

## Hazards of Earphone Usage among adolescent

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### Abstract

Earphones (or ear buds in the early days of telephony) are a pair of small listening devices that are designed to be worn on or around the head over a user's ears. Earphones are very small that are fitted directly in the outer ear, but not inserted in the ear canal. Earphones are portable and convenient.

**Keyword:** Adolescent, Effect of earphone, Noise intensity etc.

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### Introduction

Worldwide, generally new developments have led to an advancement of science and technology with a marked dispersal of technological information. This has not left the music industry underdeveloped. As observed by the researchers listening to music, videos and playing games on personal players via the ear/headphones has become a common practice amongst the youth though seemingly switching over to adults and even some elderly people.<sup>1</sup>

Earphones (or ear buds in the early days of telephony) are a pair of small listening devices that are designed to be worn on or around the head over a user's ears. Earphones are very small that are fitted directly in the outer ear, but not inserted in the ear canal. Earphones are portable and convenient. They are electro acoustic transducers, which convert an electrical signal to a corresponding sound in the user's ear.<sup>2</sup>

Noise can be defined as "an undesirable sound" and its perception could be different depending on the listener. Noise intensity, exposure time and physical characteristics will determine how much it can damage hearing health. The intensity, the kind of noise, its duration and quality are determining in the hearing alteration acquisition process.<sup>3</sup>

### Studies Related To effect of Earphone Usage

Hearing loss induced by music or by high sound pressure levels (HSPLIHL) has similar characteristics to hearing loss caused by occupational exposure to noise, with slow onset, progressive, irreversible, sensorineural, bilateral hearing loss that initially affects high frequencies and then the other frequencies. Such a loss can develop into a major public health and social problem since a growing number of adolescents and adults have symptoms related to exposure, such as distortion, intolerance to loud sounds, dizziness, earache, difficulty understanding or hearing words, tinnitus, and alterations in auditive thresholds.<sup>4</sup>

The problem can also cause extra-auditive damage, such as sleep disorders, cardiovascular disorders, stress, fatigue, tension, irritability, inattention, tiredness, nervousness, headache, and arterial hypertension. According to the American Speech Language Hearing Association (ASHA), 61% of American teenagers have personal stereos, while 51% of students in American high schools have

symptoms of hearing loss. An interesting part of that study was the fact that most students prefer high volumes, as adults tend to use more moderate volumes.<sup>4</sup>

### Harmful Effects of Listening To Music Over Headphones

1. Loss of hearing: Almost all the headphones exposes ears to high-decibel sound waves which can cause some serious damage to ears as well as permanent hearing loss.<sup>25</sup>
2. Congested air passage: Nowadays most of the high-quality headphones requires to place them in the ear canal, which is very close to the eardrum. Using these earphones for extended hours means it is restricting the flow of air in the air canal making it more susceptible to ear infections.
3. Ear infections: Sharing earphones may cause unwanted infections.
4. Ear numbness- Listening on to music for extended hours on earphone may also lead to ear numbness. Along with ear numbness, it may also lead to lose hearing abilities temporarily. But if these signs are ignored and continue with the same habits then it may also result in a permanent hearing loss.
5. Ear-ache: Prolonged use of earphones or listening to music on a very high volume may lead to aching ears.
6. Adverse effect on the brain: Brain too doesn't stay untouched from the ill effects of extended and prolonged use of headphones. Headphones generate electromagnetic waves which can cause severe harm to the brain in the long run. Since the inner part of the ear is connected to the brain, any damage caused to this part causes serious damage to the brain as well.
7. External threats: Overusing of earphones may also cause serious threats to life. Getting too carried while listening to music disconnects from the rest of the world and may have to face severe consequences. The consequences may vary from small losses to really big ones. In fact, in the recent times, the number of accidents caused due to listening to music while being ignorant about the outer environment has increased drastically.<sup>5</sup>

### Studies Related To Hazards of Earphone Usage

R. Mazlan et al. conducted a study on Infection and Hearing Loss Amongst Headphone Users. The use of headphone has been thought to cause infection in the ear canal and contribute to hearing loss. In this study, we examined 136 Customer Service Representative from Celcom (Malaysia) Sdn. Bhd. who use headphone throughout their working hours. The purpose of this study was to determine the prevalence of ear canal infection and other related diseases of the ear, nose and throat. Their hearing thresholds were also determined using the Amplaid 309 Clinical Audiometer. We found no incidence of infection of the external ear canal amongst the subjects. There were 4 cases of chronic middle ear infection and 4 cases of impacted wax. Hearing impairment was found in 25 subjects (21.2%). However, there was no significant association between hearing loss and the exposure to sound from headphone usage because the high frequencies were not predominantly affected. There was also no association between hearing loss and duration of service.<sup>6</sup>

