

"TINNITUS" -A REVIEW 1991 - 1997

REG No. M9722

AN INDEPENDENT PROJECT SUBMITTED AS PART  
FULFILMENT OF FIRST YEAR  
MSC., (SPEECH AND HEARING) TO  
THE UNIVERSITY OF MYSORE.

ALL INDIA INSTITUTE OF SPEECH AND HEARING  
MYSORE - 570 006

MAY 1998

DEDICATED TO

ALMIGHTY GOD

DADDY, MUMMY AND CHECHI

## **CERTIFICATE**

This is to Certify that the independent project entitled **TINNITUS"** - A REVIEW is a bonafide work in part/fulfilment for the First Year M.Sc, in Speech and Hearing of the student with REg.No. M-9722.

Mysore  
May 1998

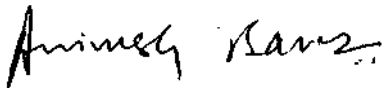
  
**DIRECTOR**

All India Institute of Speech & Hearing  
Mysore - 570 006.

## **CERTIFICATE**

This is to Certify that the independent project entitled "**Tinnitus**" - A Review 1991-97 has been prepared under my supervision and guidance.

Mysore  
May 1998

  
Mr. ANIMESH BARMAN  
Guide

## **Declaration**

I hereby declare that this independent project entitled "**TINNITUS**" - A REVIEW 1991- 1997 is the result of my own study under the guidance of **Mr. ANIMESH BARMAN**, Lecturer of Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysore, has not been submitted earlier to any University for any other Diploma or Degree.

Mysore

Reg.No. M-9722

May 1998

## ACKNOWLEDGEMENT

I express my heartfelt gratitude and gratefulness to my teacher and guide **Mr. Animesh Burman**, Lecture, Department of Audiology All India Institute of Speech & Hearing, Mysore, for his valuable suggestions, guidance and patience without which this project would not have been completed.

I am thankful to **Dr. (Miss.) S. Nikam**, Director, All India Institute of Speech and Hearing, Mysore, for giving me an opportunity to carry out this study.

My dearest Daddy and Mummy

*"You lifted me when I fell.  
stood with me in my failures  
Rejoiced in my every success.  
Attended me with loving care  
Because we know -  
We live for each other".*

My dearest Chechi and Ajichayen,

I don't know to put it in words, that how secure I feel when I am with you, and how many times a day I think of you.

I love you

My Dearest Appachan and Ammachi

I want you to know what an important place you have in my life.

My Dearest Kuttu's

You know how your cries and smiles, brighten up my heart. I will be waiting to see you as a successful man. I miss you.

**My special thanks to all the teachers who molded me.**

Thanks to all my friends, who stood with me, in my ups and downs, my special thanks to Meena, Binu and Mithu, it was great being with you all.

Thanks to all my classmates. Thanks to all my seniors who helped me, especially Roopa and Susan for their friendship support and guidance.

Thanks to the Spaceage Computers for their excellent, efficient and expeditious typing and all help.

## CONTENTS

Introduction	:	1
Methodology	:	5
Chapter -1		
Tinnitus and OAE's	:	7
Chapter - II		
Tinnitus management	:	12
Chapter - III		
Other Related articles of Tinnitus	:	25
Summary	:	37
References.	:	40



# **INTRODUCTION**

## INTRODUCTION

Tinnitus is defined as the sensation of sound not brought about by simultaneously applied mechano-acoustic or electrical signals.

By this definition tinnitus refers to a sensation and not to any externally detectable correlates.

This definition does not support the acoustic vibrations that can be detected by an observer as being emitted by the ear or elsewhere. This type of tinnitus is termed as 'Objective tinnitus'

**Objective Tinnitus** - Is relatively a rare condition. Etiologically tinnitus can be divided into two distinctive groups.

I Group consists of tinnitus caused by clonus of the palatal and pharyngeal muscles.

II group consists of tinnitus due to various vascular pathology.

**Subjective Tinnitus** - Is very common, but the exact site of pathology is unknown.

Tinnitus is an important symptom of auditory dysfunction. The manner of onset of tinnitus may relate to etiology.

If questioned carefully the patient may be able to relate the onset of the tinnitus to an event such as an infection, trauma or a cardiovascular or psychological upset.

- A pulsatile tinnitus may indicate a glomus jugular tumor or other outer ear conditions.

- A pure tone corresponding to the frequency showing the max.loss on pure tone audiometry is typical of acoustic trauma and a high pitched hissing noise is common in patients with ischemia affecting the cochlea.

- Patients with auditory tube dysfunction may report tinnitus when their nose are congested.

- Patient with NIHL frequently reports of tinnitus annoyance.

- Severe tinnitus is common in patients with syphilitic disorder and those with a total hearing loss especially when it follows a surgical procedure.

- Patients with large mastoid cavities complain of a sea shell noise within the operated ear.

- Some ototoxic drugs like salicylate causes tinnitus.

- Tinnitus is also reported during some allergic conditions.

- Tinnitus may be seen in association with vertigo and deafness as in meniere's disease.

Tinnitus is seen as a symptom in most cases and it never occurs as a disease, various researchers have tried to understand the source of tinnitus.

Different sets of pathology has been suggested by different authors.

One of the most common sites suggested by the earlier researchers were cochlea, as the research progressed other sites like Neuronal resonators, small areas of demylnation in acoustic pathway or non functioning nerve fibers causing an absence of

spontaneous discharge, Physiologically active cochlea were studied.

Currently many studies have being done on tinnitus and OAE's.

Penner, (1992) studied SOAE's and tinnitus and said that SOAE's are seldom the source of trouble some tinnitus. Most of the SOAE's are stable in frequency and amplitude, but they can also be present as fluctuating, if an SOAE were to fluctuate, it might be audible and annoying.

Earlier tinnitus maskers were greatly appreciated, as a treatment method, Smith et.al (1991); Grossman (1991); Chartland (1993) reported that there is very good beneficiary effects from tinnitus maskers, as they provide a residual inhibition, thus alleviating the tinnitus annoyance.

There are also reports on remarkable effects of medical line of treatment on tinnitus eg. lidocaine, Tegertol, Xanax, Furosemide Mysoline.

As the tinnitus is also seen in association with psychological factors, various psychotherapies eg: relaxation and self hypnosis could also bring about alleviation in tinnitus sensation.

Currently major works are done on tinnitus suppression through electrical stimulation.

Rohko and Kotti (1997), House (1990) Harell et.al (1993) reported of tinnitus suppression in Cochlear implant weavers, and the people who were given direct electrical stimulation.

## **Need of the Study**

Over the years, the views on tinnitus have been changing. Even now tinnitus remain an enigma with its course or cure unknown. Various view points concerning tinnitus are scattered throughout the literature.

So this study was aimed at collecting within single volume the multifacet views on tinnituts, to provide the readers a comprehensive and complete knowledge about tinnitus.

The information provided in the project will be of great help to researchers, teachers and future students in the field of audiology.

# **METHODOLOGY**

## METHODOLOGY

The project has been taken up with an aim to give an overview about tinnitus in the current trends. The journal articles dealing with tinnitus were selected for the study. The articles were collected from various journals. Totally 13 journals were scanned from 1991 - 97. Journals which were scanned are as follows:

1. Acta otolaryngologica
2. Annals of otorhinology and laryngology
3. Archieves of otolaryngology
4. Audiology and oto-neurology
5. Audicebel
6. British journal of Audiology
7. Ear and Hearing
8. Hearing journal
9. Hearing instruments
10. Journal of speech and hearing research
11. Journal of laryngology and otology
12. Journal of otolaryngology
13. Scandinavian Audiology.

Tinnitus being an otological symptom, all the journals related to ENT and Audiology were included.

The information from these articles were classified under various columns and were tabulated chronologically under different chapters, viz.,

- |               |   |                                     |
|---------------|---|-------------------------------------|
| Chapter - I   | - | Tinnitu. s and OAE's                |
| Chapter - II  | - | Tinnitus management.                |
| Chapter - III | - | Other related articles of tinnitus. |

After compiling the data in tabular form, it was analyzed to determine the trend in various aspects.

The various columns under which the articles are tabulated are:

Column 1: Sl.No.

Column 2: Author /year

Column 3: Purpose of the study

Column 4: Subject variables : No/age/with//without tinnitus. Column 5: Instrumentation

Column 6: Procedure.

Column 7 : Results.

Column 8 : Remarks.



# **CHAPTER -1**

## **TINNITUS AND OAE'S**

SLNo	Author	Purpose	No. Tinnitus P/A	Age in yrs.	Instrument	Procedure	Results	Remarks
1	Attias et al 1996	Illustrates relationship between noise induced tinnitus (NIT) and efferent neural auditory activity.	11 hl	26	CEOAES were recorded on an ILO88 Otodyna Analyser (version 2-9)	The effect of contralateral whitenoise stimulus on click evoked otoacoustic emission(CEOAE's) was studied in chronic tinnitus patients and controls with and without (NIHL)	The auditory efferent activity, expressed by the OHC response is abnormal in tinnitus patients. This would indicate that either the efferent activity innovating the OHCs is impaired or that the OHC respond abnormally to efferent stimulation, or both	Reflects a global efferent dysfunction rather than a specific auditory efferent dysfunction. The sensitivity of the suppressional effect is unknown. Further studies are warranted
2	Chery Croze, et al (1993)	Understanding to role of Medial olivo cochlear system in mechanism of tinnitus generation	7 M in tinnitus	23-68 yrs. 15-66 yrs	Madsen OB 822 IL088 otoacoustic emission analyser M330 distortion virtual TDH-39 ear phone	MOC functioning was tested globally using very precise in the frequency zone tinnitus using cubic product of virtual tinnitus system	In majority of tinnitus patients whether unilateral or bilateral, an alteration of MOC around that a precise matching to tinnitus frequency related to tinnitus or a broad area along the cochlear partition was also seen to be affected	The frequency area at and or around that matching to tinnitus "escapes" from the MOC

