Hearing In Alcoholics – A Case Control Study

Kavitha Ashok Kumar and Reeba Patrick

ABSTRACT

Alcohol is the most prevalent addiction in the world. It affects every organ in the body and its toxic effects are well documented. This article studies its effect on the auditory system. The authors have compared the hearing in 30 subjects where the single risk factor was alcohol consumption for more than 2 years, with 30 age and sex matched controls. The association of the severity of hearing loss with the duration and quantity of alcohol intake were studied. An attempt has been made to know whether abstinence from alcohol following de-addiction would bring about any change in hearing.

Key Words: Hearing loss, Alcoholics, Abstinence

INTRODUCTION

Alcoholism is a serious issue worldwide. Alcohol abuse is the most prevalent addiction in the world. It has been estimated that in India alone, 62.5 million people are alcoholics. Alcoholism has been included in the International classification of diseases (ICD -8).

Alcoholism is known to affect most systems, especially the hepato – portal system. Alcohol is not just directly toxic, but it also produces ill effects by the generation of free radicals. It has been reported to affect the nervous system, thus causing brain shrinkage, dependence and dementia on long term use. It also increases the risk of Alzheimer's disease. Alcohol is said to have a similar effect on the auditory system. Although there is no consensus on the toxic potential of alcohol, the ill effects of alcohol consumption on the ear has been documented by many researchers worldwide. A review of literature shows scanty publications in India on this theme. Therefore, this study was conducted in a de-addiction centre. An attempt has been made to know whether abstinence from alcohol following de-addiction improves hearing.

AIMS AND OBJECTIVES

1. To compare the hearing of alcoholics with age and sex matched controls.
2. To compare the hearing in alcoholics before and after alcohol deaddiction.

MATERIAL AND METHOD

This case control study was done at a deaddiction centre after obtaining clearance from the institutional ethical committee. The study group consisted of 30 subjects who had been consuming alcohol for more than two years and the control group consisted of 30 age and sex matched, normal, healthy individuals. An informed consent was taken from all the 60 subjects.

Patients who were above 60 years of age, having diabetes mellitus, hypertension and a history of occupational exposure to noise, those on ototoxic drugs and those with external middle or internal ear diseases were excluded from the study.

The audiological assessment was done by two tests, namely:

a. **Puretone audiometry:** The assessment of the air and bone conduction threshold was carried out by the method which was outlined by the American Speech and Hearing Association (ASHA). Air conduction at frequencies of 0.25 to 8kHz and by bone conduction at 0.5 to 4 kHz. The testing was done in an acoustioc booth by using a model orbitter 922 which was calibrated according to ISO 389,-3,-4, ANSI S 3.6.

b. **Distortion product oto acoustic emission test:** This was done by using the Madsen capella diagnostic device.

The't' test was used for the statistical analysis of the data.

OBSERVATIONS AND RESULTS

In the present study, of the 30 patients, 14 patients were in the age group of 31 -40 years and 12 patients were in the age group of 41 – 50 years, while two patients each were in the 21 – 30 years and the 51 – 60 years age groups [Table / Fig 1]. Hence, patients with an urge to give up alcoholism were seen in maximum numbers in the middle age. Most of the patients consumed locally prepared whisky. The amount of alcohol consumed was calculated as 60 ml per glass. Most of the patients (10) consumed 700 – 1000 ml / day. 8 patients consumed 100 -300 ml, another 8 consumed 300 to 500 ml and 4 consumed >1000 ml/day [Table / Fig 2].

Age	Cases	Controls
21-30	2	7
31-40	14	15
41-50	12	8
51-60	2	0

[Table/Fig 1]: Number of Cases and controls in different age group

Amount of alcohol consumed in ml per day	Cases
100-300	8
301-500	8
501-700	0
701-1000	10
>1000	4

[Table/Fig 2]: Amount of alcohol consumed in ml per day

The duration of alcohol consumption varied, with the maximum duration being 26 -30 years in 1, 21 – 25 years in 2, 16 -20 years in 10, 11 -15 years in 5, 6 – 10 years in 7and 1 -5 years in 5 patients [Table / Fig 3]. The otological examination was normal in all (both cases and controls).

