

# A Comparative Study to Determine the Efficacy of Piracetam over Carbamazepine in the Treatment of Idiopathic Tinnitus



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## **Abstract:**

*Tinnitus is a very common complaint faced by both medicine and ENT doctors alike which hampers the daily day to day activities of these patients. Many of them are idiopathic cases and there is still no complete cure with whatever advancement we have made in this field. In this study we try to determine whether Piracetam or Carbamazepine is efficient in treating such cases of idiopathic tinnitus.*

**Keywords:** Tinnitus, Pure tone audiometry, Sodium channels.

## **Introduction**

Tinnitus is not a disease but a common complaint among patients coming for auditory problems which plaques the sufferer, hinders concentration, and haunts the mental state of the sufferer. It is defined as a perception of sound in proximity to the head with the absence of an external source. Although it can worsen with age, for many people tinnitus can improve with treatment. Estimated to occur in 15-20% of the world's population, with 1-3% of cases severely affecting the quality of life.<sup>[1]</sup> It may be perceived in one ear, both ears, within the head or outside the body and the symptom may be continuous or intermittent.<sup>[2]</sup>

Two types of tinnitus are described. 1) Subjective, which can only be heard by the patient. 2) Objective, which can even be heard by the examiner with the use of a stethoscope. Subjective tinnitus is again sub classified into conductive, sensorineural and central. Some of the examples are impacted wax, fluid in the middle ear, acute and chronic otitis media, abnormally patent Eustachian tube, Menieres disease, otosclerosis etc. Objective tinnitus is caused by arteriovenous malformations, glomus tumours, palatal or tympanic myoclonus.<sup>[3]</sup> Even with the various treatment modalities and advances in surgery, tinnitus continues to be a debilitating condition with no definitive cure. This study attempts to compare the efficacy between Piracetam and Carbamazepine in the management of idiopathic tinnitus.

## **Aims and Objectives**

- To determine the percentage of patients who had relief or reduction of symptoms by using Piracetam.

- To determine the percentage of patients who had relief or reduction of symptoms by using Carbamazepine.
- To compare whether Piracetam or Carbamazepine is better in reducing tinnitus in a selected placebo controlled group of patients.

## **Review of Literature**

The term tinnitus is derived from the Latin word TINNIRE –meaning to ring and was introduced by PLINY the Elder. Throughout history, there have been many interpretations of tinnitus, as the consequence of supernatural power, as well as a natural phenomenon.<sup>[3]</sup> The management of tinnitus sufferers is a pressing need faced by doctors in their daily practice. Since tinnitus is a symptom that might be the manifest of different underlying pathologies and has several etiologies and comorbidities, the pharmacological treatment of tinnitus faces the “one drug won't fit all scenario.”<sup>[4]</sup>

The diagnosis of tinnitus is based on the patients' description. Carbamazepine comes under anti-epileptics which are drugs that cause depression of the neuronal response to excitatory stimuli and hyperpolarization of the neuronal membranes. Therefore it could be effective in patients with tinnitus particularly those in whom abnormal auditory neural activation is suspected.<sup>[2]</sup> Carbamazepine acts by binding to voltage gated sodium channels and stabilizes the sodium inactivation state, thereby reducing neural firing.

Piracetam is a GABA derivative which has been found to increase the blood flow and oxygen consumption to parts of the brain.

## Materials and Methods

### Source of Data:

The study was conducted on patients of age 20 yrs and above of either sex who presented with chronic tinnitus to Adichunchanigiri institute of medical science, Mandya Karnataka.

### Method of Collection of Data:

1. Detailed history taking and subjective assessment of the tinnitus using Tinnitus Handicap Inventory Questionnaire.
2. Clinical examination, auditory assessment and imaging wherever appropriate.
3. Patient were followed up for 3 months and were assessed with Tinnitus Handicap Inventory Questionnaire and Pure Tone Audiometry both pre and post treatment to evaluate which drug is better.

### Study Pattern:

Patients were randomized into 2 study groups and 1 control group. The first study group comprised of 20 patients and were administered Piracetam 800 mg thrice daily for 3 months. The second study group comprised of 20 patients and were administered Carbamazepine 200mg thrice daily for 3 months. The control group comprised of 20 patients and were given B-complex capsules once daily. Thus 60 patients with chronic tinnitus were studied during this period.

### Inclusion Criteria:

1. Minimum age 20 yrs
2. Tinnitus for a minimum of 6 months
3. Cochlear and retrocochlear pathology

### Exclusion Criteria:

1. Tinnitus due to systemic vascular or diabetic disease, anxiety, depression.
2. Tinnitus due to external and middle ear causes.
3. Meniere disease, Vestibular schwannoma or cerebellopontine angle tumors.

