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Original Article

Knowledge, Attitude and Practices (KAP) regarding hearing health and noise-induced hearing loss among folk/light music professionals from Chennai

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ABSTRACT

Introduction: Musicians are exposed to music at high intensities and are at risk for developing noise-induced hearing loss (NIHL). Since hearing is so important to their career, they deserve special consideration. To avoid the deleterious effects of loud music, professionals should be sensitized to noise exposure and the use of strategies to prevent NIHL. The current study aimed to assess the knowledge and attitude towards noise-induced hearing disorders and hearing-conservative practices among professional musicians.

Methods: A Knowledge, Attitude and Practice (KAP) questionnaire was developed and administered among 136 professional musicians belonging to the folk/ light music genre in Chennai between March & April 2021. The participants were 115 males and 21 females, ranging in age from 18 to 75 years, with a mean age of 29 ±11 years.

Results: 80% of musicians were aware of the nature and cause of NIHL, but knowledge of NIHL prevention and treatment was limited to a few (16%). The majority (84%) had a misconception that using cotton or fingers to plug the ears is a protective strategy against NIHL. Only 15% of participants reported having used Ear Protective Devices (EPDs).

Conclusion: Although musicians are aware of the risks of exposure to loud noise, they seldom use hearing protection. It is, therefore, vital to provide crucial information regarding NIHL and its prevention and promote musicians for better hearing preservation practices.

Keywords: Ear Protective Devices, Hearing Conservation Program, Music-Induced hearing loss

Introduction

Hearing loss can significantly impact our ability to communicate and participate fully in our daily lives. It can lead to social isolation, depression, and a decreased quality of life. According to Hearing Loss Association of America (HLAA), hearing loss is the third most common physical condition and can lead to psychological problems. In adults and children, noise exposures have been associated with both auditory and primarily non-auditory effects.[1] Excessive noise exposure is often acknowledged as an inevitable part of the recreational experience. According to the World Health Organization (WHO), 1.1 billion young people (aged 12–35) are at risk of hearing loss due to recreational noise exposure. Based on data from 2005-2006, researchers report that up to 17% of teenagers (ages 12 to 19) have NIHL (Noise Induced Hearing Loss) in one or both ears due to loud noise exposure.[2]

Musicians are unquestionably at risk for hearing

problems as professionals who participate in recreational activities such as playing at parties and concerts. In a study, 37.8% of rock musicians were found to have hearing loss, which was more pronounced at 6kHz.[3] In addition to hearing loss, auditory-related issues such as tinnitus, diplacusis, and hyperacusis were also possible outcomes.[4] Schmidt et al. used microphones mounted on the musicians' ears to assess the sound exposure levels of symphony orchestra musicians.[5] Brass players had the highest sound exposure, ranging from 86- 98db L_{Aeq}. String players were exposed to music at levels ranging from 82 to 98 dBA, and it was found that their left ear was exposed to 4.6 dB more than their right ear. Percussionists were exposed to high sound peaks > 115 dBC.

According to the guidelines of the Occupational Safety and Health Administration (OSHA), the permissible exposure limit is 85 dBA for 8 hours. A 5 dBA exchange rate is used in the OSHA standards (2006).[6] This indicates that if the noise level is increased by 5 dBA, the amount of time a person can be exposed to the same exposure is dropped by half.[7] In India, musicians belonging to folk and light music genres typically perform in wedding halls that are not acoustically treated or in open public areas where noise levels can be very high. Furthermore, these artists play percussion and string instruments (such as parai, drums, guitar., etc.), which have been shown in Western research to have higher sound peaks than the recommended level by OSHA.[5] Although published data on levels of noise exposure among musicians in India are limited, these musicians are possibly subjected to extremely loud music and are at risk of developing hearing difficulties. For the professionals to conserve hearing, they must have knowledge about NIHL and have an appropriate attitude for practicing ear protection strategies. KAP (Knowledge, Attitude and Practices) surveys may help recognize knowledge gaps, cultural beliefs, or behavioural patterns that may facilitate the development of focused Hearing Conservation Programs (HCPs) and serve as a baseline for evaluating their effectiveness. This current study aimed to explore the knowledge and attitude towards NIHL and hearing conservative practices among professional musicians belonging to the folk/light music genre in Chennai.

