International Journal of Community Medicine and Public Health
Das JJ Int J Community Med Public Health. 2020 Oct;7(10):3924-3930
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20204355

Original Research Article

Assessment of knowledge regarding the consequences of using earphones among higher secondary and non-medical postgraduate students

Jiban Jyoti Das*

Centre for Pollution Control and Environment Engineering, Pondicherry University, Puducherry, India

Received: 11 July 2020
Revised: 19 August 2020
Accepted: 26 August 2020

***Correspondence:**
Jiban Jyoti Das,
E-mail: jibanjd@gmail.com

ABSTRACT

Background: Due to the incremental scope of using earphones, in today's world youngsters are susceptible to loud sounds or prolong sounds that may cause negative consequences to them in the later run. Aim of the study was to assess the knowledge regarding the consequences of the use of earphones in terms of basic level and advanced levels of awareness among some high secondary students and non-medical postgraduate students.
Methods: A structure questionnaire-based study was done by distributing it among the students of Pondicherry central university, Puducherry, India, and Delhi Public School, Digboi Assam. 18 students from different departments of the Pondicherry central university and 19 students from the high secondary of Delhi Public School, Digboi were selected randomly for the study. A structured questionnaire consisting of questions related to the consequences of using earphones was used as a study tool for observation. Sets of questions related to the awareness were categorized into basic level, advanced level-1, and advanced level-2.
Results: Knowledge scores for basic level awareness showed very good results. Knowledge scores for advanced level 1 and 2 awareness showed poor results for both the groups.
Conclusions: The study highlights the requirement of developing awareness programs regarding health hazards associated with the use of earphones in terms of parameters like the feeling of ringing like sounds through the ears, ear wax, ear stress, ear pain, and tinnitus. Such awareness needs to be incorporated in textbooks of the school level.

Keywords: Tinnitus, Earphones, Volume, Ears, Ear stress

INTRODUCTION

In this modern era of technology, it is common to see adolescents and young adults exposing themselves to loud noise or music through the use of earphones for a long period of time However the risky patterns of exposure if are not being monitored by themselves to the proper extent may lead to noised induced hearing loss in the latter part of their life.[1] Noise-induced hearing loss is caused by long-term exposure to sounds that are either too loud or last too long. This kind of noise exposure can damage the sensory hair cells in the ear that allow us to hear.[2]

According to a large-scale survey and study by Gilliver et al of personal listening device users based on hearing health indicators suggested that several high-risk users may be experiencing early warning signs of hearing damage.[3]

In another study by Sulaiman et al suggested that excessive exposure to music among personal listening device users may lead to initial effects on their hearing at very high frequencies.[4]

The scope of using earphones was less a few years ago, however, nowadays the scope of such use has increased to a great extent. Earphones are not only used for listening to recreational music, but also to hear audio-books, online videos, and online educational programs.

According to study by Siddiqua et al. about earphone usages among peoples of age 15 and 24, risky patterns of using earphones everyday were observed.[5] Listening through earphones was found to be common for a longer duration of time also during sleep or during the study, neglecting the fact that prolonged use can result in ear canal infection and damage hearing.

According to study by Ansari et al risky patterns of usages of earphones and music player devices among Iranian adolescents were observed.[6] The authors suggested planning educational programs in this domain for adolescents, especially in high schools is necessary. It is important to make people, especially the adolescents aware of its consequences and also make them aware of the early signs of ear damages.

One such ear damage is called tinnitus which is incurable in nature. One of the symptoms of tinnitus includes the sensation of noise in the ears, such as buzzing or ringing.[7] A study was done by Chung et al through a web-based survey among 9393 young adults concluded that a majority of the participants have experienced tinnitus and hearing impairment after exposure to loud music.[8]

According to Foy, an osteopathic pediatrician from Vallejo, California, listening through headphones at a high volume for extended periods of time can result in lifelong hearing loss for children and teens and advises that people should not exceed 60% of maximum volume when listening through headphones.[9]

The study principally tries to highlight the key fact that students of both groups are aware of the basic awareness related to the consequences of earphone usage. But are not aware of some other consequences of the use of earphones like the sensation of buzzing or ringing sound in the ears, reasons for wax build-up in the ears, ear canal wetness due to prolong earphone use, and tinnitus. These lacks of knowledge are making them use earphones indiscriminately, even after knowing its potential harm.

