ORIGINAL RESEARCH

Comparison of different concentration of intra-tympanic methylprednisolone injections in subjective cochlear tinnitus

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ABSTRACT

Background: Most people believe that tinnitus results from an increase in the auditory neurons' spontaneous activity. Tinnitus can manifest with normal hearing, even though the majority of cases have hearing loss.The present study was conducted to compare different concentration of intra-tympanic methylprednisolone injections in subjective cochlear tinnitus. **Materials & Methods:** 60 patients with complaint of abnormal ringing in earswere divided into 3 groups of 20 each. Group I received 0.5ml of 40 mg/ml concentration methylprednisolone solution injected intratympanically, 125 mg/ml in group II and 250 mg/ml in group III. The groups were compared in terms of subjective tinnitus intensity and loudness matching after the intervention. **Results:** Group I had 11 males and 9 females, group II had 10 males and 10 females and group III had 8 males and 12 females. Group I showed improvement in 2, worsening in 2 and no change in 16, group II had improvement in 3, worsening in 1 and no change in 16 and group III had improvement in 3 and no change in 17 patients. The difference was non- significant (P> 0.05).4 patients each in group II and group III had cured and 3 patients in group I, 5 in group II and 6 in group III showed improvement. The difference was non- significant (P> 0.05). **Conclusion:** Subjective measurement of tinnitus intensity using a questionnaire revealed no discernible improvement in the three treatment groups in the current investigation. The loudness matching test for tinnitus also yielded a non-significant result. At different concentrations, the intratympanic methylprednisolone injection produced uneven and subpar results.

Keywords: methylprednisolone, ontological, Tinnitus

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INTRODUCTION

The Latin word "tinnire," which means "to ring," is the root of the English term "tinnitus." It is described as the ability to perceive sound in the head or ears without the use of any outside stimulants.Most people believe that tinnitus results from an increase in the auditory neurons' spontaneous activity. Tinnitus can manifest with normal hearing, even though the majority of cases have hearing loss.[1]

The conscious awareness of a phantom sound that only the patient may hear is known as subjective tinnitus (ST).[2] Although any part of the entire auditory pathway may be involved, cochlear pathology—such as presbyacusis, endolymphatic hydrops, and noise-induced hearing loss—is typically the cause.One of the most common and problematic otological disorders, tinnitus can lead to a number of physical and psychological issues that can lower one's quality of life. It seems that 10–15% of adults suffer with tinnitus.[3] The majority of patients with persistent tinnitus also have other hearing disorders, such as hyperacusis, hearing loss or distorted sound perception, sleeplessness, difficulty concentrating, irritability, melancholy, and anxiety. Tinnitus could therefore be classified as a "chronic stressor" for this demographic. Common approaches to treating tinnitus include amplification of hearing aids, masking strategies, dietary changes, tinnitus retraining therapy, and pharmaceutical intervention in the form of anxiolytics, antidepressants, or other complementary therapies.

None of these approaches, nevertheless, are truly effective.[4]

Dexamethasone at a dose of 8 mg/ml has been utilized in the majority of trials demonstrating this therapeutic impact in tinnitus, with underlying etiologies including idiopathic tinnitus, Meniere's illness, and sudden sensorineural hearing loss.[5] Nevertheless, because the data comes from uncontrolled retrospective research, it should be interpreted with caution despite this accomplishment. This concentration is not accessible in India, and the 4

mg/ml amounts that are available have produced less-than-ideal outcomes.[6]The present study was conducted to compare different concentration of intra-tympanic methylprednisolone injections in subjective cochlear tinnitus.

MATERIALS & METHODS

The study was carried out on 60 patients with complaint of abnormal ringing in ears. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 3 groups of 20 each. Group I received 0.5ml of 40mg/ml concentration methylprednisolone solution injected intratympanically, 125mg/ml in group II and 250mg/ml in group III. The groups were compared in terms of subjective tinnitus intensity and loudness matching after the intervention.

Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II	Group III
M:F	11:9	10:10	8:12

Table I shows that group I had 11 males and 9 females, group II had 10 males and 10 females and group III had 8 males and 12 females.

Table II Subjectiveanalysis of tinnitus intensity based questionnaire

Groups	Response			P value
	Improved	Worse	No change	
Group I	2	2	16	0.62
Group II	3	1	16	
Group III	3	0	17	

Table II, graph I shows that group I showed improvement in 2, worsening in 2 and no change in 16, group II had improvement in 3, worsening in 1 and no change in 16 and group III had improvement in 3 and no change in 17 patients. The difference was non- significant (P> 0.05).