1	2	3	4	5	6	7	8	9
			18M unilateral tinnitus us.	24 to 54	Audiometer Madsen OB 822 Otodynamics ELO 88 acoustic emission analyser.	The comparison between TEOAE input/output curves obtained with and without contralateral stimulation allowed a global assessment of the functioning of MOC.	Tinnitus was lateralised to the ear in which amplitude of OAE was lowest. Efficiency of MOC was least in the ear in which the input, output function of TEOAE had greater slope..	A better comprehension of the mechanisms underlying tinnitus will come from exhaustive exploration of individual case
3	Chery-Croze. S. et al 1994	Check the effectiveness of a test, used for medial system function, useful in investigation of tinnitus.	18M unilateral tinnitus us.	24 to 54	Audiometer Madsen OB 822 Otodynamics ELO 88 acoustic emission analyser.	The comparison between TEOAE input/output curves obtained with and without contralateral stimulation allowed a global assessment of the functioning of MOC.	Tinnitus was lateralised to the ear in which amplitude of OAE was lowest. Efficiency of MOC was least in the ear in which the input, output function of TEOAE had greater slope..	A better comprehension of the mechanisms underlying tinnitus will come from exhaustive exploration of individual case
4.	Chery-Croze. S. et al 1994	Understand relation between otoacoustic-emissions and tinnitus	25F with tinnitus us		Audiometer otodynamics ILO88.  Research (10 -	Audio scan audiometry was recorded after puretone and high frequency audiometry spontaneous, transient evoked and 2f <sub>1</sub> - f <sub>2</sub> distortion product otoacoustic emission at 65 dB SPL was done. The functioning, of the MOC was also tested from a comparison between OAE input/output curves, obtained in the presence and absence of 30 dB SPL contralateral stimulation by a broad band	No general law can be established from the global testing of MOC functioning, on the contrary, the local testing at the precise frequency of tinnitus revealed the existence of an alteration of MOC functioning, in at least one ear, which is weak; null or inverse effect of contralateral stimulation.	regular investigation of large sample. An extensive investigation of MOC is necessary to develop an essential link between MOC and emergence and persistence of tinnitus.

1	2	3	4	5	6	7	8	9
5.	Graham R.L. et al	Usefulness of contralateral suppression transient-evoked otoacoustic emission as a clinical test, for	of 6 with tinnitus us	(22- 26)	Otodynamic ILO92 hardware and software. restonics portareM PR-20 -Audiometer.	Contralateral suppression was measured in each ear of 12 (6 (M), 6(ab) subjects over a 6 week period.	There was a significant difference in the contralateral suppression between the tinnitus and normal group. Tinnitus group showed considerable variability in results than normal group.	Further studies has to be done to determine the exact nature of this effect.
6.	HagiMiori, S.. etal 1995	To explore the changes induced in EOAEs by ledocaine, and thus to elucidate the mechanism of ledocaine action on that part of the auditory system which generate tinnitus	17 M and 13 F with tinnitus us	28 to 74	Pure tone audiometry RION-AA61Bn Tymoanometery: RION-RS-20 EOAE RION-RK-63Bband RION-EV-08 NIHON KOHDENME B5304	EOAE of all subjects were measured before and after ledocaine injection by using 1 Kh <sub>2</sub> tone burst stimulus.	Pure tone audiometry was one to get baseline measurements. Suppression of Tinnitus was seen in 22 (73%) ears, Changes in amolitude in 18 (60%) ears. Changes in latency was not detected.	There is a relationship between the effect of ledocaine in tinnitus suppression and changes in cochlear micromechanisms.
7.	McKeel al (1992)	To investigate the psychological factors associated with tinnitus subjects with normal hearing.	18 with tinnitus us and 19	18 to 37	Kamplex Ac 4 and SE - 30D ear phone. Biologic evoked potential	The hearing sensitivity and psychological profile were investigated by pure tone and high frequency audiometry, notched noise tests, ABR, evoked OAE and Crown Crisp	Results of pure tone audiometry, high frequency audiometry and auditory brain stem evoked responsesrevealed similar hearing sensitivity for normal and tinnitus patients.	Elevated neurotic traits might be secondary to otological dysfunction.

1	2	3	4	5	6	7	8	9
			witho ut tinnit us.		system. POEMs 200 personality trait Crown Crisp experimental index.	experimental index. The results of both the groups were compared.	The OAEs was worse in ears of tinnitus. Neurotic personality traits were stronger in" tinnitus subjects.	
8.	Ola Lind. (1996)	To see whether TEOAE with or without conlateral stimulation could be used to distinguish between affected and non affected ears in patients with unilateral, irnniius	13 M -	21 to 69	B & K 1027 generator DE- thymiotic research EAR -3.	The function of medial olivo cochlear system (MOC) was examined by contralateral acoustic stimulation with broad band noise at 50 and 70 dB SPL.	Emigion amplication was significantly lowerdin tinnitus ears. Contralateral auditory stimulation is not helpful in separating 'tinnitus ears from no tinnitus ears' There was no significant latency difference between both the ears.	Different features of/ effereht cochlear effect should " be investigated in order to explore the function of the medial - olivocochlear system in tinnitus.
9.	Penner ,M.J. et al (1992)	Effect of aspirin for IF 1 tinnitus patient with for whom SOAEs tinni caused Binural tus tinnitus		52	Etymotic model ER - 10 Farnell Signal generator type OsG - 2 insert ear phone etynotic ER- 3.	SOAEswere measured preliminary to the experiment. The experiment was for 7 days and, on days 1,2,5,6 and 7 a placebo (two 50 mg tablets of ascorbic acid) was administered 4 times per day and during day 3 and 4 a drug (two 300 mg tablets of aspirin was administered four times per day.	There was a improvement in tinnitus when aspirin was taken and as the dosage reduces and when the aspirin was not given the tinnitus returned back.	Aspirin can provide an acceptable palliative for the patients for whom SOAE caused tinnitus.

1	2	3	4	5	6	7	8	9
10.	Penner, MJ. (1992)	Evaluates the relationship of SOAEs and tinnitus.	7 with tinnitus	-4b		Tinnitus should probably be represented by a range of frequencies rather than a single frequency. Then bracketting the tinnitus by SOAES in a broad region of frequency is suited.	SOAEs and tinnitus are independent phenomena even though the region bracketting the tinnitus pitch contains an SOAE frequency. There are investigators reported that SOAEs may occasionally cause trouble some tinnitus. It may be due to studies done on subjects with hearing loss in whom SOAEs are not apt to be found.	SOAEs are seldom source of trouble some tinnitus. The hypothesis that internal tones of cochlear origin may cause tinnitus when SOAEs cannot be measured.
		about annoyance caused by SOAEs.						
		(3) Estimates the prevalence of troublesome tinnitus caused by SOAEs. Discuss the -						
		(4) Possibility of internal tones of cochlear origin or idiologies causing tinnitus.						

## **CHAPTER - II**

# **TINNITUS MANAGEMENT**

1	2	3	4	5	6	7	8	9
1.	Anderson 1997	Effect of trans labyrinthine acoustic neuroma surgery on tinnitus.	141 with acoustic neuroma	19 to 86	Questionnaire	A questionnaire was sent to patients, who underwent a trans labyrinthine : acoustic neuroma surgery to study the generation site of tinnitus.	There was a 35 % risk for developing tinnitus when no pre-operative tinnitus was present and a 15% chance that tinnitus disappear when present pre operatively. In general tinnitus distress did not change pre and post surgically.	No general conclusion can be drawn on, effects of trans labyrinthine acoustic neuroma surgery on tinnitus.
2.	Andersson, G. et al (1996)	Reviews the evidences to date, contradicts the spread of acupuncture as a viable treatment alternative for tinnitus				The author reviews the literature on effectiveness of acupuncture therapy.	No evidence in the literature for long-term effects of acupuncture was found and those patients reporting success may have benefited from psychological management involved.	Acupuncture therapy was proved to be noL beneficial for tinnitus patients.
3.	Attias J et al 1993.	Evaluate the efficacy of self hypnosis, masking and attentiveness in tinnitus alleviation	45 m	34-53 yrs.		Tinnitus related to acoustic trauma were assigned to; 3 matched subgroups, self hypnosis (SH). Masking (MA) and Attentiveness (AT the therapeutic stimuli in (SH) and (MA) sessions, were recorded on an audio cassette.	SH significantly reduced tinnitus AT partially relieved tinnitus MA didn't have any significant effect.	SM piovidred a beneficial tinnitus treatments
4.	Axelsson et al (1994)	Effectiveness of Acupuncture on tinnitus	20wit h tinnit us	41-72		Subjects with noise induced tinnitus was given placebo and acupuncture therapy alternatively for 5 wks. An electro acupuncture stimulator was used for acupuncture therapy and a mock	No significant difference between acupuncture and placebo was found.	Acupumentute therapy Specific all eviating affect indual tennitus



1	2	3	4	5	6	7	8	9
						surface, electrode connected to the acupuncture stimulator was used for placebo.		
5.	Baguley, D.M. et. al (1997)	Effect of white noise on alteration of tinnitus.				An idealized white noise or a white noise generated by (WNG) white noise generator was given as a masker to tinnitus ear.	Fitting a WNG to a patient resulted in perception of narrow band noise, hence the (WBN) was not very effective in masking tinnitus.	Programmable masker that conversely enable the patient to perceive white noise is advised
6.	Chart land, M.S. (1994)	Discusses the aspects of tinnitus which may apply to the dispensing practise and second to set forth a basic tinnitus analysis screening. Protocol as it applies to the hearing aid evaluation process.			Hearing aid	Questions were asked on tinnitus characteristics and a personal description of tinnitus was sought. They also developed a protocol for tinnitus analysis before hearing.aid dispensing	The people who were using hearing aid as a masker reported of (1) Residual inhibition. (2) Auditory re-attention and stress relief.	<i>Hearing aid</i> helps in alleviating the tinnitus ammayance
7.	Dauman,R. et al (1993)	To see the effect of Cochlear - implants in the reduction of tinnitus	2with tinnit us		Tinnitus handicap question naire -Speech processor used with cochlear implant coclear interface.	Patients were made to rate their tinnitus loudness and severity, after an electrical stimulation through basal, medial and apical electrodes using a cochlear implant Parameters like pulse rate electrode location, interelectrode distance were studied. Subjects were made to rate stimulus loudness and tinnitus loudness as a variability of these parameters.	Significant changes were observed in tinnitus perception for varying pulse rate, electrode location, and interelectrode location 1. pulse rate - The 125 Hz (pulse rate) was best for tinnitus suppression 2. electrode location there was a difference in the current level needed to suppress tinnitus at each locations, interelectrode location - larger the distance lesser the current was required for tinnitus suppression.	study can be confirmed only by experimenting in large group of patients