Methods

The study was conducted per the ethical standards of the responsible committee on human experimentation and was approved by the Institutional Ethics Committee of Sri Ramachandra Institute of Higher Education and Research (Deemed to be University), Chennai, India (Appendix I). Informed consent was taken from every participant as a part of the questionnaire. This study was carried out in two phases: Phase I- Development and validation of the Knowledge, Attitude and Practice (KAP) questionnaire and Phase II- Administration of the KAP questionnaire.

Assuming that half of the musicians in Chennai would have awareness and a positive attitude towards noise-induced hearing loss and its conservation strategies, the p-value is taken as 0.5. With a 95% confidence interval, ± 9% precision, and 1.96 as the corresponding z value, $N_o = Z^2pq / e^2$ which gives the estimated sample size as 118.

Phase I: Development of Questionnaire:

An in-depth review of literature related to noise-induced hearing loss was undertaken to identify the behaviors and attitudes that were of importance. In addition, three musicians were interviewed to understand their perspectives and attitudes toward hearing health and the risk of hearing loss in their profession. All the insights were utilized to build the KAP questionnaire. The questionnaire was developed in Tamil language. Three audiologists and a social scientist validated the questionnaire. Their suggestions and comments were duly incorporated into the questionnaire. The questionnaire was designed in a Google form so that it could be conveniently shared with the participants online. The final questionnaire had 39 items divided into six sections, as given in Table 1.

Table 1: *Structure of the questionnaire*

Sections	Domain	Total no. of items	Options
1	Consent form	-	Yes/ No
2	Demographic details	5	Open-ended
3	Details of musical training and professional experience	12	Closed-ended with relevant options to each question.
4	Knowledge	8	'True,' 'False,' and 'I Don't Know'
5	Attitude	9	4 Point rating scale from "Strongly Agree" to "Strongly Disagree"
6	Practice	4	4 Point rating scale from "Always" to "Never"

Musician's knowledge related to the cause and nature of NIHL, potential harmful sources of loud sounds, treatment to NIHL, and its prevention was explored through 15 items in the questionnaire that had "Yes', 'No', and 'I don't know' as options. For 13 items, 'Yes' was deemed correct answer while 'No' was deemed correct answer for 2 items. The remaining two options which includes 'I don't know" were added as incorrect responses accordingly. Musicians' attitude towards hearing loss was explored through 9 items with options on a 4-point rating scale: "Strongly agree, Agree, Disagree, strongly disagree." For A2, A5, and A6 (please refer to Figure 1), the pertinent response would be to 'strongly agree.' Item A7 is meant to gauge the musician's insight about their community, so there is no ideal response. For the remaining items, 'strongly disagree' is deemed most appropriate. The section on practices explored musicians' use of personal music players (PMPs) and their existing practices related to hearing preservation through 4 items on a 4-point rating scale "Always, Often, Sometimes, and Never." The frequency of various practices was reported using descriptive statistics.

Phase II: Administration of the questionnaire:

The study recruited participants who were either vocalists or instrumentalists belonging to the light/folk music genre. These participants were actively involved in performing concerts and were residents of Chennai. All participants were recruited through the WhatsApp, Facebook, and Instagram groups and through contacts of senior musicians. The questionnaire was sent through social media if the professionals were comfortable completing it online. On the other hand, when the musicians had few difficulties or challenges in completing the form, responses were recorded by the investigator in an interview format. In total, 164 (One hundred and sixty- four) musicians responded to the survey between March to April 2021. Of these, 136 participants met the inclusion criteria, and their responses were retrieved for analysis. All the data were entered into a Google Excel sheet as soon as the responses were received. Percentage analysis was done to profile the participant's responses to each item in the questionnaire.

Results

The participants ranged in age from 18-75 years with a mean age of 29±11 (SD= 11) (table 2). There were 115 males (85%) and 21 females (15%). Of these, 40 (29%) were vocalists, 61 (45%) were instrumentalists, and 35 (26%) were both vocalists and instrumentalists. The details of participants with respect to their number of years of training and experience, the approximate number of concerts they perform in a year, and the approximate duration of their concerts are given in Table 2.