Graph I Subjective analysis of tinnitus intensity based questionnaire

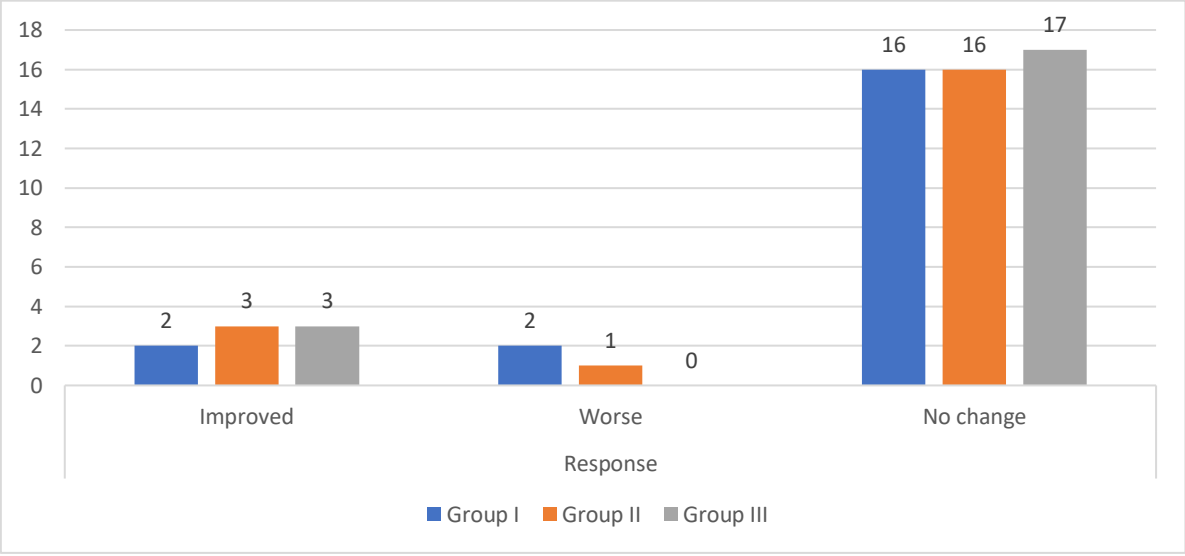

Table III Response on Loudnessmatching test

Groups	Response			P value
	Cured	Improved	Control	
Group I	0	3	17	0.85
Group II	4	5	11	
Group III	4	6	10	

Table III shows that 4 patients each in group II and group III had cured and 3 patients in group I, 5 in group II and 6 in group III showed improvement. The difference was non-significant (P> 0.05).

DISCUSSION

Over the past ten years, intra-tympanic (IT) treatment with a range of medications has become increasingly important for this illness. One emerging technique in otology is the direct administration of medication into the ear via the IT or trans-tympanic channel.[7] Inner

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ear injections were first used by Schuknecht in 1956 to treat Meniere's syndrome. Today, they are used to treat a variety of conditions, including tinnitus, autoimmune inner ear disease, and acute sensorineural hearing loss.[8,9]

Since IT injections precisely deliver higher medication concentrations to the target organ (the inner ear) with less systemic adverse effects, they are becoming a more popular alternative to systemic delivery.[10]The present study was conducted to compare different concentration of intra-tympanic methylprednisolone injections in subjective cochlear tinnitus.

We found that group I had 11 males and 9 females, group II had 10 males and 10 females and group III had 8 males and 12 females. Gupta et al[11]assessed the efficacy of intra-tympanic methylprednisolone injections in different concentrations in subjective cochlear tinnitus. Ninety patients with complaint of abnormal ringing in uni/bilateral ear, with/without hearing loss were enrolled. They were randomly assigned into three different subgroups (each with 30 patients) by a single-blind method.0.5ml of 40mg/ml concentration methylprednisolone solution was injected intratympanically in study set one (Group A), 125mg/ml in second set (Group B) and 250mg/ml in the third set (Group C). On subjective analysis of tinnitus intensity 1 patient of Group A and 2 each of groups B and C demonstrated improvement. On loudness matching test for tinnitus, no patient in Group A was cured, though 3 each in groups B and C were cured.

We observed that group I showed improvement in 2, worsening in 2 and no change in 16, group II had improvement in 3, worsening in 1 and no change in 16 and group III had improvement in 3 and no change in 17 patients. Chandrasekhar SS[12]discussed the value of intratympanic dexamethasone (IT-DEX) perfusion for sudden sensorineural hearing loss (SSNHL), clinically and in an animal model.Dexamethasone 0.5 mg was injected transtympanically and bathed the round window for 20 minutes. Animal study: 79 ears were randomized into five groups: control, IT-DEX versus intravenous (IV)-DEX, IT-DEX with histamine, IT-DEX with hyaluronic acid, and IT-DEX with dimethylsulfoxide.IT-DEX results in significant hearing improvement and in significantly higher perilymph concentration of steroid than IV-DEX.

We found that 4 patients each in group II and group III had cured and 3 patients in group I, 5 in group II and 6 in group III showed improvement. Yilmaz I et al[13]investigated the effects of intratympanic dexamethasone injection, which is done because of tinnitus, on transient evoked otoacoustic emission (TEOAE) and so determine whether given dexamethasone cause any damage in the inner ear.Twenty-six patients, aged between 32 and 75, with subjective tinnitus, were randomly selected. The selected patients were the ones whose improvement had not been achieved through minimum 6 months' medical therapy (eg, Ginkgo biloba extract EGb 761, betahistidine, and trimetazidin) and who were free of systemic or otolaryngologic disease. The injections of 4 mg/mL dexamethasone were done 5 times in fixed protocols on days 0, 2, 4, 6, and 8. After each injection, the patients were kept supine for 60 minutes with the head turned 45 degrees to opposite ear. Temporary pain and vertigo attacks which lasted at most for 15 minutes occurred in some patients only during injections. Neither infection nor persistent perforation occurred in any patients. After the management, there was no significant difference on patient's pure tone averages (P = .067) and high-frequency averages (P = .592). When the obtained TEOAE results before and after management were compared, the only significant increase was detected in the reproducibility values (P = .042). There was no significant difference in other TEOAE parameters which are stimulus stability, stimulus intensity, and overall signal-to-noise ratio (P > .05).

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that subjective measurement of tinnitus intensity using a questionnaire revealed no discernible improvement in the three treatment groups in the current investigation. The loudness matching test for tinnitus also yielded a non-significant result. At different concentrations, the intratympanic methylprednisolone injection produced uneven and subpar results.

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