Original Article

Assessment of Pattern of Using Personal Audio Devices among Adults in Karnataka: A Cross-Sectional Study

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How to cite this article: Lakshmi Hulugappa, Ramya Manchegowda, Ravindra Salkatte. Assessment of Pattern of Using Personal Audio Devices among Adults in Karnataka: A Cross-Sectional Study. Indian Journal of Public Health Research and Development / Vol. 16 No. 2, April-June 2025.

Abstract

Introduction: Exposure to personal audio devices for longer and loud noise contributes to hearing loss. Recent advances in technology have led to evolution of PAD and changes of usage pattern. This study highlights advancement in technology impact the choices, habits, behavioural trends of adults on the pattern of usage. This study is undertaken to determine the prevalence and pattern of using of personal audio devices (PAD) in Karnataka as the research is scarce.

Methods and materials: This cross-sectional study was conducted during July 2022-December 2022 using Google forms in an online platform in adults. A convenience method was used and 200 participants who gave consent were recruited. Socio-demographic profile, the pattern of using personal audio devices were included in the proforma. Data analysis was done in SPSS 26. Descriptive statistics and inferential statistics was computed.

Results: The most commonly used PAD was Bluetooth 55%, majority used for a duration of 1-5yrs 54.5%, most of them used routinely 33.5%, in a medium volume 76.5%. Around 83.5% used during travelling, 54% while walking. Pearsons Correlation between no. of days of usage of PAD and hours showed significant results with moderate positive correlation with r=0.5 and p=.000.

Conclusion: Highly risky behaviour in the pattern of using PAD is found in adults. Hence there is need to create awareness to practice healthy using patterns of PAD.

Keywords: Pattern, Personal Audio Device, Karnataka

Introduction

WHO estimates that over a billion young people worldwide are at risk of hearing loss due to unsafe listening practices[1]. Over the years, advancement and access to technology has been increasing and number of people using such technology to communicate has risen. Increased exposure to loud sounds through

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Submission date: June 24, 2024 **Acceptance date**: July 24, 2024 **Published date: March 11, 2025**

personal audio systems and entertainment venues puts people at high risk of hearing damage. Globally, 466 million people have disabling hearing loss. Of this total, 432 million (93%) are adults and 34 million (7%) are children[2].

Without action, there may be 630 million people with disabling hearing loss by 2030 and over 900 million by 2050, with a corresponding increase in the global annual cost of more than US$750 billion[1,3]. Risk factors for hearing loss include preventable factors like noise exposure, which is on the rise due to modern lifestyles. Exposure to loud sounds in social settings can triple the likelihood of hearing loss, with 40% of individuals at events like clubs or concerts being exposed to potentially damaging levels [4,5].

The widespread use of personal audio devices (PAD) like smartphones has increased the risk of hearing loss, with an estimated 50% of users listening at risky levels. Hearing loss can affect communication, cognition, education, and employment, and those with hearing loss have a higher unemployment rate and may experience social isolation and stigma[5-8].

Young people's noise exposure can contribute to age-related hearing loss, which can cause communication difficulties and emotional and cognitive effects. Seniors with hearing loss are twice as likely to experience depression, isolation, frustration, cognitive decline, and decreased personal safety compared to those without hearing loss, according to recent evidence[9-13].

Although noise-induced hearing loss is permanent, it can be prevented by adopting safe listening practices. Individuals can limit volume and exposure to noisy activities to protect their hearing. Governments, healthcare providers, manufacturers, and civil society can also create an environment that promotes safe listening[9-13].

Recent advances in technology have led to evolution of PAD and changes of usage pattern. This study highlights advancement in technology impacts the choices, habits, behavioural trends of adults on the pattern of usage. It determines the duration, hours of usage and the activity of usage of the PAD which is essential for designing the educational campaigns. By identifying the common pattern, habits of usage authorities can develop targeted interventions to the public and encourage safe listening. During and post pandemic the use of PAD has increased because of increased availability of smartphone due to various reasons, hence this study was undertaken with the objectives to determine the pattern of using personal audio devices in adults and to find out the association of pattern of using PAD with the volume levels.

Methods & Materials

A cross sectional study was conducted by Google forms between July 2022- December 2022 in adults 18 years and above. Sample Size was calculated using formula $n= Z^2 [P (1-P)]/d^2$, d absolute precision was determined to be 7%, Z = 1.96 (Confident interval at 95%), P (Prevalence) = 50%. The sample size was 196. It was rounded off to 200. Convenience sampling method was used. Study participants who gave written consent for the participation were included.

