

Original Research Article

A study on the proportion of hearing impairment among percussionists in Thrissur district of Kerala

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ABSTRACT

Background: Hearing loss is a cause of global concern. Percussionists are exposed to greater levels of continuous or intermittent noise than others. Little is known about the relationship between percussion activity and hearing impairment. The early detection of the same and subsequent management makes a significant reduction in the burden of health care services. The objective was to study the proportion of hearing impairment in percussionists in the district of Thrissur using an IOS based mobile application.

Methods: A cross sectional study was done on percussionists from Thrissur district who has experience of more than five years and has no congenital or traumatic hearing loss. A predesigned semi structured questionnaire was given and hearing tests were done using a mobile application U hear in a sound proof setting to understand the current state of hearing ability among the percussionists.

Results: A total of 39 subjects were involved in our study of which all were males. Mean age of our study population was 30.44±12.04. most of them were diagnosed with at least mild degree of hearing loss of one of the ear or both the ears. 15.4% of them had mild degree of hearing loss, 64.1% had moderate degree of hearing loss and 20.5% had severe hearing loss.

Conclusions: The study shows percussionists are more exposed to sounds of various frequencies for longer duration, they are more prone to hearing loss. The study brought out that age is directly proportional to hearing loss, music induced hearing loss progress at a rate proportion to the work experience.

Keywords: U hear, Noise induced hearing loss, Percussionist

INTRODUCTION

Hearing loss may develop at any time during the life course. The onset can be sudden or gradual, and one or both ears can be affected. Hearing loss can result from a variety of causes like trauma, infection, genetic syndromes, aging, or excessive noise exposure.¹ Although some hearing loss might be temporary or treatable using medical or surgical methods, most hearing loss in adults is permanent or slowly progressive.² We

experience sound in our environment and these sounds are at safe levels that won't damage our hearing. But they can be harmful when too loud and long-lasting. Sounds can damage sensitive structures in the inner ear and cause noise-induced hearing loss (NIHL). Professional musicians spend varied amount of time practicing, playing solo and as a member of different groups, as well as enjoying the music of others. Studies have reported that classical musicians play an average of 25 hours per week but this could vary widely from the types of music

played, their duration from week to week, and also from musician to musician.¹

Thrissur pooram is one of the most historic events to occur in the Thrissur district. It is the largest and most famous of all poorams. It is resplendent festival celebrated with a grand display of caparisoned elephants, dazzling parasols and percussion music, the Thrissur Another high point is the Ilanjithara Melam, a highly bewitching performance of traditional instruments which lifts the thousands gathered to the state of euphoria and bliss.³ The amount of practice one puts into this program is immense. And hence they are exposed to varying degrees of sounds of different Amplitudes and frequencies. One practices about 5 to 10 hours per day without any kinds of protective ear aids. Although industrial and recreational noise have been recognised as potential causes of noise induced hearing loss for quite some time, it is only recently that the sound levels within percussionists have been implicated as possible sources of harmful noise levels.

Many studies have concluded that not only are dangerous levels of noise present within the Chenda Melam, but there is evidence of noise induced hearing loss among percussionists themselves. It is generally observed that sound level of the chenda melam is higher than the level permitted by law that it constitutes a risk for hearing loss. It is most commonly observed that percussionists mostly complain about a constant ringing sound in their ears after their performance often known as tinnitus. This ringing happens when the loud noise damages the very fine hair cells that lines the ear. Mostly then it is followed by slow deterioration of hearing functionality. And hence the need for the prevention of hearing loss among the percussionists. Thrissur is well known for this splendid festival and the Chenda artists who perform at Thrissur pooram has years of experience and is under continuous exposure to very high sound levels for hours. The amount of practice the percussionists puts into this program is immense. And hence as a result is exposed to varying degrees of sounds of different Amplitudes and frequencies we have done this study to know the proportion of hearing impairment among percussionists in Thrissur district.

METHODS

This is a cross sectional study done to determine the proportion of hearing impairment among percussionists in Thrissur district of Kerala. Percussion is commonly the heartbeat of a musical ensemble, often working in close collaboration with bass instruments. The Percussionists (Chendah) who has experienced more than five years and has no congenital or traumatic hearing loss were included in this study. A total of 39 percussionists were participated in the study by snow ball sampling method. Data were collected using a pre designed questionnaire on socio demographic background of the respondent and using a self-administered smartphone IOS based

audiometry application (uHear). Hearing functionality of each ear's data were collected and hearing sensitivity test was done in a closed space to reduce errors. uHear is a screening tool which allows to test our hearing to determine if it is within normal range. The uHear screening was self- performed by the participant using an iphone in a closed environment resembling the clinical setting. Results are presented in a typical audiogram format. It is presented in the form of a Signal-To- Noise ratio (SNR).

Data analysis

Data were collected, coded and entered into MS Excel sheet. The whole data was analysed using statistical software SPSS V20. Baseline characteristics of study subjects were expressed in terms of frequency, percentage, mean and standard deviation. Association with selected variables was analysed using chi square test. The level of significance was estimated with p value <0.05. Correlation between hearing loss and variables were analysed using Spearman's rank coefficient of correlation.

