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# EXPLORING THE AWARENESS ABOUT THE RISK INVOLVED IN LONGER USAGE OF BLUETOOTH HEADPHONES

**Dr. T. V. Ambuli [1], Mr. R. Surendher [2], Mr.SV Praveen[3], Mr. M Manoj Kumar[4]**

[1]Associate Professor, Department of Commerce, SRM Institute of Science and Technology, Ramapuram, Chenni-89, India
[2] Assistant Professor, Department of Management Studies, Jerusalem College of Engineering, Chennai, India
[3]Assistant Professor, Department of Management Studies, Jerusalem College of Engineering, Chennai, India
[4]Assistant Professor, Department of Management Studies, Jerusalem College of Engineering, Chennai, India

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**ABSTRACT**

In our society today, many people of all ages use Bluetooth wireless headphones as a means of communication and entertainment. It has evolved into a trendy and fashionable device that allows you to enjoy your music without the distraction of tangled cords. The study aimed to find the customer's buying preference on different brands, duration of usage and its impact. Descriptive research design was the method employed for this research with the sample size of 102 respondents. In this study convenience sampling was used among the students in the selected Chennai region. A questionnaire was used for data collection. The data was tabulated and analyzed for logical statements using chi-square and regression.
The study found that there is an association between the gender and the preferred Bluetooth type like Wireless neckband Wireless Bluetooth, Over ear headphones, Classic ear-bud. Also, there is a significant relationship between respondents' preferred Bluetooth Brand and price ready to pay for it. And also there is an impact of long usage of Bluetooth among the respondents on Buzzing noise, Dizziness, increased wax quantity.

## 1.1 INTRODUCTION OF THE STUDY:

The world is constantly changing due to advances in science and technology. The Compound annual growth rate (CAGR) Indian electronics industry has grown around 11 percent over the last five years (*India Brand Equity Foundation*, n.d.). Over the last few decades, the consumer electronics segment has enjoyed strong growth, dominating the industry with a 33.8% share and benefiting from a large and expanding market. The industrial electronics and computer sectors each have over 15% share.

In today's world, numerous audio technologies are widely used for communication and music listening. Earphones—also known as in-ear headphones— are more compact than traditional headphones, as they do not include over-ear speakers or a headband.The terms "Bluetooth" and "wireless headphones" are often used interchangeably when discussing audio devices, though they are not identical. While both technologies support wireless communication, not all wireless devices operate on Bluetooth; however, all Bluetooth devices are inherently wireless (Zanjani, 2020). Concerns have been raised regarding the health impacts of Bluetooth technology, particularly due to prolonged usage, which may affect the auditory system over time (Leckenby et al., 2014). Nonetheless, short-term or limited exposure is generally not considered harmful (Reader et al., 2009).

"In recent times, Bluetooth technology has become a widely adopted method for establishing wireless connections between devices through radio frequency signals, eliminating the need for cables or physical wires or cables (Erina Ferro,

2004). While infrared signals typically have a transmission range of around 7 meters, Bluetooth enables seamless data exchange between compatible devices.This functionality allows for example, a Bluetooth headset to pair with a smartphone for wireless audio streaming (Bouhenguel et al., 2008). To transmit audio efficiently, codecs are employed to compress the sound data before it is sent from mobile devices to Bluetooth headphones. However, users of such wireless earphones are simultaneously exposed to electromagnetic radiation from both the phone and the Bluetooth signal. The design and size of these devices can influence user behavior (Chong & Gellersen, 2011). Moreover, frequent use of Bluetooth earphones may expose sensitive human organs such as the brain, ears, and eyes to elevated levels of electromagnetic radiation, potentially posing health risks."

An audiometric assessment was conducted on a group of young individuals aged between 16 and 25. The findings indicated that frequent exposure to high-volume music through headphones significantly increases the likelihood of irreversible hearing damage (Zanjani, 2020). With the growing number of young users, public health experts and researchers are increasingly concerned about the health risks associated with electromagnetic radiation. This electromagetic form of radiation is believed to negatively affect physical, psychological, and social health, raising substantial concern within the scientific community (Gavrilas, 2023).

