International Journal of Otorhinolaryngology and Head and Neck Surgery
Gayathri H et al. Int J Otorhinolaryngol Head Neck Surg. 2021 Aug;7(8):1284-1292
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20212896

Original Research Article

Music listening practices of college-going students and their impact on hearing

Gayathri H.[1]*, Christina Mary P. Paul[2]

[1]Department of ENT, ACS Medical College, Velappanchavadi, Chennai, Tamil Nadu, India
[2]Department of Community Medicine, ACS Medical College, Velappanchavadi, Chennai, Tamil Nadu, India

Received: 11 July 2021
Revised: 15 July 2021
Accepted: 20 July 2021

***Correspondence:**
Dr. Gayathri H.,
E-mail: gaya3harish84@gmail.com

ABSTRACT

Background: A billion youngsters are at risk of recreational noise-induced hearing loss. Motivated by WHO's campaign 'Make listening safe', the objective of this study was to estimate the prevalence of the habit of listening to music at high volumes using Personal Listening Devices (PLDs) among college students and to analyze their audiometric findings.
Methods: This cross-sectional study was performed between December 2019 and May 2020 on college-going students with a habit of listening to music using PLDs. PTA was performed on the eligible study subjects. A modified LHQ was given to the selected candidates to answer.
Results: The study population comprised 62 boys (24.5%) and 191 girls (75.5%) of the age of 17-24 years. 77.1% of the participants listened to music through PLD, at a scale of >5 on 10 (median PLD volume-7). 26.1% of students listened to music for more than 14 hours a week using their headphones or earphones. Fifteen students (5.93%) had evidence of a 4 kHz dip on PTA out of which 9 patients (3.56%) had bilateral and 6 patients (2.37%) had unilateral involvement.
Conclusions: Though many students had some awareness regarding safe volume levels while listening to music, not many were aware of daily sound allowance (DSA). Health education to the target population along with the addition of an in-built app in all PLDs for monitoring device volume and DSA may reduce the impact of music on hearing.

Keywords: Music, Hearing loss, Noise-induced, Recreation

INTRODUCTION

Noise exposure is one of the major factors implicated in early-onset hearing impairment. Though occupational noise is more of an undesirable, unpleasant sound, music is a stress-buster, a source of entertainment, a healer that makes one get into a different state of mind far away from reality. Music and musical activities have been an integral part of our culture and society for more than 2,50,000 years.[1] Recently, music has also become a mode of therapy for various chronic neurological and psychological ailments.[2] But unfortunately, recreational exposure to loud music has emerged as one of the leading causes of noise-induced hearing loss, and almost 1.1 billion teenagers are estimated to be at risk. Under the theme to make listening safe, WHO has emphasized this problem in 2015.[3] Though attending outdoor recreational events like nightclubs, music concerts, and discotheques are not universal habits in our country, personal listening devices have made music reach almost everyone's home. In addition, the coupling of PLDs with headphones or earphones has made one overcome the peer pressure as an individual now can listen to music at the highest possible volume of the device without troubling others' activities at home or neighborhood. Hence, WHO has suggested various specifications for PLD manufacturers to ensure safe

listening. Some of them include the flash of a warning message on the device when the users cross the maximum recommended intensity of sound, the addition of parental control, and an in-built app for monitoring and creating awareness about daily and weekly sound allowance.[4] As the teenagers and college-going students constitute a large section of the population at risk of developing music-induced hearing loss, and literature regarding their music listening habits from Indian studies is limited, we proceeded with this study. The primary objective of this study was to calculate the prevalence of the practice of listening to music at high volumes using personal listening devices (PLDs) among college students (at an intensity of more than five on a scale of 1 to 10). The secondary objectives of this study were to estimate the mean duration for which the students listened to music, calculate the prevalence of sensori-neural hearing loss with a 4kHz dip in the study population, and test for any association between unsafe listening practices and hearing impairment.

