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Research Article

AWARENESS ABOUT THE HEALTH HAZARDS OF USING EARPHONES IN COLLEGE STUDENTS OF PAKISTAN.

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Abstract:

Introduction: The popularity of earphones has increased dramatically over the past decade since its inception in 2001. Earphones attenuate high ambient noise levels and necessitate increased volumes for acoustic enjoyment, putting users at risk for noise-induced hearing loss. This feared consequence could increase hearing aids and add to the global burden of disability.

Methodology: This cross-sectional study of 306 college students included a self-administered questionnaire comprising (including socio-demographics) information about earphones' use in the following areas: average daily and weekly usage, volume level preference, episodes of tinnitus, symptoms of sensorineural hearing loss, knowledge about the hazards of high volume. The students were in first to final years of various undergraduate programs, aged ≥ 18 years, and provided informed consent. Data were analyzed using SPSS 24. A chi-squared test determined the association.

Results: Out of 306 students, 94% were frequent users of earphones, with the majority being females (56%) with ages of 20-22 years. 55% of the students preferred to use listening devices at higher volumes, 49% never turned TV/radio volume up in order to hear better, and 51% agreed that ringing in the ears is a warning sign of overexposure to loud sound, while 74% agreed that usage of earphones at high volumes is damaging for the ears.

Conclusion: While many students were aware of the health hazards of using earphones, very few were practicing safety measures.

Key Words: Noise-Induced Hearing Loss, Personal Listening Devices, Awareness of using Earphones, Health Hazards of using Earphones, Risky behavior associated with earphone use.

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INTRODUCTION:

In the recent years, earphone usage has become common among the general population, especially among adolescents. These small gadgets that are inserted into the ear canal can cause damage to the anatomical and physiological functioning of the ears [1, 2]. In-ear headphones allow the user to block external noise which [4], inadvertently delivers an excessive quantity of sound to the auditory structures putting the users at risk (1).

Noise-induced hearing loss (NIHL) is a gradual, cumulative and preventable decline in auditory function that follows repeated exposure to loud noise. It is the leading cause of preventable hearing loss [4]. Hearing loss induced by noise exposure is cited to be on average no greater than 75 dB in the high frequencies and no greater than 40 dB in the lower frequencies [5]. It most likely occurs at 90dB or greater for an average of eight hours per day without using any hearing protection [4]. Current personal listening devices have potential maximum output levels up to 126 dBA depends on the listening mode choice, with higher output levels for ear inserts as opposed to headphones.

Persons with early hearing impairment can often compensate for it for a relatively long time, e.g., by turning up the volume of the radio or television set or (in unilateral hearing impairment) by turning the healthy ear to the sound source. As hearing impairment worsens, vision is used as an additional aid to speech recognition, with an increasing reliance on lip-reading. Common hallmarks of hearing impairment are repeated questioning about things that have not been properly heard, inappropriate answers to misheard questions, and an excessively loud speaking voice.

There are two types of behavior associated with earphone listening, protective and risky. Risky behavior includes using high volume for a prolonged period of time, using high volume in noisy places and increasing the volume after a period of listening because of a temporary threshold shift. Temporary Threshold Shift is the reduction in hearing sensitivity that occurs due to direct prolonged exposure to high intensity sound (9). The threshold is the quietest sound perceived by the user (5). Protective behavior includes reducing volumes, taking breaks from listening and heeding warnings against high volume use (6).

Use of earphones is now a common part of a college student's life; it has become a habit which does not require intentional thinking. A study by Ineke Vogel et al (2010) revealed that adolescents listening at risky levels were more likely to experience intrinsic rewards and less likely to be motivated to protect their hearing than those listening at low levels.

When using earphones, the decibel level is too high if you can't hear anything going on around you. As a rule of thumb, users should only use their Personal Listening Devices at levels up to 60% of maximum volume for a total of 60 minutes a day (7).

The use of earphones with PLDs may pose a safety risk to pedestrians as well, especially in environments with moving vehicles. This risk occurs when a pedestrian is distracted by multiple stimuli (8).

Many research findings suggest that there is lack of knowledge amongst young adolescents regarding the use of earphones (9). A survey of college students by Danhauer et al (2009) revealed that most of the students did have general knowledge about hearing health but were not aware of the symptoms and prevention of hearing loss. Another study reported that a survey on college age participants revealed limited use of hearing protection (20).

