

Noise-Induced Hearing Loss related to Personal Music Players- Awareness Level among the Young users in a Developing Country

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ABSTRACT

Introduction: Since the first introduction of personal portable players in June 1979, the younger generations are exposed daily to high levels of noise which is higher with use of insert earphones/ headset. This is leading to Noise Induced Hearing Loss (NIHL) at a younger age. NIHL is an important public health priority because, as people live longer and industrialization spreads; NIHL will add substantially to the global burden of disability. This may have a major economic impact on the community as these teenagers and young adults may require hearing aids at a younger age.

Objective: To assess the awareness among young users of personal music players (PMP) with headset/insert earphones about NIHL caused by these devices. To assess presence of symptoms related to prolonged noise exposure.

Material & Methods: A cross-sectional questionnaire based survey was conducted on 400 university-going students.

Results: The participants were from 19-22 years of age. Male to female ratio was 1:2. Though 80% of our respondents had some knowledge about NIHL but very few were changing their practices for protection of their hearing. Twenty two percent of respondents are experiencing hearing impairment and 29% difficulty understanding speech despite their young ages. 27% had tinnitus while 21% had vertigo following prolonged exposure to noise.

Conclusion: Majority of users of audio devices surveyed were listening to music for more than 1 hr/day at moderate to high volumes. Although more than three quarters of our respondents knew something about NIHL, but less than one third of them were actually practising hearing protective measures.

Key words: Noise induced hearing loss, recreational music, personal music players, insert ear phones.

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INTRODUCTION

Young adults and adolescents are now a days constantly exposing themselves to loud music for entertainment purposes. Listening to personal music player (PMP) such as MP3 players, i-pods, or even music players on mobile devices has become quite popular. Most of these individuals are somewhat aware that exposure to continuous loud music can result in hearing loss but most do not appreciate that it can become permanent.¹ Moreover the recent trend to use insert ear phones

increases the risk as they increase the output of audio devices by 7-9db.^{2,3} Thus increasing the potential to cause Noise induced hearing loss (NIHL). It is important to understand that the Hair cells in cochlea once damaged are lost permanently as they cannot regenerate.⁴ This kind of hearing loss can be accompanied by tinnitus⁵ and vertigo.⁶

Chung et. al. had reported in their study that hearing loss was considered a big problem by only 8% of respondents as compared with other health issues in a survey conducted on 9693 respondents of a questionnaire-based survey.¹ In addition, 61% of respondents had experienced tinnitus or hearing impairment after attending concerts. Only 14% of respondents had used earplugs for noise protection. In their study 66% respondents said that they could be motivated to use ear protection if they were made aware of the potential for permanent hearing loss.

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The importance of protection lies in the fact that humans have a fixed number of cochlear hair cells which if damaged do not regenerate.² A large American national health survey indicated that 12% to 15% of school aged children have some hearing deficits which may be related to noise exposure.⁷ In another study hearing tests done on 538 teenage boys revealed a hearing loss greater than 15db in 15% which was related to noise exposure.⁸ In a Chinese study of 120 young users of PMP had impaired hearing loss (greater than 25db) in 14% of the participants.⁹

NIHL is an important public health priority because, as people live longer and industrialization spreads; NIHL will add substantially to the global burden of disability.¹⁰⁻¹² It is a strongly held view that the damage caused by chronic noise exposure is cumulative over the years. Brian J. Fligor and L. Clarke Cox have given recommendation for avoiding recreational NIHL as up to one hour per day for earphones with up to 60% of volume.² The purpose of this study is to assess the level of health priority and awareness NIHL has among adolescents and young adults of a developing country. Although there has been research regarding occupational NIHL, there has been no research regarding recreational NIHL among PMP users in Pakistan.

OBJECTIVE

To assess the level of awareness among young university going students about NIHL caused personal music players (PMP) with headset/insert earphones. And also to document presence of other ear related symptoms associated with prolonged exposure to noise such as tinnitus and vertigo.