METHODS

This cross-sectional study was performed on 2nd and 3rd-year students from institutions of Allied Health Sciences (AHS) and Nursing between December 2019 and May 2020. On using the formula,

$$N = \frac{z^{2*}p * (1-p)}{d^2}$$

based on the estimated prevalence of the habit of listening to loud music among students -of around 58.23% in the Delhi based study, and a preset precision value of 11 percent, the sample size required was found to be 228.[5] After obtaining formal written consent, screening was performed by universal sampling technique for around 400 students from various disciplines of AHS and nursing colleges. The study sample was chosen after filtering the study population based on inclusion and exclusion criteria. The inclusion criteria were the presence of a habit of listening to music using personal listening devices for at least an hour in a week. The exclusion criteria were the presence of an external or middle ear disorder or childhood-onset hearing loss even before exposure to music. Students underwent ear examination after due explanation about the procedure. Patients with impacted wax and otomycosis were included in the study after being treated with topical ear drops and aural toileting.

Following the aforesaid protocol, the first 290 students fitting inclusion and exclusion criteria based on screening underwent pure tone audiometry. 15 students found to have minimal conductive hearing loss were excluded from the study. The rest 275 students were then offered through Google Forms, a self-answerable questionnaire, which was a modified version of the Listening Habit Questionnaire.[6] The students were divided into 14 batches according to their sub-specialty and the year of graduation. Due to the COVID-19 pandemic, we conducted a separate virtual meeting through Zoom (an online video-conference portal) for each of these batches, and explained every question both in English and local language and collected the responses batch-wise. Finally, 253 students responded by submitting the answers. The audiometric findings and answers for the questionnaire were tabulated in a master excel sheet and subjected to statistical analysis using SPSS version 15.0.

Descriptive parameters have been expressed as percentages or means with 95%CI wherever required. Associations between qualitative parameters have been tested using cross-tabs and chi-square test and correlations tested by Pearson's correlation test.

RESULTS

The study population comprised 62 boys (24.5%) and 191 girls (75.5%) in the age group of 17-24 years. The students were all pursuing either the second or third year of their undergraduate course in Nursing or one of the sub-specialties of Allied Health Sciences (Table 1).

Around 34.8% of students had started listening to music through PLDs before the age of 16. The median time for which our participants were habituated to listen to music was around 3 years. Only 26.1% of students listened to music for more than 14 hours a week using their headphones or earphones, but 77.1% of the participants had the habit of predominantly listening to music at a level more than 50% of the maximum volume generated by the device. When asked to rate the average volume set by them while playing music on a PLD, on a scale of 1 to 10, the median PLD volume was 7 (Table 2). The characteristics of personal listening devices and the headphones or earphones used by our participants are also elaborated in Table 2. Around 41.9% of the students listened to music through speakers too. Among these students, the median volume of the speaker in the device while listening to music was also 7 (on a scale of 1 to 10). Many study participants (67.98%) also watched musical videos using earphones or headphones connected to the same PLD. The total music exposure through all sources put together was in the range of 1 hour to 128.5 hours per week (mean-15.28 hours/week, Standard deviation-22.8) (Table 3).

Figure 1 summarizes the important parameters looked into prior to the purchase of headphones or earphones by the students in our study. Listening to popular filmy music was almost a universal habit among our participants (97.2%). When they were asked to enlist the top 3 preferred music genres, melody topped the list with 83% voting for the same, and hip-hop (36.8%) turned out to be the next choice. In this era of electronic dance music, only 3.2% opted for the same (Figure 2). The most common location where students commonly listened to music was while traveling in a bus (82.2%) (Figure 3). The reasons for our students to listen to music are summarized in Figure 4. Fourteen students (5.53%) were doubtful whether they were suffering from hearing loss or not and 61 students

(24.11%) experienced tinnitus after listening to loud music. Around 91 members (36%) responded that they feared that they were susceptible to hearing loss due to prolonged music exposure. The maximum safe volume in which a device may be played on a scale of 1 to 10 was ≤8 as per the opinion of 90.5% of students. 203 members (80.2%) thought they could listen safely to a song through a PLD in its maximum volume for more than 15 minutes. (Table 4).