1	2	3	4	5	6	7	8	9
8.	Davies,E.etal (1994)	Evaluates usefulness of nimodipine, LCalcium antagonist in treatment of tinnitus.	31 with tinnitus		Audiometer and ILO88 equipment (0 to dynamics ltd)	Patients were treated for 4 weeks with 30 mg nimodipine four times daily. Before and after treatment, the intensity of their tinnitus was assessed subjectively. They were assessed by on a scale of 0 - 10. The subjects who showed improvement was assessed objectively by pure tone measurements, masking level and by otoacoustic emissions.	Only 5 patients reported to have a great improvement in their tinnitus. Three was a positive co-relation on the subjective and objective assessment of their responses.	Nimodipine may be a useful drug in treatment for some patients.
9.	Denk, D.M. et al (1997)	To study the effect of Caroverine in the treatment of inner ear tinnitus.	60 white and 40 black	22-83	Audiometer	60 patients with inner ear tinnitus of assumed cochlear synaptic pathophysiology were taken for the study 30 subjects were treated with Caroverine and 30 subjects with Placebo.	63.3% responded to therapy immediately after Caroverine infusion, but placebo treatment did not show any significant response.	This may be a useful guide in clinical practice for tinnitus treatment
10.	Dineen, R. et al (1997)	Compare different approaches to tinnitus management training.	36 F and 60 M with tinnitus			Subjects were randomly allocated to receive one of 4 treatment methods. (1) Information about tinnitus (2) Information plus long term white noise stimulation (LTWN) (3) Information plus relaxation training (IR) group (4) Information plus LTWN stimulation Plus relaxation training (IDR) group.	Subjects receiving low level white noise stimulation reported greater improvement in tinnitus coping ability than subjects who received information and relaxation training alone.	Therapy using of LTWN can be considered as most effective if it produces long term effects.

1	2	3	4	5	6	7	8	9
11.	Dobie, R.A et al (1992.)	Effectiveness of anti-depressant therapy on tinnitus.	100 with tinnitus	24 to 65	Audiometer	Nortriptylene was given on a clinical trail.	Nortriptylene were effective in reducing depression in patients with severe tinnitus. But audiometer and self reports measures did not show any difference between active drug and placebo.	It is difficult to specify appropriate measure of tinnitus and therapeutic train
12.	Erlandsson. S.I. et al 1991	To evaluate the effectiveness of biofeedback and stomatognathic treatment on tinnitus.	14 W and 18 M tinnitus	24 to 65	Biofeedback	Patients with disabling tinnitus received somatognathic treatment and biofeedback therapy. Stomatognathic treatment included cervical splints, occlusal adjustment and exercise therapy. Biofeedback therapy include biofeedback training progressive relaxation as home practice and counselling.	Stomatognathic and biofeedback treatment seems to have some positive effects on some tinnitus patients. mostly the patients with low severity of tinnitus, (n) occlusal interference, jaw fatigue, diurnal bruxism and fluctuations in tinnitus intensity.	Biofeedback therapy could reduce the tinnitus annoyance in the subjects studied. The stomatognathic treatment is effective only for some group of tinnitus patients.
13.	Grossan M (1995)	This paper discusses the efficiency of tinnitus masker			Audiometer	As a first step the pitch and loudness of the tinnitus was measured. As the second step the patient was exposed to noise of same pitch and loudness as that of his tinnitus for various time period. This masking level was tape recorded and was fed to the patient.	This method created a true masking phenomenon.	This method helps the patients to measure their own tinnitus and it is more effective in masking tinnitus.
14.	Holgers et al (1994)	Effectiveness of Ginkgo-biloba extract treatment	1 group for 44M and			Subjects were given GBE in the dose of 14.6 mg twice daily for 2 wks. The subjects who reported of some	GBE did not show any effect on tinnitus statistically. The positive effect of GBE on some patients may be due to diverse etiology of	Emphasize of different methods adapting treatment for

1	2	3	4	5	6	7	8	9
		tinnitus	36 F with tinnitus us ii Grou plo M and 11F with tinnitus. us.			beneficial effects were taken for II Study. It was a double blind study with GBE and placebo. Dosage for both tablet was 2 tablet thrice a day for 2 wks. (29.2 mg)	tinnitus.	deverse etiology
15.	Jastreboff, P. J1997	To study the effectiveness of Ginkgobiloba as a tinnitus attenuator.	84 M Pigm ented rats		Speaker No 40-1262 test cages coulbour n instrume nts, E10-10 shock generator coulbour n instrume ntE-13-08 coulbour n instrume nts opticl hickomet er E24-	Daily oral administration of Egb 761 in doses from 10 to 100 mg/kg/day began 2 weeks before initiation experiment and continued until the end of the experiment (Tinnitus was induced by daily administration of 321 mg/kg of Sodium salicylate (sC) corresponding to 275 mg/kg/day of salicylate acid) in 14 group pf-igmented rats, 6 animals/ group.	There was a significant decrease of the behaveoural manifestation of tinnitus for the doses of 25, 50 and 100 mg/kg/day	Clinical utility of Ginkgobiloba extract should be studied.

01 noise generator - Hewlett pack aid (model 805 75 A)

16. Jonathan. W. P.H. etal 1993  
 Evaluates the effectiveness of electrical tinnitus suppression.  
 9 with tinnitus suppression.  
 A direct stimulation of the round window using an electrically isolated, high compliance current source (20 V) was used.  
 3 subjects reported of a positive long-lasting results. Analysis of the threshold of sound perception, tinnitus suppression and auditory discomfort levels as a function of current frequency revealed the advantage of low frequency stimulation.  
 Electrical tinnitus suppression is very effective in tinnitus management.
17. Kaasimen, S. etal (1994)  
 Investigates the effects of gentamium on tinnitus and hearing in patients with meniere's disease  
 69 with tinnitus and meniere's disease  
 24 - 74  
 Audiometer and tinnitus questionnaire.  
 The subjects were made to score the tinnitus severity using a pure tone audiometry was also done prior to the treatment. One injection of gentamycin was given every day, individual variability was there an duration of treatment.  
 The mean pure tone audiometry level before treatment was 57.5 dB and 1 years after treatment 63.5 dB After the treatment 4% had no tinnitus 30% had slight tinnitus 27% moderate and 16% severe and 8% handicapped tinnitus.  
 Gentamium can alleviate tinnitus symptoms.
18. Mason, J.D.T etal (1996)  
 To assess the effect of client centered hypnotherapy for tinnitus management.  
 47 M and 39 F with tinnitus  
 26 to 30  
 Audiometer  
 Patients were randomly allocated to receive either counselling or client centered hypnotherapy. A pre and post treatment assesment of tinnitus was done using pure tone audiometry, tinnitus loudness match and tinnitus pitch match.  
 There is no difference between 2 groups in reducing the level of tinnitus or its associated symptoms.  
 Client centered hypnotherapy was found to be useful in tinnitus management.
19. McKerrow, W.S.et al  
 To understand the effect of cochlear  
 6  
 UCSF/Stroz  
 The suppression of tinnitus was tracked throughout periods of  
 Perfound tinnitus suppression is obtained by patients using their  
 Further work is required to

1	2	3	4	5	6	7	8	9
1991	implants on tinnitus				cochlear implant	cochlear stimulation and post stimulation through cochlear implant.	cochlear implants.	the optimal mode of stimulation but these findings suggest that tinnitus sufferers may ultimately benefit from development of electrical stimulation tinnitus suppression device.
20.	Nilsson, S. et. al (1992)	Effectiveness of acupuncture therapy for tinnitus patients	26 F and 25 M with tinnitus	25 to 81		Pre treatment assessment was done subjectively on intermity of tinnitus, annoyance and awareness about tinnitus. This served as a base line. This was followed by a acupuncture therapy and then the post treatment assessment was done.	3 patients reported improvement, which lasted for 10 days indicating a possible long term effect 21% of patients reported transient intensity reduction lasting for hours/days but as a whole, there was no general beneficial effects from acupuncture therapy.	Accupuncture therapy is not a effective treatment procedure for tinnitus patients.
21.	Paaske, P.B., et.al (1991)	Assess the effect of Zinc on tinitus	31 M and 17 F with tinitus	29 to 77	Madsen audiomet er (OB 802)	Pure tone, speech and ABR was done for all subjects. The subjects were distributed to receive either placebo or 100 mg zinc sulfate. The tablets were administered three times daily for 8 weeks.	Administration of Zinc for 8 weeks had no effect on tinnitus.	Zinc cannot be used for treatment of tinnitus
22.	Pawel, J.	Attempts in				Literature is reviewed.	Tinnitus is regraded to emerge as	Habituation can

1	2	3	4	5	6	7	8	9
etal (1994)	management of tinnitus in a neurophysiological view.						a result of dynamic interaction between various auditory and non auditory pathways including limbic system. According to the researchers significance of tinnitus depends on their ability to habituate to tinnitus sound and this habituates capacity is less in emotionally unstable persons hence the authors stresses on giving tinnitus maskers as a aid for habituation.	be considered as a efficient way to treat tinnitus.
23.	Podoshin,L. et al (1992.)	Discusses the effect of treating idiopathic subjective tinnitus by intra tympanic installation of lignocaine (lidocaine)	36 M and 70	36 to 70	Pure tone measurements - Speech discrimination Stapedial Reflex decay -BAEP -ENG Were measured before the experiment.	Patients with unilateral tinnitus underwent myringotomy and grommet insertion through which 1 ml of legnocene (2%) was installed. In patients suffering from bilateral tinnitus grammets were introduced in both ears, but lignocain was instilled only in one ear, The other ear served as a control and 1 ml of sterile salene was instilled.	In one patient tinnitus was completely abolished, but in all other patient tinnitus was allevated.	This can be given as a theraputic alternative for tinnitus patients
24.	Pugh, R. et al (1995)	Effect of alcohol on tinnitus.	76M and 26F	22 to 82 yrs.	Question naire	A Questionnaire was sent to subjects. The subjects were to answer the questions like type of	There was a mixed effect of alcohol on tinnitus 22% reported that alcohol worsened tinnitus, increased	The alcohol consumption for