## Discussion

Tinnitus is a common complaint among patients coming for auditory problems. Several theories about the aetiology of tinnitus were proposed and treatment modalities in the form of medications and surgery were developed with varying degrees of success. In this study we have compared the efficacy between Piracetam and Carbamazepine in the management of tinnitus in a selected placebo controlled group of patients. Patients were randomized into 2 study and 1 control group. The first study group comprised of 20 patients and were administered Piracetam 800 mg thrice daily for 3 months. The second study group comprised of 20 patients and were administered Carbamazepine 200mg

thrice daily for 3 months. The control group comprised of 20 patients and were given B-complex capsules once daily. Thus 60 patients with chronic tinnitus were studied during this period. All 3 groups were matched by the distribution of age, sex and duration of tinnitus.

## Conclusion

1. No treatment for tinnitus has been well established and no specific therapy is found to be satisfactory in all the patients.
2. Tinnitus is a symptom of different pathology, difficult to measure and has different underlying mechanisms. The possible mechanisms are
  - (a) Abnormal afferent excitation at cochlear level due to
    - i) Mechanical tinnitus based on spontaneous otoacoustic emissions<sup>[5]</sup>
    - ii) Glutamate neurotoxicity<sup>[6]</sup>
    - iii) Enhanced sensitivity of NMDA and non NMDA receptors<sup>[7]</sup>
    - iv) Abnormal ion channel conductance-calcium channel dysfunction<sup>[8]</sup>
  - (b) Efferent dysfunction/reduction of GABA effect
  - (c) Alteration of spontaneous activity and tonotopic reorganization.
3. Many treatment modalities have been tried with varying degrees of success such as antidepressants,<sup>[9]</sup> GABA analogues, Glutamate receptor antagonist, Calcium channel antagonists, Anti epileptics, Prostaglandin analogues, Lignocaine, Gingko biloba.
4. Surgical procedures for the treatment of tinnitus such as Auditory nerve section, Cochlear destruction have been tried but with little evidence of effectiveness.<sup>[2]</sup>
5. Piracetam is one of the latest drugs which are tried in the treatment of tinnitus. Piracetam is a GABA derivative. It has been found to increase the blood flow and oxygen consumption to parts of the brain.

## Summary

This study was done to ascertain the percentage of patients who had relief or reduction of symptoms by using Piracetam and Carbamazepine and to compare whether Piracetam or Carbamazepine is better in reducing tinnitus in a selected placebo controlled group of patients.

We studied a series of 60 patients with chronic tinnitus over a period of 2 years at the department of ENT, AIMS, BG NAGARA. The first study group comprised of 20 patients and were administered Piracetam 800mg thrice daily for 3 months. The second study group comprised of 20 patients

and were administered Carbamazepine 200mg thrice daily for 3 months. The control group comprised of 20 patients and were given B-complex capsules once daily. All three groups were matched by the distribution of age, sex and duration of tinnitus.

In our study maximum numbers of patients were seen in the age group of 51-60 years. In Carbamazepine group, 14 were male patients and 6 were female patients. In Piracetam group, 16 were female patients and 4 were male patients. In placebo group, 18 were male patients and 2 were female patients. All patients had tinnitus for a minimum duration of 6 months. Duration ranged from 6 months to a maximum period of 24 months.

Patients were followed up for 3 months and were assessed with Tinnitus Handicap Inventory (THI) Questionnaire and Pure Tone Audiometry both pre and post treatment to evaluate which drug is better.

Percentage change in THI score between pre and post treatment with Carbamazepine was as following: mild+10.3, moderate-8.7, severe-8.7.

Percentage change in THI score between pre and post treatment with Piracetam was as following: mild+63.3, moderate-33.3, severe-20.0.

Percentage change in THI score between pre and post treatment with placebo was as following: mild+4.3, moderate-4.3, severe0.0.

Pure Tone Audiometry test showed statistically significant improvement in hearing in those patients treated with Piracetam with a p value 0.007.

Thus this study revealed that THI score post treatment with Piracetam had significant reduction when compared to pretreatment score.

Similarly there was significant improvement in hearing in those patients who had sensorineural hearing loss when treated with Piracetam.

Those patients treated with Carbamazepine also showed reduction in post treatment THI score, but it was not statistically significant.

Thus in our study we concluded that use of Piracetam helps in reducing tinnitus and also improve sensorineural hearing loss in patients with tinnitus and the treatment should continue as long as tinnitus persists. Carbamazepine was not found to be effective in reducing tinnitus. Thus Piracetam is effective as a modality of treatment in suppressing tinnitus.

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