

EVALUATION OF NOISE INDUCED HEARING LOSS IN FISHERMEN WHO WORK IN MOTOR BOATS IN KARAİKALI. Arumugam¹, George Tukanan², Vineeth Abraham Anchery³, Arun Khosh⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: Fishing is one of the oldest professions. It is important an occupation for the coastal population of karaikal. **AIMS AND OBJECTIVES:** To evaluate noise induced hearing loss (NIHL) in a population of fishermen. **MATERIALS AND METHODS:** In an OPD based clinical study, 63 fishermen (Mean age-37.55), between 30 and 50 years of age, underwent otorhinolaryngologic evaluation, and hearing assessment through pure tone audiometry. **RESULTS:** Headache was the most common presenting symptom (n-18, 38.09%) followed by hearing loss (n-18, 28.57%) and tinnitus (n-12, 19.04%). **CONCLUSIONS:** The most evident neurotological symptoms were headache, hearing loss and tinnitus. Audiometric screening must become mandatory. Noise is an exposure that not only causes hearing loss, but also acts as a stressor. Intervention at early stages is helpful in preventing the progression of NIHL.

KEYWORDS: NIHL, Fishermen, Hearing loss, PTA.

INTRODUCTION: Fishing is one of the primitive productive activities and is an important sector of the karaikal economy. The fishing industry is an important source of employment and income. The existence of fishing as a profession is seen in both traditional and industrial formats. The focus of this study is on fishermen working in motor powered fishing boats with continuous exposure to noise from the boat's engine. Among these fishermen noise induced hearing loss (NIHL) should be highlighted. NIHL is caused by an accumulation of exposures to noise, usually daily, which are repeated continuously for a certain period.¹

AIMS AND OBJECTIVES: To evaluate noise induced hearing loss, its age distribution, common signs and symptoms in a population of fishermen who work in motor powered fishing boats with constant exposure to noise.

MATERIALS AND METHODS: We evaluated 63 fishermen, from 30 to 50 years of age (Mean age-37.55) who came to our OPD with otological symptoms. The study was a cross-sectional study. All the fishermen underwent thorough otorhinolaryngological history taking and examination. Fishermen with active middle ear disease, perforations in tympanic membrane and systemic illness like diabetes mellitus and hypertension were excluded from the study.

The years of exposure was taken into concern, as the time of exposure to loud noise was almost similar in all the 63 fishermen. The average age from which these fishermen started working in fishing boats was about 18 years. The duration of continuous exposure to sound from the both engine was about 4-6 hours per day and the desible level of noise from the engine was about 90-100 dB. A questionnaire was set which included the common symptoms and signs in otology (Table-1). Further all the patients underwent pure tone audiometry to assess hearing loss.

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Signs and Symptoms
Hearing loss
Tinnitus
Hyperacusis
Headache
Sleep disturbances
Poor concentration

Table 1: Common symptoms and signs in otology pertaining to noise induced hearing loss

RESULTS: The frequency of the otological signs and symptoms in 63 fishermen are mentioned in table 2. Headache was the most common symptom (n-24,%-38.09). The second most common symptom was hearing loss (n-18,%-28.57). The third and fourth most common symptoms were tinnitus and hyperacusis (n-12,%-19.04 and n-7,%-11.11) respectively. Least common symptoms were sleep disturbances and poor concentration (n-5,%-7.9 for both).

Otological and Signs and Symptoms	N (no)	Percentage (%)
Hearing loss	18	28.57
Tinnitus	12	19.04
Hyperacusis	7	11.11
Headache	24	38.09
Sleep disturbances	5	7.9
Poor concentration	5	7.9

Table 2: Distribution of frequency of otological signs and symptoms pertaining to noise induced hearing loss

The years of exposure to loud noise produced from the motor powered boats are given in Table 3. There were 16(25.39%) fishermen out of 63 who were exposed to noise for about 26-30 years and 12 (19.04%) belonged to 16-20 years exposure. Both 6-10 and 21-25 years of exposure group had 10 (15.87%) each. There were only 4(6.34%) fishermen each who were exposed to loud noise for both 0-5 and more than 30 years respectively.