1	2	3	4	5	6	7	8	9
						alcohol, units consumed its perceived effects on tinnitus, venue of consumption reported changes in alcohol consumption since tinnitus onset.	62% reporting noeffect of alcohol on tinnitus, and 16% reporting alcohol improved tinnitus.	whom it brought a improvement in tinnitus and decreased for whom the alcohol consumption worsened the tinnitus.
25.	Rakho, T. et al (1997)	Provides information about the effect of transcutaneous nerve stimulation on tinnitus (TNS)	12 M and 12 F witho ut tinnit us 9 M and 17 F with tinnit us.	24 to 69	The stimulat ion was a type TNS minis of 2 Hz with 200 microsec pulse length in best of 100 Hz.	Pure tone and speech audiometry were performed. Tinnitus frequency was measured by matching with audiometer frequency. The experimental group received a treatment schedule of 45 min session atleast 2 times a day. The control group did not receive any treatment.	TNS treatment had little effect on tinnitus. Tinnitus disappeared in none. The relief effect was less and the partial relief may be due to placebo effect.	TNS treatment may be recommended if the tinnitus disappear totally in the first test session.
26.	Sadlier, M. et al 1995	This study examines the advantage of an open-ended questionnaire (benefit-problem questionnaire over a tinnitus questionnaire used by Jakes et al (1985) in the auditing of a stress management programme.	44 with tinnit us			At the end of stress management course each patient was administered a benefit/problem questionnaire and tinnitus questionnaire (Jakes et al 1985)	The tinnitus by Jakes (1985) questionnaire showed very little difference pre-post treatment while the benefit/problem questionnaire showed good improvement over a number of variables	This simple questionnaire is a useful in auditing the benefits of a particular therapy, like stress management.



1	2	3	4	5	6	7	8	9
27.	Sandlin, R.E. (1994)	This paper covers some of the common non-medical-management strategies which have proven to be effective for some tinnitus patients.	-	-	-	Cognitive therapy was used to modify or alter maladaptive behaviour. Biofeedback helped the patients to control their stress level Tinnitus maskers and combination devices was used to mask the tinnitus.	Cognitive therapy showed good improvement. Biofeedback, if properly managed was found very effective in teaching the patients a means of relaxation Tinnitus masker and combination device did not give satisfactory results when used independently.	Non-medical management could provide good relief for many tinnitus patients.
28.	Sandlin, R.E. (1994)	This paper examines details on treatment procedure based on medical intervention for tinnitus	-	-	-	Drug therapy. - Intervenous lidocaine - Tegertol -xamax - flurosemide - mysoline - Direct Electrical stimulation was administered	Intervenous lidocane was not useful in treating subjective tinnitus patients. Mysoline good results were seen. Direct electrical stimulation Limited number of people benefited from this method. Tegertol - some beneficial effects were found Xamax - good results were seen Flurosemide - short duration tinnitus patients were benefited.	Medical management can be give a very significant contribution for tinnitus management.
29.	Scott, B. et al (1994)	Transcutaneous nerve stimulation (TNS) is a better 6-F treatment than applied relaxation with (AR)	14-M	29 to 77	Psychoacoustic measure was done by Madsen OB 822	Patients diagnosed were given simultaneous nerve stimulation and applied relaxation, as a treatment for reducing tinnitus dizziness and increasing hearing ability. One group called TNS/AR first received TNS and then AR in combination with cue-controlled	Reduction of tinnitus, dizziness and improving hearing ability was not obtained by TNS and AR.	This results did not support TNS to be superior to AR

- Relaxation training. The other group, called the AR/TNS Group received applied relaxation training first and then TNS.

30. Smith, P.A. et al(1991) To check the effectiveness of frequency selection as tinnitus masker. 4M and 6 F with tinnitus maskers. 31 to 71 Audiotape. Subjects were made to compare four widely different noise bands as 1 - Low frequency band [ 125 - 500 Hz] m - Mid frequency band [ 500 - 2kHz] H - High frequency band [ 2 k - 6 kHz] W - Wide frequency band [ 126 - 6kHz] As potential masker for tinnitus in a laboratory environment. There was no particular preference for any type of noise, but a wide band noise was mostly preferred. Frequency specific noise is not advisable as tinnitus masker.
31. Stoney, P.T. et al(1991) Effectiveness of azapropazone tinnitus management. 10 in tinnitus maskers. 41 to 76 The trial design was a single-blind placebo-controlled study, the patients acting as their own controls. In the initial week a placebo (chalk) three times a day was given this was followed by azapropazone (300 mg) three times a day. The tinnitus measurements were purely subjective. There was no significant difference between placebo and active drug on tinnitus reduction. Subjective tinnitus measurements shown there was a significant difference between placebo and control on strategies like coping with tinnitus, but this result was not reflected on azapropazone. Azapropazone is not very effective for management of tinnitus and a larger trial is probably therefore not justified.
32. Tyler, R.S. (1997) Describes current theories and current theories like: Tinnitus is the perception of an abnormal sound whose source is general. Strives, the general

1	2	3	4	5	6	7	8	9
		treatment methods for tinnitus.				<p>(1) What is tinnitus</p> <p>(2) How common is tinnitus.</p> <p>(3) Causes for tinnitus.</p> <p>(4) Patients reactions</p> <p>(5) Tinnitus treatment.</p>	<p>within the body. It is seen in 10% of people above 50 and, 40% of people below 50, tinnitus may be due to a abnormal spontaneous firing rates of the auditory nerve fibers Every tinnitus patients react differently to their tinnitus so the treatment can be either to cope with it or help to directly reduce tinnitus.</p> <p>(1) Tinnitus maskers</p> <p>(2) Medication</p> <p>(3) Habituation therapy can be used later.</p>	<p>population a basic information about tinnitus.</p>
33.	Tyler, R.S. (1996)	Reviews some basic concepts about neurophysiological models of tinnitus and their implication for treatment.				<p>Various observations are:</p> <p>(1) Tinnitus has a central nervous system component.</p> <p>(2) Psychoacoustical observations.</p>	<p>In NIHL there is no large change in the spontaneous activity of auditory nerve fibers and sectioning of auditory nerve is often ineffective in eliminating tinnitus.</p> <p>Masking is often effective in the ear contralateral to tinnitus suggesting that the interaction between tinnitus and noise is in the brain.</p> <p>A central involvement calls for a tinnitus management that can use the normal plasticity of the brain to the change the perception:</p> <p>(1) Habituation therapy</p> <p>(2) Systematic de-sensitization.</p>	<p>Tinnitus can have a central nervous system component.</p>

1	2	3	4	5	6	7	8	9
34.	vestilager.V. 1994	To check effectiveness of prosthetic management of tinnitus.	154 of with tinnit <b>US</b>	15 to 89	-	Subjects were treated within a programme combining psychological and prosthetic approaches. The therapy works within the frame work of existential psychology the pre and post treatment analysis was done through postal questionnaire.	(3) Tinnitus maskers can be used. Most of patients had beneficial effects from a psychological and prosthetic management. Two-thirds of the patients fitted with instruments still had their devices at follow-up.	Independent beneficial effects of psychological and prosthetic management is not known. Combined management programme can bring improvement in the lives of patients with severe tinnitus

**CHAPTER - HI**

**OTHER RELATED ARTICLES**

**OF TINNITUS**

1	2	3	4	5	6	7	8	9		
1.	Attias, J. et.al (1995)	Discusses the Psychological profile of help seeking and non help seeking tinnitus patients.	100 m with NIH and tinnitus 73 M withno NIH and tinnitus.	21 M 21 yrs.	45 yrs.	Questionnaire, Audiometer, Questionnaire and DSM-111R	16	Tinnitus pitch and loudness was assessed on all tinnitus patients. A questionnaire was asked to fill up on type of noise exposure and psychatric evaluation of patients was done by DSM-IIIIR	The psychological profile of help seeking patients associated with NIH was more severe than non help seeking group, compared to normal controls without tinnitus, the psychiatric symptomatology of the non-help seeking group was significantly greater.	Psychological factors seems to pre-dispose tinnitus symptom greatly.
2.	Attias, J. et.al (1996)	To confirm that the brain processing of auditory stimulus in tinnitus patients is impaired and also to assess the clinical utility of ERP's in differentiating tinnitus patients from hearing matched non tinnitus control subjects.	21 M with tinnitues	21 to 45 yrs.	Questionnaire, OS audiometer TDH earphones Burr Brown PC/2006 M 16 bit analogue out put module. Electro-cap international Dallax TX)	10 10 49	First tinnitus characteristics was assessed. Auditory and visual event related potential were elicited through a standard odd ball target detection paradigm. EEG were measured from electrode Sites F <sub>z</sub> , C <sub>z</sub> and P <sub>z</sub> .	The findings point to a cortical information in processing dysfunction in chronic tinnitus patients associated primarily with auditory stimuli	ERP may provide an objective electro physiological measure.	
American A.et.al 1995	Improve information for patients with tinnitus				Questionable			The investigation consists of three parts a pilot study where 24 slightly informed tinnitus patients, 17 well informed tinnitus patients and 9	The most common suggestion by 36 of the 50 original people were graded according to importance. Other tinnitus information	This questionnaire may provide a effective way of improving the information on

