Headphone/Earphone Usage Practices and its Health Effects among College going Students: A Cross-Sectional Study from South India

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Abstract:

Introduction: Noise induced hearing loss is one of the most common public health problems occurring due to use of headsets. The usage of earphone/ headphone has been increasingly used in the recent times due to online learning. **Objective:** To determine the usage practices of headphone/earphone and associated effects among college students of Tamil Nadu. **Method:** A cross-sectional study was conducted among college students in Tamil Nadu from January to February 2022. Snowball sampling technique was used, and 640 students respondedto a pre-tested semi-structured questionnaire circulated through online platform. **Results:** Out of 640 students, 57.1% were female students, 71.5% students used earphones for less than 5 hours, 32.5% students cleaned earphone daily, 46.6% didn't share their earphone, whereas 83.1% of students experienced at least one symptom or sign on using earphone. **Conclusion:** Due to online learning, earphone usage and its effects was increased among students in our study, so awareness about rational use of earphones is much needed among the younger generations.

Key Words : Earphones/ Headphones, Ear symptoms, Online learning, Students

Introduction:

Technology while turning into an imperative part of our life,Headphone/earphone usage is alsoproducing hazardous effects among users. Use of headphone/earphone for listening to music, watching videos and playing games has become a common practice among the students in recent times.[1] WHO has recommendedto limit the use of headphones and earphones to an hour per day.[2] It also stated over 1.1 billion people, aging 12 -25 were at risk of hearing loss.[3] In 1994, 3.5 percent of American teens experienced hearing loss. But that number rose to 5 percent by 2006. By the year 2050, nearly 2.5 billion people may have some degree of hearing loss and about 700 million might require hearing rehabilitation.[4]According to Indian Council of Medical Research, hearing impairment due to earphone usage is on rise in India and one out of every 12 people is a victim.[5]. About 6.3 percent of the Indian population suffers from progressive and acute hearing loss. Sound levels beyond 70 decibels and prolonged hearing for over eight hours may start damaging the hearing and sound above 120 dB cause immediate harm.[6] More literatures have reported overuse of earphone has resulted in dizziness, tinnitus, difficulty in understanding the speech and decreased ability to hear.[7-9] In recent times, due to the COVID-19 pandemic, education has undergone a drastic change with shift to virtual education. However, there has been an associated change in lifestyle with minimal or no physical activity of social life among students. With complete shift to online learning, there is a possibility of cumulative harm to sensory organs and mental health among the

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students. The potential for hearing loss is escalating every year among younger generation. Considering the increasing usage of earphone for online learning, this study was planned to determine the usage practices of headphone/earphone and associated effects among college students of Tamil Nadu.

Method:

Across-sectional study was conducted from January to February, 2022 during the early 3rd wave of pandemic with temporary shift to online learning among college students of Karpaga Vinayaga Educational Groups in Tamil Nadu. Students who were using earphones and willing to participate in the study were considered as study participants. Those individuals who were having any ear problems or hearing difficulties were excluded from the study population. The sample size was calculated using the formula $n=4pq/d^2$ (where Z=1.96 at 95% confidence); a similar study done by Poorasi AM et al reported the prevalence of hearing impairment as 60% (p), Taking 4% as absolute error[10]. Accounting for a 10% non-response rate, the sample size estimated was 640. A Pre-tested, semi-structured questionnaire consisting of the following sections was used as study tool- socio demographic details (like gender, course and year of study); Type, duration and usage of devices included (range of volume was taken with the warning shown when upper side button in android phones alerts, purpose of usage, maintenance of device, sharing the earphones);and physical symptoms experienced due to headphones/earphones usage. The study was conducted after obtaining approval from Institutional Ethics Committee. The google survey form was prepared and responses were collected by sharing the link through WhatsApp groups and the respondents were requested to share the link among their friends. The first part of Google form consisted of information of purpose of study and consent form. The participation was voluntary, and the students were given a choice to exit the study at any point of the survey. The responses were transferred to Microsoft excel and compiled using Microsoft Excel 2010 and was analysed using the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corp., Chicago, IL, USA, 2010). Statistics was summarized using frequency and percentages for all the variables. Chi square test was used for statistical analysis to identify any association between variables, p value < 0.05 was considered as statistically significant.

Results:

After eliminating the incomplete responses, a total of 640 college students were included in the study. Table 1 shows the distribution of duration of earphone usage based on the demographic characteristics of the students. Out of 640 students, 57.1% of the study participants were females and 53.8% were medical students. Majority of the students(97.7%) had used earphones during the pandemic.

