance abuse. Past medication

trials included fluoxetine, desvenlafaxine, escitalopram, and sertraline, with no clear benefit. His family history was significant for obsessive-compulsive personality disorder traits, with high levels of perfectionism in both parents, as well as for bipolar disorder in 1 grandparent and a suicide attempt in 1 cousin. Interestingly, the men on his father’s side of the family reportedly had high levels of sensitivity to music, in that they all would become tearful when listening to music. Mr D also had this trait. He had experienced his family as invalidating and was continuing to struggle with separating from his highly religious parents in terms of his lifestyle, sexuality, and sense of self.

On assessment, he was diagnosed with OCD, misophonia, and previous diagnoses of GAD, SAD, panic disorder with agoraphobia, and recurrent depression. He was treated with fluoxetine 40 mg daily and quetiapine 600 mg daily, both of which made some impact on his mood but did not significantly improve his OCD symptoms or his misophonia.

#### Case 5

Ms E was a 33-year-old single lesbian woman with a postgraduate education, who was working full-time in health care and living independently. She developed misophonia at age 12 years in the context of a fight with her mother. She had never received treatment for her misophonia, which gradually worsened over the years. She reported experiencing extreme anger, irritability, and disgust when exposed to chewing, swallowing, and crunching noises, as well as to sounds related to nasal or oropharyngeal congestion. Her symptoms increased when people were seen to be eating “impolitely” (eg, talking with food in their mouths). These symptoms were worse with her mother, but they had extended to everyone she was in contact with, to the extent that she reported being unable to concentrate at public or educational events, such as seminars and lectures, as she would be constantly scanning for these noises. She described being so attuned to others’ eating noises that she could tell who was sitting behind her and where they were sitting by the sounds those individuals made.

She had a 7-year history of MDD and a longstanding history of GAD and SAD, in addition to obsessive-compulsive personality disorder traits, not meeting full criteria. She had received trials of numerous selective serotonin reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors, as well as augmenting agents for her MDD and GAD, none of which had any effect on her misophonia symptoms. Her medical history was unremarkable, and she had no history of substance abuse. She reported a family history significant for MDD and GAD on both the maternal and paternal side. At the age of 4 years, she developed some symptoms of OCD involving toileting rituals, which resolved within 6 months. She had an intermittent preoccupation with symmetry, but not to the point of social or occupational interference. She denied history of physical or sexual abuse but experienced disruptions in childhood due to intense conflict between her parents, their divorce when she was 5 years old, and several moves to different cities.

## Discussion

This is a case series of 5 adults with misophonia. Interestingly, each of the patients reported a history of OCD or related spectrum disorder symptoms. Three patients clearly met diagnostic criteria for significant comorbid OCD, while the fifth patient had a history of mild OCD in childhood, and the first patient had a history of trichotillomania in childhood, now in remission. Treatment varied, but 1 patient responded reasonably well to CBT, as well as relaxation training and hypnotherapy. One individual improved with treatment with mirtazapine and another with sertraline, but 1 individual did not see meaningful improvement in misophonia symptoms with treatment with fluoxetine and quetiapine. The fifth patient reported nonresponse to multiple medications previously.

*Misophonia* is defined as a selective hypersensitivity to specific sounds that are associated with unpleasant emotions including frustration, anger, and anxiety. Sensitivity to these sounds tends to be exacerbated by stress or feeling tired.<sup>29,30</sup> People with misophonia associate negative or unpleasant responses to certain specific sounds, which are thought to be conditioned over time.<sup>31</sup> The underlying cause of misophonia is unknown, although researchers have postulated neurologic and psychological etiologies, given that it has a high degree of comorbidity with OCD, a psychiatric disorder, and hyperacusis, a neurologic disease. Schröder et al<sup>9</sup> postulated that misophonia should be classified as a separate psychiatric disorder given that in a sample of 42 patients with misophonia, 22% had obsessive-compulsive personality disorder, 3% had mood disorders, 2% had attention-deficit/hyperactivity disorder (ADHD), 2% had Tourette's disorder, 2% had trichotillomania, 1% had OCD, and 1% had skin picking, hypochondriasis, and panic disorder. In a large sample of confirmed misophonia cases (N=575), almost 30% had significant psychiatric comorbidities, including 10% with mood disorders, 5% with ADHD, and 3% with autism spectrum conditions.<sup>12</sup> Two additional publications reported comorbid misophonia in patients with Tourette's disorder<sup>13</sup> and eating disorders.<sup>14</sup> A large-scale online study<sup>15</sup> with over 300 self-identified individuals with misophonia found that 50% reported no comorbid clinical conditions, whereas 50% had a variety of conditions. This study<sup>15</sup> identified PTSD as the only psychiatric illness that appeared to relate to the severity of misophonia symptoms. A cross-sectional study<sup>16</sup> of misophonia in 92 individuals ascertained through treatment in a psychiatric setting reported comorbid diagnoses including depression (52.2%), schizophrenia (22.2%), anxiety disorders (12.2%), borderline personality disorder (8.9%), bipolar disorder (3.3%), and ADHD (1.1%). Unlike the previous online study,<sup>15</sup> this cross-sectional study<sup>16</sup> observed that the severity of anxiety was associated with the severity of misophonia symptoms.

