

# Role of intratympanic dexamethasone and diluted lignocaine in treatment of tinnitus

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## Abstract

The current study aims at studying effects of Intratympanic injection of dexamethasone or 1 % lignocaine on severity of tinnitus. Visual analogue scale (VAS) and Tinnitus Handicap Inventory (THI) were used to measure severity of tinnitus. 32 cases were included in group A where 1 ml dexamethasone injected intratympanically and 32 cases were included in group B where 1% 1 ml lignocaine was injected through the tympanic membrane. More than 65% cases in both groups showed significant improvement. Both dexamethasone and 1% lignocaine are useful transtympanically and they should be included in the standard treatment protocols for control of tinnitus.

**Key Word:** Intratympanic injection for tinnitus; Dexamethasone injection for tinnitus; Diluted lignocaine injection for tinnitus; Transtympanic therapy for tinnitus.

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pharmacotherapy has added an important new modality in the clinician's armamentarium against inner ear disorders and tinnitus. Efficacy of intratympanic dexamethasone for sudden sensori neural hearing loss and in Meniere's disease is appreciated well in literature in many articles<sup>2,3</sup>. The current study aims at observing effects of intratympanic injection of diluted lignocaine and dexamethasone in cases of tinnitus associated with presbycusis or idiopathic tinnitus.

## MATERIAL AND METHODS

All patients coming to the outpatient department with complains of ringing, buzzing or whistling for more than 3 months in one or both ears were evaluated clinically including otoscopy examination, tuning fork tests and pure tone audiogram (PTA). Cases also evaluated for neurological examination, including cranial nerve examinations and if suspected, an MRI done to rule out intracranial pathology. Visual analogue scale (VAS) of 0 to 100 mm was used to subjectively evaluate severity of tinnitus where 100 means the most severe form of tinnitus and 0 means absence of tinnitus. Cases with VAS more than 50 were included in the study. Improvement of 15 - 30 mm was considered significant. Improvement in VAS of more than 30 mm was considered very significant or markedly improved. Cases with VAS less than 50 were not included in the study. Tinnitus Handicap Inventory

## INTRODUCTION

Tinnitus is one of the major causes of mental distress and discomfort. Many neurotransmitters have been identified to be involved in its occurrence. It does affect day to day routine life, sleep or scholastic performance. Inhibition of tinnitus by lidocaine is a well-documented phenomenon first noted during intravenous administration for other conditions<sup>1</sup>. Through its anesthetic properties, lidocaine is thought to silence the hyperfunctional neuronal pathways responsible for the generation of noise, analogous to its action on pain pathways within the body. Many oral medications, including anti-depressants and cognition enhancers are used in its management. Many intra cranial and extra cranial causes have been identified but many cases still remain idiopathic. Intratympanic

(THI)<sup>4</sup> is the most widely used tool to measure severity of tinnitus. THI includes 25 questions and either 0 or 2 or 4 score is given to each question by the patients according to the severity. Minimum 0 and maximum 100 score can be obtained. Score of more than 38 is considered moderate handicap and more than 56 is considered severe handicap. The questionnaire used in local language for those who do not know English. Cases with THI score more than 38 included in study. Improvement of more than 10 is considered significant in this study and of more than 20 points was considered marked improvement. Cases with conductive hearing loss or unhealthy tympanic membrane or intracranial pathology were excluded from intratympanic injection therapy. All cases identified as idiopathic tinnitus or tinnitus associated with presbycusis were offered intratympanic injection of 1 ml either 1% lignocaine or 4 mg dexamethasone and explained regarding possibility of improvement or no improvement or deterioration of tinnitus and informed written consent taken for the same. Patients were also explained regarding temporary improvement which may not be permanent relief and need for repeated injections. The injection given through postero-inferior quadrant of TM after making a small needle prick in the antero-inferior quadrant [Fig 1]. The cases kept in supine position with injected ear facing upwards for the next 15 minutes. Second injection given 1 week after the first injection. In cases with bilateral tinnitus with more than 50 VAS, dexamethasone or diluted lignocaine was injected in right ear whereas normal saline was injected in left ear. VAS and THI scores recorded 1 week, 6 weeks and 4 months after the second injection. Odd numbered cases were given dexamethasone injection (group A) whereas even numbered cases were given diluted (1%) lidocaine injection (group B). 10mg Prochlorperazine given 20 minutes prior to intratympanic injection in group B cases where diluted lignocaine is used to minimize nausea or vomiting. Cases also kept under observation for 1 hour after the injection to look for any giddiness or nausea or vomiting. Approval of institutional human research ethical committee taken prior to conducting this study.