Of the 136 participants, 28 % of musicians were

trained in folk genre, 35 % in light music and the remaining were trained in different genres including Carnatic, Western, Hindustani, Rock, Jazz etc., in addition to Folk/ Light music genres. More than 60% of participants reported that they usually perform concerts that last longer than an hour. The amount of time they spend practicing before a concert was not documented. For 57 % of the participants, being professional musicians was not the only source of income. Fifty-nine musicians were involved in teaching music as well.

Table 2: Professional training and experience of participants

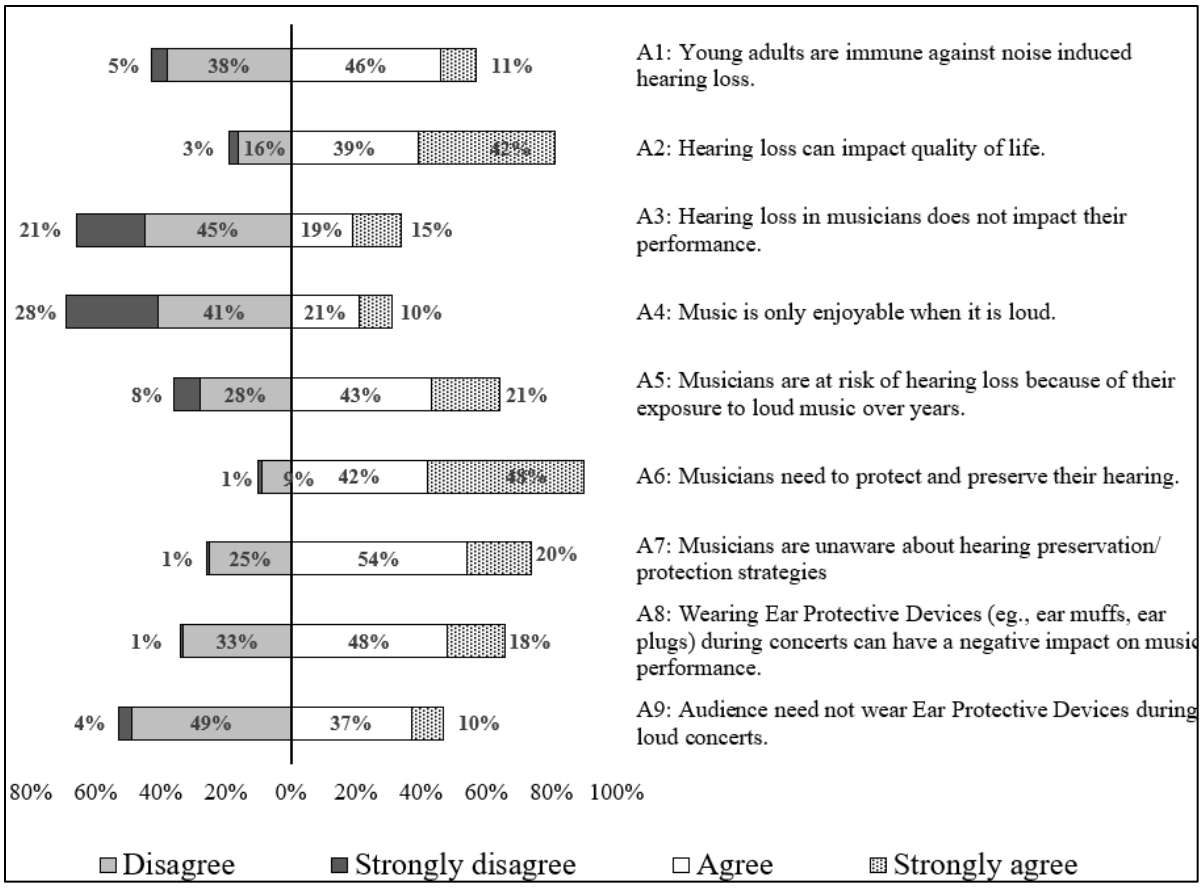
Details of Respondents		n (%)
Age range of participants	16-25	70 (52%)
	26-35	36 (26%)
	36-45	15 (11%)
	46-55	9 (7%)
	56-65	3 (3%)
	66-75	3 (3%)
Years of Training	< 3 years	25 (18%)
	> 3 years	111 (82%)
Years of Experience	0 to 3 years	26 (19%)
	3 to 6 years	34 (25%)
	> 6 years	76 (56%)
Approximate no. of concerts per year	< 20	27 (20%)
	21 to 30	56 (40%)
	31 to 40	15 (11%)
	> 40	38 (28%)
Approximate duration of concerts	< 30 minutes	11 (8%)
	30 minutes to 1 hour	40 (29%)
	1 to 3 hours	63 (46%)
	> 3 hours	22 (17%)