In many developing countries, mobile phones serve as the primary communication tool due to the limited expansion of landline infrastructure outside urban areas (Levitt & Lai, 2010). Wireless technologies, such as earbuds for music and calls, and wearable health trackers for monitoring patients, have become integral in everyday life and healthcare services (Lee, 2021). Additionally, factors like gender,impulsivity,texting frequency are influence mobile phone addiction among adolescents (Koo & Park, 2010). Researchers have also expressed concern that long-term exposure to strong electrical sources, such as batteries near power lines, may elevate the risk of developing leukemia (Misale et al., 2019).

### 1.2 OBJECTIVES OF THE STUDY:

- To determine whether their favorite Bluetooth type and gender are associated.
- To study customer's buying preference on different brands of Bluetooth devices based on Price.
- To analyze the impact of long usage of Bluetooth and Buzzing noise, Dizziness, increased
- wax quantity.

### 1.3 LIMITATIONS OF THE PROJECT:

• The only participants chosen from a specific region of Chennai are included in the study..
• The interpretation of the study is based on the assumption that the respondents provide reliable information.
• Consumer views may shift as a result of technological advancements.

## 2. LITERATURE REVIEW :

According to Gavrilas (2023), the widespread adoption of mobile phones and wireless devices, coupled with evolving social habits, has significantly increased individuals' exposure to electromagnetic radiation. In the study, 619 college students aged 18 to 24 were randomly selected to participate. Data were gathered through a structured, closed-ended questionnaire and analyzed using correlation and chi-square tests in SPSS. Headaches emerged as the most frequently reported symptom (69%), followed by a sensation of pressure in the head (38.8%). Most health complaints showed no significant gender differences; however, female participants reported more frequent phone conversations, which correlated with a higher incidence of self-reported health issues. Similarly, AK et al. (2016) conducted a quantitative study to assess the effects of excessive mobile phone usage. Their findings indicated that frequent use of Bluetooth devices and tablet PCs may contribute to health conditions such as brain tumors, male infertility, and hearing impairments.

(Skoblina et al., 2020) The purpose of the study was to find out how students felt about the potential harm that poor hygiene practices associated with using electronics could do to their

eyes and cause signs of eye disease. To evaluate the effect of risk factors on the visual health status of 768 schoolchildren and students from Belarus and Russia, quantitative indicators were computed. To determine differences and relationships between variables chi square analysis had been performed. Even if a person has a fairly high knowledge of the negative impact on vision of unreasonable work with devices, the temptation to use them in unfavorable visual conditions is still not reduced. The health and vision risk markers were more prominent in the student group.

Ankita Gupta (October 2014) have carried out a study on varied Bluetooth wireless technologies. The study includes operating of Bluetooth, Future Bluetooth hotspot technology, technology challenges.They come to the conclusion that Bluetooth is a wireless technology capable of much more than just swapping out data wires for one device for another. Bluetooth has emerged as a credible substitute for wireless personal area networks, especially with the advent of the Bluetooth version 3.0 specification, which supports faster data rates. They recommend that the device vendors should strictly adhere to the SIG's Bluetooth specification and address interoperability problems on their own initiative also. This could increase users' trust during this technology and also create a healthier marketplace. Study of (Vasudev et al., 2012) finds that, in addition to viewing mobile phones as a status symbol, scientific students use them frequently and view them as necessities for survival. Such adopting behavior is pushed by the important roles that parents, schools, and the publicity from marketing play.

Arya Kurawar (2016) carried out a literature review focusing on multiple dimensions of Bluetooth technology, such as its versions, practical applications, scatter net functionalities, and the Bluetooth Protocol Stack. The study explored core principles like communication processes, connection setups, and the methods of pairing and bonding. Bluetooth operates via a wireless air interface, enabling the transfer of files, images, and text across networks within an extended range of approximately 60 meters. The technology can function in both mobile and stationary configurations, with improved security measures now available for safe data transmission. Although factors like high costs and competition from alternative technologies have limited its widespread implementation, Bluetooth remains a viable connectivity option for numerous devices lacking built-in wireless features. Additionally, research by Divan et al. (2008) indicated a higher likelihood of behavioral issues in children with potential prenatal or postnatal exposure to mobile phone usage.