Duration of alcohol consumption (in years)	Cases
1-5	5
6-10	7
11-15	5
16-20	10
21-25	2
26-30	1

[Table/Fig 3]: Number of cases showing the duration of alcohol consumption

The hearing assessment by using a tuning fork of 512 Hz was found to be normal in both the cases and the controls. On pure tone audiometry, 14 cases were found to be having high frequency sensorineural hearing loss. This result was found to be highly significant. The audiogram was normal in all the controls [Table / Fig 4].

	Cases	Control	
Normal	16	30	P=0.001
Abnormal	14	0	

[Table/Fig 4]: Puretone audiometry before de-addiction

Distortion product otoacostic emissions were absent in 23 out of 30 cases, which was highly significant. DPOAE was normal in all the controls [Table / Fig 5]. Pure tone audiometry and DPOAE after de-addition were found to be the same. No improvement in hearing was noticed after 1 month of abstinence.

	Cases	Control	
Normal	7	30	P=0.001
Abnormal	23	0	

[Table/Fig 5]: Distortion product Oto Acoustic Emission Test before de-addiction

DISCUSSION

Alcohol is the most prevalent addiction in the world. The toxic effects of alcohol on various organ systems have been well documented. Alcohol related hearing loss has been observed in a few researches which were conducted worldwide. Sandra Beatriz et al [1] in Brazil, Nordahl et al[2] in Norway, Golabeck et al[3] in Poland, Ulf Rosenhall et al[4] in Sweden and Jukka Ylikooki [5] et al have investigated the hearing in alcoholics and have found a positive correlation between alcohol abuse and hearing. However, there are some other researchers like Propelka et al [6] and Itoh et al [7] who found no association between alcohol consumption and hearing loss. In our study, high frequency SNHL was noted in 14 out of 30 alcoholics when compared to age and sex matched controls. Pure tone audiometry showed a significantly higher rate (p = 0.001) of hearing loss in the alcoholic subjects as compared to that in the non-alcoholic controls. The results which were obtained in this study, support those of previous studies, that the hearing loss in alcoholics is of the sensorineural type and it is seen in high frequencies (4000 – 8000 Hz) [1],[3],[8]. However, because the hearing loss is mainly in the high frequency range, which is much above the normal speech frequency range, the hearing loss is not troublesome and the patient does not complain of hearing loss.

No relationship was found between the amount of alcohol consumed and the severity of the hearing loss. Similarly, the duration of alcohol intake too did not have any relationship to the severity of the hearing loss. This was found to be in contrast to the finding of Mishra A et al [9], who noted that the overall hearing dropped as the quantity of alcohol which was consumed, increased.

The impedance audiogram was normal in both the cases and the controls. This ruled out any middle ear pathology.

A comparison between the DPOAE of the alcoholics and the non alcoholics have shown that there was a statistically high frequency of the absence of emissions in the alcoholics (p=0.001) as compared to the controls. These findings correlated with the findings [6] of earlier studies [1],[10]. The absence of emissions indicates an advanced damage to the outer hair cells in the organ of Corti. However, Jukka set al [5] have attributed the hearing loss to the degeneration of myelinated and non mylinated nerve fibers.

The audiological tests were repeated one month following the abstinence from alcohol. No change was seen in the audiogram, thus indicating that the hearing loss which was observed was not a temporary change. However, the hearing loss could not be termed as permanent, as the duration of the abstinence was short and as most of the subjects were lost to a long term followup.

CONCLUSION

The audiological findings in the subjects, where the single risk factor for hearing loss was alcohol consumption, confirmed that there was a positive correlation between hearing loss and alcoholism. Alcoholics were found to have a high frequency of sensori neural hearing loss of a mild to moderate degree when compared to the normal subjects. The distortion product otoacoustic emissions test showed the absence of emissions in 76.6% of the cases, thus suggesting damage to the outer hair cells of the organ of Corti. After abstinence from alcohol for a month, hearing did not improve in these cases.

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