## RESULTS

A total of 64 cases involved in the study and 32 cases were included in group A where 1 ml of dexamethasone was injected and 32 cases were included in group B where 1 ml of 1% lignocaine injected. 21 cases in group A and 22 cases in group B were between 25 to 45 years of age and 11 cases in group A and 10 cases in group B were above 55 years of age. There were 14 cases in group A and 12 cases in group B with bilateral tinnitus more than 50 VAS and in these cases, dexamethasone or diluted lignocaine was injected in right ear whereas 1 ml normal

saline was injected in left ear. Average VAS in group A before injection was 64.90 mm whereas at 1 week, at 6 weeks and at 4 months after the second injection it was observed to be 33.5 mm, 32.15 mm and 32.40 mm respectively. For group B, it was 62.46 mm before injection and at 1 week, at 6 weeks and at 4 months it was observed to be 34.06 mm, 34.06 mm and 32.68 mm respectively. As compared to control cases, both group A and group B cases showed marked improvement in VAS [Table 1]. There were 21 (65.62%) patients in group A that showed improvement of more than 15 points in VAS, whereas 9 cases did not show significant improvement and 2 cases showed complete disappearance of tinnitus. According to the THI scores, in group A there were 22 (68.75%) cases that showed improvement of more than 10 points after injection with 1 ml dexamethasone

**Table 1: Average VAS of different groups**

Average VAS (mm)	Group A n= 32	Group B n= 32	Control n= 26
Pre injection	64.90	62.46	63.77
At 1 week	33.5	34.06	42.96
At 6 weeks	32.15	34.06	43.88
At 4 months	32.40	32.68	43.96
Compared to control (At 4 months)	P=0.0243	P=0.0134	

In group B, 21 (65.62%) cases showed improvement of more than 15 points on VAS and 2 cases showed complete remission of tinnitus, whereas 19 (59.37%) cases showed improvement of more than 10 points on THI score. 9 (28.12%) cases did not show any improvement in THI or VAS. Comparison with controls is shown in fig 2 [Fig 2]. Applying the ANOVA test, it was found that improvement in group A and group B at 4 months was more than controls and the difference was statistically significant (p=0.0243 and 0.0134) as per the VAS scores and same results obtained with THI scores as well (p= 0.02 and 0.0187). Improvement in group A was slightly more than group B cases but the difference was not statistically significant. Worsening of tinnitus was not seen in this study in any of the cases in any groups. No significant difference was seen in VAS or THI in both groups over period of 4 months. Residual perforation or any other long-term complications were not seen in this study.

## DISCUSSION

Intratympanic dexamethasone injection (ITDI) is one of the effective modalities for management of sudden onset sensori neural hearing loss.<sup>5,6,7</sup> Very few studies have been done to determine its effectiveness on improvement in tinnitus. Many other inventories have also been developed to evaluate severity of tinnitus like 'Tinnitus Handicap Questionnaire', the 'Tinnitus coping style

Questionnaire' etc.<sup>8,9</sup> In 2008, Meikle M *et al*<sup>10</sup> have described 'Tinnitus Functional Index' but still not available in public domain. Dodson KM *et al*<sup>11</sup> have mentioned that further research is awaited for role of intratympanic perfusion in the treatment of tinnitus. Hoffer ME *et al* have shown improvement in tinnitus in 6 out of 10 patients with intratympanic corticosteroids<sup>12</sup>. Fradis M *et al* used 1% 1 ml Lignocaine and showed improvement in 68% individuals<sup>13</sup>. Lignocaine is diluted to avoid unpleasant side effects of nausea, vomiting or giddiness. In present study, only 3 cases of group B had nausea and vomiting that settled in an hour. Nausea, vomiting or giddiness were not seen in any patients in group A with dexamethasone intratympanic injection. Shulman A *et al*<sup>14</sup> have shown good results in cochlear type of tinnitus with the help of intratympanic steroids. Sakata H *et al*<sup>15</sup> have reported good success rates in cases of tinnitus with transtympanic infusion of 4% lignocaine.

## CONCLUSION

Intratympanic injection of either dexamethasone or diluted lignocaine bring about improvement in significant number of cases and should be considered a dependable option for control of tinnitus.

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