INTERNATIONAL JOURNAL OF RESEARCH CULTURE SOCIETY
Monthly Peer-Reviewed, Refereed, Indexed Journal
Volume - 10, Issue - 5, May - 2026
ISSN(O): 2456-6683
[Impact Factor: 9.241]
IJRCS

DOIs:10.2017/IJRCS/202605010 --:-- Research Paper / Article / Review

A study to assess the knowledge and impact of Long-Term Headphone use on Hearing Ability among Adolescents in a Selected Arts and Science College in Puducherry.

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Abstract: *Adolescence is a critical developmental stage during which unhealthy lifestyle practices may adversely affect long-term health outcomes. Excessive and unsafe headphone use among adolescents has become common due to increased exposure to social media, digital entertainment, and peer influence. This study aimed to assess the knowledge and perceived impact of long-term headphone use on hearing ability among adolescents in a selected Arts and Science College in Puducherry. A descriptive research design was adopted, and 500 adolescents aged 17–19 years who regularly used headphones were selected through purposive sampling. Data were collected using a structured knowledge questionnaire and the Hearing Handicap Inventory Screening Version. The findings revealed that 81.4% of adolescents had moderate knowledge, 14.6% had adequate knowledge, and 4% had inadequate knowledge regarding the effects of long-term headphone use. Regarding hearing impact, 76.8% had no hearing handicap, while 22.6% experienced mild to moderate hearing handicap and 0.6% had significant hearing handicap. Statistical analysis showed significant associations between knowledge and variables such as age, gender, features used, duration of use, preferred volume, listening environment, and use of earphones during sleep ($p<0.05$). The study highlights the need for awareness programs to promote safe listening habits among adolescents. Early education regarding appropriate headphone use may help in preventing hearing-related problems and improving adolescent health outcomes.*

Keywords: *Adolescents, Headphone Use, Hearing Ability, Knowledge, Puducherry.*

1. INTRODUCTION:

Technological advancement in the 21st century has greatly transformed the way people communicate, learn, and entertain themselves. The rapid growth of digital devices such as smartphones, tablets, laptops, and personal music players has significantly influenced modern lifestyles, particularly among adolescents. These technological innovations have become an inseparable part of daily life, shaping social interaction, education, and recreational activities among young people. [1]

Adolescence is an important developmental stage characterized by significant physical, psychological, emotional, and social changes. During this transitional phase from childhood to adulthood, adolescents experience rapid growth, hormonal fluctuations, and emotional development. It is also a period in which individuals begin to develop independence, explore personal identity, and establish habits and behaviors that may continue throughout adulthood. Therefore, adolescence is considered a crucial period for promoting healthy lifestyle practices and preventing risky behaviours. [2]

Adolescents are naturally curious and are strongly influenced by peers, media, and social trends. Although their cognitive abilities improve during this stage, their decision-making skills are still developing, which often increases the likelihood of engaging in risk-taking behaviors. Consequently, adolescents are more vulnerable to environmental influences, including unhealthy patterns of technology use, which may adversely affect both their physical and psychological health. Understanding adolescent behavior and awareness regarding health-related issues is essential for planning effective educational and preventive interventions.[3]

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In today's digital era, adolescents are recognized as "digital natives" because of their early exposure and adaptability to modern technologies. Devices such as smartphones, tablets, laptops, and personal audio systems are widely used by adolescents for communication, academic activities, social networking, and entertainment purposes. Although these technologies offer several advantages, including easy access to information, online learning opportunities, and global connectivity, excessive or inappropriate use may contribute to various health-related problems.[4]

Among the commonly used technological devices, personal audio devices such as headphones and earphones have become highly popular among adolescents. These devices are frequently used for listening to music, gaming, attending online classes, and communication. However, prolonged use of headphones at high volume levels may expose adolescents to unsafe listening practices, which can negatively affect hearing ability. Lack of awareness regarding safe listening habits further increases the risk of auditory problems among young users.[5]

According to the World Health Organization (WHO), more than one billion young individuals worldwide are at risk of hearing loss due to unsafe listening practices. Reports indicate that approximately 25% of adolescents and young adults are exposed to harmful sound levels through personal listening devices, while nearly 50% encounter excessive noise levels in recreational settings such as clubs, concerts, and bars. These alarming statistics emphasize the growing public health concern related to hearing impairment among adolescents and the urgent need for preventive measures and awareness programs.[6]

Noise-induced hearing loss (NIHL) is a permanent and irreversible condition caused by prolonged exposure to loud sounds that damage the sensitive structures of the inner ear.[15] Assessing the impact of long-term headphone use on hearing ability among adolescents in a selected Arts and Science College in Puducherry will provide valuable insights into their knowledge, listening practices, and associated hearing-related problems.[7] The study findings may help identify gaps in awareness regarding safe listening behaviors and support the development of targeted educational interventions aimed at promoting hearing health and preventing hearing impairment among adolescents.