On enquiring regarding the presence of any co-morbidity, 2 students had a history of tuberculosis in the past for which they were treated completely, 3 students were hypothyroid and one of them was a diabetic on medication. 6.32% of students had a positive family history of early-onset hearing loss. 7.11 % of students had a history of prolonged hospitalization for more than a week in their childhood for some illness. 31.62% of students attended discotheques and 34.39% of the participants attended music concerts rarely (Table 1). But none of these students with co-morbidities, family history of hearing loss, history of hospitalization, or history of occasionally attending concerts and discotheques had evidence of hearing loss on audiometry. 43 students (17%) gave the history of living in a noisy atmosphere out of which, 2 subjects had hearing loss with a 4kHz dip. But these two students also listened to music for more than 40 hours a week.

Fifteen students (5.93%) had evidence of deafness with a 4kHz dip on pure tone audiometry out of which 9 were female and 6 were male. 9 patients (3.56%) had bilateral hearing loss and 6 patients (2.37%) had unilateral hearing loss. (Table 4).

The audiometric findings of the study participants are summarized in table 5 in terms of their pure-tone average for air conduction for 500 Hz, 1000 Hz, and 2000 Hz, and their 4 kHz air conduction and bone conduction thresholds. The prevalence of NIHL among boys was 9.68% though that in girls was only 4.71% but this difference wasn't statistically significant (p value=0.117).

After dividing the students into 2 groups, one without evidence of noise-induced hearing loss (group 1), and the other with a 4 kHz dip on PTA (group 2), we found no statistically significant difference between them in terms of frequency of listening to music at high PLD volume or speaker volume, weekly music exposure duration through PLD, or total weekly music exposure duration (through PLD or speaker or music videos) (Table 6).

Table 1: Socio-demographic profile of the study subjects.

Variables	Number (out of 253)	Percentage (%)	95%CI
Age (in years)			
<20	184	72.7	66.8-78.1
≥20	69	27.3	21.9-33.2
Gender			
Male	62	24.5	19.3-30.3
Female	191	75.5	69.7-80.7
Year of undergraduate studies			
Second	223	88.1	83.5-91.8
Third	30	11.9	8.2-16.5
Name of the course			
Allied health sciences	227	89.7	85.3-93.2
Nursing	26	10.3	6.8-14.7
History of comorbidities			
Present	6	2.4	0.9-5.1
Absent	247	97.6	94.9-99.1
Lives in noisy background			
Yes	43	17	12.6-22.2
No	210	83	77.8-87.4
Family H/o hearing loss			
Yes	16	6.3	3.7-10.1
No	237	93.7	89.9-96.3

Table 2: Details of music listening habit using PLD.

Variables	Number (out of 253)	Percentage (%)
PLD use starting age (years)		
<16	88	34.8
≥16	165	65.2
Number of years of habitual music listening (Present age minus PLD use starting age) (years)		
<1	52	20.6

Continued.

Variables	Number (out of 253)	Percentage (%)
1-3	116	45.8
3-5	55	21.7
>5	30	11.9
Hours per week on PLD (hours)		
<14	187	73.9
≥14	66	26.1
PLD volume		
≤50% of max volume	58	22.9
>50% of max volume	195	77.1
Type of earphone/headphone		
Behind the ear headband	4	1.6
Supraaural headphones	6	2.4
Circumaural headphones	5	1.9
External earphones	46	18.2
Insert earphones	192	75.9
Noise cancellation feature in PLD		
Present	77	30.4
Absent	176	69.6
Types of devices		
Mobiles	229	90.5
Computers	3	1.2
MP3	21	8.3
Display of warning signal on the devise when the recommended sound level is crossed		
Yes	205	80.6
No	49	19.4
Display of ear symbol on the devise when the recommended sound level is crossed		
Yes	112	44.3
No	141	55.7

Table 3: Details on speakers and video related parameters

Variables	Users (%)	Range- min-max (among users)	Mean	Standard deviation among users
Watching musical videos (hours per week among users)	172 (67.98)	0.62-70	14.53	13.38
Speaker use for listening to music (hours per week among users)	106 (41.9)	0.17-48	4.42	6.61
Total music exposure duration per week	253 (100)	1-128.5	15.28	22.98

Table 4: Impact and awareness regarding music induced hearing loss.

