



CASE SERIES

Dietary Triggers as Clinical Indicators of Migraine-Associated Tinnitus: A Case Series

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ABSTRACT

Background: Tinnitus is the perception of sound in the absence of external auditory stimuli. Management usually involves education and cognitive behavioural therapy. However, in cases where there is an underlying medical cause, such as migraine, targeted treatment may lead to subjective improvement.

Migraine is a complex neurological disorder characterised by a wide range of symptoms beyond headache alone, including tinnitus exacerbations. Patients presenting with fluctuating tinnitus and hearing loss after dietary triggers may represent an atypical migraine phenotype. Diagnosis requires an in-depth clinical history and may not always meet strict thresholds of International Classification of Headache Disorders criteria.

Methods: Objective is to present a case series of tinnitus precipitated by dietary triggers, guiding diagnosis and management. Case series of three patients aged 43 to 72 presenting to Audiovestibular Medicine clinic with fluctuating tinnitus, hearing loss and vestibular symptoms, triggered by specific dietary factors. Outcome measured by symptomatic improvement following trigger avoidance and tailored migraine management.

Results: Dietary triggers included dark chocolate, coffee, seafood, strawberries and chilli. Neuroimaging and vestibular testing were unremarkable. Mechanisms likely to be involved include trigeminal neurovascular sensitisation and cortical spreading depression. Management involved dietary trigger avoidance, lifestyle modifications, stress reduction, hearing therapy, vestibular rehabilitation, and pharmacological prophylaxis following UK National Institute for Health and Care Excellence guidelines. Significant symptomatic improvement was achieved in all cases.

Conclusion: Dietary triggers can unmask an underlying migrainous disorder presenting primarily with auditory and vestibular symptoms. Recognition of these triggers, combined with detailed clinical history, is crucial for early diagnosis and effective management. Lifestyle and dietary adjustments alongside targeted migraine prophylaxis significantly reduce tinnitus exacerbations. Awareness of atypical migraine presentations in the management of tinnitus is essential.

Introduction

Tinnitus – the perception of sound in the absence of external auditory stimuli¹ – is a common clinical presentation, affecting 14.4% of the adult population globally and 2.3% severely². While many cases are associated with sensorineural hearing loss or noise exposure, tinnitus is a symptom with diverse aetiologies, including neurological and somatosensory conditions¹. Management typically focuses on education, sound therapy, cognitive behavioural therapy (CBT) and psychological support^{3,4}. However, in some cases, tinnitus may be a manifestation of an underlying medical disorder, and targeted intervention can lead to notable symptom improvement³.

Migraine is a complex neurological disorder characterised by a wide range of symptoms beyond headache alone, including tinnitus exacerbations^{5,6}. Patients may experience hypersensitivity across auditory, vestibular, visual, and somatosensory pathways. Symptoms such as fluctuating tinnitus, hearing loss, ear pressure and episodic vertigo may arise independently of headache, and often dominate the clinical picture. Diagnosis therefore requires an in-depth clinical history, since the International Classification of Headache Disorders (ICHD-3) criteria⁷ prioritise specificity over sensitivity⁸, and symptoms may fall outside the strict diagnostic thresholds. In these cases, patients may instead meet the criteria for a diagnosis of probable migraine⁷.

Dietary triggers are a well-established feature of migraine disorders^{9,10}. Commonly implicated substances include caffeine, chocolate, cheese, alcohol, and citrus fruits. In some cases, less typical triggers such as spicy foods containing capsaicin¹¹ may also provoke symptoms. These dietary triggers are thought to act via several possible mechanisms, including cortical spreading depression and neurovascular sensitisation^{12,13}, and transient changes in inner ear fluid regulation¹⁴. Patients may report immediate or delayed symptom onset following consumption, adding to the diagnostic complexity.

The recognition of consistent dietary or environmental triggers should raise clinical suspicion of migraine-related pathology, even in the absence of classical headache symptoms. This is particularly relevant in audiovestibular practice, where patients may present with fluctuating tinnitus or episodic imbalance without

other neurological signs. Identifying a migrainous component in these patients not only aids diagnosis but also opens up effective treatment pathways that extend beyond conventional tinnitus management.

Pharmacological approaches based on migraine treatment guidelines – such as the use of amitriptyline, propranolol, or topiramate¹⁵ – may offer benefit in selected patients, especially when combined with dietary modifications, sleep regulation, stress reduction, and rehabilitation therapies^{12,16}. Importantly, patient education about the association between tinnitus and migraine is essential to promoting engagement with these strategies.