Table 3: Percentage of correct and incorrect responses for questions relating to Knowledge about NIHL

ITEMS	Correct responses n (%)	Incorrect responses n (%)
K1: Exposure to a very loud sounds (like a bomb blast, very loud crackers) may cause damage to the ears resulting in hearing loss.	117(86%)	19(14%)
K2: Continuous exposure to loud sounds for several years such as in factories/ construction sites etc., can cause gradually progressive hearing loss.	113(83%)	23(17%)
K3: Hearing loss caused by prolonged exposure to loud sounds cannot be treated.	39(29%)	97(71%)
K4: There are laws that stipulate the maximum permissible noise limits for community noise such as music festivals, air traffic etc.	88(65%)	48(35%)
K5: The following are the potential sources of loud noise.		
K5.1. Light music concerts in a wedding	76(56%)	60(44%)
K5.2. Carnatic music concerts in sound treated auditorium	98(72%)	38(28%)
K5.3. DJ Music	103(76%)	33(24%)

K5.4. Concerts in a public place	81(60%)	55(40%)
K6: The following are the symptoms of hearing loss		
K6.1. Difficulty understanding speech in presence of noise.	99(73%)	37(27%)
K6.2. Difficulty understanding speech in group conversations.	87(64%)	49(36%)
K6.3. Poor ability to identify the direction of sound/ speech.	88(65%)	48(35%)
K6.4. Poor music perception.	57(42%)	79(58%)
K6.5. Difficulty in communication through phone.	89(65%)	47(35%)
K7: Hearing loss due to exposure to loud sounds can be prevented.	74(54%)	62(46%)
K8: Using cotton or fingers to plug the ears serves as a protective strategy against noise induced hearing loss.	22(16%)	114(84%)

Figure 1: Participant's responses on a 4-point Likert scale for items relating to attitude towards NIHL and EPDs



Knowledge:

More than a hundred musicians (80%) were aware of the nature and cause of NIHL, but only about thirty- nine (29%) were aware that NIHL is permanent and cannot be reversed (Table 3). The majority (76%) believed DJ music (which refers to Disc Jockey, who plays amplified pre-recorded music for an audience) could be a potential source of loud sounds, and several participants commented that DJ music was much louder than any music. Only fifty- seven participants (42%) believed 'poor music perception' could be a symptom of hearing loss, suggesting that they were unsure of the effects of hearing loss. Concerning hearing protection, 84% had the misconception that using cotton or fingers to plug the ears is a protective strategy against NIHL

Attitude:

Participants had misconceptions about the sources of harmful loud sounds, the effects of hearing loss,

and hearing conservation strategies, as shown in Figure 1. Fifty- seven percent of participants were under the assumption that young adults are immune to NIHL. One-third (34%) believed that hearing loss would not affect their musical performances, out of which 15% strongly agreed to the same. Ninety percent believed they should preserve their hearing, but only a few (26%) had information regarding effective hearing preservation strategies.

Practices:

In the present study, a hundred and twenty- seven (93%) musicians reported that they listened to music on personal music players (PMPs) at more than ¾th volume on a regular basis. Table 4 describes the hearing preservation strategies used by the participants. Of 136 respondents, 85% had never used EPDs. Figure 2 shows the reported reasons for the non-usage of EPDs. Only 21 participants (15%) had ever used EPDs. Table 5 shows the percentage of participants (n= 21) using EPDs in different environments.

