

DESCRIPTION OF USE OF PERSONAL LISTENING DEVICES (PLD) DURING ONLINE LEARNING DURING COVID-19 PANDEMIC

Agustiawan^{1,2*}

¹Health Education and Promotion Program

²Master in Public Health Helvetia Institute of Health, Medan

*Corresponding author. Email: agustiawan.dr@gmail.com

ABSTRACT

Background: Unwise use of personal listening devices (PLD) when learning online during COVID-19 pandemic can increase risk of deafness in future. **Methods:** This cross sectional study involved 159 respondents (97 students and 62 lecturers) who then filled out a questionnaire regarding their knowledge and attitudes in using PLD. Mann-Whitney test was conducted to see the association between two variable. **Results:** A total of 51, 55, and 53 respondents respectively used earphones, headsets, and both. A total of 83.0% of respondents knew that they should not use PLD with a volume >60%, 81.1% of respondents knew that they should not use PLD >60 minutes, and as many as 70.4% knew that they should not clean their ears using cotton bud. Respondents in this study generally never used PLD within >60 minutes (27.7%), rarely used PLD with volume >60% (35.2%), and always cleaned their ears with a cotton bud (48.4%). The bivariate test showed that there was no relationship between the respondent's knowledge of the duration of PLD use >60 minutes (p-value= 0.392) and the volume of PLD usage > 60% (p-value= 0.410), while for the respondent's knowledge in terms of "no ear cleaning" using a cotton bud" on the attitude of respondents not to clean their ears using a cotton bud was significant (p-value = 0.034). **Conclusions:** This study shows that there are still many uses of PLD that are not in accordance with the rules of <60% and <60 minutes. Online learning has been carried out for three semesters, so efforts are needed to invite students and lecturers to use PLD wisely.

Keywords: Cotton Bud, Deafness, Online Learning, Personal Listening Device

1. INTRODUCTION

The World Health Organization (WHO) has declared the 2019–20 coronavirus outbreak a Public Health Emergency of International Concern. Evidence of local disease transmission was found in many countries across all six WHO regions as of 7 March 2020.¹ The World Health Organization on February 11, 2020 has announced that "COVID-19" is the official name of the disease.² This disease is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), previously known as the 2019 novel coronavirus (2019-nCoV). This disease is spread through respiratory droplets that come from coughing and sneezing.^{3,4} There have been 3.6 million cases of COVID-19 in Indonesia where the average addition of cases in the first 10 days in August has reached 30-50 thousand cases. The death rate for COVID-19 in Indonesia has reached 104,000 cases where the average increase in the death rate is 1,500 cases per day.⁵ Pandemic has made a shift in several sectors, including education. Education system in almost all of the world, including Indonesia, has shifted to an online learning system since the pandemic.⁶ Students and lecturers often use PLD to support their online learning activities. The use of PLD has the potential to increase the risk of noise-induced hearing loss (NIHL) for

its users.^{7,8} Noise-induced hearing loss (NIHL) is the result of prolonged exposure to high-intensity sound and is associated with damage to the sensory hair cells of the inner ear. This makes the development of NIHL dangerous because the hearing deficit often goes unnoticed until significant and irreversible loss has occurred.⁷⁻⁹

The World Health Organization (2019) shows that 50% of people aged 12 to 35 years or as many as 1.1 billion young people are at risk of hearing loss due to prolonged and loud noise exposure. The data shows that more than 5% of the world's population, namely 466 million people will experience hearing loss, 432 million (93%) adults and 34 million (7%) children whose quality of life will be affected. WHO projections show that if no action is taken, then 630 million people will suffer from hearing loss in 2030. This number is expected to grow to an increasing number from 900 million in 2050 or at least 1 in 10 people will experience hearing loss.¹⁰

This study aims to observe the knowledge and attitudes of students and lecturers regarding the wise use of PLD during online learning.

2. METHODS

This is a cross sectional study involving 159 respondents consisting of 97 students and 62 lecturers. The respondents

of this research came from the National Hearing Seminar held by the Health Education and Promotion Program.

Respondents were asked to fill out a questionnaire that we distributed on googleform. The distributed questionnaires have undergone previous validity and reliability tests. The questionnaire contains points that ask about the knowledge and attitudes of respondents in using PLD. The time for filling out the questionnaire is from July 20 to August 10, 2021.