MATERIAL & METHODS

It was a prospective study. A cross-sectional survey was designed to be conducted on University-going day scholar students of a metropolitan city who had no known co-morbid. The survey was conducted on University going students as PMP is most popular among this age group as shown by previous studies on the subject and the variables of education and age was kept similar. A survey questionnaire consisting of 25 questions was given to each respondent. The questionnaires were distributed manually by the research team to students. It was collected back from them after being filled on the same day in person by members of the team. The study was conducted from August 2011 – November 2011 on 400 respondents. Convenience sampling technique was used. Data were analyzed on SPSS 16.0. Frequencies and comparative analyses was done using chi-square test and p-values were calculated for the related data. A p-value of 0.05 was considered as significant. Only users of music devices along with

insert ear phones/ head sets were included in the study and non users of PMP with insert ear phones / headsets were excluded from the study. Informed consent was taken from each individual before giving out the questionnaires.

The volumes of PMP were described as low when upto 25% of capacity, 25 – 50% of capacity as moderate; 50 – 75% of capacity as high and 75 – 100% of capacity as very high. Tinnitus was defined as ringing or buzzing sound in the ear when there is no external stimulus. Vertigo is defined as a rotatory or spinning movement of surroundings felt when one is stationary.

The RISK GROUP was defined as those using PMP for more than 1 hour at moderate to high volumes. Ethical consideration:

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RESULTS

We surveyed a total of 400 individuals. The participants were from 19-22 years of age. Male to female ratio was 1:2. Approximately 57% of our participants used insert earphones with their PMP, 32% used headphones and the remaining used a combination of both.

Duration of use of PMP: It was found that 29% of individuals were using their devices for 5 years or more (fig. 1). Thirty nine percent of respondents were using PMP for upto 1 hour daily. Forty seven percent respondents listened through their devices for 1-8 hours. Thirteen percent were using it for more than 8 hours per day; both these groups falling in the high risk group fig. no. 2.

Volumes of PMP: Twenty nine percent of these individuals were listening at a high volume and 19% at a very high volume for listening to PMP. About 36% of participants felt that they are now listening at higher volumes than before.

Awareness of NIHL related to PMP: 70% of the participants had read, seen or heard something related to NIHL related to music players before filling out the survey questionnaire. Interestingly, we found that about 84% of users were aware that listening to music at high volumes can cause some hearing loss. About 60% were aware of how to protect their ears from noise-induced damage. Although approximately 41% were slightly and 28.5% were highly concerned about their hearing loss (fig. 3); but still only 23% actually using hearing protective devices when required, fifty seven percent were taking a break within one hour of listening

to PMP. Thirty three were taking a break after 1 Hour and 10% of individuals were not taking a break at all.

Figure 1: Duration of PMP use in years

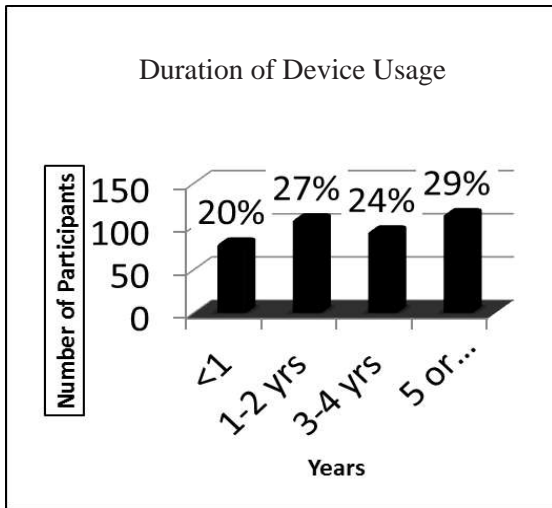
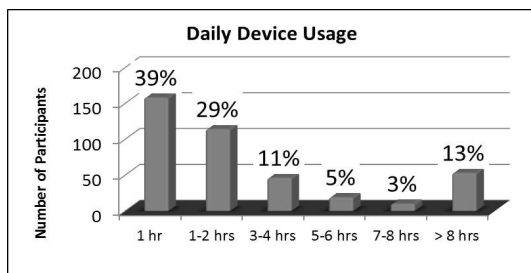


Figure 2: Duration of daily PMP use



Approximately 81% said that they were likely to take preventive measures if they gained more knowledge about NIHL from a health-care professional. Such measures include the usage of earplugs/earmuffs when going to concerts, lowering the volumes on their PMP devices and taking a break while listening to PMP.