People with misophonia have reported using varying coping methods. Most people will simply avoid the sounds and leave the area, whereas some will try to block the sounds with ear plugs or listen to music with headphones. In more

extreme cases, individuals will avoid social interaction for fear of being exposed to unpleasant and intolerable sounds.

Identified treatment options for this condition in the literature have included sound therapy, CBT, hypnotherapy, Gestalt therapy, and pharmacotherapy. A case series<sup>17</sup> of 12 children with misophonia and comorbid tic disorders demonstrated that no single treatment was effective, with some responding to psychotherapy (ie, CBT) and others to pharmacotherapy (ie, aripiprazole, risperidone, divalproex, sertraline, clonidine). Cavanna,<sup>18</sup> on the other hand, provided some insight into the treatment of misophonia: anxiolytics have been prescribed to help reduce anxiety and stress. Sound sensitivity training is a form of therapy in which the patient is exposed to both pleasant and aggravating sounds to reduce immediate rage toward the aggravating sounds, thereby eventually desensitizing the patient to the offending sounds. Sound therapy utilizes different devices including an ear-level white noise generator or music with headphones with the goal of minimizing awareness to the offending sounds, and this type of therapy usually involves an audiologist to deliver the appropriate type of sound therapy while monitoring progress.

CBT targets the cognitive pathway and behavioral component by changing maladaptive thinking patterns and using behavioral techniques to increase tolerance to offending sounds. Two youths with misophonia who underwent CBT observed a significant reduction in symptoms related to misophonia according to a published case report.<sup>19</sup> More recently, an open-label trial demonstrated that 48% of 90 individuals with misophonia showed a decrease in misophonia symptoms in response to CBT and noted that the severity of misophonia and the presence of disgust were positive predictors of CBT response.<sup>20</sup> A very recent randomized clinical trial of CBT targeting misophonia in 54 patients showed significant improvement, both short-term (3- to 6-month follow-up) and long-term (15- to 18-month follow-up) when compared with a waitlist group ( $P < .001$ ).<sup>21</sup> In addition to CBT, mindfulness-based therapy has also been proposed to be effective in decreasing emotional turmoil toward the aggravating sounds. Dialectical behavioral therapy, another form of psychotherapy, was implicated in treating misophonia symptoms in an adolescent with misophonia.<sup>22</sup> Tinnitus retraining therapy has also been recommended based on a neurophysiologic model of tinnitus to extinguish preconditioned reflexes in the limbic and autonomic nervous system.<sup>23–25</sup>

In summary, there are limited clinical studies on the etiology and assessment of misophonia.<sup>26</sup> Our patients, although representing sampling bias since they were assessed through a tertiary hospital setting either at an OCD center or a mood and anxiety clinic, all had comorbid OCD or a related disorder such as trichotillomania, while 2 patients also had comorbid MDD, GAD, and/or SAD. Based on the literature review, most case series and large studies of misophonia reported comorbidity with MDD and anxiety disorders in general but also psychotic disorder, ADHD, and autism, the latter 3 of which we did not observe in our 5 cases.



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Research studies have implicated genetic overlap between OCD, body dysmorphic disorder, and hoarding disorder,<sup>27</sup> and misophonia is consistent with the characteristics used for defining the *DSM-5* obsessive-compulsive and related disorders criteria: mental preoccupations and/or repetitive behaviors causing significant distress/functional impairment.<sup>28</sup> Response to antidepressants and adjunct antipsychotic treatment is also a common characteristic between obsessive-compulsive and related disorders, but we reported inconsistent response to antidepressants and antipsychotics in our 5 cases of misophonia presented here.

Most of the therapeutic literature focuses on symptom amelioration and tolerance, using approaches such as CBT, psychotropic medications, sound sensitivity training, and tinnitus retraining therapy. Despite this array of postulated treatment options for the management of misophonia, there are no systematic studies published on the efficacy of pharmacologic or audiologic treatments and very limited work on CBT. Currently, there are no empirically well-supported treatments for misophonia, which highlights the need for further research into this little understood, underrecognized, and challenging condition.

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