Da-An Huh et.al conducted a study on the effects of earphone use and environmental lead exposure on hearing loss in the Korean population: data analysis of the Korea national health and nutrition examination survey (knhanes), 2010–2013. The Objectives of the study is to investigate both the individual and joint effects of earphone use and environmental lead exposure on hearing loss in the Korean general population. The data was analyzed from 7,596 Koreans provided by the Korea National Health and Nutrition Examination Survey (KNHANES) during the period 2010–2013. The pure-tone average (PTA) of hearing thresholds at 2, 3, and 4 kHz frequencies was computed, and hearing loss was defined as a PTA  $\geq$  25 dB in one or both ears. The Results are a dose-response relationship in hearing loss with earphone use time and blood lead level is observed after adjustment for confounding factors. With a 1-hour increase in earphone use time and 1  $\mu$ g/dL increase in blood lead concentration, the odds of hearing loss increased by 1.19 and 1.43 times, respectively. For hearing loss, the additive and multiplicative effect of earphone use and blood lead level were not statistically significant. Thus they have Concluded that Earphone use and environmental lead exposure have an individual effect on hearing loss in the general population. However, the estimated joint effect of earphone use and lead exposure was not statistically significant<sup>7</sup>.

Sara Ba°sjo° conducted a cross-sectional study to investigate hearing function and headphone listening habits in nine-year-old Swedish children and included otoscopy, tympanometry, pure-tone audiometry, and spontaneous otoacoustic emissions (SOAE). A questionnaire was used to evaluate headphone listening habits, tinnitus, and hyperacusis. Study sample: A total of 415 children aged nine years. Results: The prevalence of a hearing threshold 20 dB HL at one or several frequencies was 53%, and the hearing thresholds at 6 and 8 kHz were higher than those at the low and mid frequencies. SOAEs were observed in 35% of the children, and the prevalence of tinnitus was 5.3%. No

significant relationship between SOAE and tinnitus was found. Pure-tone audiometry showed poorer hearing thresholds in children with tinnitus and in children who regularly listened with headphones. Conclusion: The present study of hearing, listening habits, and tinnitus in nine-year old children is, to our knowledge, the largest study so far. The main findings were that hearing thresholds in the right ear were poorer in children who used headphones than in children not using them, which could be interpreted as headphone listening may have negative consequences to children's hearing. Children with tinnitus showed poorer hearing thresholds compared to children without tinnitus.<sup>8</sup>

Lee JS et.al. conducted a study on Analysis of Predisposing Factors for Hearing Loss. It is aimed to estimate the effects of various risk factors on hearing level in Korean adults, using data from the Korea National Health and Nutrition Examination Survey. They examined data from 13,369 participants collected between 2009 and 2011. Average hearing thresholds at low 18 (0.5, 1, and 2 kHz) and high frequencies (3, 4, and 6 kHz), were investigated in accordance with various known risk factors via multiple regression analysis featuring complex sampling. We additionally evaluated data from 4,810 participants who completed a questionnaire concerned with different types of noise exposure. Low body mass index, absence of hyperlipidemia, history of diabetes mellitus, low incomes, low educational status, and smoking were associated with elevated low frequency hearing thresholds. In addition, male sex, low body mass index, absence of hyperlipidemia, low income, low educational status, smoking, and heavy alcohol consumption were associated with elevated high frequency hearing thresholds. Participants with a history of earphone use in noisy circumstances demonstrated hearing thresholds which were 1.024 dB (95% CI: 0.176 to 1.871; P = 0.018) higher, at low-frequencies, compared to participants without a history of earphone use. Our study suggests that low BMI, absence of hyperlipidemia, low household income, and low educational status are related with hearing loss. Male sex, smoking, and heavy alcohol use are related with high frequency hearing loss. A history of earphone use in noisy circumstances is also related with hearing loss.<sup>9</sup>

Harshitha S and Azeem Ayesha Siddiqua conducted a survey on prevalence and affect of earphone usage among adolescents. This survey examined several areas like dependence on earphones, its psychological impact on individuals and health issues people experienced after using headphones. Sample consisted of 84 men and 83 women between the age group of 15 to 24 years. Ex post facto research design with convenient sampling technique was used. A selfconstructed questionnaire was framed consisting of 9 questions. The responses obtained from the samples were analyzed and percentages were then calculated. The responses obtained from the individuals indicate that almost all the individuals use earphones daily for at least 1-2 hours per day. It was also evident that majority of users Own at least 1 pairs of earphones and many other users own more than 4 pairs of earphones, Look for sound quality, size, and affordability when they decide to buy a pair of earphones.

The adverse factor which is found to be evident from the majority of earphone users is they experienced ear pain, headache, they were involved in accidents while using earphones, they experienced irritation, attention and concentration problems, they feel like they fade away into the surroundings while using earphones, They feel frustrated, unhappy and uncomfortable when they do not use earphones, they are unable to think clearly and unable to pay attention to others conversation, they felt uncomfortable in crowds or around strangers, they felt people around them feel uncomfortable when they use earphones, 19 these individuals seem to use earphones to get sleep, to ignore their surroundings, to feel comfortable, to avoid talking with others and to get going in the morning, they also earphones while driving, exercising, social gathering, to maximize their time utilization and to reduce noise, they felt the best way to spend time alone is by using earphones. Thus, it is evident that majority of people are using earphones everyday which is affecting their health and psychological wellbeing causing them psychological distress and separation. They seem to use earphones indiscriminately even after knowing its potential harm.<sup>10</sup>

**Conflict of Interest:** None.

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