Variables	Number (out of 253)	Percentage (%)
Hearing loss noticed after developing the habit of listening to music		
Present	0	0
Doubtful	14	5.53
Absent	239	94.47
Students' perception on susceptibility to hearing loss		
No susceptibility	162	64
Low susceptibility	51	20.2
Medium susceptibility	26	10.3
High susceptibility	14	5.5
Hearing loss on audiometry		
Left ear	12	4.74
Right ear	12	4.74
Any ear deafness	15	5.93
Bilateral deafness	9	3.56

Continued.

Variables	Number (out of 253)	Percentage (%)
Tinnitus on listening to loud music		
Present	61	24.11
Absent	192	75.89
Max safe volume (on a scale of 1 to 10)		
≤8	229	90.5
>8	11	4.35
Said they did not know the answer	13	5.1
Safe duration in max volume		
≤15 min	31	12.2
>15 min	203	80.2
Said they did not know the answer	19	7.6

Table 5: Audiometry test findings of the study subjects.

Variables	Minimum	Maximum	Mean	95%CI
Left pure tone average	10.00	16.67	13.48	13.32-13.64
Left 4 kHz air conduction threshold	5	50	18.68	18.03-19.33
Left 4 kHz bone conduction threshold	10	30	13.54	13.15-13.93
Right pure tone average	8.33	16.66	12.96	12.76-13.16
Right kHz air conduction threshold	5	50	17.96	17.29-18.63
Right 4 kHz bone conduction threshold	10	30	13.14	12.73-13.55

Table 6: Association between any ear hearing loss and certain suspected risk factors.

Variables	Grouping of variables (number)	No. of subjects with deafness in any ear (out of 15)	No. of subjects without deafness (out of 238)	Odds ratio (95%CI of odds ratio)	Chi square value	P value
PLD volume	(>5) (195)	13	182	2.00 (0.44-9.13)	0.35	0.55
	(≤5) (8)	2	56	1.00		
Weekly exposure to PLD	>14 hours (66)	5	61	1.45 (0.48-4.41)	0.13	0.72
	≤14 hours (187)	10	177	1.00		
Speaker volume	>5 (84)	6	78	1.37 (0.47-3.98)	0.33	0.57
	≤5 (169)	9	160	1.00		
Total duration of music exposure per week	>14 hours (144)	8	136	0.86 (0.30-2.44)	0.08	0.77
	≤14 hours (109)	7	102	1.00		

Note: *Statistically significant.

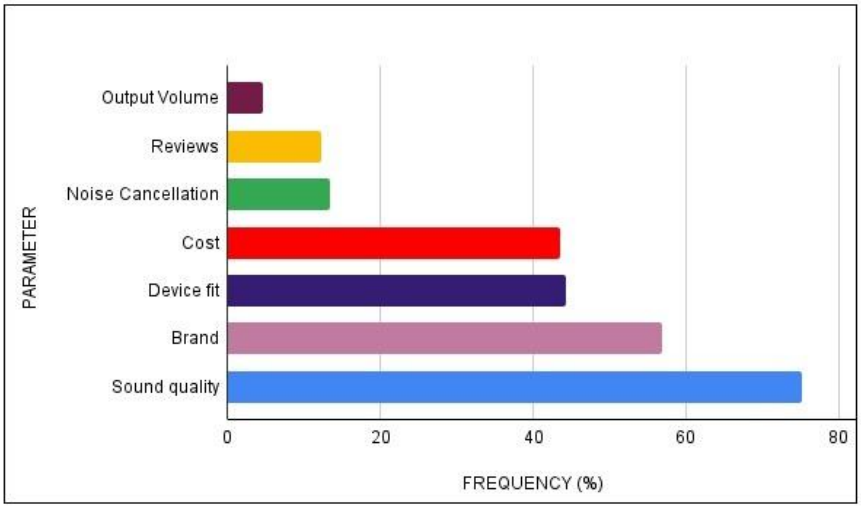

Figure 1: Features looked for by the study subjects during the purchase of headphones/ earphones (in percentages).