1	2	3	4	5	6	7	8	9
						audiological professionals suggested contents for a tinnitus information pamphlet.	folders were also used in preparing tinnitus information pamphlet	
4.	Chole, R.A, et.al. (1990)	Determines whether tinnitus and vertigo are more prevalent in patients with temporomandibular disorder (TMD)	338 with tinnitus 694 without tinnitus		Questionnaire	A self administered questionnaire was used to assess the syptomatology for both control group and TMD group.	Tinnitus and vertigo were more prevalent in the TMD group than in the control group	The mechanism of the association of TMD and otologic symptoms is unknown.
5.	Coccaee, A.A, et.al (1994)	Relationship between studies on the auditory perceptual and visual spectral characteristics of subjective tinnitus evoked by eye gaze on adults.	I group 1 F 52. II group 211M	47	Madsen OB 822, ILO - 92 otodynamics Ltd., Ophamological and visual spatial procedure, were measured by octopus perimeter 1-2-3 interzeag.	Pitch and loudness of tinnitus perception was assessed on following eye gaze directions, (a) Left and right (horizontal) (b) Up and down (Vertical) otoacoustic emissions were also measured as a function of eye direction. Each subject also underwent a detailed ophthalmological and visual spatial testing procedure.	Tinnitus studies showed that the pitch and loudness characteristics changed with change in eye gaze direction in both the patient. No spontaneous otoacoustic emissions were found. All the ophthalmologic and visual spatial testing results were normal.	Hypothesis for gaze evoked tinnitus can be put forth as a interaction of cochlear pathway with the neural integrator of eye movements.
6.	Dimeen, R. et.al (1997)	Investigates the audiological and psychological characteristics of tinnitus sufferers, prior to tinnitus management.	36F 60 M with tinnitues	21 to 87	Questionnaire, audiometer, WCCL-R(ways of coping checkk list) DSP (Derogatis stress profile) TRQ (Tinnitus reaction	Subjects were first made to complete a history questionnaire then psychological reaction towards tinnitus and stress was assessed. Tinnitus pitch and loudness was made to rate in 10 point visual analogus scale. Later a audiometric test was done to assess pure tone threshold, Tinnitus frequency and intensity	History did not influence the tinnitus characteristics, The use of a particular coping strategy may not change the perceived ability to cope with tinnitus. There was no correlation found between any of the audiological measures of	This assessment can be used as a baseline to evaluate the effectiveness of tinnitus management post-therapeutically.

1	2	3	4	5	6	7	8	9
					questionnaire.	matching.	tinnitus and the self reported levels of tinnitus loudness.	
7.	Erlandss on S.I. et al (1992)	Investigates relation of audiological psychological and psychosomatic factors of tinnitus	80 - M 82. F with tinnitus	21 to 89	Audiometer - Quesuonnaire developed by Axlesson, Cales, Lutman (1989)	After an audiological evaluation. Perceived tinnitus was rated by tinnitus questionnaire focussing on tinnitus impact on aspects of quality of life, concentration and sleep. A 28 - handicap and support, questionnaire was used to analyse perceived attitude, social support and disability.	Tinnitus severity was significantly related to attitudes Frequent depression worry, tension irreability depressed feelings etc have adverse effect on tinnitus	Patients with psychological problems might increase the severity of tinnitus.
8.	George, R. N. et al 1991	To survey the experiences of tinnitus among new Zealanders	905 with tinnitus	-	New Zealanders	The subjects were asked to complete a questionnaire.	Respondents of university sample often had some experiences of tinnitus, they reported sometimes rather different from those of the tinnitus sample. Most of them had severe depression.	Results calls for better counselling and understanding on the part of the medical professional.
9.	Hagnebo, C et.al (1997)	To investigate the impact of symptoms in meniere's disease and to analyse the relationship between the cardinal symptoms and environmental and emotional and activity factors.	514 with tinnitus		Questionnaire	The questionnaire was sent to patients. The questionnaire discussed on (1) onset and development of symptoms. (2) Present discomfort from each of the symptoms vertigo, hearing impairment and tinnitus. 3) Pre-monitory symptoms of vertigo (4) Attacks of vertigo (5) Coping with vertigo, (6) Awareness about discomfort and environmental conditions, emotional and bodily states. (7) Quality of life and other symptom than miniere's disease.	75% of subjects avoided certain everyday activities, because of disease co-relation between discomfort and reported satisfaction with life was moderate. Most of the subjects reported pre-monitory symptoms of the attacks and 80% reported relationship between external factors and vertigo attacks.	Psychological intervention should be given to teach the patients to cope with the discomfort.



1	2	3	4	5	6	7	8	9
10.	Hallam, R.S. (1996)	Discusses the sleep disturbances in chronic tinnitus patients.	10 M 16F with tinnitus	31 to 68	Tinnitus effect questionnaire and diary of patients, on tinnitus characteristics.	The patients were made to rate their tinnitus severity on tinnitus effect questionnaire, they were also asked to maintain a diary on loudness and annoyance of tinnitus on a daily basis for 1 week.	Sleep disturbances was more seen on patients with hearing impairment. Measures of mood and emotional distress did not relate to degree of sleep disturbances.	Raised sensory threshold <sup>††</sup> by one factor that increases tinnitus severity which in turn results in sleep disturbances.
11.	Hallberg, L.R.M. et al (1993)	Describes the structure of self-perceived handicap and tinnitus annoyance in patients with noise-induced hearing loss.	I Group J HV1 WFM1 WFM2 WFM3 II Group 75 M with tinnitus	40-60		Using a modified step wise regression analysis technique, the structure of self-perceived handicap and tinnitus annoyance in patients with noise-induced hearing loss was described. Handicap was related to three clusters of variables. reflecting individual environmental and socio-economic aspects.	60% of the variance in self-perceived handicap was explained by the non verbal representatives of these clusters; ie., acceptance of hearing problems, social support related to tinnitus and years of education. Tinnitus had no impact of its own on self-perceived handicap.	Frequent use of active coping and the non verbal communication strategies might reduce the handicap, Frequent use of maladaptive behavior and escape coping might increase the handicap.
12.	Kemp, S. ete.al, (1992)	Investigates the Masking behaviour of tinnitus induced by sound	3 M 5 F	21 to 38 Induced with tinnitus Morbes IEC	Sound generator IEC Model FSSA earphone with TDH - 49  Model F34 and hafayette noise generator.	3 experiments were performed. In teh first supairment tinnitus was induced on subjects by continuous exposure. In the second experiment masking tuning curves were measured for each listener for critical band width noise of different center frequencies. In the third experiment contralateral and epsilateral masking, was introduced.	I <sup>st</sup> experiment subjects reported of a noisy rushing sound following the presentation of inducing tone. II experiment. The narrower band masker were generally less effective than the broader noise bands. III. Experiment. Contralateral maskers were less effective than ipsilateral	There can be both similarities and disimilates in masking behaviour of induced tinnitus and tinnitus due to other causes hence masking.behaviour and site of etiology may not be necessarily co-ntroled.

1	2	3	4	5	6	7	8	9
13.	Kieshiomi et.al 1997	Attempts to evaluate tinnitus objectively	3 M and 1 W with tinnitus 3 without	52 to 69	122 - channel planar first order dc - squid (Superconducting quantum interference device neuromagnetometer(122Tm)	The study compared the auditory evoked magnetic field before and after lidocaine injection.	For patients with complete tinnitus remission the N100 M appeared to be more sharper after lido caine injection where as for normals and patients with partial tinnitus remission the N100 m did not show any marked sharpening after the lidocaine injection.	The sharpening of N100 M peak with tinnitus remission may be used as a magnetoencephalographic parameter for objective evaluation of tinnitus.
14.	Lee,A.G. et.al (1996)	Discribes about pulsatile tinnitus occurring in patients with pseudo tumor cerebri (PTC)	IF with tinnitus	46 yrs.		A detailed case study was done, significant report from the case study shows that she had (1) intermittent ringing in her cell &. Diffuse bifrontal head ache binocular vertical deplopia.	The mechanism for pulsatile tinnitus in PTC is believed to be related to the transmission of artefical pulsation and subsequent synchronous periodic compression of the exposed walls of the dural venous sinues by increased intracranial pressure dere to PTC.	Pulsalite tinnitus may occur in patient with increased intracranial pressure dere to PTC.
15.	Lellemor R.M. et.al (1993)	Describe the characteristics of tinnitus	87 with tinnitus			Tinnitus characteristics were discussed with patients seeking professional help (complainers) and patients who do not seek help for their tinnitus (non-complainers)	Non complainers perceived tinnitus in both the ears equally significantly more frequently than complainers. Complainers had more often combined ( tonal plus buzzing) tinnitus sounds (SIV 30%) and non flucutating tinnitus (49 Vs 25%) than had non complainers Tomal tinnitus was more frequent in non-complainers than in complainers	'Combined' tinnitus sound and non-fluctuating tinnitus might be determinants of a psychological problem.

1	2	3	4	5	6	7	8	9
							complainers (43 V 16%)	
16.	Lemaire, M.C. et al (1995)	Evaluate the effect of tinnitus on the central auditory system.	33 M and 355 with tinnitus	20 to 56 15 to 10 /D	NicoletCA-1000 Interacoustics AC-30.	Pure tone audiometry and BSERA was done on all the subjects. The amplitude of wave I, III and V and the latencies of each wave and interpeak latencies of tinnitues group was compared with normal group.	Latencies and amplitude of tinnitus group differed significantly with normal group latencies of tinnitus group was lengthened and amplitude was reduced.	The more disturbances seen in the wave I and II suggest involvement of the eijfrentijystem.
17.	Makce et al 1992	To investigate the psychological factors associated with tinnitus subjects with normal hearing.	18 with tinnitus and 19 with tinnitus	18 to 37 13 to 85	Kemplex AC <sub>4</sub> SE - 30D earphone. Biologic evoked potential system. OAEs PEOMS 200 personality trait crown crips experimental index.	The hearing sensitivity and psychological profile were investigated by puretone and high frequency audiometry, notched noise tests, ABR, evoked OAE and Crown crisp experimental index results of both group were compared.	High frequency audiometry and ABR was taken to get a baseline measurement. OAEs was worse in ears of tinnitus Neurotic personality traits were stronger in tinnitus subjects.	Elevated neurotic traits might be secondary to otological dysfunction.
18.	MartimM K, et.al (1994)	To find out characteristics of tinnitus in children	67 with tinitus	Less than 18	Questionaire and Medical records.	A retrospective survey of children complaining of tinnitus was carried out by questionnaire and by the study of the children's medical notes.	Tinnitus was more in the children who had other associated symptoms, family history, personal past history and hearing loss.	Problems suffered by children can be as sever as adults.
19.	Matsushi ma, J.I. et al (1997)	Effectiveness of electrical stimulation on perception of words for patients with tinnitus.	12 W and 8 M with tinnitus and hearing loss.	39 to 80	Electrical stimulator and compact disk.	The promontary was electrically stimulated for 30 minutes. Twenty sentences recorded on compact disk was delivered to ears tested at intensity of 20dBHL via a head phone. Ten ears tested in 20 patients were contralateral to ears treated.	Improved word perception was observed in most tinnitus patients with tinnitus relief, showing that tinnitus may disturb word perception, but improved word perception was seen on ears opposite to ears treated, this shows that the effect occurs in central auditory	Further research is needed to know what makes word perception better following electrical stimulation in tinnitus s patients.