RESULTS

In our study out of the total 39 participants, 74.4% were less than 30 years, 10.3% were in the age group of 31-45 years, 10.3% were between the age group of 46- 60 years. Age ranges between 18 to 65 years and mean age was 30.44±12.04. Among the study subjects 35.9% have completed high school education, 30.8% have completed higher secondary education, 33.3% have a degree or above as educational status (Table 1).

Table 1: Sociodemographic details of study subjects.

Sociodemographic details	Frequency	Percentage
Age (years)		
15-30	29	74.4
31-45	4	10.3
46-60	4	10.3
≥60	2	5.1
Educational status		
High school	14	35.9
Higher secondary	12	30.8
Degree and above	13	33.3
Work experience		
May-15	25	64.1
16-25	9	23.1
26-35	3	7.7
>35	2	5.1

56.4% were having chenda only as a occupation, 2.6% had both chenda and elathalam as an occupational background, 41% were doing chenda and other jobs like beautician, Baker and farmer as occupation (Figure 1).

64.1% had a work experience from 5-15 years and 5.1% had a work experience more than 35 years. 35.9% of percussionists works on an average of 21-30 days per month. Majority (61.5%) were having a monthly income of about Rs 10000-20000. Among the study subjects, 94.9% had family history of hearing loss (Figure 2) and 28.2% of the study subjects were addicted to smoking 30.8% were addicted to alcohol, and 23.1% had habit of tobacco chewing. 56.4% had history of tinnitus, 20.5% had history of vertigo and 5.1% had taken their treatment for vertigo.

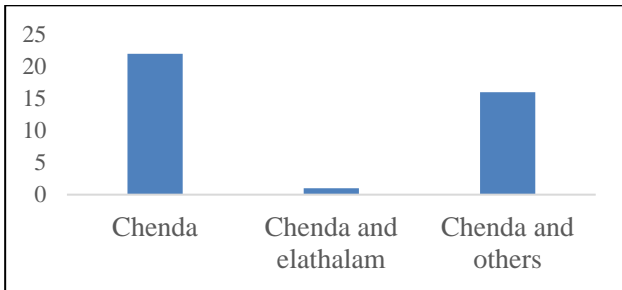


Figure 1: Occupational status of study subjects.

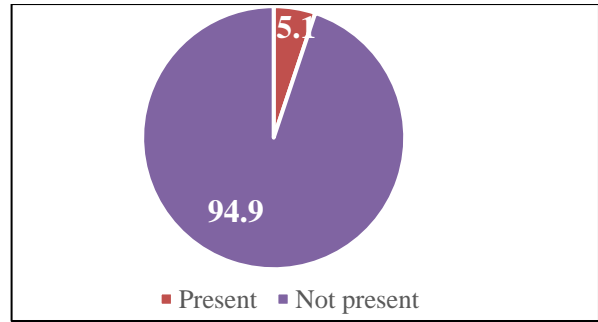


Figure 2: Family history of hearing loss amount the study subjects.

Table 2: Distribution of study subjects based on their hearing loss.

Hearing loss	Frequency	Percentage
Mild	6	15.4
Moderate	25	64.1
Severe	8	20.5
Total	39	100.0

Table 3: Association of age and hearing loss.

Age (years)	Hearing loss						χ^2 value	P-value
	Mild		Moderate		Severe			
	N	%	N	%	N	%		
≤30 (29)	6	20.7	20	69	3	10.3	6.941	0.020*
>30 (10)	0	0	5	50	5	50		

Table 4: Association between tinnitus and hearing loss.

Tinnitus	Hearing Loss						χ^2 value	P-value
	Mild		Moderate		Severe			
	N	%	N	%	N	%		
Present	6	27.3	13	59.1	3	13.6	0.046	0.032
Absent	0	0.00	12	70.6	5	29.4		

Table 5: Correlation between years of experience and degree of hearing loss.

Variables	Hearing loss		
	N	Correlation coefficient	P-value
Years of experience	39	0.422*	0.008

Another problem faced by these percussionists is the weight of the instruments. They weigh approximately 10 kilograms and have to be carried throughout the program which may prolong to about several hours and 97.5% suffered from musculoskeletal pain.

Using the U hear application we have found out that among the study subjects, 15.4% had mild form of hearing loss, 64.1% had moderate form of hearing loss, and 20.5% had severe form of hearing loss. Majority

(43.6%) had moderate loss of hearing sensitivity (Table 2). Among the subjects, out of those who aged less than 30years 10.3% had severe hearing loss and those aged above 30years around 50% had severe hearing loss and the association between the age and hearing loss was statistically significant (p value=0.020) (Table 3).

Those who had (66.7%) family history of hearing loss had moderate to severe hearing loss and the association between family history of hearing loss and hearing loss due to playing the instruments were not statistically significant.

