

AUDIO CASSETTE ON HEARING .CONSERVATION PROGRAMME

Reg.No.M9203

**AN INDEPENDENT PROJECT IN PART FULFILMENT FOR THE FIRST YEAR
M.Sc.(SPEECH & HEARING) SUBMITTED TO THE UNIVERSITY OF MYSORE-6.**

ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE- 570 006.

May 1993

DEDICATED TO MY

APPA, *AMMA*

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CERTIFICATE

This is to certify that the Independent Project entitled : **Audio Cassette on Hearing Conservation Programme** is the bonafide work in part fulfilment for M.Sc., (Speech and Hearing) of the student with Reg.No.M9203.

Mysore

Hay 1993




Director

All India Institute of
Speech and Hearing
Mysore-6,

CERTIFICATE

This is to certify that the Independent Project entitled: **Audi o Cassette on Hearing Conservation Programme** has been prepared under my supervision and guidance.

Mysore
May:1993.


Dr.(Miss)S.Nikam,
GUIDE

Declaration

I hereby declare that this Independent. Project entitled: Audio cassette on Hearing Conservation Programme is the result of my own study under the guidance of Dr.(Miss) S. Nikam, Professor and Head of the Department of Audiology and Director, All India Institute of Speech and Hearing, Mysore, has not been submitted earlier to any University for any other Diploma or Degree.

Mysore

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#

INTRODUCTION

Few old sayings go this way "We hear twice as much as we speak" "To hear the best, prevent the nest of hearing".

The above highlights, the Importance of ear and hearing.

Ear which is a God given gift, like any other organ is liable to damage from drug, trauma disease, and noise. Among these 'Noise' take the major role. With the increase in sophistication, in the areas of science and technology, the area of audition and the process of hearing has been ignored. Not many people spend any time on their ears. All these posits additional threat for our hearing.

So 'Noise' is defined as "unwanted" sound with more or less random disturbances (Robert and Young, 1957). Noise is a random frequency current or voltage signal extending over a considerable frequency spectrum and no useful purposes, unless it is intentionally generated for test purposes. (The illustrated Dictionary of Electronics 1980; Rutus and Turner),

Summar says "Ears never sleep". This emphasizes the fact that the ear continually is sending signals to

the brain. Also the insidious characteristic of noise, ie, it can cause damage without the individual being aware of it. This point has emphasized that "hearing loss is the number one health problem of a nonfatal nature in industry today".

One of the major hazardous nature of noise is that, it results in hearing loss. There is no doubt that hazardous noise conditions produce destruction of the auditory sensory cells, and haircells in the cochlea and that sufficient destruction of these elements will produce hearing loss (Sataloff and Michael, 1973). This type of hearing loss is called noise-induced hearing loss (NIHL).

Hearing loss caused by continuous noise exposure is called occupational disease and the hearing loss due to the instantaneous impact of noise is called occupational injury (Newell, 1987).

Hearing loss in case of NIHL is usually bilateral, Symmetrical, sensori-neural hearing loss affects mostly high frequencies. It starts as a symptomless disease. Initially the hearing loss appears as a small area in the hearing. Such losses are difficult to detect except through testing by a trained person.

Few other enemies of our hearing which , as a part , are ototoxicity of aspirin, certain other drugs and also diseases such as hypertension, diabetes, arteriosclerosis make the ears more vulnerable to damage from prolonged noise exposure.

Both ears are essential to enable us to fully utilize the sense of hearing. So it is necessary to protect our ears against the noise. Noise has become a necessary evil, where it is difficult to live in a complete noiseless place. So, it becomes needful to adapt, Ourselves to the existing conditions. One such way of adapting ourselves and doing justice to our ears, is to follow the "Hearing Conservation Programme" for the health, and well-being of our ears.

Now, let us ask what is meant by hearing conservation.

The word 'conservation' is defined as a careful preservation or protection of something, the planned management of a natural resource to prevent exploitation, destruction, or neglect. The conservation of hearing is a function of an audiologist.

(a) Role of hearing conservation programme is to maintain or preserve hearing and usually refers to an industrial or military setting, ie mainly concerned with occupational noise exposure. It should be emphasised, however that hearing conservation should be a lifelong preoccupation - 24 hours a day, 365 days a year.

b) Purpose of hearing conservation programme: The purpose is to prevent significant NIHL resulting from both occupational and non-occupational noise exposures.

c) Benefits: Implementation of hearing conservation programme provides both primary and secondary benefits.

