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Knowledge and Practices Related to the Use of Audio Devices, and Their Ear Health Impact Among Teenagers in the UAE

Prajakta I. Dongritot[1],
Afrah Mazumder[1],
Arwa A. Mohammed[1],
Fariha N. Khazi[1],
[1] College of Medicine,
Gulf Medical University, UAE

Dr. Shatha Al Sharbatti[2]
[2] Head of Community Medicine Department,
Gulf Medical University, UAE

Abstract:- The study aimed to assess the levels of knowledge among teenagers in the UAE about the safe use of personal audio devices (PAD), the factors related to knowledge, and their impact on ear health, to determine the utilization patterns and the perceived impact on ear health by audio devices, among teenagers in the UAE. A cross-sectional study conducted among 292 students. A self-administered questionnaire was administered to teenage students from high schools in the UAE, of both sexes from grades 9 to 12. The Chi-square test was used to find an association between the categorical variables. Logistic regression was used to determine the determinants of knowledge, impact, and practice. Scoring was assigned to items that reflect knowledge, practice and impact, median score was taken as cut off to determine adequate level of knowledge, unsafe practice, and impact. Findings included a total of 161 male and 131 female students were enrolled (n = 292). 73.3% of students use personal audio devices. 49.5.% of students had adequate knowledge, female students had higher levels of knowledge than males. 50.3% (93) of the participants used the audio devices in an unsafe manner, the majority being males. The younger age groups, female gender, parents' education who did more than high school had adequate levels of knowledge. The most common impact experienced by using PAD was insomnia (41.1%), decreased hearing (21.6%) and numbness of the ear is the least common effect of using PAD (11.6%). The present study revealed that 49.5.% of students had adequate knowledge, female students had higher levels of knowledge than males. 92 (49.7%) of the participants undertook safe practice of using audio devices, whereas 93 (50.3%) had remarkably unsafe practices. The factors associated with adequate levels of knowledge were among younger age groups, female gender, parents' education who did more than high school. The most common impact experienced by using PAD was insomnia (41.1%) numbness of the ear (11.6%) was the least common effect of using PAD.

Keywords:- *PADs, Earphones, Headphones, Teenagers, Students, Knowledge, Unsafe Practice, Impact, Hearing.*

I. INTRODUCTION

Audio device (listening device) is a device used to transmit sound to the ear. Examples are headphones and earphones. [1] According to a study conducted in Brazil, teenagers were seen to utilize audio devices more as they occupy themselves with gaming activities, phones, and listening to music.[2] The main reason behind the occurrence of ear-related health issues like ear infections, hearing loss, numbness, etc., is due to a lack of awareness and knowledge regarding the use of audio devices among adolescence. [1,2,3]

The usage of earphones on a regular basis can increase bacterial flora, leading to ear complications such as infection or inflammation of the external ear canal.[4] Sharing audio devices with others can spread bacteria and infections from one person to the other.[5] The WHO has formulated guidelines to ensure the safe use of audio devices which talks about the duration and the volume at which sound should be heard when followed correctly will help to ensure its safe use. [1] Hearing impairment and hearing loss can occur when volume levels exceed 85 db. Constantly wearing earphones for more than 15 minutes, exceeding the safe range increases the risk of hearing loss.[6] WHO recommends that users maintain a safe listening range, take frequent breaks between using audio devices, and pay close attention to any signs of hearing loss.[1]

Understanding the importance of following healthy behavior related to audio device usage and knowing the consequences of not applying the same can reduce the severity of the problem. The previous study indicates that there is an incorrect use of earphones among adolescents and youth, including long periods of using earphones with high volume and intensity without taking a break. The authors suggested that this behavior could lead to a decline in the ear health of adolescents if the concern is not corrected.[7] According to studies conducted in Korea and Netherlands that included 2279, 5355 students respectively, there was a significant number of adolescents who suffered from various degrees of hearing loss (Korea, 17.2%, Netherlands 14.2%) due to listening to audio at high volumes.[8,9]

This topic is very relevant to today's generation as technology is important now. The teenage population most frequently uses audio devices, while they engage themselves in gaming activities, listening to music, etc. No study about this area of research has been conducted in the UAE, hence pronounces a knowledge gap. This study will attract the attention of the teenage population to this issue and can raise awareness among them. The results of this study can help school authorities, parents, and policymakers to develop strategies that can guide adolescents to use audio devices safely.