The study also highlights the average duration of daily use of earphones and points out common symptoms like feeling pain after listening to music among the students. It also makes an important highlight the fact that most of the students of non-medical post graduate student group as well as the higher secondary student group use earphone more than the 50% of the maximum volume level of their device. This may make them vulnerable to dangerous levels of noise making them susceptible to noise-induced hair loss in later life if the patterns of the use of earphones are not monitored properly. Through this study authors want to convey the concerned policy makers in the development of programs of building awareness regarding health hazards associated with the use of earphones beyond the scope of the basic awareness commonly known by the students and make them aware of the body indications and early symptoms of damage in ears.

METHODS

The study site was selected using the convenience sampling method. Study site included Pondicherry Central University, Puducherry and Delhi Public School, Digboi. The study was conducted in between March 2018 to June 2018.

A structured questionnaire was used as a study tool for observation. The questionnaire was designed such that it enables to know about the duration of use of earphones, occurrence of symptoms in students like pain in the ears, and awareness related to the consequences of use of earphones. Assessment of awareness among the groups was done by categorizing knowledge and awareness scores in terms of basic level and advanced level. Advanced level was further categorized into advance level 1 and advance level 2.

Participants were selected randomly. 18 students from the Pondicherry Central University and 19 students of standard 11 from Delhi Public School, Digboi participated in the study. Prior consent was obtained from all participants. Inclusion criteria included students having an electronic device for playing music and using earphones for it. Students not having an electronic device capable for playing music or not using earphones were excluded from the study.

Statistical analysis was done using WPS office and through online tools provided by Graphpad software available at https://www.graphpad.com.

RESULTS

The average time of earphones used in one day was noted. The average time of daily earphones use was 1.30 hours among postgraduate students and 1.70 hours among higher secondary students (Table 1).

Table 1: Average hours of daily earphones use.

Group	Average time in hours (approximately)
Non-medical postgraduate	1.30
High school	1.70

The inputs of the students whether they use earphones at the level of more than 50% level of the device was noted and studied. The study has been done considering the fact that the students who listen more than the 50% volume level of the device may be susceptible to loud sound if used for a prolonged time. 17 students (94.44 %) out of 18

students of the postgraduate group and 12 out of 19 students of the higher secondary group normally use earphones with more than 50% level of the volume of the device.

From the study, it can be observed that more than 50% of the students of both groups use earphones at a volume level of more than 50% of the device volume level.

The percentage of the student using at this level is seen to be much higher among the postgraduate student group than among the higher secondary student group.

Assessment of basic level awareness among the students of the two groups was done based upon three questions mentioned in Table 3. Out of 18 students of the non-medical postgraduate group, 16 (88.89%) and all the 19 students of the higher secondary group responded positively about the awareness that high volume can damage the listening capacity of the ears.

The result shows that almost all the students of both the group are aware of the basic fact that high volume can damage the hearing capacity of ears. Also, all the students of both groups responded positively (100%) about awareness that the overuse of earphones can damage the hearing capacity of ears.

About the awareness that listening to music for longer duration may lead to stress in ears 15 (83.33%) students of non-medical postgraduates and 13 (68.42%) students of the higher secondary group responded positively. The percentages of awareness about ear stress due to prolong listening to music are more than 50% for both the groups.

Knowledge scores for basic awareness was studied based upon the mentioned three parameters by giving an equal weight of 2 points to each parameter and then calculating the average knowledge score for each group. It was found that for both the groups the percentage of knowledge score was more than 89% highlighting a strong and very good level of awareness.

Knowledge score data of both the groups was statistically checked using two sample independent tests assuming unequal variances for finding any relation between the scores of students among both the groups if it exists.

The 18 participants of the postgraduate student group (M=5.67, SD=0.77) compared to the group of 19 participants of the higher secondary level (M=5.37, SD=0.96) did not demonstrated significantly at t (35) =1.0512, p=0.3006. Hence we can conclude that there is no difference regarding knowledge score among the studied post graduate and higher secondary level students.

From Table 2 it is observed that 88.89% of the students from the postgraduate group are aware that high volume can damage listening capacity of ears, however, from Table 3 it can be observed that 94.44% of the students use earphones in more than 50% level mode. Similarly, from Table 2, it is observed that 100% of the students of the higher secondary graduate group are aware of the same, but still, 63.16% of the students use earphone in more than 50% level mode of the device. This particular observation highlights the fact that even having the basic knowledge student may not be making a conscious decision of using earphone at a good level of volume of the device.