Years of Exposure	Number of Fishermen (n)	Percentage (%)
0-5	4	6.34
6-10	10	15.87
11-15	7	11.11
16-20	12	19.04
21-25	10	15.87
26-30	16	25.39
>30	4	6.34
Total	63	100

Table 3: Years of Exposure to noise

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The age distribution of signs and symptoms in otology (Hearing loss, Tinnitus, Hyperacusis, headache) pertaining to noise induced hearing loss in 63 fishermen are mentioned in Table 4. These major symptoms were analysed separately and showed that 11(61.11%) fishermen out of the 18 fishermen who presented with hearing loss as a major symptom belonged to the age group of 41-50 years. On the other hand there were only 3(16.66%) and 4(22.22%) who belonged to the age group of 20-30 and 31-40 years respectively. There were 12 fishermen who presented with tinnitus as a major symptom.

The age group who had tinnitus as the major symptom was 41-50 years and 8(66.66%) belonged to this age group. There were 1(8.33%) and 3(25%) fishermen under the age group of 20-30 and 31-40 years respectively. Regarding hyperacusis 5(71.42%) out of the 7 fishermen came under the age group of 41-50 years. There were no fishermen who had hyperacusis in the age group of 20-30. But 2(28.57%) belonged to the age group of 31-40 years. A total of 24 fishermen presented with headache as the major symptom and 11(45.83%) out of them belonged to the age group of 41-50. Rest of the fishermen came under the age group of 20-30 and 31-50 years which included 4(16.66%) and 9(37.5%) fishermen respectively.

Age	Hearing loss (n) (%)		Tinnitus (n) (%)		Hyperacusis (n) (%)		Headache (n) (%)	
20-30	3	16.66	1	8.33	0	0	4	16.66
31-40	4	22.22	3	25	2	28.57	9	37.5
41-50	11	61.11	8	66.66	5	71.42	11	45.83
Total	18	100	12	100	7	100	24	100

Table 4: Age Distribution of signs and symptoms (n-number of fishermen%-percentage)

The age distribution of hearing loss in decibels according to pure tone audiometric findings is shown in table 5. The age group of 41-50 years showed average values 51.50 and 52.84 decibels of hearing loss in the right and left ear respectively. Their average values of hearing loss for the age group of 20-30 and 31-40 years were 26.14 and 32.25 decibels on the right side, 25.57 and 33.66 decibels on the left side respectively.

Age	NIHL Right (dB) (Avg)	NIHL Left (dB) (Avg)
20-30	26.14	25.57
31-40	32.25	33.66
41-50	51.50	52.84

Table 5: Analysis of Results of Pure tone audiometry in Decibels and Age Distribution of Hearing loss (Mean values of right and left Ear)

The grades of hearing impairment according to WHO is shown in Table 6. According to this analysis 10(15.87%) out of the 63 fishermen had moderate hearing loss, 28(44.44%) had mild or slight hearing loss. There were only 7(11.11%) who had severe hearing loss. The fishermen with no hearing loss were 18(14.28%). There was no one with profound hearing loss.

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Grade	Audiometric Value (dB)	Number (n)	Percentage (%)
0- No impairment	>25	18	28.57
1- Slight impairment	26-40	28	44.44
2- Moderate impairment	41-60	10	15.87
3- Severe impairment	61-80	7	11.11
4- Profound impairment	>81	-	-

Table 6: Analysis of Grades of Hearing Impairment (WHO)

The distribution of hearing loss in the 63 fishermen according to no hearing loss in any frequencies, loss of high frequencies with preservation of low frequencies and loss of both high mid and low frequencies were 18(28.57%), 31(49.20%) and 14(22.22%) respectively (Table 7).