Figure 2: Reasons for non- usage of EPDs

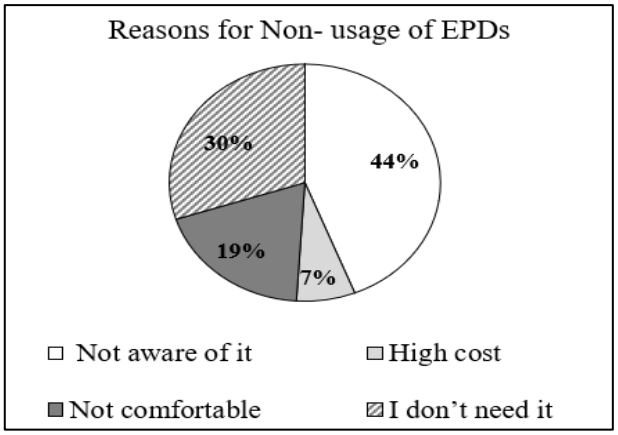


Table 4: Participant responses relating to ear protection strategies.

Items	Always n (%)	Often n (%)	Sometimes n (%)	Never n (%)
P1: How often do you listen to music using headphones or speakers at more than 3/4th of the volume.	26(19%)	45(33%)	56(41%)	9(7%)
P2: How often have you used the following strategies to protect your hearing?				
P2.1. Use of ear muffs/ any ear protective devices	6(4%)	20(15%)	24(18%)	86(63%)
P2.2. Use cotton to plug your ear	8(6%)	15(11%)	40(29%)	73(54%)
P2.3. Walking away from the source of noise	18(13%)	40(29%)	51(38%)	27(20%)
P2.4. Turning down the volume, if possible	29(21%)	38(28%)	50(37%)	19(14%)
P2.5. Limit/ reduce the duration of exposure to loud noise	27(20%)	30(22%)	52(38%)	27(20%)

Table 5: Participant (n= 21) responses regarding use of EPDs at different environments

S.No	Situations	Always n (%)	Often n (%)	Sometimes n (%)	Never n (%)
1	During personal rehearsals	1(5%)	5(24%)	11(52%)	4(19%)
2	During orchestral rehearsals	1(5%)	7(33%)	8(38%)	5(24%)
3	During performance	0(0%)	7(33%)	6(29%)	5(38%)
4	When exposed to community noise (E.g., aircraft, industrial noise, clubs)	2(10%)	7(33%)	7(33%)	5(24%)
5	As an audience in any concert	1(5%)	6(28%)	5(24%)	9(43%)

Discussion

Hearing loss in musicians has been documented in several studies, implying that hearing conservation strategies should be targeted to this population.[8,9] In India, musicians of the folk and light music genres typically perform in a wedding hall or an open public area that is not acoustically treated. As a result, they are exposed to additional levels of music owing to reverberation besides being exposed to the actual levels of performance. The results of the study are in accordance with studies done with musicians belonging to different genres.[10–12] It is noteworthy that about two-thirds of the participants in this study reported at least one of the hearing-related problems, such as difficulty in understanding speech in noisy situations, tinnitus, and hyperacusis, with very few reporting a temporary hearing loss.

More than 80% of the participants had knowledge regarding the cause and nature of NIHL. This finding is in contrast to other studies that musicians from eight professional orchestras in Australia failed to recognize NIHL as a cumulative effect rather than a result of a single event.[13] Very few evidenced knowledge about the treatment and prevention of NIHL. An interesting observation was that 37% of participants believed that their own genre of music was not a potential source of loud noise. Some reiterated that hearing loss has no effect on music perception (referring Beethoven as an example). According to Moore, NIHL affects hearing sensitivity by causing threshold shifts, and reduced frequency selectivity, loudness recruitment, and transmission of distorted signals to the brain.[14] As a result of these alterations, individuals would be unable to discriminate and appreciate the music properly. Any hearing conservation program should emphasize the repercussions of hearing loss in the perception of music.