All data in this study were tested using Chi Square test to see the relationship between the two, p value <0.05 was considered statistically significant. The confidentiality of the respondents was guaranteed by the researcher. The researcher has no conflict of interest with anyone.

3. RESULTS

This study involved 159 respondents. A total of 55 respondents (34.6%) used headsets, 53 (33.3%) respondents used both, and 51 respondents (32.1%) used earphones. A total of 83.0% of respondents knew that they should not use PLD with a volume >60%, 81.1% of respondents knew that they should not use PLD >60 minutes, and as many as 70.4% knew that they should not clean their ears using cotton buds (Table 1).

Table 1. Characteristics of respondents

Varbale	n	%
Occupation		
Lecturer	62	39,0
Student	97	61,0
Device		
Earphone	51	32,1
Headset	55	34,6
Both of them	53	33,3
Not allowed to use PLD with duration >60 minutes		
Yes	129	81,1
No	30	18,9
Cannot use PLD with volume >60%		
Yes	132	83,0
No	27	17,0
Can't clean ears with cotton buds		
Yes	112	70,4
No	47	29,6

Respondents in this study generally never used PLD within >60 minutes (27.7%), rarely used PLD with volume >60% (35.2%), and always cleaned their ears with a cotton bud (48.4%) (Figure 1). Bivariate test showed that there was no relationship between the respondent's knowledge of the duration of PLD use >60 minutes (p-value= 0.392) and the volume of PLD usage > 60% (p-value= 0.410), while for the respondent's knowledge in terms of "no ear cleaning", using a cotton bud" on the attitude of respondents not to clean

their ears using a cotton bud was significant (p-value = 0.034).

4. DISCUSSIONS

This study included respondents consisting of students and lecturers who underwent online learning during the COVID-19 pandemic. E-learning or online learning is the application of Internet technology to improve knowledge and work skills.¹¹ This study involved 159 respondents. A total of 55 respondents (34.6%) used headsets, 53 (33.3%) respondents used both, and 51 respondents (32.1%) used earphones. A total of 83.0% of respondents knew that they should not use PLD with a volume >60%, 81.1% of respondents knew that they should not use PLD >60 minutes, and as many as 70.4% knew that they should not clean their ears using cotton buds.

Respondents in this study generally never used PLD within >60 minutes (27.7%), rarely used PLD with volume >60% (35.2%), and always cleaned their ears with a cotton bud (48.4%) (Figure 1). A person's ear has a limited ability, which is only able to hear sounds up to 85 decibels. The decibel is a unit of measure for measuring the loudness of sound. Communication devices such as mobile phones and laptops can produce sound up to 120 dB. This makes the rational use of PLD is to use a volume of less than 60% and less than 60 minutes.^{9,12,13}

The volume and duration of PLD usage must indeed be considered. Hussain showed that volume was significantly correlated with hearing threshold. They identified a high-risk subgroup using PLD (in which 22% of participants used PLD for 2 hours per day with 91 dB noise) in which pure-tone audiometry showed increased hearing thresholds at 4000 and 6000 Hz, potentially indicating early manifestations of NIHL.¹⁴

Another study conducted by Sulaiman showed that 80% of their research subjects used PLD, of which 20.1% used it with a noise level of 75 dB, while 4.4% of them with 85 dB which can provide a higher risk of hearing damage. Those exposed to noise >75 dB reported a significantly higher incidence of tinnitus and difficulty hearing others immediately after taking PLD. PLD users who were exposed to 75 dB of noise and had used their device for 4 years also showed significantly higher mean audiogram thresholds compared to non-PLD users.¹⁵

The tendency to listen to louder volumes was also associated with a poorer hearing threshold. Women reported more subjective hearing problems that were worse than men. In contrast, men reported using more personal music devices, and they listened at higher volumes.¹⁶

Their study also showed that teens who listened to music using PLD for 3 hours on each occasion were more likely to experience tinnitus. Those who listened to a noise level of 85 dB daily showed a worse average hearing threshold. Students in general use PLD more often at school and at bedtime.¹⁶

The use of earphones for a long period of time and with high volume levels can mediate an increase in damage to hair cell structures such as mitochondria, lysosomes which will

cause hearing loss. This is because the intensity of the noise produced by the earphones can reach 121 dB when used at high volume levels and the peak noise generated can reach 139 dB.^{16,17}