➢ *Objectives of the study:*

- To assess the knowledge among teenagers in the UAE about the safe use of audio devices, their impact on ear health, and factors related to knowledge.
- To determine the utilization patterns of audio devices among teenagers in the UAE.
- To determine the perceived impact of utilization patterns for the audio devices on ear health among teenagers in the UAE.

II. MATERIALS AND METHODS

➢ *Study Design:* A Cross-Sectional Study Design.

➢ *Study population*: Teenage students grade 9-12 in High schools.

➢ *Inclusion criteria*: Age*:* 10- 19 years

➢ *Gender:* Both Genders

➢ *Nationality:* Any Nationalities

➢ *Tool/ instrument for data collection, validation:* A self-administered questionnaire that included domains of socio-demography, knowledge about the adverse effects of audio devices, utilization pattern of audio devices, and impact of utilization of audio devices on ear health. Validation by two ENT specialists/ consultants preceded pilot tests including 5 students to check for clarity of the questions. Completion of the pilot study concluded no major changes in the questionnaire and ensured clarity. The final questionnaire was used for data collection.

➢ *Data Collection Method Methodology:* Final approval was obtained from the selected schools' management. The research team had a meeting with the school authorities after which a link to the online version of the questionnaire was sent to the respective school to be distributed among the students.

➢ ***Ethical Issues:*** Data collection started after approval from GMU Institutional Review Board (IRB). Parents and participants were informed about the objectives of the study and their right to refuse participation. The consent form mentioned the parents of the students below the age of 18 to read the consent form and permit their ward to participate. The study was anonymous. Data were analyzed with no link between the participants and the results. Confidentiality of the information was respected. Only the research team and IRB committee members may have access to the data.

➢ ***Analytical Approach:*** The data entered was on an Excel sheet and imported to SPSS version 29 to be analyzed. Descriptive statistics were used to show the data, chi square was used to know the significant association between the selected variables. Logistic regression was used to determine the determinants of knowledge, impact and practice.

➢ ***Scoring:*** Scoring for each domains were assigned. Knowledge scores was assigned to items that reflect knowledge on the adverse impacts of improper use of audio devices with a total score of 14. Scoring for Practice assigned to items that reflect unsafe practice (higher scores)/ safe practice(lower scores); total score of 29. A total of 5 items reflected Impact, with no cumulative scoring assigned to each item as each item reflected a unique Impact, hence analyzed individually. The Median was taken from the observed scores from all domains.

III. RESULTS

➢ *Description of the Sample:*

Our sample size was 438. We received 292 responses in total from all the schools (66.6%).

Table 1 Socio-Demographic Information

Variable	Subcategories	Number	%
Age	14 and less	28	9.6
	15	33	11.3
	16	72	24.7
	17	74	25.3
	18 and above	85	29.1
Gender	Male	161	55.1
	Females	131	44.9
Nationality	Indian, Sri Lanka, Bangladesh, Philippines (SEA)	214	73.3
	Pakistan, Afghanistan, UAE, Egypt, Iran, Iraq, Syria, Yemen (EMR)	78	26.7
Grade	9	32	11
	10	39	13.4
	11	87	29.8
	12	134	45.9
Father Education	more than high school	139	47.6
	High schools and less	153	52.4
Mother Education	more than high school	171	66.3
	High school and less	70	27.1

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Most participants in the study were aged 18 and above (29.1%) including more male participants (55.1%) than females (49.9%). Maximum participants were southeast Asians (73.3%). Most participants were in 12th grade (45.9%) and least from grades 9. Most of the parents' education, fathers who did more than high school was slightly less than those who did only High school and less, and the opposite for mothers.