In this case series, we present three patients with severe exacerbations of tinnitus and accompanying auditory or vestibular symptoms, reproducible following specific dietary exposures. All underwent standard neuro-otological assessment with normal results. Each case responded to migraine-oriented management strategies including dietary trigger avoidance, lifestyle modification, and pharmacological prophylaxis where appropriate. This series highlights the importance of considering migraine as an underlying cause of tinnitus exacerbations and supports a more integrative approach to diagnosis and management within Audiovestibular Medicine and Ear, Nose and Throat (ENT) surgery.

Clinical Summary of Cases

This series describes three adults with episodic or fluctuating tinnitus exacerbations who attended an Audiovestibular Medicine clinic. Extreme symptom exacerbations were linked to dietary and environmental triggers, suggestive of an underlying migrainous mechanism despite the absence of classical headache. The first case involved a 47-year-old fireman with baseline high-frequency tinnitus and episodic severe flares triggered by dark chocolate and coffee, alongside low-frequency hearing fluctuation. His symptoms improved with dietary exclusion, lifestyle adjustment, and hearing therapy, though pharmacological prophylaxis was poorly tolerated. The second case, a 72-year-old woman, experienced bilateral tinnitus with profound left-sided exacerbations, delayed food triggers, and eventual development of vertigo, ear pressure, blurred or double vision and vomiting – again responsive to dietary management and amitriptyline. The third patient, a 43-year-old software engineer, had constant bilateral tinnitus with episodic “sawing aluminium” exacerbations

linked to jaw tension and a particular chilli-based dish. His symptoms were attributed to acephalgic migraine with somatosensory contributions; he showed improvement with physiotherapy and began amitriptyline titration.

All three patients had normal imaging and standard neuro-otological assessments, but demonstrated significant symptomatic relief through migraine-informed strategies focused on dietary trigger avoidance, stress and sleep management, and in some cases pharmacological intervention. These cases highlight the importance of recognising migraine spectrum disorders in atypical tinnitus presentations, particularly when symptoms are triggered by food or environmental stimuli.

Tinnitus Characteristics and Associated Features

All patients described intrusive, often disabling tinnitus peaks, which varied in intensity and temporal pattern. One patient reported constant high-frequency hissing punctuated by short, intolerable bursts of severe tinnitus likened to a blaring alarm. The second reported an inability to read and perform daily household activities during her tinnitus flares, while the third described a “sawing aluminium” quality, lasting hours to days, which rendered him unable to work.

Tinnitus was frequently associated with other auditory and non-auditory symptoms:

- Hearing fluctuation: Two patients had subjective or audiometrically-confirmed reduction in hearing, which were unilateral and temporally linked to symptom flares, in one case up to three times a day for an hour at a time.
- Head pressure and ear fullness: Reported in two cases during symptom flares.
- Vestibular symptoms: One patient experienced episodic vertigo with visual disturbances and vomiting during exacerbations.
- Somatosensory modulation: One case involved jaw and neck tension modulating tinnitus intensity, suggesting somatic-migrainous overlap.

These symptom patterns were episodic, often prolonged (lasting from minutes to several days), and tended to recur with a consistent frequency unless triggers were identified and addressed.

Dietary and Environmental Triggers

All patients reported consistent dietary triggers which provoked or worsened tinnitus and associated symptoms. Identified triggers included dark chocolate (2/3), coffee (2/3), seafood and strawberries (1/3), and a specific South Korean chilli chicken dish (1/3).

Symptom latency after exposure varied:

- In the first case, immediate onset occurred after ingestion (e.g. chocolate and coffee).
- In the third case, delayed onset occurred eight hours post-exposure, particularly with seafood and certain fruits.

Two patients experienced significant relapse:

- In one patient, after six months of remission, relapse was triggered by a combination of environmental stress and a drop in barometric pressure, suggesting multifactorial sensitivity.
- The second patient experienced relapse after five months of remission, following a serious argument with her husband.

All patients described stress and poor sleep as exacerbating factors, consistent with migraine pathophysiology. Only the first patient had a history of classical migraine with aura, which he experienced throughout his life even prior to developing tinnitus flares.