Among the 39 subjects, the study subjects who had greater years of musical experience 25% had mild hearing loss, 55% moderate hearing loss and 20% severe hearing loss. Among the study subjects who had a history of tinnitus, it was found that 27.3% had mild hearing loss,

59.1% had moderate hearing loss and 13.6% of them had severe hearing loss and the association between tinnitus and hearing loss found to be statistically significant (p value=0.032) (Table 4). We did Correlation between years of musical experience and degree of hearing loss and found to be statistically significant (Correlation coefficient=0.422) (Table 5).

DISCUSSION

The conventional audiogram remains the gold standard for measuring hearing sensitivity but has geographic, financial, and logistical obstacles that could potentially lead to delays in the diagnosis.^{4,6} Current evidence suggests that automated audiometry is valid and reliable for diagnostic audiometry.⁷ Telehealth audiology and automated audiology are two alternatives. Tele health involves delivery of health care using telecommunications technology such as dial-up, computer networks, and the internet.^{8,9} Health-care providers typically use these assessment apps as alternative audiometers that offer the advantages of affordability and of being mobile, with touchscreen functionality. Validated clinical tools, which are often only available directly from app providers include iPad- and smartphone-based testing with calibrated headphones.¹⁰ Smartphone hearing screening audiometry has been widely implemented as mobile phone gained popularity, and several studies have compared hearing thresholds with standardized automated hearing thresholds obtained in a sound-treated booth. Numerous audiometric apps have been developed for hearing assessments on Apple mobile devices most of which calibrate mobile devices using a biological method to determine a reference sound level in relation to the hearing threshold of normal people.¹¹⁻¹⁵ In this study we assessed hearing loss using a IOS based mobile application in a sound proof setting. In a study done by Rashid Al-Abri they found out that the use of the uHear app in a clinical setting is highly inaccurate in giving the exact hearing thresholds and is more reliable when conducted in a soundproof booth.¹⁶ Secondly, there is potential for the use of uHear to exclude moderate hearing impairment (more than 40 dB) even in clinical settings. We done this study in thrissur district which is famous for thrissur pooram a religious festival were many percussionists participate. we tried to evaluate their hearing loss using the Uhear app. 15.4% of subjects showed mild degree, 64.1% showed moderate degree and 20.5% showed severe degree of hearing loss.

A study done by Ostri et al. among symphony orchestral musicians from the Royal Danish Theatre found out that 58% of musicians had hearing impairment. 50% of the males and 13% of the females showed typical audiogram with notched curve at higher frequencies normally attributed to occupational noise exposure, along with a significant poorer hearing on the left ear at higher frequency among the violinists.¹⁷ In a study done by Pawlaczky et al among symphony orchestral musicians

showed that occupational exposure to sound levels over 40 years of employment might cause hearing loss. From our study, we found out that years of experience and hearing loss of study subjects show significant correlation (correlation coefficient of 0.422).¹⁸ Also among those with greater musical experience, 73.7% showed moderate degree of hearing loss and 21.1% showed severe degree of hearing loss. It can be concluded that association of hearing loss and musical experience is statistically significant (musical experience=years of experience x weekly hours). The study conducted by Heli et al among symphony orchestral musicians exposed to harmful sound levels came to a conclusion that musicians can suffer from tinnitus, hyperacusis and distortion, among other hearing disorders which can affect them more severely than hearing loss.¹⁹ In our study, 56.4% had history of tinnitus. The tinnitus and hearing loss thus showed significant association (p value=0.03).

In a study done by Cruickshanks et al. among adults aged 48-92 years they found out that current smokers were 1.69 times as likely to have hearing loss as non-smokers having no history of occupational noise exposure.²⁰ A cross-sectional study on interaction of smoking and occupational noise exposure on hearing loss by Pouryaghoub et al observed that percentage of workers with hearing threshold differences of greater than or equal to 30 dB between 4000 Hz and 1000 Hz in both ears were 49.5% and 11.2% in smokers and non-smokers group respectively (Odds ratio 7.8,95% CI equal to 4.7-13) and percentage of workers with hearing threshold >25 dB at 4000 Hz in the better ear were 63.6% and 18.4% in smoker and non-smoker group respectively.²¹ It concludes that smoking can accelerate noise-induced hearing loss. In our study 28.2% are smokers and 23.1% are tobacco chewers. In this study the association between smoking and tobacco chewing is statistically significant with hearing loss (p value <0.05). A study on musculoskeletal discomforts and associated risks among Indian percussionist (Tabla) conducted by Gangopadhyay et al.²² found that they were prone to have musculoskeletal discomforts ie. lower back ache (74.15%), right shoulder pain (67.06%) and neck pain (67.06%) which is consistent with our finding were 97.5% had history of musculoskeletal pain.

CONCLUSION

The study shows percussionists are more exposed to sounds of various frequencies for longer duration, they are more prone to hearing loss. The study brought out that age is directly proportional to hearing loss, music induced hearing loss progress at a rate proportion to the work experience.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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