Hearing Loss: Twenty two percent of participants subjectively felt that they were having some degree of hearing loss (perception of sound) and in 27.5% other people had mentioned it to them that they were listening at higher levels than before Table.1. When hearing loss was compared with the duration of PMP usage/ day the p-value was 0.02 which is significant.

Understanding of Speech: Twenty nine percent of our participants had noticed that they were experiencing difficulty in understanding speech (conversation). In this group of individuals 11% have difficulty understanding speech on the phone and 12.8% reported difficulty in general daily activity. In this group when

Figure 3: Concern for Hearing loss

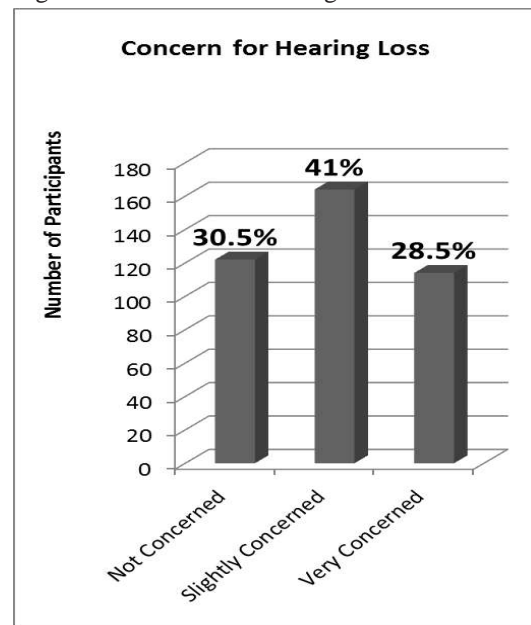


Table 1: Correlation between the Daily hours of PMP usage and symptoms n=400

Daily usage of PMP in hours	Difficulty Hearing	Difficulty Understanding Speech	Tinnitus	Vertigo
1 hour	26	41	48	43
1-2 hours	24	42	30	17
3-4 hours	11	13	19	12
5-6 hours	3	2	8	8
7-8 hours	6	5	3	1
more than 8hr	10	13	1	3
Total	(20%) 80	(29%) 116	(27%) 109	(21%) 85
p-value	0.02	0.077	0.006	0.000

understanding speech was compared with the duration of daily use of PMP, it was found that 65% were listening to their devices for more than 1 hour/ day. It is worth mentioning here that people are experiencing difficulty even within 1 hour of daily listening to PMP.

Tinnitus: Twenty seven percent of our participants said that they experienced tinnitus after listening to PMP. (Table 1). In this group of individuals 70% listened to their PMP for more than one hour daily. 30% were listening for an hour or less per day. It should be noted that people are experiencing tinnitus even when they are well within the one hour recommended time for safe listening to PMP. When tinnitus was compared with the duration of device usage per day, the p-value came out to be 0.006, which is significant.

Vertigo: Twenty one percent of our participants said they experienced vertigo (Table 1). In this group of individuals 48.2% listened to PMP for more than one hour a day. In the remaining 50.5% experienced vertigo after listening to PMP for even an hour or less per day of usage. When vertigo was compared with the duration of usage of PMP/ day, the p- value came out to be as 0.000, which is significant. Vertigo can be an initial sign of dysfunction/ cell damage in these individuals. It should be noted that these were otherwise healthy individuals and vertigo is not a common complaint in this age group.