According to a published survey of 2011-2012, around 10 to 40 million adults in U.S. between the age of 20 to 69 years had features of hearing loss that suggests NIHL.[15] In contrast, the participants in this study believed that young adults are immune to the effects of loud noise. Similar findings were reported in a survey from college students in the USA wherein 76% of the participants reported they would not lose their hearing until they get older.[16] This is a universal misbelief that should be addressed in all hearing conservation programs, including those for musicians. It must be emphasized that NIHL can occur at any age, from childhood to older adults.[17] Despite acknowledging that their profession puts them at risk for NIHL and that they must protect their hearing, the participants admitted that musicians are unaware of hearing preservation strategies. Schink et al. suggested that professional musicians are at four times more likely than the general population to develop NIHL.[18] This is hardly surprising, given that they are exposed to loud music during both performances and practice/rehearsals. The effect on hearing would be greater when the amount of time spent exposed to loud music during performance and rehearsal is put together. Sixty- five percent of the participants in this study believed that the use of EPDs would have a negative impact on their performance. This clearly emphasizes the need for motivation and training among musicians for proper placement and to adapt to EPDs in the ear canal.[19]

An overwhelming majority (94%) of the musicians in this study had used their listening devices (PLDs), at a volume greater than the recommended levels by WHO (World Health Organization).[20] Similar results were reported in a study with a group of students from secondary school where most of them reported using their MP3 players at maximum volume.[21] According to the noise dose model recommended by the National Institute of Occupational Safety and Health, the maximum permissible noise dose would be reached within 1 hour of listening with a 70 % volume control setting using supra-aural earphones. As a result, headphone use was recommended to be limited to 60 minutes or less per day at a volume control setting of 60%, known as the "**60-60 rule**".[22] The most commonly followed hearing preservative strategy is turning

down the volume wherever possible, limiting the duration of exposure, and walking away from the source of loud noise. The use of cotton plugs was reported by 43% of participants. According to Safety Research Corporation of America (SRCA),[23] stuffing cotton balls or tissue paper would only attenuate noise by around 7dB, which is insufficient to protect against loud sounds. Although it is key for any hearing conservation program to educate musicians regarding hearing preservative strategies, it is also crucial to emphasize how counterproductive their current practices could be.

Conclusions

This study highlights the knowledge, attitude, and practices of the light/folk genre musicians towards NIHL and its prevention. The study's findings also support the recommendation that musicians should be educated regarding the risks of hearing loss and the need for ear protection. Any efforts to educate musicians must sensitize them with information regarding the cause and permanent nature of NIHL, other possible ear-related problems, optimal levels and duration of noise exposure, and effective strategies for hearing conservation with special attention on different types of EPDs. Knowledge alone does not always lead to desirable behaviors; addressing the community's entrenched misconceptions is also a high priority. One of the Western studies has emphasized the importance of changing one's self-perception from "non-vulnerable" to "vulnerable" to change hearing prevention practices.[24]

Individual behaviors such as hearing protection require substantial education at various levels of society before they are individually or universally accepted. Many programs are available, such as "Dangerous Decibels", "It's a Noisy Planet", "Cheers for Ears", and others. A campaign by WHO, focuses on implementing evidence-based strategies to promote safe hearing health behaviors from children through adults.[20]

During data collection, it became evident that any public health program promoting hearing conservation for this population should be conducted in the vernacular, and in addition, education campaigns should be carried out in several ways, including distributing pamphlets on World Noise Day and promoting them via social media channels. Hear WHO, hearX, hearZA, and other Web-based hearing screening applications can encourage musicians to self-assess their hearing and seek treatment as needed.

In addition to the study findings, following needs to be addressed in order to develop an effective hearing conservation program,

- ✓ Measurement of noise levels at different kinds of music concerts.
- ✓ Document noise exposure levels of individual musicians.

This KAP study provided valuable insights into the knowledge, attitude, and practices of musicians towards NIHL. The findings of this study can be used as a preliminary step for more in-depth and large-scale research on the knowledge, attitudes, and practices of musicians from genres other than folk and light music.

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