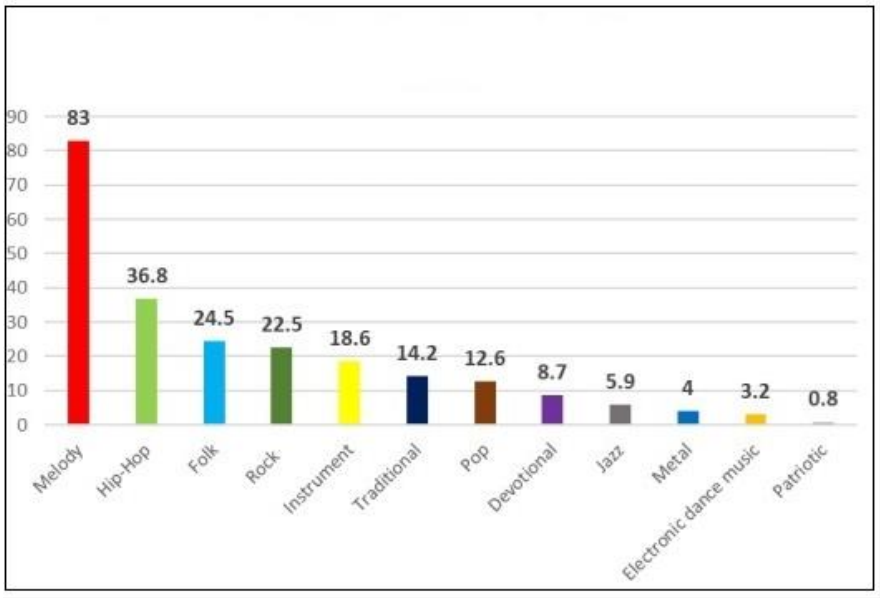

Figure 2: Music genre preference of students (in percentages).

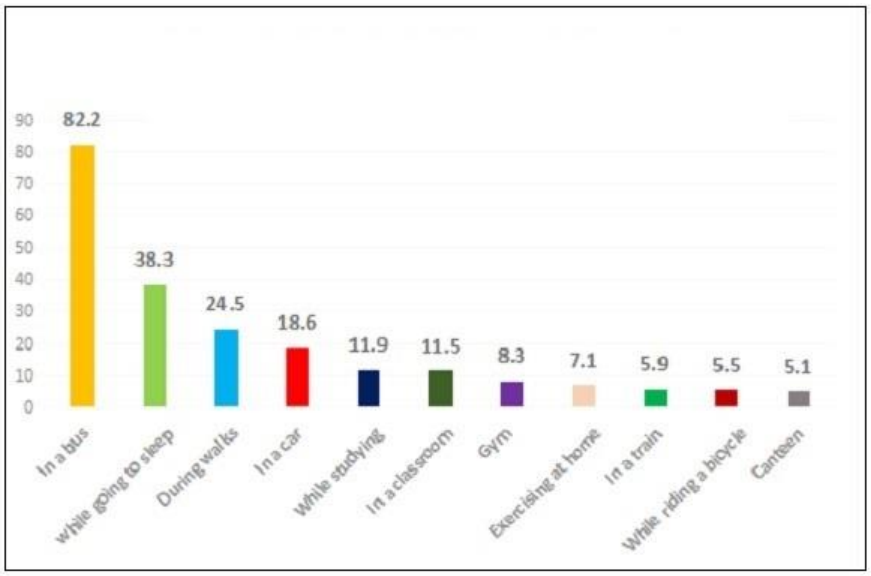

Figure 3: Common situations during which students reported to listening to music (frequency in percentages).