1) Primary benefits:

- Hearing loss from any cause reduces the quality of life for the affected individual. Hearing-impairment interferes with normal communication. For many jobs we need adequate hearing to qualify, to be hired or promoted, so hearing loss decreases our employment potential. Thus, hearing conservation programme prevents job related NIHL.
- Off the job our interpersonal communication with family and friends puts much of the pleasure in our lives, and gives us a- feeling of being involved with others in

recreational situations at home. We also need our hearing to enjoy music and the quiet sounds of nature, such as bird songs, or rustling of leaves. Thus, hearing conservation programme (HCP) becomes useful.

- The individual protected, experiences less fatigue less emotional stress as a result of communication difficulties on and off the job and potential benefits in communicating in noise can be achieved.

- 2) There are some secondary benefits also. Setting up of HCP will improve the attitude of employee towards the management. By HCP detection of not only NIHL but also hearing loss due to other diseases is possible. The implementation of HCP for two or more years, will reduce the compensation cost for NIHL, and also unjustified claims for NIHL (Bergerana Royster, 1983).

- d) Indications: Of the need for HCP's are listed:
 - (1) Difficulty in communicating by speech while in noise.
 - (2) Head noises or ringing in the ears after working in noise for several hours..
 - (3) A temporary loss of hearing that has the effect of muffling speech and changing the quality of other speech sounds after several hours of exposure to noise.

e) What are the features of HCP?

Hearing Conservation Programme			
1	1	1	1
Five Phases	Desired characteristics	Personnel involved	External influences
Sound surveys	Enforcement of hearing protection utilization	Boss	Company headquarters
Engineering + Administrative controls	Potentially effective hearing protection devices	Top management	Consultants
Education	Key individual.	Middle management	Suppliers
Hearing protection	Active communications.	Supervisors	Second job
Audiometric monitoring		Employees	Community
			Leisure time
			Hobbies etc.

f) Phases:

Operation	Function
Education	To motivate individual actions and consistent supervision of safety practices. Acceptance for machine modifications to understand and take care of their hearing.
Sound surveys	Identification of .hazardous areas/occupations and the degree of hazardous noise.

Engineering & Administrative noise controls : Modification of noise sources, the noise path, and the receiver. To eliminate employee exposures to harmful noise.

Hearing protection : Where noise control is not possible, provision, fitting and maintenance of earplugs, muffs for personnel at risk together with their education about hazardous effects of noise.

Audiometric evaluation : Monitoring effectiveness of hearing protection.
Pre-employment and serial audiometry to identify noise sensitive workers.

Legal aspects : Legal liability, likely legislation.

Lastly, organisation of hearing conservation program is, very important, since co-ordination of work of medical safety and occupational hygiene, staff involved and also for referral and re-employment of workers with hearing loss/damage.

The above same guidelines hold good for hearing conservation in community noise, Aircraft noise, military noise and also- in educational set-up.

Most initial concern about noise exposure focused on the work place. This concern led to the occupational safety and Health Administration Act (OSHA) in-1971 to impose restrictions on the amount of noise to which workers could be subjected.

In 1983, OSHA, promulgated additional regulations requiring employers to protect the hearing of workers employed in work places Where employees' time-weighted , average exposure over an eight hour exceeds 85 dB called Damage Risk Criteria (*DRC*).

Though occupational noise exposure was one of the most common causes of NIHL, the new threat is exposure to non-occupational noise, sources of which are high volume music, recreational instruments and power tools, which are potentially hazardous to hearing. Thus Federal Government's (in 1970) noise control activities extended to non-occupational noise as well.

In the same period, many control Acts and Noise Abatement Controls such as Environmental Protection Agency Noise Control Act of 1972 (*NCA*) have stated, that their goal was to protect the ears from "noise that jeopardizes the people's health or welfare".

As Paul Lambert in 1980's said we're living in an increasingly noisy society. As we become more mechanised more of our leisure activities also are beset in noise. He also adds, "we used to see NIHL primarily in individuals who *worked* in manufacturing jobs and they were mostly middle aged or older. Now we're beginning to see it in *young* adults and teenagers".

Also Lipscomb notes, in our high-tech society, **there** is a greater abundance of opportunities to cause injury to our hearing than there has ever been. For example, introduction of Walkman and similar personal stereo systems has a noise level of 145 dB. Remember 140 dB is regarded as dangerous!

To conclude, it is important to note that once the hearing loss is caused due to noise, it is almost impossible to regain our valuable hearing back. It is gone forever.

So go by the old saying 'Prevention is better than cure'. **Plan** and implement a Hearing Conservation Program we should get to work and conserve human hearing – a very precious commodity.