Table 1: Association between the socio-demographic characteristics and duration of earphone usage in a day among the study participants (N=640)

Socio-demographic characteristics	Duration of usage in a day			p value
	Total (640)	Less than 8 hours (458)	More than 8 hours (182)	
Gender				
Male	274 (42.9)	199 (72.6)	75 (27.4)	0.605
Female	366 (57.1)	259 (70.8)	107 (29.2)	
Course of study				
Medicine	344 (53.8)	247 (71.8)	97(28.2)	0.785
Engineering	172 (26.9)	120 (69.8)	52 (30.2)	
Nursing	124 (19.3)	91 (73.4)	33 (26.6)	
Year of Study				
I	179 (28)	136 (76)	43 (24)	0.387
II	211 (33)	145 (68.7)	66 (31.3)	
III	143 (22.3)	99 (69.2)	44 (30.8)	
IV	107 (16.7)	78 (72.9)	29 (27.1)	

Most students (71.5%) used earphone for less than 8 hours. More than half of the students used wired type of connectivity (52.5%), among them 84.5% of students had symptoms; 27% of students had reported that they used headphones while charging their smartphones and among them 83.2% developed symptoms. About 70.3% of students used the range of volume within limit, among them majority (82.2%) had symptoms, 32.5% of students cleaned their earphones daily and 46.6% of students

did not share their earphone. There was statistically significant association between sharing of earphone and symptoms experienced while using earphones.

Table 2: Association between the earphone usage characteristics and symptoms experienced while using earphone among the study participants (N=640)

Socio-demographic characteristics	Symptoms experienced while using earphone			p value
	Total (640)	Yes (532)	No (108)	
Type of connectivity				
Bluetooth	203 (31.7)	165 (81.3)	38 (18.7)	0.599
Wired	336 (52.5)	284 (84.5)	52 (15.5)	
Both	101 (15.8)	83 (82.2)	18 (17.8)	
Duration of usage of earphone in a day				
Less than 8 hours	458 (71.5)	379 (15.9)	79 (17.2)	0.689
More than 8 hours	182 (28.5)	153 (28.8)	29 (15.9)	
Use earphone/ head phone while smart phone is charging				
Yes	458 (71.5)	379 (15.9)	79 (17.2)	0.963
No	182 (28.5)	153 (28.8)	29 (15.9)	
Range of volume				
Above limit	190 (29.7)	162 (85.3)	28 (14.7)	0.348
Within limit	450 (70.3)	370 (82.2)	80 (17.8)	
Cleaning of earphone/ head phone				
Daily	208 (32.5)	169 (81.2)	39 (18.8)	0.127
Never	432 (67.5)	363 (84)	69 (16)	
Sharing of earphone/ head phone				
Yes	342 (53.4)	300 (87.7)	42 (12.3)	0.001*
No	298 (46.6)	232 (77.9)	66 (22.1)	

*p value < 0.05 was statistically significant

The common symptoms experienced by the students while using earphones were headache (41.9%), ear pain (36.1%), itching/irritation (27%), impaired hearing (6.9%). Common symptoms of ear infections which the students reported were ear discharge (19.5%), swelling (6.9%) and reddening (17.7%). On prolonged usage of earphones, 23% of students had ringing of ear, 25.9%had ear block,10.9%had auditory hallucination (Hear noises that don't exist in reality), 20% had dizziness (feeling faint) and 14.5% had hyperacusis(unusual tolerance to ordinary environmental sounds). There was statistically significant association found between sharing of earphone and having any one of the symtoms of ear infection on earphone usage (Table 3).

Table 3: Association between the earphone usage characteristics and Sign of ear infections on earphone usage among the study participants (N=640)

Earphone/ Head phone characteristics	Symptoms experienced while using earphone			p value
	Total (640)	Yes (268)	No (372)	
Type of connectivity				
Bluetooth	203 (31.7)	77 (37.9)	126 (62.1)	0.261
Wired	336 (52.5)	143 (42.6)	193 (57.4)	
Both	101 (15.8)	48 (47.5)	53 (52.5)	
Duration of usage in a day				
Less than 8 hours	458 (71.6)	189 (41.3)	269 (58.7)	0.621
More than 8 hours	182 (28.4)	79 (43.4)	103 (56.6)	
Use earphone/ head phone while smart phone is charging				
Yes	173 (27)	79 (45.7)	94 (54.3)	0.237
No	467 (73)	189 (40.5)	278 (59.5)	
Range of volume				
Above limit	190 (29.7)	77 (40.5)	113 (59.5)	0.653
Within limit	450 (70.3)	191 (42.4)	259 (57.6)	
Cleaning of earphone/ head phone				
Daily	208 (32.5)	91 (43.8)	117 (56.2)	0.505
Never	432 (67.5)	177 (41)	255 (59)	
Sharing of earphone/ head phone				
Yes	342 (53.4)	159 (46.5)	183 (53.5)	0.011*
No	298 (46.6)	109 (36.6)	189 (63.4)	