DISCUSSION

Noise induced hearing loss is now becoming a major health concern as our youth are becoming habitual of using PMP with earplugs/ headphones more frequently than their previous generations. They are in the habit of listening to these devices while walking, talking, exercise and even while studying. Some of the individuals use PMP for hours at a stretch without a break. This modern style of living has put them at risk of permanent hearing loss at a younger age as compared to their older generation.

Our study showed that 57% of the total 400 participants used ear phone style PMP. Others used headphones or a combination of both. This trend is more pronounced in a study conducted by Samit et al. In their study the trend of using head phone was 89 % in graduate students.¹³ The majority in our study were females (69.5%). This trend is comparable to Ineke Vogel et al. in their survey.¹⁴ In our study most of the users showed risky hearing habits with only 40% using it for upto one hour; 47% using it for more than one hour but less than 8 hours; 13% of users using for more than eight hours without taking a break at all while listening to PMP. These individuals were falling in the high risk zone for permanent hearing loss. In a Dutch survey out of 1687 secondary school going adolescents 90% were reported to use MP3 with earphones and 28% were using it for > 1hr at 89db.¹⁵

The volumes reported in our study were 29% and 19% for high and very high volumes respectively; this is less as compared to the study conducted by Samit et al which was 55%.¹³

The major problem faced by clinicians is not only the lack of awareness among young adults and adolescents; it has been seen that even if these individuals have some knowledge about NIHL they still show the reluctance to implement their knowledge about preventive measures for NIHL.¹⁶⁻¹⁸ Regarding awareness most of our study participants (84%) were aware that listening to music at high volumes can cause

permanent hearing loss. This is less when compared to the study done by Samit et al.¹³ Unfortunately, despite their concern only 23% were doing anything practically to protect themselves such as giving breaks in between listening to PMP for noise protection. Eighty one percent expressed interest in improving their hearing practices if given better guidance by a health care worker about the importance of giving breaks and keeping their volumes low while listening to PMP.^{1,13}

Twenty percent of participants subjectively felt that they were experiencing some degree of hearing loss. In 27.5% individuals other people had mentioned it to them that they were hearing at a louder level than before. This is less as compared to the literature. Chung et al. has reported 43% self reported hearing loss.¹ In our study when hearing loss was compared with the duration of PMP usage /day the p-value was 0.02 which is significant.

Twenty-nine percent participants had noticed that they were experiencing difficulty in understanding speech. Interestingly in this group of individuals 36 % had noticed that they are listening to music at much higher volumes now than previously. This may be a subtle sign of the progressive hearing loss which they might be experiencing without appreciating it consciously. Ineke et al. found that 48% of PMP users were using the high volume setting and 33% were increasing the volume after sometime; this is more as compared to our study.¹⁴

An important sign that the noise may be causing hair cell damage in the cochlea is tinnitus¹⁹ which was experienced by 27% of our study participants. This is also less as compared to the international reported data by Regina et al. In their study it is 36% for sound technicians and 11.6% for the control group.²⁰ Another important sign of vestibular hair cell damage is vertigo which has been experienced by 21% of our subjects. A study conducted on 258 military personnel concluded that NIHL may be related to vertigo only when there is asymmetrical hearing loss.²¹ Vertigo is not a common complaint in this age group; therefore it needs to be evaluated further.

LIMITATIONS

The limitation of our study is that we need relevant test to confirm our findings of subjective feelings of hearing loss, tinnitus & vertigo. Another study should be conducted to confirm these findings.

CONCLUSION

Majority of users of audio devices surveyed were listening to music for more than 1 hr/day at moderate to high volumes. Twenty two percent of respondents were experiencing hearing impairment and twenty nine

percent had difficulty understanding speech despite their young ages of 19-22 years. Although more than three quarters of our of respondents knew something about NIHL, but less than one third of them were actually practising hearing protective measures. Tinnitus and vertigo may be an initial symptom of hair cell damage which needs to be evaluated further in another separate study. Most adolescents and young adults were willing to change their practices if proper guidance would be given to them about NIHL and how to take preventive measures against it. Mass media campaign can help in creating awareness and public motivation about this potential health hazard.

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Informed consent: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.”

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