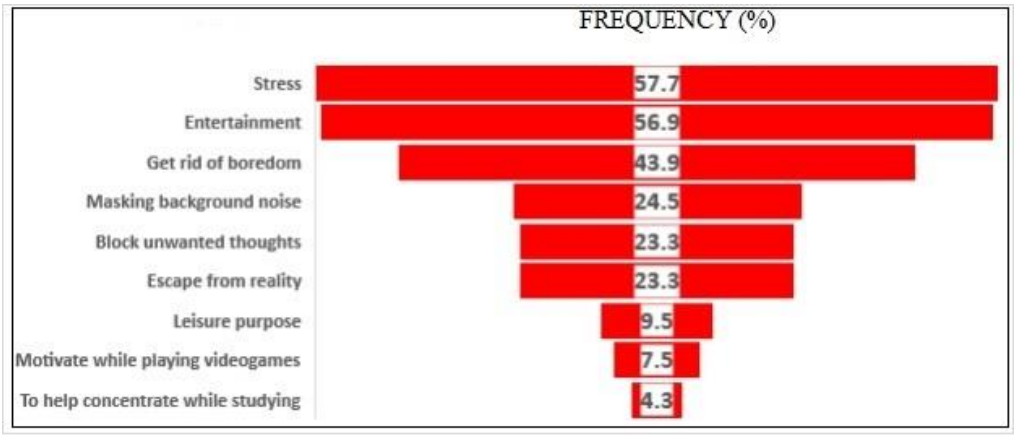

Figure 4: Main reasons for listening to music as quoted by the study subjects expressed in percentages.

DISCUSSION

Music is known to have various positive effects on our brains and has even become a mode of therapy to facilitate the recovery of patients with stroke, Parkinson's disease, cerebral palsy, traumatic brain injury, and memory disorders such as Alzheimer's disease, depression, and other mood disorders.[2] But, listening to loud music may have various adverse effects like temporary and permanent threshold shift, tinnitus, headache, irritability and mood swings, insomnia, inability to concentrate at work, etc.[2] Listening to music like talking on the phone or texting may compromise the road safety of individuals by distracting them from the street environment.[7]

Higher volumes intensify the emotional response to music, alter the listener's state of consciousness and create a craving for the pleasurable sensation in susceptible individuals. In addition, headphones or earphones modify one's aural space and experience of the world.[8] In children, reading, long-term memory, and learning can all be significantly affected by exposure to noise.[9]

Personal listening devices like walkman, iPod, MP3 player, mobile phone, and the most popular smartphone, in combination with headphones or earphones, have overcome the influence of family members and neighbours on limiting the music listening volume and duration and carry the advantage of being portable. Similar to the observation in other studies, music-enabled mobile phones were the most commonly used PLD to listen to music by our students too (90.5%).[5,10,11]

Circumaural headphones and insert earphones can cancel background noise and effectively transmit sound signals and hence, can reduce the need to raise the volume to unsafe levels for maintaining clarity of the output. Though insert earphones were used by 75.9 % (192,) and circumaural headphones by 1.9% (5) of our study participants, only 77 (30.4%) of them reported that their earphones or headphones could cancel background noise effectively. This could be because of the poor fit of earphones or headphones to students' ears. While purchasing headphones or earphones, many of our participants were bothered mainly about the sound quality of the output (75.1%) and the brand (56.9%). But only 44.3% gave importance to the fit of the headphones/earphones to the ears and 13.4% of them alone looked for the presence of a noise cancellation feature.

As against the general belief that today's youth prefer electronic dance music, which is also reflected in the results of the Delhi-based and Canadian studies, most of our college students (83%) chose melody as one of the three most common genres of music that they would listen.[5,11] In the Canadian study by Friesen et al, 84% of college students listened to music while traveling on a bus.[11] Similarly, 82.2% of our study participants too listened to music while going on a bus. Unless the headphones or earphones effectively cancel the noise, there is a probability that music listeners raise the volume of their PLD to unsafe levels to maintain sound clarity and mask the background traffic noise.