NIHL is a preventable cause of acquired hearing loss. Currently, much focus is directed on awareness about health hazards of using earphones in college students. However, NIHL among the younger population has acquired increasing concern (10).

A Chinese study on 120 young users of portable music players found impaired hearing in 14% of ears (11). In Singapore, a study among National Service Conscripts showed a hearing loss prevalence of 36 per 1000 conscripts, especially in those with frequent exposure to loud sound (12). In another study conducted in India about the awareness in medical undergraduates, more than half of the students had knowledge about health hazards associated with earphone usage (13).

In a survey conducted in Karachi by students of Dow Medical College on NIHL related to personal music players, -Awareness level among the young users in developing country- a significant number of participants had some knowledge on NIHL but very few were changing their practice for protection of their hearing (14).

Awareness about health hazards of using earphones is an important public health priority because, as people live longer and industrialization spreads; NIHL will add substantially to the global burden of disability (15-17). It is a strong held view that the damage caused by chronic noise exposure is cumulative over the years. To avoid recreational NIHL, it is recommended that earphones through PLDs be used for one hour per day with up to 60% of maximum volume (18).

The purpose of this study is to access the level of health priority and awareness among college

students of Rawalpindi and Islamabad. Although some research on occupational NIHL has been done, there is no study regarding recreational NIHL and awareness among earphone users in Pakistan.

METHODS:

Study Design and Participants

A group of medical students conducted a cross-sectional study over the course of three months in 2019 (July till September), having sought sanction from the respective International Review Board. The purpose was to assess the awareness about health hazards of using earphones in college students of Rawalpindi and Islamabad. The sample size was calculated to be 306 with an anticipated frequency of 50%, confidence level of 95% and absolute precision of 5%, via Open Epi version 3.01 (openepi.com).

Data Collection and Administration:

A pilot study of 20 responses was carried out initially and two proficient doctors reviewed the questionnaire in an attempt to foolproof the study; since a little change was made in the prototype, the pilot study's responses were not included in the original study. A total of 350 individuals were approached for interviews and questionnaire filling; however, 30 refused to partake in the study and 14 left with an incomplete questionnaire, yielding a cooperation rate of 87.4%. A written and informed consent was sought from the volunteers prior to the survey.

For people who were not well versed in English, an Urdu translation was done. To remove interviewer bias, the questionnaire was pre-coded and thoroughly explained to all interviewers for articulate and professional communication. Questionnaires were also appropriately explained to all the participants who agreed to fill out the questionnaire and were offered further assistance if needed by the principal investigator dressed in a white lab coat. Non-probability convenience sampling was employed and no imputation was exercised.

Questionnaire Details

The questionnaire comprised 24 questions. The first few addressed demographics such as gender, age, occupation, etc. They were further asked “when did

you start using earphones?”, “What volume do you prefer for listening to music?” and questions assessing if they knew about risks of using headphones, if they experienced any difficulty in hearing following use of earphones, how often and during which activates they used earphones.

Data Analysis:

Data was entered and tests were run using Statistical Package for Social Sciences (SPSS) version 24.0 (IBM Corp., Armonk New York). Categorical variables were tested for the association through Pearson's Chi-square test. Associations were considered significant in accordance with a p-value of less than 0.05.

RESULTS:

Descriptive Statistics

Among 306 participants, majority 56% were females while 44% were males. Most (62%) belonged to age group of 20-22 years and were undergraduates (67%). Regarding use of earphones, the greater chunk of participants (94%) claimed of using it. 66% mentioned music as foremost reason for using earphones whereas others (29%) regarded the use of earphone as a trend. Preference to high volume music was seen among 55% individuals. Most of the participants thought that they don't have any hearing difficulties, 51% never experienced ringing in ears and 49% never turned TV/radio volume up in order to hear better.

According to our study, 74% of college students agreed that the use of earphones in some situations may be dangerous; also, vast majority (88%) were aware that earphone usage at loud listening levels may damage hearing. And a significant number of students (90%) strongly agreed that earphones should be labeled with warnings regarding hearing loss associated with high volumes.

Among 34% of the respondents who noticed behavioral changes, 30% noticed that they were happy/calm/relaxed. While 24% either felt irritable, aggressive or depressed. 62% wanted the media to play an active role in promoting awareness of health hazards of using earphones, while 61% wanted such health hazards related surveys to be conducted in the future. Responses to questions are summarized in Tables 1 and 2.