1	2	3	4	5	6	7	8	9
20.	Matsushima, J. I. et al (1997)	Effectiveness of electrical stimulation of promontory, on detection of changes in pitch of tinnitus.	8 F and 3 M with tinnitus.	46 to 79	Electrical stimulator.	The promontary was electrically stimulated for 30 min. Two Japanese words with same pronunciation but different intonation was tested. The change in Fo was asked to detect.	8 out of 11 patients experienced relief of tinnitus following treatment and these patients also reported an improved frequencydetection ability.	Further research should be aimed at effects of electrical stimulation of the ear, on the detection ability of other formants such as F <sub>1</sub> , F <sub>2</sub> and F <sub>3</sub> .
21.	Miller 1995	Discusses the spinal manipulation therapy as a cause of sudden hearing loss and tinnitus.	1 F in 1 m with pain in the neck.	29.		Patients with pain in the neck and shoulders were given brisk head rotation as a treatment method.	Brisk head rotation resulted in the experience of vertigo, nausea vomiting diminished vision, decreased hearing sensitivity and tinnitus.	Spinal manipulation therapy can cause sudden SN hearing loss and tinnitus.
22.	Newman, C.W. et.al (1996)	To develop a self report tinnitus measure that is brief easy to administer and interpret.	84 M with tinnitus	23 to 77 yrs. /YD		Two investigations were carried out, 1st 45 items alpha version of the tinnitus. Handicap inventory (TH1) was used (II) 25 item beta version of the (TH1) was used.	Significant co-relation were found between the TH1 and the symptom existing scales. The total scale yielded excellent internal consistency and reliability.	The TH1 is a self-report measure that can be used in a busy clinical practise to quantify the impact of tinnitus on daily living.
23.	Newman, C.W. et al (1997)	Evaluates relationships among psychoacoustic judgements. Speech under standing ability and self	I group 16-M 7 F with tinnitus and HL	29 to 49 37 to 49	Grason - stadler clinical audiometer (Model 10) with Ear phones TDH - JV earphone encased in MX - 41/Ar cushions.	Data obtained from both the groups on audiometric speech measures were compared tinnitus subjects were made to rate their tinnitus using a pitch match frequency as reference tone. Tinnitus character sties was also rated on a tinnitus handicap	The group with tinnitus performed more poorly on the low predictability item of the speech perception in noise test. Significant relationships were observed between loudness judgement and tinnitus annoyance. No report	Speech tests alone may be insufficient in describing an individual reaction to his/her communication break downs a self measure

1	2	3	4	5	6	7	8	9
		perceived handicap in tinnitus subjects.	18M 5 F with HL only.			questionnaire.	predictable relationship were observed between the audiometric speech measure and perceived handicap using the tinnitus handicap questionnaire.	will be helpful in understanding more communication problems of tinnitus patients.
24.	Penner, M.J. (1993)	Studies of the efficacy of tinnitus synthesis in understanding the mechanism underlying tinnitus.	I-F and 3 M with tinnitus.		Colburn model 1284 translation Board, Model 2823. Chronofilter Model 3202 R TDH-49.	Subjects were asked to mimic the sensation caused by their tinnitus with a complex sound pattern consisting of the sum of sine waves.	The imitation was never rated identical to the genuine tinnitus but multiple tone could provide a better tinnitus.	Multiple tone may provide a better tinnitus imitation than does a single pure tone.
25.	Penner, M.J. et.al (1994)	To measure the pitch and loudness of tinnitus simultaneously.	6		PS-2, Tucker-Davis technologies system-2, Two - 16-bit digital - to-analog converters programmable mixers amplifiers and an impedance matching device for deriving head sets (TDH-49)	Two stair cases in a forced-choice procedure tracked two frequencies, one higher and one lower than the predominant pitch of tinnitus, while two staircase tracked two levels, one louder and one softer than the tinnitus.	The imitation standard deviation of pitch matches to tinnitus using (4S FC) exceeded that from a (2S FC).	These data may be interpreted as indicating that tinnitus is a fluctuating signal, and that matches of pure tones to tinnitus are not single valued.
26.	Penner, M.J. et.al, (1992)	Describe the characteristics of tinnitus	11 with tinnitus		IBM AT computer interfaced to programmable attenuators (Colburn, Model 1284).	Method of adjustment and a forced - choice double staircase adaptive procedure were used to measure the predominant pitch and loudness of tinnitus.	For 3 subjects who participated in 20 sessions, the two psychophysical methods could measure the tinnitus.	Tinnitus may be stable within a brief title span but fluctuant in the longrun.

16-bit data  
translation board  
model 3202R)  
with Headset -  
TDH49

27. Reid, A. et al (1993) Investigate the prevalence of perilymphatic hypertension in patients with tinnitus 32
- The Subjects were divided into 4 groups. These subjects underwent several routine audiological tests and were then tested with the tympanic membrane - Measurement system to assess the perilymphatic pressure of both ears.
- Young females had raised preilymphatic pressure. This was higher than test population and normal groups, this was attributed to endocrinological irregularities.
- These findings require further investigation with regard to possible medical treatment.
28. George, R.N et al 1991 To survey the experiences of tinnitus among new Zealanders 905 with tinnitus - New Zealanders
- The subjects were asked to complete a questionnaire.
- Respondents of university sample often had some experiences of tinnitus, they reported sometimes rather different from those of the tinnitus sample. Most of them had severe depression.
- Results calls for better counselling and understanding on the part of medical professional.
29. Rosenhal, I, V. et al 1991 Investigated the prevalence of tinnitus in old age and to estimate the influence of occupational exposure. 674 Mwith tinnitus 76 to 79
- Audiometry and questionnaire
- Each subjects underwent pure tone and speech audiometry and given questionnaire.
- 8 - 15% had continuous tinnitus and they were exposed to noise for an average of 20 - 30 years, 20 40% had occasional tinnitus and they were only exposed to noise of an average of 11 - 15 years.
- Noise - induced hearing loss is an important etiological factor for tinnitus in old age.
- The subjects with contineous tinnitus had poorer pure tone threshold.
30. Roy, D. et.al Gives a description of I - F with tinnitus 32
- On the basis of this case a review on clinical presentation of the transverse sinus can
- Careful diagnostic tinnitus

1	2	3	4	5	6	7	8	9
(1993)	about a case of dural arteriovenous fistula of the transverse and sigmoid sinus presenting with a pulsatile tinnitus					pathogenesis, diagnostic imaging and principles of treatment of this disease is given.	be a cause for pulsettile tinnitus.	evaluation is important. In case of potential cerebrovascular complication associated with dural fistula.
31.	Rubinstei n, B. etal (1991)	To identify the symptoms of cranio mandebular disorder (CMD) related to tinnitus.	15 W - 27 M with tinnitus.	24 to 67		Patients with disabling tinnitus and reported symptoms of cranio mandabular disorder (CMD) were investigated by means of questionnaire..	Awareness of discermal bruxism and feeling of jaw tenderness/fatigue may be related to fluctuating tinnitus. Vertigo and hyperacusis in CMD cases.	Further studies to confirm this result is necessary.
32.	Stephens, P, et.al (1997)	Investigate difficulties associated with tinnitus	224 F and M with tinnitus.	57.1 (mean age)	Open-ended questionnaire	Patients were made to list these problems associated with the tinnitus in an open ended questionnaire.	Responses could be divided into following groups (1) psychological (2) hearing, (3) health, (4) sleep and (5) situational	The questionnaire served as a good reflector of problems associated with tinnitus.
33.	Toshimas a et.al (1992)	To develop a method to estimate 'tinnitus loudness.,			-	An averaged loudness function was devised, which converts the same level of tinnitus into an estimate of the effective loudness level.	The effective loudness level is considered to be an unbiased loudness estimate of tinnitus under the condition that only the SL of tinnitus and the bone conduction HTL are available.	This method of estimating tinnitus loudness is probably the least biased method to estimate tinnitus loudness.
34.	Vermen, J, et.al, (1992)	Investigate the nature of response bais for tinnitus	332 with tinnitus	-	Questionnaire	Questionnaire was sent to 332 patients for whom recommendations have been made for specific ear level	Fluctuations in tinnitus sensation were frequent and associated with higher perceived levels and	This retrospective information often determines the effectiveness of

1	2	3	4	5	6	7	8	9
		questionnaire				masking devices returned the questionnaire and are considered as responders..	annoyance but the results were complicated by individual difference in tinnitus and life style.	given treatment or the long term therapy.
35.	Vermon, J.et al (1994)	Determines whether tinnitus caused by head trauma are specific and exclusive when compared with other origins of tinnitus	I group 89 with tinnitus followed by a head injury. II Group 1151 with tinnitus due to other etiology.	20 to 50 18 to 55		The experimental group (tinnitus due to head injury) as well as the comparison group (tinnitus due to other etiology) was assessed on following :- Tinnitues characteristics such s pitch loudness, maskability and residual inhibition. Tinnitus questionnaire was assessed specially, to measure tinnitus severity.	The pitch and loudness match of both the group did not differ markedly but patients with head injury had more high-pitched, and louder tinnitus. There was no significant difference between two group in terms of mask ability and residual inhibition of tinnitus sound. The patients with tinnitus due to head injury had more severe associated problems than the others.	Tinnitus in the head injured patients are more severe than other etiological cases.
36.	Wable,J, et . al (1996)	Effects of alteration of perilymphatic pressure on tinnitus patients	29 M and 15 F with tinnitus 23 without tinnitus	Meanage «4. A (mean age) «-i. f. (mean age)	Audiometer and Immittance tympanic displacement	All the subjects underwent pure tone audiometry and ART and was detected as having normal middle ear. The perilymphatic pressure was measured using the tympanic displacement analyzer, in setting and supine positions	Perilymphatic pressure was more for all tinnitus patients in sitting position that in the lying position.	The higher values obtained by tinnitus patients on sitting position may be due to their anxiety.
37.	cher,A. (1991)	To describe personal experiences as				The author describes about the onset of his tinnitus and his response to it.	Considers tinnitus as a hidden condition.	By the efforts of laypersons and professional effort





# **SUMMARY**

## **SUMMARY**

In this project an attempt has been made to provide a concise report about the literature available on tinnitus in the recent journal articles 1991-1997. All the information available are divided into three chapters i.e.,

Tinnitus and OAE's

Tinnitus management

Other related articles of tinnitus

The review of above articles revealed the following trends.