Study data of students having pain in ear, especially after listening to music highlighted that out of 18 students of the postgraduate students 9 (50%) responded positively for pain in ears especially after listening to music. Only 4 (21.1%) students of the higher secondary group responded positively of having some pain in ears. The result shows that the incidence of pain in the ears, especially after listening music, is seen more among the postgraduate student's group. The study highlights the fact that the incidence of pains may gradually be visible with age as students are promoted to higher studies (Table 5).

Assessment of advanced level-1 awareness of the students among the groups was done based upon the parameters mentioned in Table 6. Out of 18 students of the postgraduate student's group, only 5 (27.78%) and out of the 19 students of higher secondary students, only 4 (21.05%) responded positively to the awareness that prolonged listening to music using earphones may make ear canal wet. The result highlights the fact that, more than 50 % of both groups are not aware that prolong music may make ear canals wet.

About the awareness of ear wax, only 8 (44.44%) responded positively among the postgraduate student groups which also makes it clear that more than 50 % of the students are not being aware of the awareness about ear wax. However, among higher secondary students, 11 (57.89%) responded positively and 8 responded (42.11%) negatively about its awareness. The result highlights that between the two groups the percentage of the higher secondary students are more aware of the knowledge of ear wax. However, the percentage is not satisfactory and highlights the fact that awareness is required among both the groups.

Based on the response provided for advance level-1 awareness, knowledge score was awarded to every student by giving an equal weight of 2 points to each parameter mentioned in Table 7 and the average knowledge score corresponding to the two groups were noted. It was found that in both the groups the percentage of knowledge score was below 50% reflecting very bad knowledge score.

Knowledge score data for advanced level-1 awareness of both the groups was statistically checked using two sample independent test assuming unequal variances for finding any relation between the scores of students among both the groups if it exists.

The 18 participants of the postgraduate student group (M=2.17, SD=2.01) compared to the group of 19 participants of the high secondary level (M=2.37, SD=2.14) did not demonstrated significantly at t (35)=0.2931, p=0.7712. Hence it can be concluded that there is no difference regarding knowledge score of advanced level-1 among the studied post graduate and higher secondary level students.

Assessment of advanced level 2 awareness was based upon two parameters mentioned in Table 8. It was observed that out of 18 students only 2 (11.11%) from the postgraduate group and out of 19 students of the higher secondary group only 2 (10.52%) students knew about tinnitus. The study clearly reflects a big knowledge gap of the awareness about tinnitus among both the groups. The second parameter that was taken for the study was the knowledge of ringing in the ears as it is considered as a sign of tinnitus or other underlying ear infection.

It was observed that out of 18 students of the postgraduate group only 6 (33.33%) students knew about the term of ringing sound that can be heard in the ears. However, the case was opposite about the higher secondary group as out of 19 students 15 (78.95%) knew about the ringing in ears.

The study highlights that there is a huge difference of the percentages of awareness about ringing in ears between the groups. The higher secondary group highlighted better knowledge about it than that by the postgraduate group.

Knowledge score of advanced level-2 awareness was studied based upon the two parameters by giving an equal weight of 3 points to each parameter. It was found that for both groups the percentage of knowledge score was less than 50%.

Knowledge score data for advanced level-2 awareness of both the groups was statistically checked using two sample independent test assuming unequal variances for finding any relation between the scores of students among both the groups if it exists.

The 18 participants of the postgraduate student group (M=1.33, SD=1.85) compared to the group of 19 participants of the high secondary level (M=2.68, SD=1.70) demonstrated significantly at t (35)=2.3076, p=0.0272. Hence it can be concluded that there is difference regarding knowledge score of advanced level-2 among the studied post graduate and higher secondary level students.

As mentioned in table 8 that only 6 students from the postgraduate group and 15 students of the higher secondary group were aware of the ringing in the ears. Among these 6 students of postgraduate group 4 students and among these15 students of higher secondary group 10 students themselves felt that they can hear buzzing or ringing sound through their ears. This highlights the fact that ringing in the ears could be prevalent among the students, but ignored due to lack of awareness of parameters as mentioned in advanced level-1 and level-2 of this study. Awareness about the knowledge of the perception of ringing in the ears and tinnitus therefore is something which is required at top most priority from the lower age level.

Table 2: Distribution of earphone use at more than 50% device level.