Table 1 Responses showing practice of using earphones among participants.(n=306)

	Yes	No
Do you use earphones?	94%	6%
Do you know the difference between protective earphones and routine earphones?	30%	70%
Do your parents have any concern about your use of earphone?	29%	71%
Do you think having to turn up the TV/radio volume higher than normal is a sign of hearing loss?	60%	40%
Have you noticed any behavioral changes in yourself from long term use of earphones?	34%	66%
Do you obey manufacturer warning regarding the use of earphones?	33%	67%

Table 2 Responses to questions regarding use of earphones.

	Frequency (%)
How long have you been using earphones?	
1-3 years	101 (33)
4-6 years	117(38.2)
7-10 years	47(15.4)
Above 10 years	23(7.5)
How many days a week do you use earphones?	
Twice a week	67(21.80)
Thrice a week	74(24.1)
More than 4 days a week	165(53.9)
How many hours a day do you use your earphones?	
less than 1 hour	77(25.2)
1-2hours	79(25.8)
3-4hours	63(20.6)
more than 4 hours	69(22.5)
During which activities (indicate all that apply) do you use your earphones?	
Studying/during class	10(3.3)
Walking/jogging	53(7.3)
Driving/travelling	70(2.9)
Working	21(6.9)
Exercising	36(11.8)
Relaxing	98(32)
Have you noticed any behavioral changes in yourself from long term use of earphones?	
Yes	104(34)
No	112(36.6)
Maybe	58(19)
I don't know	14(4.6)
Do you set listening device at higher volumes when you are in a noisy background?	
Yes	168(55)
No	58(19)
Sometimes	79(26)

Do you think that ringing in the ears is a warning sign for overexposure to potentially hazardous sound?	
Yes	165(54)
No	55(18)
May be	67(22)
I don't know	183(6)

It has been found that half of the students (50%) agreed that earphones at loud listening levels may damage hearing and that ringing in the ears is a warning sign for overexposure to potentially hazardous sound. This finding is statistically significant on application of chi-square test ($p=0.000$). A noteworthy amount of the participants (66%) began using earphones because of music itself ($p=0.001$). Use of higher volume was significantly associated with noisy background despite manufacturer's warnings for safe use of earphones ($p=0.021$). Habit of using earphones for 1-4 years was associated with longer duration of earphone use on daily basis i.e. more than 3 hours ($p=0.002$). Our study reveals that 46% of the students would not obey manufacturers' warnings regarding safe use of earphones but agree that earphones should be labeled with warnings that use at higher volume levels can cause hearing loss ($p=0.04$). Majority (52%) of students knew that having to turn up the TV/radio volume higher than normal is a sign of hearing loss and also agreed that earphones should be labeled with warnings that use at high volumes can cause hearing loss ($p=0.046$). To our surprise 42% of the students did not know the difference between protective and routine earphones and it was associated with listening at higher volumes when in a noisy background. test ($p=0.011$).

DISCUSSION:

Hearing loss due to earphone usage is becoming a major health concern as young adolescents are habitual of using earphones incessantly when compared to the older generations. They tend to use earphones during daily and leisurely activities such as walking/jogging, driving/travelling, exercising, relaxing and even while studying. Some individuals use earphones for several hours at a stretch thus inadvertently putting their hearing at risk. Noise-induced hearing loss (NIHL) refers to a gradual, cumulative and preventable decline in auditory function that follows repeated exposure to loud noise. It is the leading cause of preventable hearing loss

Our study demonstrated that 94% of the partakers used earphones, of which 56% were females. This trend is comparable to the survey conducted by Sadaf Zia et al. Analogous to the study ordained by Amanda et al, 67% of our sample size was

represented by undergraduates (bachelors) as young people are more inclined to use earphones.

For the ease of analysis, the volume at which the users listened to music was categorized into low, moderate, high-full volume, of which 55%, 31% and 8% preferred high-full moderate and low volume, respectively. This corresponds to the study headed by Sadaf Zia et al, in which 48% preferred high to very high volume indicating common and significant results among studies.

Alarmingly, 65% of our sample population was unaware of the difference between protective and routine earphones; additively, 65% of the students' parents were not concerned about their prolonged use of earphones. Aforesaid disregard and heedlessness can lead to protracted exposure to excessive sounds which ultimately results in Noise Induced Hearing Loss (NIHL).