A pretested self-designed, self-administered questionnaire was used for collecting data by google forms from the study participants. The items in the questionnaire were prepared based on a comprehensive review of the literature. Validation of questionnaire was ensured by consultation with subject experts and pilot study was conducted before sharing the google forms. The questions consisted of consent form, socio-demographic profile, Pattern of usage included type of personal audio device, duration of usage, no. of days of usage weekly, hours of usage per day, volume level, type of music preferred, sharing of PAD and usage of PAD during routine activities like Sleeping, driving, studying, travelling and walking were included.

Operational definition:

Bluetooth Device: Any device that uses Bluetooth technology for wireless communication.

Headphones: Audio devices worn over the ears, typically consisting of two ear cups connected by a headband, used for listening to audio.

Earphones: Small audio devices that fit directly into the ear canal, providing a portable and compact listening experience.

Data was entered in Microsoft excel and analysis was accomplished in SPSS vs 26. Descriptive statistics was used to determine prevalence of PAD. Inferential Statistics.

Results

Table 1: Socio-demographic profile of Participants n=200

Study Variables	n	Percentage (%)
Age in years		
<30	129	64.5
>30	71	35.5
Gender		
Male	120	60
Female	80	40
Marital Status		
Married	78	39
Unmarried	122	61
Education		
Profession or Honours	20	12.0
Graduate or Postgraduate	161	78.5
Intermediate or post high school diploma	16	8.0
High School Certificate	03	1.5
Employment		
Employed	100	49.0
Unemployed	16	7.0
Student	88	44.0
Area of Residence		
Urban	52	74.0
Rural	148	26.0
Type of device		
In ear	137	68.5
Out ear	23	11.5
Both	40	20.0
Duration of usage		
< 1 year	58	29.0
1-5 year	109	54.5
6-10 years	24	12.0
>10 years	9	4.5
No of days of using personal audio devices per week		
1 day	29	14.5
2days	26	13.0
3 days	23	11.5
4 days	20	10.0
5 days	20	10.0
6 days	15	7.5
7 days	67	33.5
Hours of usage per day		
< 1 hour	62	31
1-2 hours	66	33
3-4 hours	46	23
5-6 hours	13	6.5
hours	7	3.5
>8 hours	6	3
Volume level		
High	27	13.5
Medium	153	76.5
Low	20	10.0
Type of music preferred		
Soft	143	71.5
Metal	9	4.5
Pop	16	8.0
Rock	32	16.0

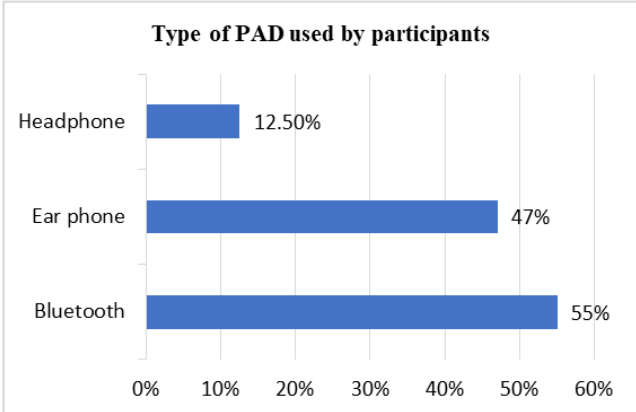

Figure 1: Type of personal audio devices used by the participants

Table 2: Pattern of using personal audio devices during activities by participants n=200

Questions	Frequency n	Percentage
Sharing of PAD with others		
Yes	56	28.0
No	144	72.0
During Exercise		
Yes	66	33.0
No	134	67.0
Sleeping with PAD plugged		
Yes	39	19.5
No	161	80.5
Driving		
Yes	58	29.0
No	142	71.0
Studying		
Yes	57	28.5
No	143	71.5
Travelling		
Yes	167	83.5
No	33	16.5
Walking		
Yes	108	54.0
No	92	46.0

Table 3: Type of music preferred according to the age, type,, volume, pattern of usage of PAD

Variable	Metal	Pop	Rock	Soft	Total (%)
Age of participant					
<30 years	6(4.66)	13(10.08)	26(20.15)	84(65.11)	129(100)
>30 years	3(4.22)	3(4.22)	6(8.45)	59(83.09)	71(100)
Type of PAD					
In ear	5(3.65)	12(8.76)	25(18.25)	95(69.34)	137(100)
Out ear	2(8.69)	0(0)	3(13.04)	18(78.27)	23(100)
Both	2(5.0)	4(10.0)	4(10.0)	30(75.0)	40(100)
Volume level					
High	3(11.11)	2(7.4)	14(51.85)	8(29.64)	27(100)
Low	0(0)	1(5)	0	19(95)	20(100)
Medium	6(3.92)	13(8.5)	18(11.76)	116(75.82)	153(100)