➢ *Knowledge:*

71.9% of the participants felt that audio devices were not harmful. 79.8% of the respondents were aware of the side-effects

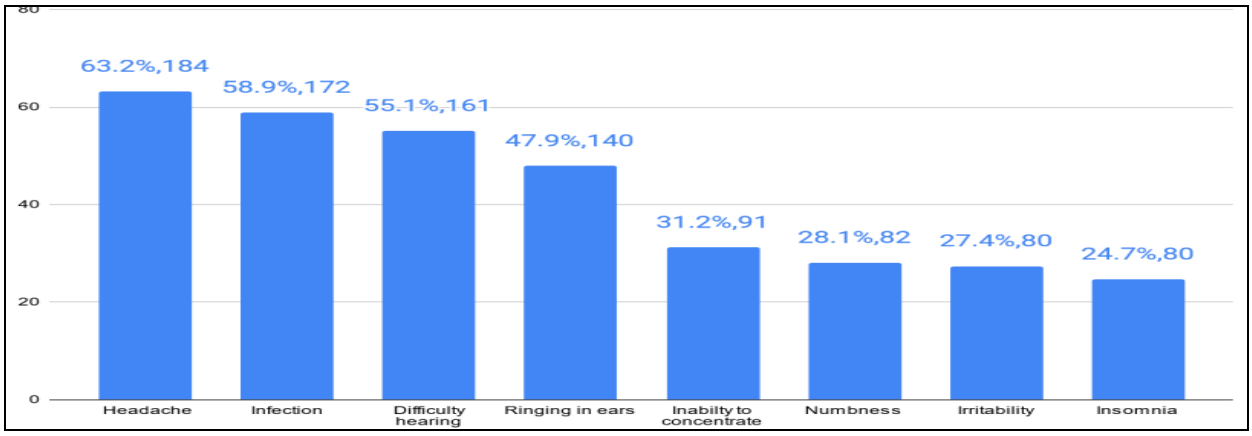

Fig 1 Awareness of the Symptoms of Harmful Effects of Audio Devices.

The most common harmful effect known by the students was headache (63.2%). The least known adverse effect of using audio devices was insomnia (24.7%) Level of knowledge: 146 (50.5%) of the participants had low levels of knowledge whereas 143 (49.5%) of the participants had adequate levels of knowledge.

➢ *Practice:*

A portion of 73.3% of students use personal audio devices. It was observed that 34.1% of the students used audio devices for less than 1 hour per day and 41.8% of the students preferred using their audio devices at a very loud volume. In addition, 72% of the students used audio devices in a continuous pattern. 64.5% of students said that they were told by people around them to reduce the volume of their audio devices. The majority take a break after 1 hour of using the audio devices (56.5%). Results show that 49.7% (92) of the participants use audio devices safely, whereas 50.3% (93) of the participants use the audio devices in an unsafe manner.

Table 2 Utilization Pattern of Audio Devices

Do you use personal audio devices (PAD)?	Yes	214	73.3
	No	78	26.7
How many hours/days are you using PAD	<1	95	34.1
	2-3	93	33.3
	4-5	91	32.6
What is your volume preference while using the PAD	Very loud	118	41.8
	Somewhat loud	91	32.3
	Loud	73	25.9
The pattern of using the PAD	Continuous	79	72
	Intermittent	203	28
While using earphones, do people around you tell you to reduce the volume?	Yes	189	64.5
	No	103	35.2
How frequently do you take breaks between sessions of using them?	After 1 hour	165	56.5
	After 2 Hours	63	21.6
	3 Hours	37	12.7
	No break	27	9.2

