# Machine Assisted Rapid Scoping Review: Current Therapeutic Trends for Tinnitus Cure and Control

**Kapil Khambholja*, Divya Patel, Vatsal Chhaya**

Genpro Research Inc. Boston, MA, USA

**EPH88**

## Introduction

- Tinnitus is the perceived "**ringing sound**".
- It can also be a *symptom* of other underlying infections, diseases, or a *side-effect* of various drugs[1]. Unidentified causative mechanisms and a poor understanding of pathophysiology can lead to unclear treatment options[2].

### Consequences of Tinnitus

- *Reduced quality-of-life (QoL)*
- *Anxiety and Irritability*
- *Disrupted sleep, Impaired Concentration*

### Research Gaps

- **Lack** of clinical practice guidelines (CPGs) on tinnitus treatment
- **Inconclusive evidence** on the use of pharmacological, medical technology therapies (MedTech), herbal therapies in tinnitus patients
- Previous systematic/scoping reviews (ScRs) focused on **standalone therapies** in tinnitus treatment

## Objectives

- To study prevalent options for tinnitus treatment and management to date.
- To review the global evidence-based guidelines on tinnitus care.
- To review the evidence-based therapies.

## Methods

- A literature search was performed on PubMed, and Google using an AI-powered evidence synthesis tool – **MaiA.**
- We retrieved randomized trials, systematic reviews & meta-analyses, and observational studies from 2014 to 2021 on tinnitus patients.

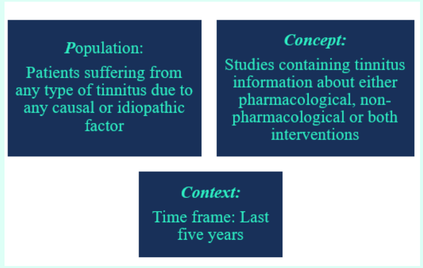


**Figure 2. PCC mnemonic used for retrieval of studies**

- Data charting: Microsoft Excel-based data charting using JBI ScR data extraction template[3].

## Results

- We retrieved **38 articles** and **five evidence-based CPGs from** United States [US], European [EU], United Kingdom, and Japan.

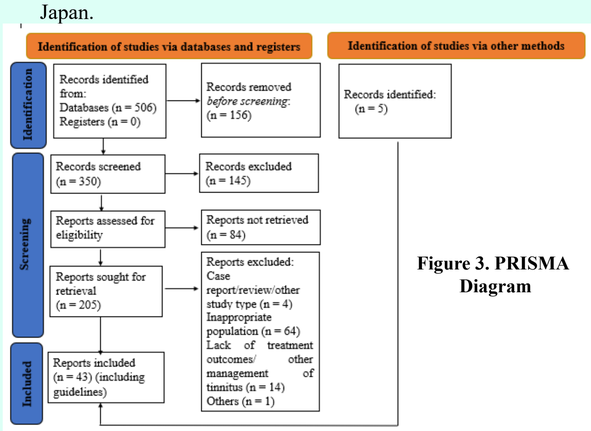


**Figure 3. PRISMA Diagram**

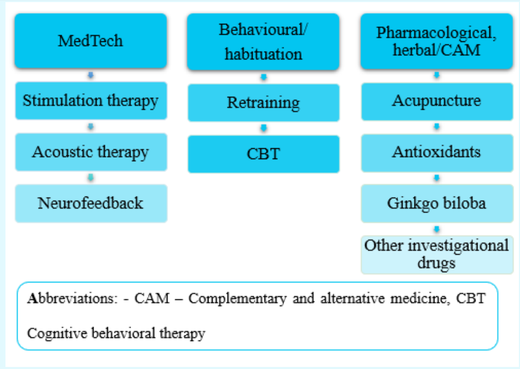


**Figure 4. Three Major Treatment Modalities in Tinnitus Treatment**

- Among these major treatment modalities (fig. 4), repetitive transcranial magnetic stimulation, CBT, dexamethasone, ginkgo biloba, antioxidants, and acupuncture were found to be effective therapies.
- Two studies on digital interventions also demonstrated the therapeutic potential of *audiologist-guided internet-based CBT*.
- Except for CBT, none of these therapies were recommended in practice as per the latest EU guidelines (2019) due to limited strength of evidence.

## Discussion & Conclusion

- **Machine-assisted ScR** promotes fast and robust evidence synthesis. Our review was performed in less than a week using **MaiA**.
- Only one ScR to date, focusing on behavioural and habitual therapies. However, we overcome the limitation by including broad and informed search strategy. Our review also aligns with evidence-based guidelines on tinnitus management.
- Our ScR found several new therapies such as **stimulation therapies, pharmacological** (antidepressants, anxiolytics) & **CAM** (acupuncture) than those mentioned in included guidelines, reflecting recent developments in tinnitus research.
- Majority of studies in our review focused on stimulation and acoustic therapies, however, there are no strong recommendations for such therapies in CPGs, owing to potential side-effects like tingling, burning, and pain sensation.
- No studies were found from the Asia-Pacific region, warranting for large-scale studies in these countries for deeper insights.
- Inclusion of secondary outcomes like **QoL, depression,** and **anxiety** in future research, to understand the impact of tinnitus in an individual's life.
- *Digital* and *MedTech interventions* can be explored further as it holds the potential to provide newer insights and also as a **cost-effective** approach to manage tinnitus.
- Recent trends in the field of audiology shows potential direction for tinnitus research including the use of *innovative diagnostic strategies (neuroimaging), incorporating a multidisciplinary approach, and patient-centered care in tinnitus care.* This could further shape our understanding and management of tinnitus.

## References

1. Bisht M, Bist SS (2011) Ototoxicity: The Hidden Menace. Indian J Otolaryngol Head Neck Surg 63:255–259.
2. Haider HF, Bojić T, Ribeiro SF, Paço J, Hall DA, Szczepek AJ (2018) Pathophysiology of Subjective Tinnitus: Triggers and Maintenance. Front Neurosci 12:866.
3. JBI Manual for Evidence Synthesis. 11.2.7 Data extraction. Accessed at: https://jbi-global-wiki.refined.site/space/MANUAL/4687700.

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**Contact Information:** Kapil Khambholja, Genpro Research Inc. https://genproresearch.com/
Email: kapil.khambholja@genproresearch.com Phone: +91-7702949998