SCRIPT FOR AUDIOASSETTE ON HEARING CONSERVATION PROGRAMME

Audiologist : Dear friends, I being an audiologist I would like to educate you regarding hearing care. In this present decade, there are so *many* factors which affect our hearing sense. As you all know how important the hearing sense is, it becomes imperative to know as to how to protect one's hearing from the dangers. Especially for this team, which consists of an Industrial Worker, Teenager, Teacher, and a social worker, this discussion will be of utmost importance.

Industrial worker : Sir, what do you think, is most hazardous for an industrial worker?

Audiologist : One of the major causes is exposure to noise, which results in occupational noise induced hearing loss (NIHL). Apart from this, there are non-auditory effects which interfere with the physiology of our systems.

Industrial worker : Well, could you tell us, what amount of noise exposures will result in hearing loss?

Audiologist : It's a good question. If a person is exposed to 85 dB noise, for eight hours continuously everyday, then he is more likely to acquire hearing loss. This we call as Damage Risk Criteria (DRC). This particular information applies not only for you, but also for other members in this team.

Teenager : Sir, I am a college student, how can you say, that my hearing is at risk? . -

Audiologist : Ah ! presently we're living in an increasingly noisy society. As our lives become more mechanised, our leisure time activities also involve more of noise.

Teenager : Can you tell us, what sort of hobbies or leisure activities involve more noise.

Audiologist : Listening to walkman and similar personal stereo system which has a noise level of 145 dB has the potential to harm our hearing. Also it has become a fashion, for the young people to go on a ride, removing the silencer. Many of them, spend their leisure time attending rockconcerts and

: involve in noisy sports such as shooting, ear and bike racing. All this is enough to cause non-occupational noise induced hearing loss.

Teenager : Then do you mean to say all those who listen to music and rock musicians, are exposed to sounds which cross the damage risk criteria?

Audiologist : Mm m m ... It is said that exposure to a single rock concert with dB level of 106 is equivalent in/its permanent effect on listener's hearing threshold. Or few hours of exposure a week or a month, the attendees of discotheques and rock concerts present "little risk to the attendee".

Teenager : What are the changes taking place in the ear that results in hearing loss"?

Audiologist : Overamplified music and over exposure to sound results in damage to the ears, which leads to temporary threshold shift also hearing loss and tinnitus (sound in the ear) .

: I suppose, what I told now, seems to worry you right.

Teenager : Of course, yes. Since one of my hobbies is shooting, your information concerning noise and its effects really worries me .

Audiologist : Surely, guns are without doubt the most hazardous "Which produce impulse noise of an intensity of 150-170 dB. An intensity of 130 dB to 140 dB can cause physical . injury to ear, a tearing of inner ear structures. They acquire hearing loss upto 25-30 dB for high frequency sounds. They also have ringing or buzzing sounds in their ears and also problems in understanding speech.

Teenager : Do you think, these are the only sounds which harms our hearing.

Audiologist : Certainly not. Others such as aircraft noise, traffic noise are also implicated.

Industrial worker : Is only the noise exposure a stress factor for an industrial worker?

Audlologist : Usually it is said that other factors are a diseased ear which is more susceptible

: to noise. Also it is seen that drugs in combination with noise exposure have adverse effects on our hearing.

Industrial worker : Once we acquire a hearing loss due to noise, is it possible to cure it? .

Audiologist : Depends on the extent of damage caused by that noise, Once noise has damaged the inner ear structures, hearing loss thus acquired is not reversible is, it becomes permanent and irreversible.

Industrial worker : Then, how best could be protect our hearing?

Audiologist : Ah: That's a good question. The only way is to "preserve" or "conserve" your hearing against alarming noise For this there is a programme called as Hearing Conservation Programme (HCP) which is of utmost use.

Industrial worker : What exactly is meant by "Hearing Conservation Programme" and its role in conserving the hearing?

Audiologist : The purpose of Hearing Conservation Programme is to prevent the employees and others who are at risk, from developing

: noise - induced hearing loss and implement steps to control the ill-effects either by engineering methods or through administrative measures.

Industrial worker : Can you tell me how hearing conservation program is useful for an job purpose?

Audiologist : On the job, we need good communication ability to give and receive instructions, we should be able to use the telephone and detect abnormal machinery sounds and Warning signals. Effective hearing conservation programmes can reduce accident rates, promote worker efficiency as well as reduce the stress and fatigue that result from high level noise exposures.

Industrial worker : Well, how do you think, this programme will be helpful for us, when we are off the job.