*p value < 0.05 was statistically significant

Among the study participants about 48.4% of students had used earphone frequently for online classes, 30% for entertainment purpose and 11% for phone call.The distribution of scenario of usage among the students showed that about 61.9% used during travel purpose, 45.80% used while studying 33% during physical activity and 13.3% while driving.The common impact reported due to earphone usageamong students were sleep disturbances (89.4%), lack of focus in academics (43.2%) and lessinteraction with family(6.1%).

Discussion:

Increased usage of headphone/earphone has been reported to cause significant health effects. Hence, a study was planned to determine the usage of earphone and for assessing the health effects caused due to its usage among college students. In our study, the prevalence of usage of earphones among females were higher than the males which was similar to a study done by Mohammand Poorasi et al and Harshitha et al.[11-12] But few studies done by Suchdeva et aland Kannan et al showed higher usage among males.[3,9] In our study, medical students were found to use the earphone more than the other students. Since it was an online study with snowball sampling equal representation of all streams could not be obtained. In our study, 52.5% students had used wired type and 31.7% had used Bluetooth type earphone when compared to the previous study done by Suchdeva et all in Chandigarh in 2018 wired earphone usage was 75% and Bluetooth was 7%, it shows that wired earphone usage has been decreased because of advancement of recent technologyand need for increased usage for online learning[9] In our study, proportion of students who shared earphones were 33.8%, which was similar to the previous study done by Suchdeva et alreported49% shared earphones.[9] Similarly, 88.6% of students clean their earphone which was remarkedly higher when compared to Suchdeva et al(51%) and Alarfaj et al(29.8%) study.[8,9] Reduced sharing and increased cleaning of earphone might be due to increased awareness about personal hygiene and privacy among study participants. More than 75% of the students avoided using earphones while charging the smartphones which is a positive behaviour compared to Das study where the corresponding proportionwas 44.7%.[7] This may be because of the raised awareness through media and social media about hazards caused of using smartphones while charging. Majority of the students had reported that they had used earphones for less than 8 hours which might be because they are facing irritation on prolonged usage of earphone. Similar finding has also been reported by Suchdeva S et al study.[9] In the current study, 61.9% of students used earphone while travelling, 45.8% of students used for while studying, 33%while doing physical activity, 22.2% used while sleeping and 13.30% used while driving. Travelling was found to be the main setting associated with earphone usage in asimilar study done in Saudi Arabia by Alarfaj et al.[8] In the present study, 83.1% of students had experienced at least one of the ear symptoms on using the earphone and 41.9% of students had at least one of the signs of ear infection. In this study, participants showed increased effects such as 23% had tinnitus, 17.7% had ear infection and 19.5% had discharge, similar distribution of frequency of symptoms were reported in studies done by Suchdeva etal(20% had tinnitus, 13% had ear infection and 12% had ear discharge) and Alarfaj et al(16.5% had tinnitus, 28% had infection) although the exact proportion was marginally lesser.[8,9] In our study, distribution could be due to increased usage of earphones/ headphones during the COVID pandemic.

Limitation:

Considering this as an online study with snowball sampling technique, the result could not be projected to entire student's population and there might be over-representation of students who actually used earphones.Selecting the subjects in this study was biased as they were consumers of social medias and smart phones. But this study adds value as one of the first studies to assess the headphone/earphone usage practices and its impact during COVID-19 pandemic. There is also a need to revamp education to increase blended or asynchronous learning in such circumstances in future.

Conclusion:

In this study, majority of the study participants had experienced ear symptoms while using earphones. About one third students had symptoms suggestive of ear infection in this study. Almost half of the students had used earphones for attending online classes and while studying. Due to prolonged usage of headphones, majority of participants had sleep disturbances and lack in focus in studies. Further research and activities are recommended to improve the current situation.

Declaration:

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Conflict of Interest: Nil

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