International Electro-technical commission had specified the standard sound level limits for personal audio players in 2010.[12] These include standard acoustic output level of not greater than 85 dB (A), maximum output from player and listening device not greater than 100 dB (A), a warning on the equipment on crossing safe volume limit, and a provision of information to the user regarding increased sound pressure and higher output level which needs to be acknowledged by the user once in every 20 hours. In this study, 205 students (80.6%) reported that their PLD displayed a warning signal on their PLD on crossing the safe volume limit. Subsequently, in 2018, the international telecommunication union recommended weekly sound dosage to be limited to the equivalent of 80dBA for 40 hours per week in adults and 75dBA for 40 hours/week in children.[13]

Safe listening not just depends on the sound intensity. It also depends on the duration of exposure. Effectively, the total amount of sound energy to which an individual is exposed remains the same whether he is exposed at lower volumes for longer periods or at louder levels for shorter periods. The safe duration of exposure to a sound of 85 dB could be 8 hours a day. But, the maximal permitted duration of exposure to a sound of 90 dB is only 2.5 hours a day, and increasing the intensity to 100 dB, reduces it drastically to just 15 minutes. A sound of 120 dB would be hazardous if one hears it for just a few seconds.[14]

To ensure safe listening, music listeners have been advised to adhere to the '80-90 rule' by Portnuff et al which suggests that an individual will be exposed to 50% of the total permitted noise dose if he listens to music at 80% of the maximum volume of the PLD for 90 minutes a day.[8] The frequency of our students listening to music at a volume of more than 5 on a scale of 1 to 10 was 77.5%, which is higher than the frequency observed in the Delhi-based study of 58.23%.[2,5] Around 36 (14.2%) students preferably set their PLD volume, most of the time at its maximum. As per the answers in the questionnaire, according to Portnuff's 80-90 rule, 76 students (30.04%) listened to music at a volume of ≥8 on 10 (80% maximal volume) for more than 90 minutes a day and were exposed to more than 50% of permitted noise dose.[8] Students who listened to music at a higher volume were also exposed to music for a longer duration whether it was through headphones or earphones in particular or it was through all sources being considered together (p value<0.01 as per Pearson's correlation test for both). In contrast, students in the Canadian study who listened to music for a prolonged duration hardly listened to levels greater than 85 dB.[11] Most of the participants answered that the maximum safe volume at which music could be played in a PLD would be ≤8 (on a scale of 1 to 10). But only 12.2%, on the contrary, answered that the safe duration for which a song could be listened to using a PLD at its maximal volume would be ≤15 minutes. This shows that though there is some awareness regarding maximal safe volume, not many

are aware of the maximum daily sound allowance which varies based on the intensity at which the person is exposed to the sound. The number of years spent listening to music by the participants in our study was in the range of 1-10 years, with a median of 3 years which is similar to the study by Rao et al.[10]

While looking at other sources of recreational noise exposure, attending music gatherings and discotheques were extremely rare events in our study population. 68.38% of the students never attended any discotheques and 65.61% of our participants never attended any music concerts. The rest also attended such recreational events very rarely- less than once in a month. This is much lesser than the frequency observed in the Delhi-based study where 56.23% of the respondents attended music gatherings around once in 4 weeks.[5] This could be attributed to the cultural differences and relatively conservative parenting in this region of the country.

Only 24.11% of our students had experienced tinnitus after exposure to loud music which is similar to the results of the Canadian study (23%) but much lesser than the frequency observed in the Delhi based study (41.8%).[5,11] Around 5.93% of our students had evidence of unilateral or bilateral 4 kHz dip on audiometry which is lesser than the frequency in the Bangalore-based study by Rao et al (12.62%).[10] None of the students in our study had a pure tone average (for frequencies 500 Hz, 1 kHz, and 2 kHz) of more than 15 dB in both ears. This could be the reason for even the students with evidence of a 4 kHz dip on audiometry, not being aware of the presence of a hearing loss in them. 8 out of 15 students (53.33%) in group 1 (with NIHL) didn't even consider themselves to be susceptible to hearing loss in near future.

As the primary objective of our study was to calculate the prevalence of a habit of listening to loud music using PLD, the sample size calculation was done based on this parameter. It would be a natural tendency for all of us to presume that the prevalence of music-induced hearing loss would be higher among the candidates who listen to music at high volumes for a long duration when compared to the prevalence among the candidates listening to music at soft volumes for a brief duration. But this hypothesis was not translated into results in our study. Probably, higher sample size may have been required to test these associations with more precision.