Widen et al conducted a study with a sample of 280 adolescents who listened to music using earphones for 3 hours or more on any occasion per day, of which 14.0% of

their sample had subjectively poor hearing, 7–8% reported frequent or constant hearing problems. , such as tinnitus, sound sensitivity or sound fatigue. The high prevalence of hearing loss in individual earphone users is related to noise intensity, noise frequency, length of exposure time, noise spectrum, and individual vulnerability factors.¹⁶

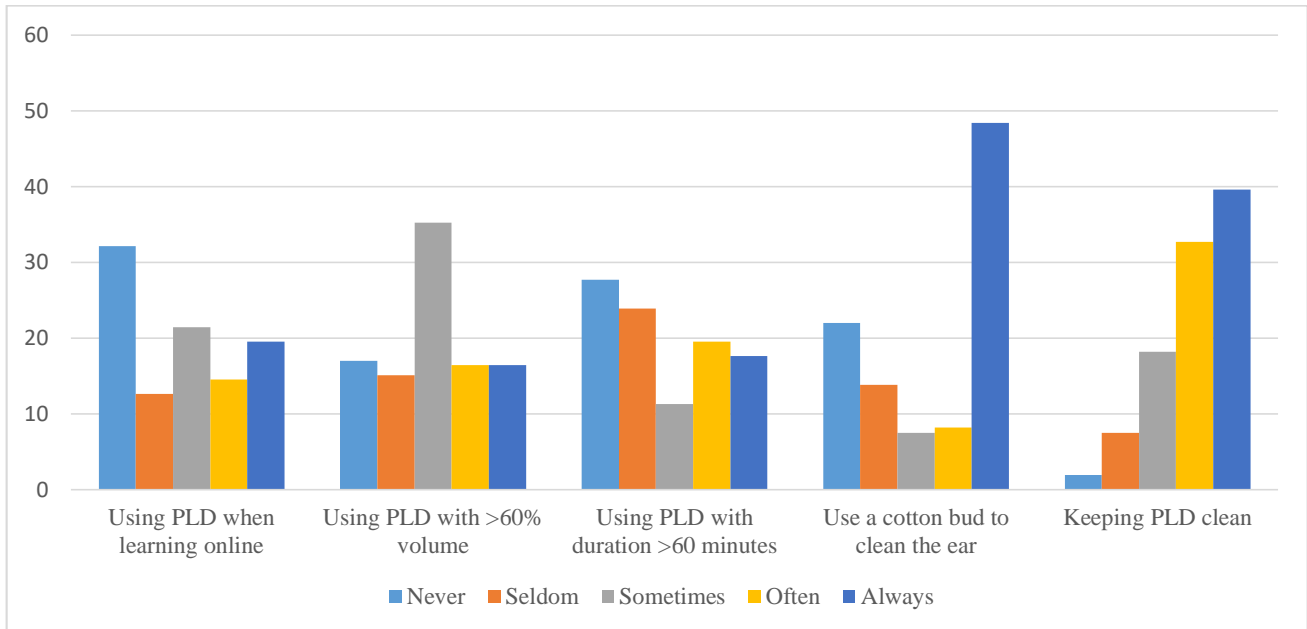


Figure 1. Attitudes of respondents in using PLD and maintaining ear health

The bivariate test showed that there was no relationship between the respondent's knowledge of the duration of PLD use >60 minutes (p-value= 0.392) and the volume of PLD usage > 60% (p-value= 0.410), while for the respondent's knowledge in terms of "no ear cleaning". using a cotton bud” on the attitude of respondents not to clean their ears using a cotton bud was significant (p-value = 0.034).

Another study conducted in Indonesia showed that as many as 32.3% of respondents had a good level of knowledge about the risks of using a headset with a positive attitude, while 67.7% had a good level of knowledge with a negative attitude towards using a headset. The results of statistical tests obtained values (p value = 0.421, α : 0.05). They also show that there is no relationship between the level of knowledge about the risks of using a headset with the attitude of using the headset.¹⁸

Another study conducted in Korea showed that university students were aware of the maximum volume and duration limits of using their PLD without risking hearing loss. Based on the current results, educational programs should provide more information about the effective actions needed to minimize the risk of hearing loss, while increasing public knowledge and their impact on changing attitudes and listening habits using PLD.¹⁹ Upik (2017) also

shows that if the headset is used incorrectly, it can have an impact on hearing loss at a young age.²⁰

Environmental factors affect the process of inputting knowledge into individuals in the environment. The surrounding environment can be one of the factors that affect friendships and the surrounding environment. If you are familiar with an environment that teaches you how to use a headset wisely, it is hoped that this will have a positive impact on knowledge about the risks of using a headset.²⁰⁻²²

This study has several limitations. First, the researcher did not measure the noise decibel level of each respondent. Second, the researcher did not examine the audiogram to see the respondent's hearing ability.