Audiologist : Off the job, our interpersonal communication -with family and friends gives much pleasure and gives us a feeling of being with others in recreational situations

: and at home. We also need our hearing to enjoy music and the melodious sounds such as birds singing, For/all these reasons and more, maintaining good hearing is of invaluable benefit in all spheres of one's life.

Industrial worker : Sir, how is it possible to identify the areas where there is hazardous noise?

Audiologist : Sound surveys have to be done. Sound surveys can identify dominant noise sources in each area of the plant and reduce *employee* exposure.

Industrial worker : What are the instruments used for noise surveys?

Audiologist : It includes a wide range of instruments depending upon the type of surveys, from a microphone, sound level meter, dosimeter, octave band analyzer and the tape recorders for detailed analysis of noise.

Industrial worker : How do these noise surveys help in further elimination of noise and protect our hearing.

- Audiologist : Once the dominant noise production sources and contributing equipment noise sources are identified, appropriate engineering and administrative controls can be undertaken to reduce the employee exposure.
- Industrial worker : Engineering control, what exactly does it mean?
- Audiologist : It involves modification of the noise at the source itself (such as fitting mufflers to air exhaust nozzles) noise at the path (such as by placing sound-absorbent enclosures around equipment) or at the receiver (such as by constructing an enclosure around the employee's work place.
- Industrial worker : Does administrative control mean the same as engineering control?
- Audiologist : No. It involves adjusting work schedules to rotate noisy operations *among* different workers for shorter exposure periods, or limiting the amount of time during which a noisy machine may operate.

Industrial worker : Sir, don't you think that it is necessary for educating the workers, since many are ignorant about the hearing conservation programme.

Audiologist : Yes. you are right. If noise problem is identified during sound surveys, then a more formal educational program, should be given to explain the risks of noise induced hearing loss, and also regarding hearing protection.

Industrial worker : Since, the hearing loss Which is acquired is very insidious, what ways do you suggest to rule out the presence of hearing loss?

Audiologist : For this every employee who is at risk has to regularly monitor their hearing ie. they have to undergo audiological testing at regular intervals. The audiograms will reveal, the hearing deterioration.

Industrial worker : If audiograms reveal that there is hearing loss, What further steps can we take?

Audiologist : That's a good question. You should start wearing hearing protective devices(HPDs) to prevent further deterioration of hearing and can claim for worker's compensation.

- Teacher : Being a teacher I am interested to know about the ill-effects of noise exposure to children.
- Audiologist : They develop high frequency hearing loss which is attributable to environmental and recreational noise and also a mild conductive hearing loss of 15 to 25 dB.
- Teacher : What sort of difficulties would such a child have to face in the classroom?
- Audiologist : This mild degree of hearing loss hinders the the child's speech and language development and also poses difficulties in learning in the classroom.
- Teacher : so can you tell me, how it can be tackled?
- Audiologist : In an educational setting the focus is on early identification of hearing problems, then referral for intervention (medical and/or professional) and rehabilitation, if needed.
- Teacher : When to consider the child as being at risk?
- Audiologist : The child with a hearing loss of 15 dS HL or more in the speech frequencies in the better ear is at risk for that loss having an adverse effect on *some* aspect of their education, vocational or social competency.

- Teacher : How do you think, we can conserve their hearing.
- Audiologist : Counsel all the students and their parents about hearing conservation and the need to use hearing protectors when they are around potentially injurious noise sources.
- Teacher : But Sir, they complain of , feeling of isolation, and peer pressure among the students when they wear the hearing protective devices, So how is it possible to overcome the resistance?
- Audiologist : This is where the importance of health education programs and hearing health comes into picture. Deglamorising loud noise and making the student aware of the long-term risks are the first step in educating and motivating, at risk population.
- Teenager : What is the potential market for hearing care services in recreational audiology?
- Audiologist : Recreational audiology can entail. such sports as shooting, racing and attending rock concerts where there is loud music. Each of these hobbies poses a threat to the participants hearing.

- Teenager : How can hearing care professionals become involved in non-occupational hearing losses?
- Audiologist : Each of these sports activities hold national and regional trade shows. Hearing care professionals can exhibit at these events and promote their services as providers of hearing protection devices, sources of hearing screening and dispensors of amplification.
- Teenager : Sir, at what stage, wearing of hearing protection devices becomes mandatory?
- Audiologist : Hearing protection devices are the first line of defense against noise in environments where engineering and/or administrative controls have not reduced employee exposures to/safe levels.
- Teenager : What are different types of hearing protection devices available.
- Audiologist : They range from a small cotton ball to a helmet, with other kinds like earplugs, earmuffs, semi-aurals inserts or canal caps.
- Teenager : Sir, can you tell us how exactly it reduces the noise exposure?