A study by Al-Muhayawi et al. (2012) investigated the impact of electromagnetic radiation from mobile phones on human health. To explore how medical education influences students' awareness regarding mobile phone usage and its associated health risks, the researchers employed a mixed-method approach. The study involved 400 students who used various mobile phone brands, all of whom completed questionnaires. The results indicated that many students were aware of the potential health hazards linked to mobile phone use, with at least half reporting having experienced some adverse effects. The study also recommended preventive measures such as using hands-free devices or speaker mode during calls and avoiding the prolonged use of wireless or Bluetooth headsets. Furthermore, it advocated for incorporating mobile phone health education into university medical curricula. In support of this, Abd-El Haleem et al. (2022) emphasized the importance of educational initiatives aimed at improving young people's knowledge and attitudes toward the safe use of earphones.

## 3. RESEARCH METHODOLOGY

“Research design is a plan, structure and strategy of investigations to obtain answer to the research questions”.

**Research Design:** Descriptive research design
**Target Respondents:** Youngsters
**Sampling Technique:** convenience sampling
**Population size:** Infinity
**Sample Size:** 102
**Data Collection Method:**
Primary Data: Questionnaire
Secondary Data: Journals, Websites, Technical reports
**Tools For Analysis**

Percentage analysis Chi- Square and Regression Analysis

## 4. DATA ANALYSIS AND INTERPRETATION

### 4.1 PERCENTAGE ANALYSIS

**TABLE 1.1**

| | | | |
|---|---|---|---|
| **Gender** | Male | 43 | 42.60% |
| | Female | 58 | 57.40% |
| | Total | 102 | 100% |
| **Age** | 10-20 years | 19 | 18.80% |
| | 20-30 years | 72 | 71.30% |
| | 30-40 years | 6 | 5.90% |
| | Above 40 years | 5 | 4% |
| | Total | 102 | 100% |
| **Occupation** | Student | 67 | 65.70% |
| | Respondents | 25 | 24.50% |
| | Own business | 1 | 1% |
| | Others | 9 | 8.80% |
| | Total | 102 | 100% |
| **Duration of Bluetooth headset usage** | Less than a hours | 25 | 24.50% |
| | 1 to 2 hours | 44 | 43.10% |
| | 2 to 3 hours | 15 | 14.70% |
| | 3 to 4 hours | 8 | 7.80% |
| | More than 5 hours | 10 | 9.80% |
| | total | 102 | 100 |
| **kind of Bluetooth headset using** | Wireless neck band | 37 | 37% |
| | Wireless Bluetooth | 27 | 27% |
| | Over ear headphones | 18 | 16% |
| | Classic earbud | 20 | 20% |
| | Total | 102 | 100% |
| **Preferred price range** | 500-1000 | 31 | 30.70% |
| | 1000-1500 | 28 | 27.70% |
| | 1500-2000 | 23 | 22.80% |
| | Above 2000 | 20 | 18.80% |
| | Total | 102 | 100% |
| **Type of Bluetooth brand** | apple | 7 | 6% |
| | boat | 53 | 53% |
| | Red mi | 10 | 10% |
| | Sam sung | 9 | 8% |
| | Others | 23 | 23% |
| | total | 102 | 100% |
| **Wearing the earphones long time will be harmful** | Strongly agree | 37 | 36.60% |
| | agree | 57 | 56.40% |
| | disagree | 8 | 6.90% |
| | Strongly disagree | 0 | 0% |
| | total | 102 | 100% |
| **Long time usage of blue tooth creates problem in ear drums** | yes | 88 | 88% |
| | no | 14 | 14% |
| | total | 102 | 100% |
| **Experienced dizziness after / while using Bluetooth** | often | 7 | 6.90% |
| | rarely | 41 | 40.60% |
| | Not at all | 54 | 53.50% |