### **Tinnitus and OAE's:**

Different authors have tried to study the relationship between tinnitus and OAE's.

Studies done on SOAE's and tinnitus reveals that SOAE's were normally found to be stable in frequency and amplitude, but if they were to fluctuate they might be audible and annoying, (Penner, 1992).

Aspirin was found to be effective in SOAE caused tinnitus (Penner, 1992).

Studies done on MOC of tinnitus patients revealed an alteration in MOC functioning on testing precise frequency of tinnitus (Croze, 1994, olalind, 1996), and a significant difference was seen between the normals and tinnitus patients on contra-lateral suppression of transient - evoked otoacoustic emissions (Graham, 1994). Whereas global efferent dysfunction in tinnitus patients was reported by Attias, et al, 1996 .

### **Tinnitus management:**

Tinnitus management was mainly directed in non medical and medical way of treatment.

Among the non medical methods of treating tinnitus, tinnitus maskers were proved to be very helpful.

(Dineen, et al, 1997, Baguley, et.al., 1997, smith, 1991, Grossman, 1995., Sandlin, 1994).

Various psychological treatment approaches were also found to be helpful. Attias, 1993 found very good beneficial effects from self hypnosis. A client centered hypnotherapy was supported by (Mason et al., 1996) and (Sandlin, 1994) found reduction in tinnitus symptoms using various cognitive therapy approaches.

Electrical stimulation of cochlea was found to be helpful in tinnitus suppression Dauman, et al., 1993, McKerrow, et.al., 1991., Matsushima, et al., 1997). There were reports of improved word perception ability following tinnitus suppression through electrical stimulation of cochlea on tinnitus patients (Matsushima, et. al., 1997>Erlandsson, et al., 1991, found biofeedback and stomatognathic treatment beneficial in reducing tinnitus symptoms.

In the medical line of treatment Tregertol, xanase, Furosemide, Mysoline, Showed varying amount of tinnitus alleviation. None of this medicines could give complete tinnitus suppression (Sandlin, 1994). Other ways of management like Accupuncture therapy was proved ineffective in tinnitus treatment (Axelsson, et al., 1994, Nilsson, et al., 1992, Anersson, et al. 1996).

Neurophysiological treatment was aimed at re-training the subcortical and cortical centers involved in processing tinnitus signals without attempting to suppress the tinnitus generator, in this view point, habituation therapy was considered to be beneficial (Pavel, et. al, 1993).

### **Tinnitus and other related articles of tinnitus :**

Masking is often effective in the ear contralateral to tinnitus suggesting that the tinnitus can have a central-nervous system component (Tyler 1996). Possibility of tinnitus patients having peripheral and brainstem lesion was reported by (Rosenhall, et al, 1995). However attempts have been made to find out the severity of tinnitus in different disorders. Tinnitus symptoms were aggravated in certain conditions like head injury (Vernon, A, et. al., 1994) and

temporomandibular disorder (Chole, 1992), NIHL was reported as a major etiological factor for tinnitus in old age. (Hall, R.V., et.al 1991).

Benefit problem questionnaire (Sadler, M, et. al, 1995) and open ended questionnaire (Stephens, P., et.al 1997) could serve as a reflector of problems associated with tinnitus. Tinnitus handicap inventory was helpful in quantifying the impact of tinnitus on daily living (Newman, C.W., et.al 1996).

Development of objective methods like ERP was found to be helpful in providing a electrophysiological measures for tinnitus estimation (Attias, et.al, 1996). Sharpening of N<sub>100</sub>M peak with tinnitus remission can be used as a magneto-encephalographic parameter for objective evaluation of tinnitus (kieshiomi, Y, et.al 1997).

Toshimasa, et. al., 1992 reported that calculating effective loudness level could be considered as an unbiased method to estimate the loudness of tinnitus.

Over all findings suggests that the cause, assessment and management of tinnitus still remains as an enigma. Further studies has to be conducted to understand more about various aspects of tinnitus.

## REFERENCES

## REFERENCES

1. **Andersson, G., Lyttkens. L.** (1996). Acupuncture for tinnitus: Time to stop. *Scandinavian Audiology*, 25 (4), 273-274.
2. **Andersson.** (1997). Tinnitus and translabyrinthine Neuroma surgery. *Audiology and neurotology* 2(6), 403-409.
3. **Anthony, T.C.,** (1994). Auditory perceptual and visual-spatial characteristics of Gaize-evoked tinnitus. *Audiology*, 33 (5), 291-303.
4. **Attias, J., Bresloff, I., Furman, V.** (1996). The influence of the efferent auditory system on oto acoustic emission in noise induced tinnitus clinical relevance. *Ada oto laryngologica*, 116 (4), 534 - 539.
5. **Attias, J., Shemesh, Z., Sohmer, H., Gold, S., Shoham, C, Faraggi, D.** (1993). Comparison between self hypnosis, Masking and attentiveness for alleviation of chronic tinnitus. *Audiology*, 32 (3), 205 - 212.
6. **Attias, J., Furman, V., Shemesh, Z., Bresloff, I.** (1996). Impaired Brain Processing in noise-induced tinnitus patients as measured by Auditory and visual event related potential. *Ear and hearing*, 17(4), 327-33.
7. **Attias, J., et al** (1995). Psychological profile of help seeking and non help - seeking tinnitus patients. *Scandinavian audiology* 24 (1), 13 - 18.
8. **Axelsson, A., Nilsson, S., Coles, R.** (1995). Tinnitus information, a study by questionnaire. *Audiology*, 34 (6), 301-310.
9. **Axelsson, A., Andersson, S.,** (1994). Acupuncture in the management of tinnitus - A placebo controlled study *Audiology*, 33 (6), 351-360.
- 10 **Baguley, D.M., Beynon, G.J., Thomtom, F.** (1997). A consideration of the effect of ear canal - resonance and hearing loss upon white noise generators for tinnitus retraining therapy. *The journal of laryngology and otology*, 111(9), 810-813.

11. **Chartrand, M.S.**, (1994). Tinnitus management in the dispensing practice *Audicebel*, 42 (4), 7 - 10.
12. **Cherry-croze, S., Moulin,A., Collect. L., Morgan, A.** (1994). Is the test of medial efferent system function a relevant investigation in tinnitus. *British journal ofaudiology*, 28(1), 13-25.
13. **Chery Croze, S., Truy, E., Morgon, A.** (1994). Contralateral suppression of transiently evoked otoacoustic emissions and tinnitus. *British journal of Audiology*, 28 (4/5), 255-266.
14. **Chery-croze, S., Collect, L., Morgon, A.**(1993). Medial Olivo Cochlear system and tinnitus. *Acta Oto laryngologica*, 113 (3), 285-290.
15. **Chole, R.A., Paikes, W.S.** (1992). Tinnitus and Vertigo in patients with temporo mandibular. *Disorder Archieves Otolaryngol Head and neck surgery*, 118(8), 817-821.
16. **Crossan, M.** (1995). The 20 tinnitus masker: A drug free approach. *The hearing journal*, 48(6), 39-40.
- 17 **Dauman, R., Tyler, R.S., Aran, J.M.** (1993). Intra Cochlear Electrical Tinnitus reduction. *Acta-ota-laryngologia*, 113 (3), 291-295.
18. **Davies, £., Knox, £., Danaldson, L,** (1994). The usefulness of nimodipine an L-calcium-channel antagonist in the treatment of tinnitus. *British journal ofaudiology*, 28(3), 125-129.
19. **Denk, D.M., Heinzl, H., Franz, P., Ehrenberger, K.** (1997). Caroverine in tinnitus treatment. A placebo-controlled blind study. *Acta oto-laryngologica*, 117(6), 825-830.
20. **Dineen, R., Doyle, J., Bench, J.** (1997). Audiological and psychological characteristics of a group of tinnitus sufferers, prior to tinnitus management. *British journal of audiology*, 31 (1), 27-38.



21. **Dineen, R., Doyle, J., Bench, J** (1997). . Managing tinnitus: A comparison of different approaches to tinnitus management training. *British journal of audiology*, 31(5), 331 to 345.
22. **Dobie, R.A., Sulluvan, M.D., Katan, W.J., Sakai, C.S., Russo, J.**(1992). Anti-depressant treatment of tinnitus Patients interim report of a randomized clinical trail. *Acta otolaryngologica* 112 (2), 242-247.
23. **Erlandsson, S.I. Hallberg, L. R.M., Axcelsson, A.** (1992). Psychological and audiological co-relates of perceived tinnitus severity. *Audiology*, 31 (3), 168-179.
24. **Erlandsson, S.I., Rubinstein, B., Axelsson, A., Earlsson,S.G.** (1991). Psychological dimensions in patients with disabling tinnitus and cranio mandibular disorders. *British Journal of Audiology*, 25 (3), 151-161.
25. **George, R.N. Kemp,S.** (1991). A survey of Newzelanders with tinnitus. *British journal of audiology*, 25 (5), 331-336.
26. **Graham, R.L., Hazell, J.W.P.** (1994). Contralateral suppression of transient evoked otoacoustic emissions: intra - individual variability in tinnitus and normal subjects. *British journal of audiology*, 28 (4/5) 235 - 245.
27. **Haginomori, S.,Makimoto, K., Araki, M., Kawakami, M., Takashashi, H. ete.al.** (1995). Effect of lidocaine injection on eOAE in patients with tinnitus. *Acta-oto-laryngologica*, 115 (4), 488-492.
28. **Hagnebo, C, Melin, L., Larsen, H.C., Lindberp, P., Lyttkens, L., Scott, B.** (1997). The influence of vertigo, hearing impairment and tinnitus on the daily life of miniere patients. *Scandinavian audiology*, 26(2), 69-75.
29. **Hallam, R.S.,** (1996). Correlates of steep disturbances in Chronic distressing tinnitus. *Scandinavian Audiology*, 25 (4), 263-266.