Parameter	Group	Responses	Number of participants (Percentage)
Earphones use in more than 50% level mode	Non-medical post graduate	Yes	17 (94.44)
		No	1 (5.56)
	Higher secondary	Yes	12 (63.16)
		No	7 (36.84)

Table 3: Details of basic awareness.

Parameters	Group	Responses	Number of participants (Percentage)
Awareness that high volume can damage listening capacity of ears	Non-medical post graduate	Yes	16 (88.89)
		No	2 (11.11)
	Higher secondary	Yes	19(100)
		No	0 (0)
Awareness that prolong use of earphone can damage the listening capacity of ears	Non-medical post graduate	Yes	18 (100)
		No	0 (0)
	Higher secondary	Yes	19 (100)
		No	0 (0)
Awareness that listening to music for longer duration may lead to stress in ear	Non-medical post graduate	Yes	15 (83.33)
		No	3 (16.67)
	Higher secondary	Yes	13 (68.42)
		No	6 (31.58)

pISSN 2394-6032 | eISSN 2394-6040

Table 4: Knowledge scores for basic level of awareness.

Group	Total knowledge score	Average score per student	Percentage (%)
Non-medical post graduate	102 out of 108	5.7 out of 6	94.4
Higher secondary	102 of 114	5.36 out of 6	89.3

Table 5: Distribution of student suffering from pain in ear, especially after listening to music.

Parameters	Group	Responses	Number of participants (Percentage)
Pain in ear specially after listening to music	Non-medical post graduate	Yes	9 (50)
	Higher secondary	Yes	4 (21.1)

Table 6: Details of advanced level-1 awareness.

Parameters	Group	Responses	Number of participants (Percentage)
Awareness about prolong music can make ear canal wet	Non-medical post graduate	Yes	5 (27.78)
		No	13 (72.22)
	Higher secondary	Yes	4 (21.05)
		No	15 (78.95)
Awareness about the reason of wax build up in ear	Non-medical post graduate	Yes	8 (44.44)
		No	10 (55.56)
	Higher secondary	Yes	11 (57.89)
		No	8 (42.11)

Table 7: Knowledge scores for advanced level-1 awareness.

Group	Total knowledge score	Average score per student	Percentage (%)
Non-medical post graduate	39 out of 108	2.17 out of 6	36.11
Higher secondary	45 out of 114	2.37 out of 6	39.47

Table 8: Details of advanced level-2 awareness.

Parameters	Group	Responses	Number of participants (Percentage)
Awareness about ringing sound heard from ears	Non-medical post graduate	Yes	6 (33.33)
		No	12 (66.67)
	Higher secondary	Yes	15 (78.95)
		No	4 (21.05.)
Knowledge of definition of tinnitus	Non-medical post graduate	Yes	2 (11.11)
		No	16 (88.89)
	Higher secondary	Yes	2 (10.52)
		No	17 (89.48)

Table 9: Knowledge scores for advanced level 2 awareness.

Group	Total knowledge score	Average score per student	Percentage (%)
Non-medical post graduate	24 out of 108	1.33	22.2
Higher secondary	51 out of 114	2.68	44.7

Table 10: Distribution of students feeling ringing sound in the ears.

Parameter	Group	No. of students
	Non-medical post graduate	4 out of 6

Awareness of ringing of ears together with themselves thinking that they can hear the ringing sound through their ears	Higher secondary	10 out of 15

DISCUSSION

With the growing use of earphones, especially among the students has led to an increased risk of the consequences of using earphones, especially when used for a longer duration. Although there has been awareness about the basic consequences of using earphones at high volume and also its prolonged use, certain facts like ear stress, ear wetness, ringing in the ears, and tinnitus are something which students may not be aware of. In this study, these facts have been classified as advanced level awareness while those considered to be commonly known facts have been classified as basic awareness. Advanced level was further categorized into level 1 and level 2.

Although there had been many studies regarding the risky patterns of using earphones observed in students or the risk of having ear infection and hearing loss but no study has been taken to know whether students are actually aware of certain terms and causes related to consequences of using earphones as mentioned in this study.

This study was conducted primarily to investigate the knowledge scores of awareness of the consequences of using earphones among some of the students of non-medical postgraduates of Pondicherry University and higher secondary students of Delhi Public School, Digboi.

