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Original Article

Survey of Recreational Noise Exposure through the Use of Personal Music Players in Young Nigerian Adults

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ABSTRACT

Background: Personal music players (PMPs) are widely used among young adults of Nigeria, but information on knowledge about their usage and effect on hearing health has not been studied in Nigeria.
Objectives: The aim of the study was to determine the pattern of usage, knowledge and attitude towards loud sound output from PMPs among young Nigerian adults.
Methods: This was a prospective, observational survey. Subjects were recruited from a cross-section of undergraduate students of Obafemi Awolowo University, Ile-Ife. A structured questionnaire that detailed the type and usage of PMPs was administered. Subjects were also asked about episode of adverse hearing effects and the attitude of the respondents to issue of recreational noise and hearing loss.
Results: There were 985 respondents, comprising 594 (60.3%) males and 391 (39.7%) females. Of the 985 students, 967 (98.2%) admitted listening to music on PMPs. The mean age of the student was 24.4 (6.0) years, with 891 (92.1%) of the 967 using earphones while listening to music. Mobile phones were the most common PMPs being used by 768 (79.3%) of the respondents. Five hundred and thirty (54.8%) were listening to music for more 1 h per day and 536 (55.4%) were listening to music for more than 3 days per week. Further, 502 (52.3%) were listening to music at the level of loudness, which was self-assessed to be high volume.
Conclusions: Mobile phones are the most common PMPs in the present study population and most of the respondent were listening to music at the level of loudness that should call for concern.

Key words: Personal music players, recreational noise, tinnitus, young adults

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INTRODUCTION

Noise exposure constitutes a hearing health risk. Occupational noise exposure has received most attention as a cause of noise-induced hearing loss in the past.[1] However, other sources of noise exposure relevant to the present realities, such as noise exposure from recreational activities such as the use of personal music players (PMPs), are now emerging.[2]

The use of PMP has been shown to be popular among teenagers and young adults.[2] It has also been shown that high-school students are most likely to listen to their PMPs for longer periods at higher settings when compared with other adults.[3] Knowledge with the free-field equivalent sound pressure levels (SPLs) measured at a maximum volume control setting of PMP ranged from 91 to 125 dBA,[4,5] and the fear that the use of these devices may be dangerous to hearing health is justified.[2,6-9]

On the contrary, some reports showed that the use of PMPs has no damaging effects on hearing. Rabinowitz[9] found that there was no significant change in hearing level following regular use of PMP by subjects. Nevertheless, a study by Peng *et al*.[10] had shown that early acoustic trauma in the cochlea was in the extended high-frequency range of 10–20 kHz, and such may not be picked by the usual audiometer.[10]

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The present study focussed on how PMPs were being used by university students. It focussed on extent of usage, knowledge and attitude of the students towards improper usage as well as the potential risk associated with the usage of PMP.

MATERIALS AND METHODS

A survey questionnaire was designed to explore the use of PMP among young adults using students of Obafemi Awolowo University, Ile-Ife, as the study population. The survey was carried out in 2011. Participants were students who volunteered to complete the questionnaire after brief introductions. The questionnaire was administered to consecutive participants in the lecture theatres, lectures rooms and hostels using research assistants.

Items in the questionnaire included demographic characteristics and knowledge, attitude and belief about the use of PMP. The questionnaire also included questions to assess the frequency of use of PMP, listening duration and the loudness level at which participant usually listen to music, using a chosen listening level (CLL). There were also questions exploring episodes of adverse hearing effects such as tinnitus and hearing loss from excessive the use of PMP and attitude questions on protecting the ear from loud sound. The survey questionnaire is shown in Appendix I.

RESULTS

There were 985 respondents comprising 594 (%) males and 391 (%) females. Of the 985 respondents, 967 (98.2%) were using PMP. The ages of the participants ranged from 16 to 30 years with a mean age of 24.4 (6.05) years. Further analysis was based on the 967 respondents who were using PMP.

Table I shows the distribution of PMPs, listening duration per day, listening frequency per week, listening frequency per week and the usual listening volume. Mobile phones were the personal music system being used by 768 (79.4%) of the respondents while a total of 891 (92.1%) of the respondents were using earphones while listening to music on PMP. Five hundred and thirty (54.8%) were listening to music for more than 1 h per day and 536 (55.4%) listening to music on PMP for at least 3 days in a week. Five hundred and six (52.3%) were listening to music with the volume setting at a level considered to be high.

Table II shows the distribution of responses to questions on knowledge, attitudes and beliefs. Eight hundred and forty (86.9%) of the respondents believed that they were at risk of hearing impairment with the usage of PMP. Only 80 (8.3%) however knew anyone who had hearing loss from loud music.

There was an association between attitude and knowledge (P = 0.000) and association between attitude to loud music from PMP and the tendency to take protective measures against loud music from PMP (P = 0.000). The experience of transient tinnitus and hearing loss did not significantly influence the tendency of the subjects to take protective measures against hearing loss (P = 0.31) [Table III].