Type of Frequency loss	Number of Fishermen (n)	Percentage (%)
No loss	18	28.57
High	31	49.20
High, mid and low	14	22.22
Total	63	100

Table 7: Distribution of Hearing Loss in Fishermen (According to high and low Frequencies)

DISCUSSION: Fishing is one of the world's oldest occupations.² Fishing is probably the most dangerous occupation in the world.³ the term noise-induced hearing loss refers to reduction in auditory acuity associated with noise exposure. The term 'acoustic trauma' has, however, been utilized to describe the situation where a single exposure to an intense sound leads to an immediate hearing loss. NIHL is regarded as a physiologic disorder resulting from abnormal neural activity in the auditory pathways.⁴ Hearing loss can affect safety and work performance and can reduce the quality of life for most affected individuals.^{5,6} Tinnitus is one of the major neurotological manifestations along with sensorineural hearing loss.⁷

According to various published writings, tinnitus is the forewarning of exposure to unrestricted sound stimuli. This is an important symptom in preventing NIHL. Noise induced hearing loss is preventable and can have negative consequences of different natures, leading to hearing impairment, auditory dysfunctions such as tinnitus.^{8,9} In a pure tone audiogram (PTA), a notch at 3-6 kHz, and recovery at 8kHz is usually seen. But absence of a notch doesn't rule out noise induced hearing loss. It is one of the main predictors of handicap generated in workers exposed to noise and may indicate an increased susceptibility to injury.

Existing studies of NIHL in these occupational groups are few and reflect exposures in the past. Efforts to improve the working environment for fishermen have included inspections, noise measurements. Hearing protection has improved worldwide, but protection is not used consistently.¹⁰ Fishermen had a slightly higher rate of hospital contacts over time perhaps because they are now more aware of the problem or are more attentive to it than before.

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Former studies establish that NIHL may result either from traumatic impulse noise >140 DB, resulting in acute permanent hearing loss or from exposure to lower noise levels of longer duration. It is not currently possible to reduce engine room noise levels below 85 decibels although fishing boats have become larger with more modern engine room isolation.¹¹ Noise levels have therefore reduced mainly outside the engine room. But still noise levels on medium sized fishing boats commonly reach 102-110 decibels in the engine room and 75-85 dB in the working and living areas.¹²

Anyone regularly exposed to a noise level exceeding 80 decibels should be supplied with ear protectors. The instantaneous sound pressure or impulse noise must not exceed 130 decibels. There is evidence that age, alcohol consumption and smoking has a cumulative effect on hearing loss and the latter two factors are common among lower socioeconomic group especially in fishermen.

CONCLUSIONS: The most evident neurotological symptoms were headache, hearing loss and tinnitus. Early hearing loss can be detected by screening with pure tone audiometry. In fact, it would be relevant to initiate intervention at early stages to prevent progression of noise induced hearing loss among those with early signs like tinnitus. Audiometric screening must become a mandatory health examination at least once in 2 years. It should be recognized that noise is an exposure that not only causes hearing loss, but also acts as a stressor. The effect of alcohol consumption and smoking has to be further studied in a detailed manner to establish its cumulative effect on NIHL in fishermen.

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AUTHORS:

1. I. Arumugam
2. George Tukanan
3. Vineeth Abraham Anchery
4. Arun Khosh

PARTICULARS OF CONTRIBUTORS:

1. Professor and HOD, Department of ENT, Vinayaka Missions Medical College, Karaikal.
2. Post Graduate (Final Year), Department of ENT, Vinayaka Missions Medical College, Karaikal.
3. Assistant Professor, Department of ENT, Vinayaka Missions Medical College, Karaikal.

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COMPETING INTERESTS: None

4. 1st Year Post Graduate, Department of ENT, Vinayaka Missions Medical College, Karaikal.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

George Tukanan,
Edatheru-85,
Keezha Kasa Kudy,
Kottucherry P. O.,
Karaikal-609609, Puducherry.
E-mail: doctorgeorgetukanan@gmail.com

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