| | | | |
|---|---|---|---|
| | total | 102 | 100% |
| **Ear wax quantity increased since you started using Bluetooth** | Strongly agree | 7 | 7.10% |
| | agree | 39 | 39.40% |
| | Neutral | 35 | 35.40% |
| | disagree | 15 | 15.20% |
| | Strongly disagree | 6 | 6% |
| | total | 102 | 100% |
| **Talk aggressively in phone while using Bluetooth** | yes | 37 | 36.40% |
| | no | 65 | 63.60% |
| | total | 102 | 100% |
| **Wireless earphones to not let other people know what I am doing** | yes | 54 | 51.50% |
| | no | 48 | 48.50% |
| | total | 102 | 100% |
| **Wireless earphones to mak myself peace and quiet** | yes | 93 | 93% |
| | no | 9 | 9% |
| | total | 102 | 100% |

**INFERENCE**

From the study, it is found that out of 102 respondents 42.60% are male and 57.40% are female and 65.70% are student 24.50% are employees, 1% are Own business, 8.8% are others. From the study, it is found that out of 102 respondents24.5% are less than a hour,43.1% are 1 to 2 hours, 14.7% are 2 to 3 hours, 7.8% are 3 to 4 hours,9.8% are more than 5 hours. Whereas 37% are wireless neck band,27% are wireless Bluetooth,16% are over ear headphones,20% are classic ear bud. Their preferred price range for rupees 500-1000 are 30.7%, 27.7% are 1000-1500, 22.8% are 1500-2000,18.8% are above 2000. From the study 6% respondents go for apple brand, 53% are boat,10% are redmi,8% are Samsung,23% are others. 76.2% respondents uses the volume level as medium, 15.8% are high and 7.9% are low. Wearing the earphones long time will be harmful are agree by 93.1% of the respondents,6.9% are disagree. From the study, it is found that long time usage of Bluetooth creates problems in ear drums respondents 88% are says yes ,12% are no.

Respondents awareness on shortcoming of using Bluetooth/earbud are NIHIL (Noise Induced Hearing Loss) (Oscier et al., 2008) 35.8% ,6.6% are tinnitus,5% are hyperacuais (Jensen, G. R., Solberg, D. P., & Zorn, 2018),14.7% are dizziness,37.9% are ear infection.

## 4.2 CHI SQUARE ANALYSES

**HYPOTHESIS**

**H1:** There is no association between gender with their favorite Bluetooth headset type.

**H0:** There is association between gender with their favorite Bluetooth headset type.

**TABLE 2.1**

| Gender * What kind of Bluetooth headset are you using? Crosstabulation | | | | | |
|---|---|---|---|---|---|
| Count | | | | | |
| | | What kind of Bluetooth headset are you using? | | | Total |
| | | Wireless neck band | Wireless Bluetooth | Over ear headphones | |
| Gender | Male | 15 | 10 | 18 | 43 |
| | Female | 22 | 18 | 19 | 59 |
| Total | | 37 | 28 | 37 | 102 |

**TABLE 2.2**

| Chi-Square Tests | | | |
|---|---|---|---|
| | Value | df | Asymptotic Significance (2-sided) |

| | | | |
|---|---|---|---|
| Pearson Chi-Square | 1.156[a] | 2 | .001 |
| Likelihood Ratio | 1.157 | 2 | .001 |
| Linear-by-Linear Association | .494 | 1 | .482 |
| N of Valid Cases | 102 | | |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.80. | | | |

**INFERENCE**

The calculated value 0.001 is higher than the significant value 0.05. Hence H0 is accepted H1 is rejected. Thus, there is an association between the gender and the preferred Bluetooth type.