Table I: Summary of the listening habits of the participants

	n (%)
Personal music system	
Mobile phone	768 (79.4)
MP3 player	178 (18.4)
Apple iPod	116 (12.0)
Computer	241 (24.9)
Discman	38 (3.9)
Others	109 (11.3)
Use of earphones while listening to music	891 (92.1)
Listening duration per day (h)	
<1	430 (44.5)
1-3	318 (32.9)
>3	212 (21.9)
Not given	14 (1.4)
Listening frequency per week (days)	
Once	194 (20.1)
1-3	215 (22.2)
>3	536 (55.4)
Not provided	22 (2.3)
Usual listening volume	
Low	381 (39.4)
Medium	87 (9.0)
High	506 (52.3)

Table II: Responses to knowledge attitude and belief questions

Responses	*n* (%)
Subjects who believe they have risk of HI from PMP	840 (86.9)
Subjects who believe young people can have HI	757 (78.3)
Subjects who believe they have personal risk of HI	357 (36.9)
Subjects who have awareness of risk of HI from loud music	867 (89.7)
Subjects who know people who have hearing loss due to loud music	80 (8.3)
Subjects who know that HI due to loud noise cannot be treated medically	332 (34.3)
Subjects who have taken steps to reduce your noise exposure from PMP	577 (59.7)

PMP: Personal music system, HI: High-intensity

DISCUSSION

The present study focussed on university students who were mainly young adults. A similar study by Torre[7] also focussed on students. The present study was, however, different from the approach in the Zogby[3] survey in which participants aged 18 years and above were studied.

There were no significant sex differences in the listening volume and length in the present study. This was in agreement

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Table III: Relationship between attitude knowledge and attitude to loud music from personal music system and relationships with tendency to take protective measures

	P
Knowledge of effect of loud music on hearing	0.00
Belief that young people can have HI from loud music	0.00
Belief in personal risk	0.01
Previous warning or education on negative effects loud music on hearing	0.00
Knowledge or awareness of anyone who has hearing loss due to loud music	0.00
Belief that HI due to loud noise cannot be treated medically	0.00
Transient tinnitus or temporary hearing loss after listening to loud music?	0.31

HI: High-intensity

with the findings of Zogby[3] but different from the findings of Torre,[7] which showed significant higher listening volume and length in males than females.

The present study showed a high prevalence of use of PMP among young adults. Mobile phones were the most prevalent PMP, with over two-third of the respondents listening to music on mobile phones. In similar studies, mobile phones were however not classified as MP3 players but had become an essential music playing components in recent mobile phones. The approach in the present study was justified because the previous works were carried out before the global boom of smartphones that have now made mobile phones widely available.[3,7]

A very important finding in the present study was that an overwhelming majority of the students were using earphones while listening to music on MP3 devices. This finding should be a cause for concern because it has been established that there is an increase in the free-field equivalent of the SPL of sound delivered to the ear with the use of earphones.[11] This was found to be particularly disturbing since the majority of the students were also listening to music for more than 1 h in a day at the maximum volume setting.

While it may be difficult to estimate the actual exposure to noise from these devices, self-reported CLL was assessed the in the present study with responses set at low, medium and high noise levels. Various approaches have been used by different workers such as in the studies by Zogby[3] and Torre.[7] They included additional classes such as very low and very high noise levels. For example, Ahmed *et al.*[1] asked their respondents to report their CLLs as a percentage of the volume control; Hoover and Krishnamurti[11] asked participants to report their preferred volume settings by quartiles of the volume control; Danhauer *et al.*[12] used a 1–10 Likert scale to assess preferred volume control settings. The approach in the present study was the listening duration which was similar to the approach in similar studies in the use of response set [Table I].[3,7] Exposure was however further characterised in the present study by enquiring about the number of times of listening per week.

Similar surveys of university students showed that the majority of listeners were using PMP for about 2 h per day, with 16% listening for more than 3 h per day.[1,7,12] In Zogby survey, 30–44% reported listening to PMP at medium volume while the Torre found that 54% were listening to music at a medium level. Ahmed *et al*. found that the average setting of this group was 60% of the maximum volume, with 14% of listeners reporting levels >80% of the maximum volume. About half of the listeners reported using their players above 50% of maximum volume and 23% of listeners reported listening between 75% and 100% of the maximum volume level in the survey by Hoover and Krishnamurti,[11] whereas Danheuer *et al.*[12] found that 21% of the subjects listened at a '6' on the scale, 25% listened at a '7' and 26% listened between '8' and '10'.[12] In the present study, a higher percentage of the respondents were listening at high CLLs. The possible explanation for this finding in contrast to what was found in other previous studies was the fact that the design in the present study did not use the fine-grained classification of CLL as in the previous studies.

Although the validity of listeners' self-reported CLLs to actual CLLs was not firmly established in the literature,[2] self-reported CLLs are however still of value in estimating actual CLLs as listeners can report both the levels at which they typically listen and their listening duration.[2]

The findings that most of the respondents had knowledge of the possible deleterious effect of loud music on their hearing was encouraging. It was however not pleasing that despite the high use of PMP among respondents, most of them were still thinking that they did not have a personal risk of developing hearing impairment. This was perhaps due to the very low proportion of the respondents who knew anyone who had developed hearing impairment due to listening to loud music.

It was found in the present study that a majority of the participants had taken measures to reduce their exposure to noise from theses device. It was however strange that the attitude of taking these protective measures was not influenced significantly by the development of temporary hearing loss or transient tinnitus after listening to loud music. A possible explanation for this was due to the transient nature of the events. It was possible that they were regarded as 'normal' experience following exposure to loud music by the respondents. The attitude may need further exploration to clearly understand the reasons for this.

CONCLUSIONS

A high level of recreational noise exposure existed in the study population, and mobile phones constituted the most prevalent PMP in use. Judging from the findings in the present study, levels of noise exposure should be levels that call for concern. There appeared to be some awareness of the deleterious effect among the study population. Health education strategies should, therefore, emphasise factors found in the present study, such as knowledge of the effect of loud music, previous

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health education on the effect of noise and awareness of anyone that developed hearing impairment from loud music that significantly make respondents take protective measures. If proper attention is to be given to the regulation of listening volumes in PMPs, more will be achieved by focussing on mobile phones in the efforts at reducing recreational noise exposure may on the run deleterious to young adults.

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Conflicts of interest

There are no conflicts of interest.

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