Limitations

As this was a questionnaire-based study, the measurements could have been biased secondary to the subjective variations that might have occurred while answering the questionnaire. Bias might have also occurred due to the differences in the quality of the PLDs and the headphones or earphones used by the participants. But due to the pandemic situation, direct observation of the subjects listening to music and quantitative measurement of sound intensity using sound level meter was not feasible. In addition, a higher sample size would have permitted better testing of the various associations between unsafe listening practices and their impact on hearing.

CONCLUSION

Mobile phones with the insert-earphone combination were the most commonly used PLD for listening to music among college students, though most of the earphones didn't effectively negate the background noise. Around 30 percent of our participants were exposed to more than 50% maximal noise dose as per the 80-90 rule stated by Portnuff et al. Students who listened to music at a higher volume were also the ones who were exposed to it for a prolonged duration. Though many students were aware of safe volume levels while listening to music, not many were aware of the daily sound allowance (DSA). Probably the addition of an in-built app in all PLDs for displaying warning messages for crossing the maximum permitted safe sound dose per day may improve the knowledge of the students regarding DSA. As students mostly continue to hear to music at unsafe levels despite such warning messages, additional health education may be needed for the target population to motivate them to make listening to music a safe yet enjoyable experience.

ACKNOWLEDGEMENTS

We would like to thank Dr. Kalpana Devi, Mrs. Sheba Yesu Priya, and Dr. Hema V. H. for their co-ordination in conducting this study. We thank all the students who whole-heartedly extended their co-operation for this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Schafer T, Sedlmeier P, Stadtler C, Huron D. The psychological functions of music listening. Front Psychol. 2013;4:511.
2. Sacks O. The power of music. Brain. 2006;129(10):2528-32.
3. Krug E, Cieza MA, Chadha S, Sminkey L, Morata T, Swanepoel D, et al. Hearing loss due to recreational exposure to loud sounds: A review. Geneva: WHO; 2015.
4. WHO. Safe listening devices and systems: a WHO-ITU standard, 2019. Available at: https://www.who.int/publications/i/item/safelistening-devices-and-systems-a-who-itustandard. Accessed on 01 July 2021.
5. Gupta N, Sharma A, Singh PP, Goyal A, Sao R. Assessment of Knowledge of Harmful Effects and Exposure to Recreational Music in College Students of Delhi: A Cross Sectional Exploratory Study. Indian J Otolaryngol Head Neck Surg. 2014;66(3):254-9.

6. Portnuff CDF. Music-Induced Hearing Loss from Portable Listening Devices: Evaluating the Factors That Influence Risk Behaviors. University of Colorado, Boulder. 2011.
7. Schwebel DC, Stavrinos D, Byington KW, Davis T, Neal EE, Jong D. Distraction and pedestrian safety: how talking on the phone, texting, and listening to music impact crossing the street. Accid Anal Preven. 2012;45:266-71.
8. Portnuff CDF. Reducing the risk of music-induced hearing loss from overuse of portable listening devices: understanding the problems and establishing strategies for improving awareness in adolescents. Adolescent Health Med Therapeut. 2016;7:27-35.
9. Bistrup ML. Prevention of adverse effects of noise on children. Noise Health. 200;5:59-64.
10. Rao A, Chandrakiran C, Hussain A, Prakash SDR, Rajiv SR. Effect of Usage of Personal Music Players on Hearing in Students Aged 18-25 yrs. J Evolut Med Dent Sci. 2014;3(61):13560-71.
11. Friesen CE, Papadopoulos A. Personal listening habits and the potential for hearing loss of Canadian university students. Environmental Health Rev. 2015;58(4):79-86.
12. IEC. Audio/video, information and communication technology equipment - Part 1: Safety requirements. Available at: https://webstore.iec.ch, 2010. Accessed on 01 July 2021.
13. ITU. Guidelines for safe listening devices/systems. ITU-TH.870, 2018. Available at: https://www.itu.int/rec/T-REC-H.870, 2010. Accessed on 01 July 2021.
14. Daniel E. Noise and hearing loss: a review. J Sch Health. 2007;77(5):225.

Cite this article as: Gayathri H, Paul CMP. Music listening practices of college-going students and their impact on hearing. Int J Otorhinolaryngol Head Neck Surg 2021;7:1284-92.