30. **Hallberg, L.R.M., Johnsson, T., Axellsson, A.** (1993). Structure of perceived handicap in middle - aged - males with noise induced, hearing loss with and without tinnitus. *Audiology* 32 (2), 137-152.
31. **Holgers, K.M., Axelsson, A., Pringle,** (1994). Ginkgobiloba extract for treatment of tinnitus, *Audiology* 33 (2), 85 - 91.
32. **Jaastreboff, P.J., Hazel 1, J.W.P.** (1993). A neurophysiological approach of tinnitus clinical implication. *British journal of audiology*, 27 (1), 7 - 17.
33. **Jastreboff, P.J.** (1997). Attenuation of salicylate-induced tinnitus by Ginkgobiloba extract in rats. *Audiology and Neuro otology*, 2(4),. 197-212.
34. **Jonathan, W.P.H. Pawel, J.J. Leah, E.M. Mike, J.C.** (1993). Electrical tinnitus suppression: Frequency dependence of effects. *Audiology*, 32 (1), 68-77.
35. **Kaasinen, S., Pyykko, I., Ishizaki, H., Aalto, H.** (1994). Effect of intratympanically administered gentamicin on hearing and tinnitus. *Acta otolaryngologica* (Supp.520), 184-185.
36. **Kemp.S., George,R.N.** (1992). Masking of tinnitus induced by sound. *Journal of speech and Hearing Research*, 35(5), 1169-1179.
37. **Lee, A.G.** (1996). Pulsatile tinnitus as a presenting symptom of pseudotumor cerebri. *Journal of otolaryngology*, 25 (3), 203-204.
38. **Lemari, M. C, Beutter, P.** (1995), Brainstem Auditory evoked Responses in patients with tinnitus. *Audiology*, 34 (6), 287-300.
39. **Lillemor; R.M., Hallberg., Erlandsson, S.I.** (1993). Tinnitus characteristics in tinnitus complainers and non complainers. *British journal of audiology* 27(1), 19-27.
40. **Lind, O.** (1996). Transient evoked otoacoustic emissions and contralateral suppression in patients. With unilateral tinnitus. *Scandinavian Audiology*, 25 (3), 167-172.

41. Martin, K., Snashall, S. (1994). Children presenting with tinnitus: a retrospective study. *British journal of Audiology*, 28(2), 111-115.
42. Mason, J.D.T., Rogerson, D.R., Butler, J.D. (1996). Client centered Hypnotherapy in the management of tinnitus - is it better than counselling. *Journal of laryngology and otology*, 110(2), 117-120.
43. Matsushima, J., Kumagai, M., Kamada, T., Takeichi, N., Miyashi, S., Uemi, No., Hukube, T., Sakai, N. (1997). Preliminary study of improved perception of words with the same sound but different intonation in patients following electrical stimulation of the ear. *Acta oto-laryngologica* (Supp 532), 112-114.
44. Matsushima, J., Kumagai, M., Takeichi, N., Miyoshi, S., Sakajiri, M., Unemi, N., Ifukube, T., Sakai, N. (1974). Improved word perception following electrical stimulation of ear. A preliminary report. *Acta Oto-laryngologica*, (Sup 532), 115 - 118.
45. McKee, Stephens, G.J. (1992). An investigation of normal hearing subjects with tinnitus. *Audiology*, 31 (6), 313-317.
46. McKerrow, W.S., Schreiner, C.E., Synder, R.L., Merzenich, M.M., Toner, J.G. (1991). Tinnitus suppression by Cochlear implants. *Annals of otology, Rhinology and Laryngology*, 100(7), 552-557.
47. Miller, M.H. (1995). Spinal manipulation therapy a cause for sudden hearing loss. *Hearing instruments*, 42 (12), 11 - 13.
48. Neher, A. (1991). Tinnitus: The hidden epidemic: A patients perspective. *Annals of otology: rhyiology and laryngology* 100(4), 327-330.
49. Nernom, J.A., Press, H.S. (1994). Characteristics of tinnitus - Induced by Head injury. *Archieves of otolaryngology head and neck surgery*, 120 (5), 547-551.
50. Newman, C.W., Wharton, J.A., Shivapuja, B.G., Jacobson, G.P. (1994). Relationships among psychoacoustic judgements speech understanding

- ability and self perceived handicap in tinnitus subject. *Audiology*, 33 (1), 47-60.
51. Newman, C.W., Jacobson, G.P., Spitzer, J.B. (1996). Development of the tinnitus Handicap inventory. *Acta oto-laryngologica*. 122(2), 143-148.
52. Nilsson, S., Axelsson, A., LiDeG. (1992). Acupuncture for tinnitus management. *Scandinavian Audiology*, 21 (4)245-251.
53. Paaske, P.B., Perderson, C.B., Gunmar Kiems, G., Sam, I.L.K. (1991). Zinc in the management of tinnitus placebo - controlled trial. *Annals of otology Rhinology and laryngology*, 100(8), 647 - 649.
54. Pawel, J., Jastreboff. (1994). Instrumentation and tinnitus: A neurophysiological approach. *Hearing instruments*, 45 (7), 7-11, 31.
55. Penner, M.J., Coles, R.R.A. (1992). Indication for aspirin as a palliative for tinnitus caused by SOAES: A case study. *British journal of Audiology*, 26(2), 91-96.
56. Penner, M.J. (1992). Linking spontaneous otoacoustic emissions and tinnitus. *British journal of audiology*, 26(2), 115-123.
57. Penner, M.J. (1993). Synthesizing Tinnitus from sine waves. *Journal of speech and hearing research*, 36(6), 1300-1305.
58. Penner, M.J. (1994). Spontaneous measurement of tinnitus pitch and loudness. *Ear and hearing*, 15 (6), 416-421.
59. Penner, M.J. Belger, R.C. (1992). Consistent within - session measures of tinnitus. *Journal of speech and hearing research*, 35 (3), 694-700.
60. Podoshin, L., Fradis, M., David, Y. (1992). Treatment of tinnitus by intratympanic instillation of lignocaine (lidocaine) 2 percent through ventilation tube. *Journal of laryngology and otology*, 106, 603-606.

- 61: Pugh, R., Budd, R.J., Stephens, S.D.G.** (1995). Patients report of the effect of alcohol on tinnitus. *British Journal of Audiology*, 29(5), 279 - 283.
- 62. Rahko, T., Kotti, V.** (1997). Tinnitus treatment by transcutaneous nerve stimulation (TNS). *Acta-oto-laryngologica*, (Supplement 529 Aug) 88-89,8-11.
- 63. Reid, A., Cottingham, C.A., March bank, R.J.** (1993). The prevalence of perilymphatic hypertension in subjects with tinnitus. *Scandinavian audiology*, 22 (11), 61-63.
- 64. Rosenhall, U., Karlsson, A. K.** (1991). Tinnitus in old age. *Scandinavian Audiology*, 20(3) 165-171.
- 65. Rosenhall, U., Axelsson, A.** (1995). Auditory brainstem response latencies in patients with tinnitus. *Scandinavian audiology*, 24 (2), 97-100.
- 66. Roy, D., Lavigne, F., Raymond. J.** (1993). Pulsatile tinnitus and dural arteriovenous fistula of the transverse sinus. *Journal of otolaryngology*, 22 (6), 406-414.
- 67. Rubinstein, B., Erlandsson, S.** (1991). Astomatognathic analysis of patients with disabling tinnitus and craniomandibular disorder (CMD). *British journal of audiology*, 25 (2), 77-83.
- 68. Sadlier, M., Stephens, S.D.G.** (1995). An approach to the audit of tinnitus management. *Journal of laryngology and otology*, 109, 826-829.
- 69. Sandlin, R.E.** (1994). Management of tinnitus part-I. *Audicebel*, 42 (1) 7-9.
- 70. Sandlin, R.E.** (1994). Management of the tinnitus patient part-II, non medical strategies. *Audicebel*, XLIII (2), 8-11.
- 71. Scott, B., Larsen, H.C., Lyttkens, L. Melin, L.** (1994). A experimental evaluation of the effects of transcutaneous nerve stimulation (TNS) and

- applied relaxation (AR) on hearing ability, tinnitus and dizziness in patients with Meniere's disease. *British journal of Audiology*, 28(30), 131-140.
72. **Smith, P.A., Parr, V.M., Lutman, M.E., Coles, R.R.A.** (1991). Comparative study of four noise spectra as potential tinnitus masker. *British journal of audiology*, 25 (1), 25-34.
73. **Stephens, P., Sanchez X.** (1997). Tinnitus problem questionnaire in a clinic-population. *Ear and hearing*, 18(3), 210-217.
74. **Stoney, P.J., Callaghan, D.E., Walker, F.S., Stephens, S.D.G.**(1991). A controlled trial of Azapropazone in tinnitus. *British journal of audiology*, 25 (6), 415-417.
75. **Toshimasa., Matsuhara., Koichiyamashita., Masoyasuda.** (1992). Estimation of the loudness of tinnitus from matching tests. *British journal of Audiology*, 26(6), 387-395
76. **Tyler, R.S.** (1996). Tinnitus treatment modify behaviour. *Hearing Instruments*, 47 (3).
- 77-**Tyler,R.S.** (1997). Tinnitus current theories and treatment. *The hearing journal*, 50 (8), 10 - 33.
78. **Vernon, J.A., Press, L.S.,** (1994). Characteristics of Tinnitus induced by Head injury. *Archives of oto-laryngology*, 120(5), 547-551.
79. **Vernon, J. Criet, S. Press, L.** (1992). Plight of unreturned questionnaires. *British journal of Audiology*, 26(2) 137-138.
80. **Vesterager, V.,** (1994). Combined psychological and prosthetic management of tinnitus: a cross-sectional study of patients with severe tinnitus. *British journal of audiology*, 28(1), 1-11.
81. **Wable, J., Museux, F., Collect, L., Morgan, A., Chery - Croze, S.** (1996). Is perilymphatic pressure altered in tinnitus. *Acta-oto-laryngologica*, 116(2), 205-208.