➢ *Impact:*

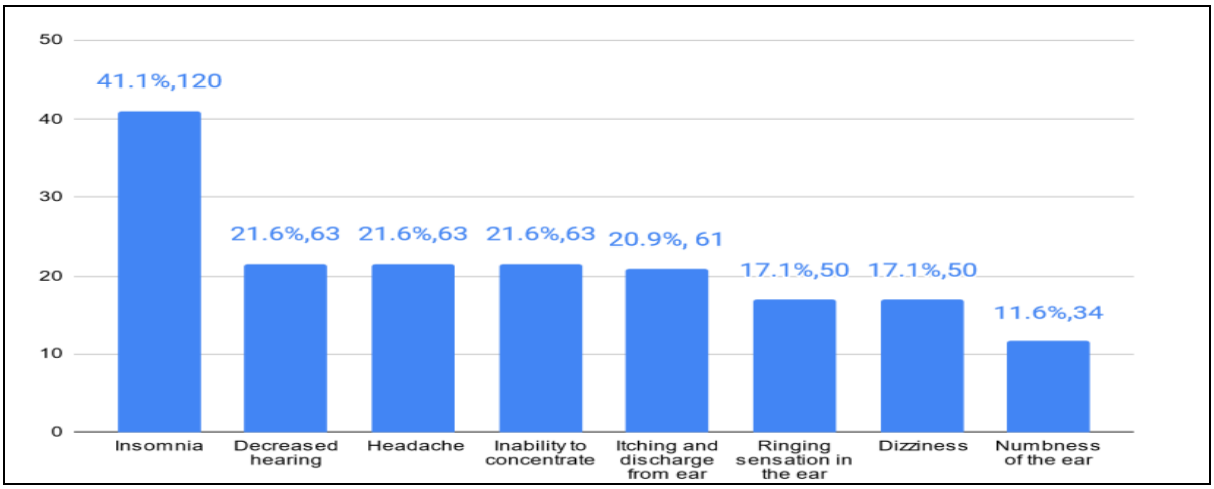

Fig 2 Symptoms Experienced by the Participants After Using Personal Audio Devices

The most common side effect experienced by using PAD was insomnia (41.1%), and numbness of the ear is the less common effect of using PAD (11.6%)

Table 3 Association Between Unsafe Practice and Impact.

Variable	Subcategories	Safe Practice		Unsafe Practice		P
		Number	%	Number	%	
Visited Dr. for ear health	No	76	52.4	68	47.6	
	Yes	17	41.5	24	58.5	0.215
Do you have any ear health issue	No	84	53.8	72	46.2	
	Yes	8	28.6	20	71.4	0.014
Have you visited the doctors for ear problems because of using audio devices?	No	89	51.1	85	48.9	
	Yes	3	30	7	70	0.193
Do people tell you that you raise the volume of the TV/ speakers, etc. too high?	No	75	52.4	68	47.6	
	Yes	17	41.5	24	58.5	0.215
Do you frequently ask people to repeat what they said?	No	89	51.1	85	48.9	
	Yes	3	30	7	70	0.193

There was an association between the improper issue of theaudio device and the ear health issue. (P value < 0.05). There was no significant association between practice and knowledge.

Table 4 Determinants of Unsafe Practice and its Impact

Question	Subcategories	No.	COR	C.I.		P value
				Lower	Upper	
Do you have any ear health issues?	NO	243	0.343	0.142	0.825	0.017
	Yes	48	1			

The unsafe practice of using audio devices has an impact on ear health, as there is a likelihood of the students experiencing ear health issues.

Table 5 Determinants of Unsafe Practice and Demographic Factors

Variable	Subcategory	No.	COR	C.I.		P value	AOR	C.I		P value
				Lower	Upper			LL	UL	
Age	14 and less	28	1							
	15	33	1.485	0.492	4.477	0.483				
	16	72	1.018	0.38	2.725	0.971				
	17	74	3.355	1.173	9.601	0.024	1.397	0.586	3.329	0.451
	18 and above	85	0.806	0.304	2.141	0.665				
Gender	Male	122	2.072	1.148	3.738	0.016	2.767	1.426	5.369	0.003
	Female	148	1							
Father Education	more than high school	131	0.481	0.267	0.867	0.015	0.352	0.181	0.685	0.002
	High schools and less	139	1							

Female gender, Fathers' education increase the likelihood of unsafe practice, and inferred by multiple regression; female gender and the fathers' education for those who completed high school and more have a higher risk and are a predictor for the unsafe practice of audio devices.

IV. DISCUSSION

➢ *Awareness and Level of Knowledge of Participants:*

The level of knowledge about the safe use of audio devices, and their ear health impact in the current study among participants is 146 (50.5%) of the participants have low levels of knowledge whereas 143 (49.5%) of the participants have adequate levels of knowledge. In this study, 79.8% of the respondents had knowledge about the adverse effects of using audio devices which means more than half of the total participants were aware. This percentage is higher than a study conducted from Saudi Arabia found that more than 50% of the participants had previous knowledge of the side effects of audio devices.[6] Headache is the most common side effect of using audio devices for a long time. In the current study, it was observed that headache (63.2%) was the most reported harmful impact of using audio devices.