**4.3 ANOVA**

**HYPOTHESIS**

**H0:** There is no significant difference between price and preferred Bluetooth Brand.

**H1:** There is a significant difference between price and preferred Bluetooth Brand.

**TABLE 3**

| ANOVA | | | | | |
|---|---|---|---|---|---|
| What brand Bluetooth device do you use? | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 12.626 | 3 | 4.209 | 2.096 | .106 |
| Within Groups | 194.800 | 97 | 2.008 | | |
| Total | 207.426 | 100 | | | |

**INFERENCE** The calculated value 0.106 is higher than the significant value 0.05. Hence H0 is accepted H1 is rejected. Thus, there is no significant different between price and Bluetooth Brand

**HYPOTHESIS**

**H0:** there is no impact of long usage of Bluetooth and Buzzing noise, Dizziness, increased wax quantity.

**H1:** there is an impact of long usage of Bluetooth and Buzzing noise, Dizziness, increased wax quantity

**4.4 REGRESSION ANALYSIS**

**TABLE 4**

| Sl.No | Variables entered | Sig. |
|---|---|---|
| 1 | Experience buzzing noise in your ears | .000 |
| 2 | Experienced dizziness after while using Bluetooth | .000 |
| 3 | Ear wax quantity increased since you started using bluetooth | .000 |

Predictors: (Constant), How long you use your Bluetooth headset?

**INFERENCE:** For the above given variables the calculated value 0.000 is lesser than the significant value 0.05. Hence H1 is accepted H0 is rejected. Thus, there is an impact of long usage of Bluetooth and Buzzing noise, Dizziness, increased wax quantity (Neilson & Rossiter, 2005) .

**5.1 FINDINGS**

- From the study, it is found that out of 102 respondents24.5% are less than a hour, 43.1% are 1 to 2 hours, 14.7% are 2 to 3 hours, 7.8% are 3 to 4 hours,9.8% are more than 5 hours. Whereas 37% are wireless neck bands, 27% are wireless Bluetooth,16% are over ear headphones,20% are classic earbuds.
- Their preferred price range for rupees 500-1000 are 30.7%, 27.7% are 1000-1500, 22.8% are 1500-2000, 18.8% are above 2000. From the study 6% respondents go for apple brand, 53% are boat,10% are redmi,8% are Samsung,23% are others.
- 76.2% respondents use the volume level as medium, 15.8% are high and 7.9% are low. Wearing earphones for a long time will be harmful. 93.1% of the respondents,6.9%

disagree.

- From the study, it is found that long time usage of Bluetooth creates problems in ear drums respondents 88% are saying yes ,12% are no. Respondents awareness on shortcoming of using Bluetooth/earbud are NIHIL(NOISE INDUCED HEARING LOSS) 35.8% ,6.6% are tinnitus,5% are hyperacusis,14.7% are dizziness,37.9% are ear infection.
- There is an association between the gender and the preferred Bluetooth type like Wireless neck band
- Wireless Bluetooth, Over ear headphones, Classic earbud. There is a significant relationship between preferred price and Bluetooth Brand And also there is an impact of long usage of Bluetooth among the respondents on Buzzing noise, Dizziness, increased wax quantity.

## SUGGESTIONS

- It is suggested to connect carefully when you use Bluetooth devices.
- To use Bluetooth for a short duration.
- To hear at low volume.
- Not to use Bluetooth while charging.
- Parents have to prevent their kids from various dangers like cyber bullying and wrong company of their kids.
- To use branded Bluetooth to avoid demerits.

## CONCLUSION

This study found that most participants were aware of the potential risks linked to Bluetooth radiation, with many showing a reliance on Bluetooth-enabled devices. Prolonged usage of such gadgets could potentially lead to further physiological and anatomical issues. Nonetheless, it is important to investigate other possible causes of certain symptoms and determine whether they are indeed related to electromagnetic radiation emitted by mobile phones.

“Wealth (gained) by the ear is wealth of wealth; that wealth is the chief of all wealth” given in the Hearing Chapter from UNESCO recognized ancient works “Thirukkural”.
This study may increase the awareness among participants to reduce the use of Bluetooth devices and use your hearing wealth wisely.

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