Investigations and Findings

All patients underwent comprehensive assessment including:

- Bilateral MRI of the internal auditory meatus – normal in all cases.
- Pure tone audiometry – one patient demonstrated fluctuating low-frequency loss; the second patient had a bilateral dome-shaped hearing loss; the third showed a high-frequency dip consistent with prior noise exposure.
- Otoscopy and neuro-otological examination – unremarkable.
- Temporomandibular joint (TMJ) imaging and neck assessment – performed in one patient with somatosensory modulation of tinnitus intensity by jaw and neck tension; revealed incidental findings (small exostoses, TMJ clicking).

Importantly, no peripheral pathology was found to explain the symptom pattern in any patient, reinforcing the suspicion of a central, migrainous mechanism.

Management Strategies and Outcomes

Management was individualised but shared common elements, focused on:

- Exclusion of identified dietary triggers (advised and followed in all cases).
- Lifestyle optimisation: including stress reduction, improved sleep hygiene, and hydration.
- Hearing therapy and sound generators: used in two patients with intrusive tinnitus.
- Vestibular rehabilitation and CBT: offered where dizziness or sensory misperception was prominent.
- Pharmacological prophylaxis:
 - Amitriptyline was initiated in two patients (one tolerated it well; the other discontinued due to drowsiness).
 - Propranolol was trialled in one case but discontinued due to lack of perceived benefit.
 - One patient remained under primary care for slow titration of treatment and further review.

In all cases, clinical improvement followed recognition and avoidance of dietary triggers, even when pharmacological interventions were limited or declined. Both patients who experienced relapse subsequently responded well to multimodal intervention.

Discussion

This case series illustrates how dietary triggers can suggest an underlying migrainous pathology in patients presenting primarily with tinnitus, often without the classical headache features of migraine. In all three patients, dietary triggers were consistently linked to tinnitus exacerbation, and significant clinical improvement was achieved through dietary modification, lifestyle intervention, and migraine-informed management. These findings highlight the importance of recognising dietary and environmental triggers as clinical signposts.

Clinical Recognition and Pathophysiological Mechanisms

Migraine is increasingly understood as a disorder of central sensory processing, capable of affecting multiple sensory systems in a paroxysmal and reversible manner¹⁷. While migraine is primarily a headache disorder, auditory and vestibular manifestations – such as tinnitus, ear pressure, fluctuating hearing loss, vertigo, and sensory hypersensitivity – may be present in a majority of

patients with migraine⁵. Less typical migraine symptoms often fall outside the current ICHD-3 criteria¹⁷, resulting in diagnostic uncertainty. However, multiple studies have confirmed an association between migraine and tinnitus^{13,18-20}.

All patients in this series presented with severe tinnitus exacerbations as their primary complaint, accompanied by symptoms including fluctuating hearing, ear pressure, head discomfort, and vestibular symptoms. Notably, only one had a history of classical migraine with aura. Nevertheless, the overall pattern – episodic symptoms, consistent dietary triggers, and positive response to migraine-based management – supports an atypical migraine phenotype.

The link between migraine and tinnitus, particularly when triggered by dietary factors, is increasingly recognised in clinical practice. Current evidence suggests this association arises from an interplay of trigeminal neurovascular sensitisation and cortical spreading depression. Dietary triggers may influence these systems through neuropeptide release and inflammatory signalling. The presence of delayed onset following ingestion – in one case, after eight hours – suggests that a complex network is likely to be involved⁹, involving metabolic intermediaries or immune-mediated pathways.

The trigeminovascular system plays a central role in migraine pathophysiology²¹ and may also mediate tinnitus through its anatomical and functional connections with the auditory system¹³. Trigeminal afferents innervate the cochlear vasculature, and their activation – either spontaneously during migraine or via dietary triggers such as capsaicin¹¹ – results in the release of CGRP and substance P, leading to vasodilatation, increased vascular permeability, and neurogenic inflammation¹⁴. These neurovascular changes can impair cochlear perfusion, precipitating transient hearing loss or tinnitus.

Cortical spreading depression, the likely basis of migraine aura, can induce a neuroinflammatory response via activation of trigeminal meningeal nociceptors, potentially amplifying tinnitus perception¹². Facial and jaw movements, mediated by trigeminal innervation, are known to modulate tinnitus activity in some patients, and there is a strong association between temporomandibular joint dysfunction and tinnitus¹³. These findings suggest that trigeminal sensitisation, a hallmark of migraine²¹, also plays a role in tinnitus pathogenesis.