Another study was conducted by Saurav Basu et al. in Delhi, India concluded that most of the participants were aware of headaches as a harmful effect with 80.4%, followed by hearing loss as the side effect of using audio devices [9]. The current study found that 35.4% of students knew about the safe limit for using the PAD at a loud volume, while 64.6 didn't. Moving to safe limits for using PAD at loud volume, 43% of the students did not have any idea about it. However, our data is very close to the finding from another study conducted by Saurav Basu. et al. in Delhi, India found that 80.5% of the students had knowledge about the risks of using audio devices.[9] Awareness is the first step toward the prevention of the harmful effects of audio devices. In the current study, 33.6% of students had awareness regarding audio devices' impact on ears/hearing, A study conducted in Saudi Arabia regarding the awareness of proper use of audio devices among adults and teenagers shows an acceptable level of awareness with 56.3%.[6]

The present study showed that the percentage of students who were aware of how to prevent the harmful effects of using audio devices, cleaning ears, cleaning Audio devices, not sharing, and reducing volume, (39.5%), (30.8%), (28.1%) and (27.1%) respectively. This is like the findings of other studies conducted by Saurav Basu. et al. in Delhi, India, and Jordan. [9][10]

➢ *The Practice of Participants:*

The current study, maximum of the students used audio devices for less than 2 years. In a study from KSA concluded that most of the participants used their audio devices for 1 to 5 years which has a lot of difference comparatively. [6] The harmful effects of audio devices also depend on their use whether used continuous or intermittent. In the current study, 71.7% of the student's pattern of using audio devices is intermittent and 28.3% of them are continuous. This tells us that most of the students are not using the devices in a regular fashion. In a study conducted by Saurav Basu et al. a total of 292 (75.3%) students used audio devices continuously for equal to or less than an hour. [9] Several studies revealed that sharing devices may lead to many problems unless followed safety cleaning methods, as bacteria can transfer from one another.

In this study, a majority of 65.4% do not share their audio devices whereas; In a study from KSA, maximum of the respondents did not share their audio devices.[6] In the current study, 34.1% of the participants used the audio device for less than 1 hour, 33.3% used it for 2-3 hours, and 32.6% used it for 4-5 hours. In a study done in India, most of the students reported using audio devices for more than 2 hours per day. In another study conducted by Sachdeva and Kumar found usage up to 2 to 4 hours per day using their audio devices.[11]

In the current study, 41.8% of the participants preferred the personal audio device at a very loud volume. In a study from Iran, the majority listened at a very loud volume.[12] In this current study, 73.3% of the students used personal audio devices and 26.7% did not. In a study conducted by Mohammadpoorasl et al., 745 (81.2) used audio devices and 100 (18.8) did not use them.[3] In the current study, 25.6% of respondents rarely cleaned their PAD. In a study conducted in Libya, 50% of the students did not clean their audio devices.[12] another study also found most users cleaned their audio devices weekly once. [13]

- *Impact:*

In the current study, the most effective experienced by using PAD were insomnia (41.1%). Following insomnia, decreased hearing (55.1%), headache (63.2), itching (20.9%), and ringing (47.95). A study conducted by Alarfaj et al. recorded the most frequent symptoms were itching (28%), while Tinnitus (ear ringing) (16.5%) was the least. [6] In the current study, 2.4% of the participants said that they tell people to repeat themselves. A study conducted by Hind Khalaf et.al found that 67% of the participants ask people to repeat themselves.[14] This indicates some degree of hearing loss as the participants require others to repeat themselves.

V. LIMITATIONS

The results cannot be generalized because of convenience sampling and only a few schools have participated. No medical assessment of the ear was performed by physicians to assess the impact on the ear health, impact was only perceived based on the responses of recorded symptoms. There is a possibility of recall bias as the questionnaire is long and the options might make the students face a systematic error. Hence, we recommend more studies to be conducted within a larger representative sample.

VI. CONCLUSION

It was found that 146 (50.5%) of the participants had low levels of knowledge and 143 (49.5%) had adequate levels of knowledge about the safe use of audio devices, their impact on ear health, and factors related to knowledge. The factors associated with adequate levels of knowledge were among younger age groups, female gender, parents' education who did more than high school. It was found that 92 (49.7%) of the participants undertook the safe practice of using audio devices, whereas 93 (50.3%) had remarkably unsafe practices.

There was a significant association between the improper use of the audio device and its impact on ear health issues. 66.4% of the students were not aware that audio devices negatively affect ear/ hearing. Moving to safe limits for using PAD at loud volume, 43% of the students did not have any idea about it. Hence there is a necessity to address the issue of low knowledge among students regarding the use of headphones in an unsafe manner and the consequences of the same.

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