2. MATERIALS & METHODS:

Design: A Descriptive research design was adapted for the present study.

Sample Size: 500 Adolescents aged 17-19 years studying in a selected college.

Sampling Technique: Purposive sampling technique was used to select the samples.

Data collection Procedure: The research proposal was reviewed and approved by the experts prior to conducting the pilot study. Permission to carry out the main study was obtained from the Head of the Department at Sri Manakula Vinayagar Medical College and Hospital, and the necessary approval certificate was issued. Written informed consent was obtained from all study participants before data collection. The participants were clearly informed about the purpose and objectives of the study, and assurance was given regarding the confidentiality and privacy of the information provided.

After obtaining formal permission, the researcher initiated data collection among adolescents studying at Saratha Gangatharan Arts and Science College. A total of 500 adolescents were selected using a purposive sampling technique. Demographic data were collected using a structured questionnaire. The level of knowledge regarding headphone use and its impact on hearing ability was assessed using a Structured Knowledge Questionnaire, while the effect of long-term headphone use on hearing ability was evaluated using the Hearing Handicap Inventory Screening Version Scale. Participants were assured that all information collected during the study would be maintained with strict confidentiality. The collected data were entered into Microsoft Excel 2020 and coded appropriately for analysis. Statistical analysis was performed using SPSS (Statistical Package for Social Sciences) version 26.0. Demographic variables were presented using frequency and percentage distributions. Inferential statistics, including the chi-square test, were used to determine associations between variables. A p-value of less than 0.05 was considered statistically significant.

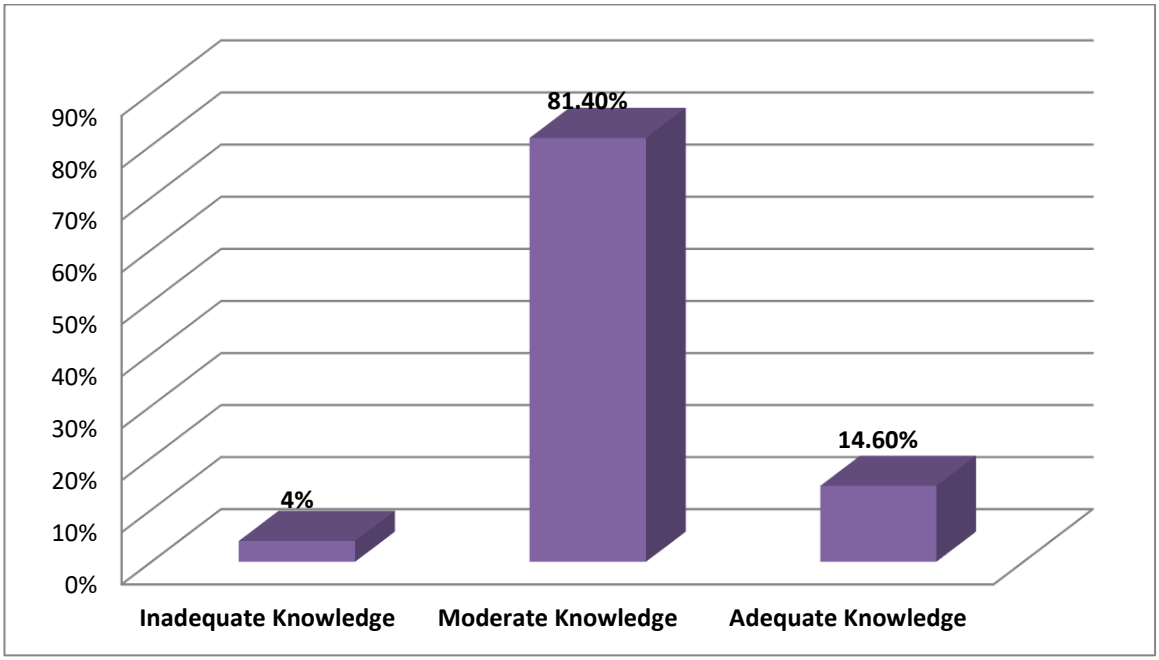
3. RESULTS:

The frequency and percentage-wise distribution of the demographic variables of adolescents (N = 500). The majority of participants (60.0%) were in the age group of 18-19 years, while 40.0% were between 17-18 years. In terms of gender, 60.0% were males and 36.0% were females. Regarding their course of study, 36.0% were enrolled in commerce, 30.0% in science, 24.0% in arts, and 10.0% in other disciplines. Most of the participants were in the first year (40.0%), followed by second-year (36.0%) and third-year (24.0%) students. Regarding the purpose of use, the majority of participants reported using headphones primarily for gaming (41.0%) and watching videos (37.0%), for academic purposes (10.0%), and for music (6.0%) & communication (6.0%). Regarding Preferred Volume majority of respondents (58.0%) reported

listening at high volume levels, and additional 22.0% used headphones at the maximum volume, only 12.0% listened at moderate volume, and just 8.0% reported using low volume levels. Regarding Listening Environment 50.0%) reported using headphones in mixed environments (both quiet and noisy), while 30.0% used them primarily in noisy settings. Only 20.0% reported listening in consistently quiet environments.

Percentage wise distribution of the level of knowledge regarding the impact of long-term use of headphone among adolescents (Figure 1)

Figure 1: Percentage wise distribution of the level of knowledge regarding the impact of long-term use of headphone among adolescents.



The table shows that frequency and percentage-wise distribution of the impact (effect) level of long-term headphone use among adolescents. The findings revealed that the majority of adolescents, 384 (76.8%), had no hearing handicap. About 113 (22.6%) adolescents experienced a mild to moderate hearing handicap, while only 3 (0.6%) adolescents had a significant hearing handicap. **(Table 1)**

Table no-1: Frequency and percentage wise distribution of the impact (effect) level of long-term use of headphone among adolescents (N=500)

Impact Level	Frequency (f)	Percentage (%)
No hearing handicap	384	76.8%
Mild to moderate handicap	113	22.6%
Significant hearing handicap	3	0.6%
Total	**500**	**100%**

There is a statistically significant association between age ($p<0.05$), gender ($p<0.05$), features used ($p<0.05$), daily duration of use ($p<0.05$), preferred volume ($p<0.05$), listening environment ($p<0.05$), and earphones during sleep ($p<0.05$) with the level of knowledge regarding the impact of long-term headphone use among adolescents. However, course of study, year of study, type of headphones, purpose of use, history of hearing problems, and family hearing problems did not show any statistically significant association ($p>0.05$).

4. DISCUSSION:

A descriptive research design was adopted for the present study among 500 adolescents aged 17–19 years studying in a selected college, and samples were selected using a purposive sampling technique. The study findings revealed that the majority of adolescents (81.4%) had a moderate level of knowledge regarding the impact of long-term headphone use, while 14.6% had adequate knowledge and only 4% had inadequate knowledge. These findings are supported by the study conducted by Das et al. (2021), which reported that although students had basic awareness regarding unsafe headphone use, knowledge about hearing-related complications was limited. Regarding the effect of long-term headphone use on hearing ability, 76.8% of adolescents had no hearing handicap, whereas 22.6% experienced mild to moderate hearing handicap and 0.6% had significant hearing handicap[8]. The findings indicate that prolonged headphone use may contribute to hearing-related problems among adolescents. Similar findings were reported by Haewon Byeon (2021), who identified a significant relationship between loud headphone use and hearing problems among adolescents. The study also revealed a statistically significant association between the level of knowledge and selected demographic variables such as age, gender, features used, daily duration of use, preferred volume level, listening environment, and use of earphones during sleep ($p < 0.05$) [9]. These findings emphasize the importance of creating awareness regarding safe listening practices to prevent hearing impairment among adolescents.

5.CONCLUSION:

The study concluded that most adolescents had only a moderate level of knowledge regarding the impact of long-term headphone use on hearing ability, while only a small proportion demonstrated adequate knowledge. These findings highlight the importance of conducting awareness and educational programs to improve adolescents' understanding of the harmful effects associated with prolonged and unsafe headphone use. The study also identified a statistically significant association between gender and level of knowledge, indicating that gender-specific educational interventions may help enhance awareness and promote safe listening practices among adolescents.

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