Clinically, the identification of such triggers requires directed history-taking, as many patients are unaware of these associations until specifically prompted. The reproducibility of symptoms following exposure provides useful diagnostic confirmation, particularly in the absence of objective findings on imaging or vestibular testing.

Diagnostic Limitations of Conventional Testing

All patients underwent standard investigations, including bilateral MRI of the internal auditory meatus, pure tone audiometry, and neuro-otological examination. These were non-diagnostic in all cases, reinforcing the limitation of structural imaging and standard testing in capturing functional disturbances. In practice, this can lead to diagnostic inertia or over-reliance on reassuring investigations while failing to explore central aetiologies for fluctuating symptoms.

The presence of normal peripheral findings alongside central symptom patterns – such as fluctuation, cyclical pattern, modulation by stress and sleep, dietary sensitivity, and somatosensory contributions – should alert clinicians to consider a central origin, particularly migraine. This reinforces the importance of clinical history-taking as the primary diagnostic tool in atypical tinnitus presentations.

Treatment Response and Implications for Management

All patients in the series experienced clinical improvement following multimodal intervention, with dietary trigger exclusion serving as the foundation. While pharmacological prophylaxis was trialled in all patients (amitriptyline or propranolol), benefits were not universally observed and tolerability varied, particularly due to sedation and other side effects. This underscores the need for personalised management plans, including:

- Trigger identification and exclusion.
- Sleep and stress management.
- Gradual pharmacological titration, where appropriate.
- Audiological and vestibular support.
- Patient education on migraine mechanisms and sensory symptoms.

Importantly, one patient achieved substantial improvement without pharmacotherapy, demonstrating that dietary and behavioural interventions may suffice in well-motivated patients. Others required

a combination of modalities to regain control over their symptoms. Clinicians should remain flexible and collaborative, tailoring approaches based on individual preferences, tolerability, and response.

Clinical and Research Implications

This case series raises several important implications:

- Migraine-associated tinnitus should be recognised as a distinct clinical phenotype within the migraine spectrum, even in the absence of headache.
- In-depth clinical history taking is crucial to establish dietary triggers, which provide a practical diagnostic signpost and therapeutic pathway in migraine-associated tinnitus.
- Conventional diagnostic criteria may need to evolve to include non-headache and sensory-dominant phenotypes, particularly within Audiovestibular Medicine.
- Interdisciplinary approaches drawing from Audiovestibular Medicine, psychology, hearing therapy and vestibular rehabilitation are essential for comprehensive care.

Further research is needed to establish diagnostic criteria, standardised assessment tools and prevalence estimates for migraine-associated tinnitus. Although mechanisms have been suggested for the link between migraine and tinnitus, more evidence is needed to establish the pathophysiology underlying dietary triggers in auditory symptoms. Studies evaluating the efficacy of migraine-oriented management will hopefully improve the quality of life for patients with migraine-associated tinnitus.

Conclusion

This case series highlights the importance of recognising migraine as a cause of tinnitus exacerbations and associated auditory or vestibular symptoms, even in the absence of headache. All patients presented with disabling tinnitus that was reproducibly triggered by specific dietary factors, including chocolate, coffee, seafood and strawberries. These triggers served as crucial clinical signposts, prompting a thorough evaluation of symptom origin.

Despite normal imaging and vestibular testing, each case demonstrated improvement following migraine-informed management, including dietary trigger avoidance, lifestyle modifications, and pharmacological prophylaxis. The therapeutic benefit of these interventions reinforces the relevance of central

sensory mechanisms, in particular trigeminal neurovascular sensitisation and cortical spreading depression, in the pathophysiology of tinnitus with migrainous features.

This series underscores the importance of structured clinical history-taking in uncovering patterns that may not align with traditional diagnostic criteria but are nonetheless responsive to treatment. Clinicians working in ENT and Audiovestibular Medicine should maintain a high index of suspicion for atypical migraine presentations, particularly in patients with fluctuating tinnitus exacerbated by dietary or environmental triggers.

Greater awareness and interdisciplinary collaboration are needed to improve diagnostic accuracy, reduce delays in appropriate treatment, and ultimately enhance outcomes for patients with migraine-associated tinnitus. Future research should focus on formalising diagnostic criteria, elucidating underlying mechanisms, and evaluating targeted therapies for this under-recognised clinical diagnosis.

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