59% of the students set their listening devices at high volumes whenever in a noisy background as they would require a higher frequency to blunt the background noise. Considering students usually are in groups, it would require them to use them at a level higher which constitutes unsafe levels. Back in 2006, Fligor and Ives, conducted a study in which majority of the students using ear buds had to adjust their iPods to potentially unsafe levels in a noisy background.

Ninety percent of our respondents strongly agree that earphones should be labeled with warnings that use at high volumes can cause hearing loss implying that people should be informed through various manners as similar to cancer labeling on packets of cigarettes which was effective in lowering down their use. In a study comparable to such advices conducted by Jeffery L. Danhauer et al 45.9% of their respondents reported that they would follow such warnings.

61% of the students reported deteriorating hearing and 49% said that they had to turn up the TV/radio volume in order to hear better after using earphones. These findings are suggestive of NIHL which is a chronic condition and hence, develops secondary to a sustained usage of earphones.

A significant number of participants were aware of the health hazards of using earphones, 55% of the students agreed to the fact that turning up the TV/radio volume higher than normal is a sign of hearing loss, which is a hopeful sign that the general young population is aware of the issue and its irreversible effects. While 61% were aware that ringing in the ears is a warning sign for overexposure to loud sound. Another positive finding indicated that 74% of the students were aware that usage of earphones in some situations may be dangerous and 88% agreed that listening to music at high volumes may damage hearing. This finding is comparable with the study conducted by Richard Lichtenstein *et al*, in which 116 reports of death or injury to pedestrians wearing headphones pressing another effect that awareness of surrounding and environment and cognition can also be hampered. In about 55% of the cases, trains were involved and 67% were less than 30 years of age.

61% of the students acquiesced to paying no heed to the manufacturers' admonition regarding cautious use of earphones in the future, in spite of being aware of the consequent health risks; a proclivity often observed in teenagers and young adults.

From among those who noticed behavioral changes after long term usage of earphone, 30% reported feeling happy/calm/relaxed, pointing to the fact that tunes were resonating with their feelings. While 24% revealed that they either felt irritable/aggressive/depressed possibly due to the nature.

Sixty-two percent of the students want the media to play an active part in promoting awareness as it is widely used and accessed by a higher proportion of population and 61% thought such surveys should be conducted about health hazards of using earphones in order to mitigate the side-effects of hearing at higher frequency levels causing sometimes indefinite hearing loss. Nowadays NIHL is irreversible, necessitating as much effort as possible being put toward prevention. These activities should include identification of high-risk noise exposures, particularly those affecting young people, improvement of noise legislation and effectiveness of use of hearing protectors

CONCLUSION:

The results of our study revealed sufficient cognizance of the respondents regarding the health jeopardizing nature of using earphones. They unanimously agreed that such enlightening information should be dispersed through various mediums. However, they themselves were reluctant to practice the preventive measures.

RECOMMENDATIONS

- 1) Manufacturers of earphones and personal listening devices must be encouraged to provide safer listening environment to users by warning them against the dangers of listening at high volumes.
- 2) Health workers, teachers and parents should play an active and effective role in providing health education to children on the safe and judicious use of earphones, as children are vulnerable at this tender age.
- 3) Mass media promotion can help in creating awareness and simultaneously, motivate the public to use the earphones in a more secure manner.

REFERENCES:

1. Your earphones could make you sick! Healthsite.com, January 22, 2015.
2. Mcmanus M R, Earbuds vs. Headphones. Howstuffworks.com/home/tech/electronics/gadgets/audio and music gadgets
3. Headphone Safety, Tony Woolf, acoustics.com
4. Stony Brook Surgery. "Headphones & Earphones Can Cause Permanent Hearing Loss." Stony Brook School of Medicine. N.p., 23 Aug. 2013. Web. 4 Dec. 2015.
5. Kirchner DB, Evenson E, Dobie RA, Rabinowitz P, Crawford J, Kopke R, Hudson TW. Occupational noise-induced hearing loss: ACOEM Task Force on Occupational Hearing Loss. *Journal of Occupational and Environmental Medicine*. 2012 Jan;54(1):106-8.
6. Keith SE, Michaud DS, Chiu V. Evaluating the maximum playback sound levels from portable digital audio players. *Journal of Acoustical Society of America*. 2008 Jun;123(6):4227-37.
7. Petrescu N. Loud music listening. *McGill Journal of Medicine*. 2008 Jul;11(2):169-76.
8. Vogel I, Verschuure H, van der Ploeg CP, Brug J, Raat H. Adolescents and MP3 players: too many risks, too few precautions. *Pediatrics*. 2009 Jun;123(6): e953-8.
9. Osteopathic.org/osteopathic-health/about-your-health/health-conditions/general-health-headphone-safety
10. Lichenstein R, Smith DC, Ambrose JL, Moody LA. Headphone use and pedestrian injury and death in the United States: 2004-2011. *Injury Prevention*. 2012 Oct;18(5):287-90.
11. DelGiacco, A.M., Serpanos, Y.C., & Gunderson, E. (2015). Education and Knowledge of Noise Exposure, Hearing Loss, and Hearing Conservation in College Students. 2015 Volume 42 :88-99.
12. Dayna S. Dalton, Karen J. Cruickshanks, Terry L. Wiley, Barbara E.K. Klein, Ronald Klein & Ted S. Tweed (2001) Association of Leisure-Time Noise Exposure and Hearing Loss:

- Asociación entre exposición a ruido durante el tiempo libre e hipoacusia, *Audiology*, 40:1, 1-9.
13. Peng JH, Tao ZZ, Huang ZW. Risk of damage to hearing from personal listening devices in young adults. *Journal of Otolaryngology*. 2007 Jun;36(3):181-5.
 14. Toh ST, Lu P, Ong M, Seet B. Prevalence of hearing disorders in Singapore military conscripts: a role for routine audiometry screening? *Singapore Medical Journal*. 2002 Dec;43(12):622-627.
 15. Pandey D, Saroshe S, Dixit S, Sabde Y. Estimation of prevalence of headphone usage during driving and awareness about their health hazards among medical undergraduates *International Journal of Community Public Health* 2015 May;2(2):167-171.
 16. Zia S, Jawaid MA, Bilal M, Farooqui T, Lakhani F, Tabassum L, Shaikh SM. Noise-induced hearing loss related to personal music players- awareness level among the young users in a developing country. *Journal of Dow University of Health Sciences* 2014; 8(1): 11-15.
 17. Ising H, Hanel J, Pliggram M, Babisch W, Lindthammel A. Risk of Hearing Loss caused by listening to music with headphones *HNO* 1994;429:764-8.
 18. Redhead JT. Oto-acoustic emissions and recreational hearing loss. *The Medical Journal of Australia* 1998;169(11-12):587-588.
 19. Robinson T, Whittaker J, Acharya A, Singh D, Smith M. Prevalence of noise-induced hearing loss among woodworkers in Nepal: a pilot study. *The International Journal of Occupational and Environmental Health* 2015;21(1):14-22.
 20. Fligor BJ, Cox LC. Output levels of commercially available portable compact disc players and the potential risk to hearing. *Ear Hear*. 2004 Dec;25(6):513-27.
 21. Danhauer JL, Johnson CE, Byrd A, DeGood L, Meuel C, Pecile A, Koch LL. Survey of college students on iPod use and hearing health. *American Academy of Audiology*. 2009 Jan;20(1):5-27; quiz 83-4.
 22. Holmes AE, Widén SE, Erlandsson S, Carver CL, White LL. Perceived hearing status and attitudes toward noise in young adults. *Journal of the American Academy of Audiology*. 2007 Dec;16(2): S182-9.
 23. 23. Vogel I, Brug J, Van der Ploeg C P B, Raat H, Adolescents risky MP3-player listening and its psychosocial correlates, *Health Education Research*. April 2011;26(2):254–264.
 24. 24. Brian J, Terri E. (2006) Does earphone type effect risk of recreational noise - induced hearing loss? *Etymotic Research Incorporation*.
 25. 25. Bakker, Bart & Rooijen, Johan & Toor, Leo. (2014). The System of social statistical datasets of Statistics Netherlands: An integral approach to the production of register-based social statistics. *Statistical Journal of the IAOS*. 30. 411-424. 10.3233/SJI-140803.
 26. 26. Niskar AS, Kieszak SM, Holmes AE, Esteban E, Rubin C, Brody DJ. Estimated prevalence of noise-induced hearing threshold shifts among children 6 to 19 years of age: the Third National Health and Nutrition Examination Survey, 1988-1994, United States. *Pediatrics*. 2001 Jul;108(1):40-3.