A study done by Vineetha et al regarding knowledge of the hazards of earphone use among high school students of Mangaluru concluded that the students had good knowledge.[10] However, in this study, it is observed that students of high school groups and non-medical post graduate group, though have very good knowledge about the basic consequences of using earphones, but they do not have good knowledge and awareness if we go little beyond the basic awareness towards parameters of advanced level 1 and 2 of this study. Among the parameters of advanced knowledge, the knowledge of tinnitus was the lowest among both the groups.

A questionnaire based study conducted among the students of a Dental college done by Reddy et al. highlighted that 60% of the students can feel ringing in the ears due to exposure of the ears to noise for longer duration.[11] However, in this study, it was observed that though students of high school were aware of the term ringing in the ears, most of the students of non-medical post graduates actually did not know about the term. Therefore, it may be concluded that students may feel ringing in the ears already mildly, but they aren't conscious about it and therefore may neglect the same.

It was also observed that the average hours of use of earphones by the students of both the group were between 1 to 2 hours, which was similar to the observation of a study done by Siddiqua et al where almost all the individuals used earphones daily for at least 1-2 hours per day.

The study was concluded as students from the non-medical post graduate group and the higher secondary group have poor knowledge regarding health hazards associated with the use of earphones in terms of parameters like the feeling of ringing like sounds through the ears, ear wax, ear stress, ear pain, and tinnitus.

CONCLUSION

Requirement of developing awareness programs regarding health hazards associated with the use of earphones in terms of parameters like the feeling of ringing like sounds through the ears, ear wax, ear stress, ear pain, and tinnitus.

Limitation of the study

Further research based on this qualitative study may be conducted in terms of higher number of participants including demographic and other important parameters.

ACKNOWLEDGEMENTS

The author would like to sincerely thank Er. S. Sudalai, Assistant Professor and the head of the department Dr. Basant Kumar Tiwary of Centre for Pollution control and Environment Engineering, Pondicherry University, India for the support and providing valuable guidance for carrying out the survey based study. The author also likes to acknowledge the contribution of the students of Pondicherry University and Delhi Public School Digboi, India for participating and contributing this questionnaire-based study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Harrison RV. Noise-induced hearing loss in children: A "less than silent" environmental danger. Paediatr Child Health. 2008;13:377-82.
2. National Institute on Deafness and Other Communication Disorders. Available at:

https://www.nidcd.nih.gov/health/age-related-hearing-loss. Accessed on: 6 August 2020.
3. Gilliver M, Nguyen J, Beach EF, Barr C. Personal Listening Devices in Australia: Patterns of Use and Levels of Risk. Semin Hear. 2017;38:282-97.
4. Sulaiman AH, Husain R, Seluakumaran K. Hearing Risk among Young Personal Listening Device Users: Effects at High-Frequency and Extended High-Frequency Audiogram Thresholds. J Int Adv Otol. 2015;11:104-9.
5. Harshitha S, Siddiqua AA. A survey on prevalence and affect of earphone usage among adolescents. Int J App Res. 2017;3:438-42.
6. Ansari H, Mohammadpoorasl A, Rostami F, Maleki A, Sahebihagh MH, Naieni KH. Pattern of Use of Earphone and Music Player Devices among Iranian Adolescents. Int J Prev Med. 2014;5:776-81.
7. Han BI, Lee HW, Kim TY, Lim JS, Shin KS. Tinnitus: characteristics, causes, mechanisms, and treatments. J Clin Neurol. 2009;5:11-9.
8. Chung JH, Des Roches CM, Meunier J, Eavey RD. Evaluation of noise-induced hearing loss in young people using a web-based survey technique. Pediatrics. 2005;115:861-7.
9. American Osteopathic Association: Headphones & Hearing Loss. Available at: https://osteopathic.org/what-is-osteopathic-medicine/headphones-hearing-loss. Accessed on: 6 August 2020.
10. Vineetha CV, Jasmine M, Jeenu B, Christeena T, Sharin ND, Asha PS. A Study To Assess The Knowledge Regarding Hazards of Ear Phone Usage Among High School Students of Mangaluru. Int J Recent Sci Res. 2016;7:13307-9.
11. Thenmozhi MS, Reddy AB. Excessive usage of headphones among college students and their effects. Drug Invention Today. 2018;10:2296-9.

Cite this article as: Das JJ. Assessment of knowledge regarding the consequences of using earphones among higher secondary and non-medical postgraduate students. Int J Community Med Public Health 2020;7:3924-30.