- Audiologist : All hearing protection devices create a barrier to the air-conducted sound from reaching the eardrum.
- Teenager : Does the attenuation provided by all types of hearing protection/devices the same or they vary?
- Audiologist : Earplugs mainly seal against the wall of ear canal, and ear muffs seal against the skin around the external ear. In each case the amount of attenuation achieved depends largely on the completeness of the seal, ie. any air leaks will allow some sound to bypass the hearing protection devices.
- Industrial worker : There is a major complaint from the industrial worker's that hearing protectors are uncomfortable.
- Audiologist : Hearing protection devices are often uncomfortable initially, but hearing loss due to noise exposure is 'uncomfortable' permanently. Not all hearing protectors adapt equally well to all head shapes and ear canals, it is important to give the employee the final

: choice in selection. If after a couple of weeks of **daily** use the employee is still experiencing difficulties or **discomfort**, the protector should be resized or refitted.

Industrial worker : Sometimes I feel Sir, that I don't need hearing protection, since I am used to noise.

Audiologist : Oh, No: Ears do not get used to noise - they get deaf. Repeated exposure does not toughen ears. Although individual susceptibility to noise exposure varies widely, there are currently no tests that can detect the more noise sensitive members of the population.

Industrial worker : Do earmuffs block out noise better than earplugs?

Audiologist : No, the misconception that earmuffs are better than earplugs at reducing noise is partly due to the 'bigger is better' school of thought. Actually, whether or not an earmuff or an earplug is better is dependent upon the device and **user** in question.

Industrial worker : I cannot hear my fellow worker if I wear the hearing protectors and I feel it impairs my communication.

Audiologist : When the ear is bombarded with high level sound, it overloads and distorts reducing one's ability to accurately discriminate different sounds. Wearing hearing protection devices reduces the overall sound levels so that the ear can operate more efficiently. The effect is similar to the improved vision that sunglasses provide in very bright, high glare conditions. This is the case with normal hearing individuals.

Industrial worker : Then, what happens to the communication of hearing-impaired individuals.

Audiologist : For moderate to severely impaired individuals, hearing protectors may not provide a communication benefit and actually be a liability. But, if these individuals do not protect their hearing they may suffer additional impairment, impeding his communication to a larger extent.

- Industrial worker : Will I hurt my ears if I blow my nose while wearing an earplug?
- Audiologist. : No. Since an earplug is inserted in the external ear canal, which is separated from the middle ear by a membrane (ear drum) it will not affect the pressure changes in the middle ear which may arise due to blowing of the nose.
- Teenager : Is it possible to hear music while wearing on the hearing protection devices?
- Audiologist : To tell more about the hearing protection devices there are also specifically designed hearing protection devices for musicians, which provide uniform attenuation at all frequencies thus eliminating the distortion of sound that is characteristic of many devices, and making it possible to listen music while wearing hearing protection devices.
- Teenager : There is a doubt persisting that earplugs cause ear infection. Is it true Sir?

Audiologist : Based on our experience, it appears that earplugs causing outer ear infections is minimal. Nevertheless, cleanliness should be stressed and diabetics who are prone to infection should be more carefully monitored. Other causative agents may be recreational water sports, habitual scratching with finger nails and systemic conditions such as anemia, vitamin deficiencies, endocrine disorders and various forms of dermatitis. And so when ear infection is reported, earplugs should not necessarily be assigned the blame.

In fact, there are some evidences, that earplugs protect the ears from ear infection.

Teenager : O: that's interesting to hear that hearing protection devices are also useful for other purposes.

Audiologist : Usually, swimmers use the swim plugs to protect their ears, not from noise but from ear infections which can cause hearing loss.

Social worker : Sir, till now, you were telling a lot. about the hearing care and the ways and means for it, May I also know, What exactly is the role of a social worker in the hearing care services?

Audiologist : Since the public awareness of this hazard is low, educational programs should be targeted towards children, parents, hobby groups, public role models and professionals in influential positions, and also among primary health care physicians and educators who deal with young people and also among the consumers. This sort of education helps the means for also self protection. This kind of work can be taken up by people like you, and Hearing Conservation Programme can be enhanced more.

So to conclude this discussion, here comes a plea of the ear.

"DON'T GIVE ME DIAMONDS AND RICHES,
HELP ME BE MYSELF".

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