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Duration of usage of PAD					
<1 year	0(0)	5(8.62)	9(15.51)	44(75.87)	58(100)
1-5 years	8(7.33)	9(8.25)	18(16.52)	74(67.9)	109(100)
6-10 years	0(0)	2(8.3)	4(16.67)	18(75)	24(100)
>10 years	1(11.11)	0	1(11.11)	7(77.78)	9(100)
No. of days of usage of PAD					
<3 days	0	10(12.82)	10((12.8)	58(74.36)	78(100)
>3 days	9(7.38)	6(4.92)	22(18.03)	85(69.67)	122(100)
Hours of usage					
< 2 hours	4(3.13)	11(8.6)	20(15.63	93(72.64)	128(100)
>2 hours	5(6.95)	5(6.95)	12(16.66)	50(69.44)	72(100)

Most participants <30 years and >30 years preferred soft music 65.11% and 83.09% respectively. Most of them preferred rock 51.85% in high volume.

Table 4: Pearsons Correlation between no. of days of usage of PAD and hours.

Variable	Pearsons correlation	p value
No. of days of usage of PAD vs hours	r=0.5	.000

Pearsons Correlation between no. of days of usage of PAD and hours showed significant results with moderate positive correlation with r=0.5 and p=.000

Discussion

This study determined the pattern and usage of personal audio devices among adults. In the present study regular use of earphone was seen in 67(33.5%) of the adults, which was similar to study conducted by A. A Alarfai et al[14] 32.5% in teenagers and adults whereas Pandey et al[15] 15.2% in medical students. It was also observed that these studies were observational cross-sectional studies.

Majority of the study participants were using PAD for >1 hr i.e., 69% similar to the study by Rekha et al[16], however study conducted in Korea [17] (47.6%), the proportion of students using personal listening devices for more than 1 h is lower compared to our study. This can be due to different socio demographic characteristics and cultural differences.

In our study we have included all the types of PAD used by the participants. Increase use of PAD > 1hr has an impact on hearing. The inappropriate use of PAD among these groups can be due to the lack of awareness regarding harmful effects. Since there is upward trend in usage of PAD, its important to address the situation and improve the awareness in the young population. Around 27(13.5%) listened at high volume. The prevalence of listening to loud or very loud music was estimated to be 37.4% and 35% in studies in Brazil and USA, respectively[18,19] The observed differences could be explained by the different geographical location. Majority of our participants listened to their PADs at a medium volume 153(76.5%) similar to Rekha et al[16] 63.3% and contrary to Hoover et al[20] 53%.

Most of participants preferred soft music 143(71.5%). Around 58(29%) were using PAD for < 1 year similar to Kim et al[17]and majority of study participants were using PAD for >1 year. However post COVID 19 ear infections has been increased due to long hours of usage of headphone/ earphone with the pandemic forcing adults to work from home and students attending online classes using headphones/ earphones[18].

Prevalence of usage of PAD while driving is 58(29%), similar to Pandey et al[15] 20.8%. This behaviour leads to increased accidents and injuries to adults. Sleeping with PAD plugged is found in 39(19.5%) similar to Pandey et al 18.1[15]%. In contrast by S Harshitha et al[22] it was found to be 33%. In our study nearly three fourth of the participants did not share the PAD while only 56(28.0) shared the PAD which was similar to A AAlarfai et al[14], Sachdeva S[23]. Sharing of PAD leads to increased ear infections.

Around 57(28.5%) used PAD during studying contrast to the study conducted by S Harshitha[22]et al which was 8%. Present study revealed around 167(83.5%) used during travelling similar to the study by S Harshitha et al[22] which was 84%.

There is a statistically significant moderate positive correlation (r = 0.5, p=0.000) between the number of days of usage of the PAD and the hours of usage. This study revealed as the number of days of using the PAD increases, the total hours of usage also increased.

This study was conducted in a smaller sample size hence it cannot be generalised. Further studies involving larger sample and hearing difficulties has to be conducted. The level of volume measured in this study is by recall method and it is unlikely that the volume setting measured in this way is comparable across devices.

Conclusions & Recommendation

This study concludes that there is risky pattern of usage of PAD among adults. Hence its important to develop strategies for improving adults' awareness and attitude towards the use of PAD.

Ethical clearance: The study followed Declaration of Helsinki guidelines. Informed consent was obtained by the participants. No intervention was conducted and was a cross-sectional study.

Acknowledgements: The authors would like to thank the participants for the time and patience for participating in the study.

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