5. CONCLUSION

This study shows that there are still many uses of PLD that are not in accordance with the rules of <60% and <60 minutes. Online learning has been carried out for three semesters, so efforts are needed to invite students and lecturers to use PLD wisely. Education about the dangers of using PLD wisely should be done to prevent NIHL in the future.

ACKNOWLEDGEMENT

We would like to thank all participants of the HEP Indonesian hearing national seminar for being willing to become research respondents and HEP Semarang for being the committee in carrying out this activity.

REFERENCES

1. World Health Organization (WHO). Novel Coronavirus (2019-nCoV): situation report. Geneva; 2020.
2. World Health Organization (WHO). Naming the coronavirus disease (COVID-19) and the virus that causes it. Geneva; 2020.
3. Gorbalenya AE. Severe acute respiratory syndrome-related coronavirus – The species and its viruses, a statement of the Coronavirus Study Group. *BioRxiv*. 2020;2(7):93–7.
4. Centers for Disease Control and Prevention. 2019 Novel Coronavirus (2019-nCoV). Washington DC; 2020.
5. SATGAS. Peta Sebaran Covid-19. 2020.
6. Zulfikar E. What Should be Prepared before Face-to-face Learning? [Internet]. Universitas Gadjah Mada. 2021 [dikutip 7 Agustus 2021]. Tersedia pada: <https://www.ugm.ac.id/en/news/20899-what-should-be-prepared-before-face-to-face-learning>
7. Sliwinska-Kowalska M, Davis A. Noise-induced hearing loss. *Noise Heal*. 2012;14(61):274–80.
8. Boies A. Buku Ajar Penyakit THT. 8 ed. Jakarta: EGC; 2013. 40–41 hal.
9. Dhingra PL; Dhingra S. Disease of Ear Nose and Throat. 7 ed. Disease of Ear Nose and Throat. Philadelphia: Elsevier Health Sciences; 2016.
10. World Health Organization's. Standard aims to prevent hearing loss among 1.1 billion young people [Internet]. WHO Int. 2019 [dikutip 4 September 2021]. Tersedia pada: <https://www.who.int/news-room/detail/12-02-2019-new-who-itu-standard-aims-to-prevent-hearing-loss-among-1.1-billion-young-people>
11. Ruiz J, Mintzer MJ. The Impact of E-Learning in Medical Education. *Acad Med*. 2006;
12. Tuli BS. Textbook of Ear, Nose, and Throat. India: Jaypee Brothers Medical Publishers; 2013.
13. Nina I; et al. Buku Ajar Ilmu Kesehatan Telinga Hidung Tenggorok Kepala dan Leher. Jakarta: Balai Penerbit FKUI; 2012.
14. Hussain T, Chou C, Zettner E, et al. Early Indication of Noise-Induced Hearing Loss in Young Adult Users of Personal Listening Devices. *Ann Otol Rhinol Laryngol*. 2018;127(10):703–9.
15. Sulaiman AH, Husain R, Seluakumaran K. Hearing Risk among Young Personal Listening Device Users: Effects at High-Frequency and Extended High-Frequency Audiogram Thresholds. *J Int Adv Otol*. 2015;11(2):104–9.
16. Widen SE, Basjo S, Moller C, et al. Headphone listening habits and hearing thresholds in Swedish adolescents. *Noise Heal*. 2017;19(88):125–32.
17. Susiyanti E, Imanto M. Efek Penggunaan Earphone sebagai Faktor Resiko Kejadian Noise Induced Hearing Loss. *Majority*. 2020;9(2):63–7.
18. Listiana I, Hasan M, Rosmayati W. Determinan Tingkat pengetahuan Tentang Risiko Pemakaian Headset dengan Sikap Penggunaan Headset pada Mahasiswa. *Edu Masda J*. 2021;5(1):89–98.
19. You S, Kwak C, Han W. Use of Personal Listening Devices and Knowledge/Attitude for Greater Hearing Conservation in College Students: Data Analysis and Regression Model Based on 1009 Respondents. *Int J Environ Res Public Health*. 2020;17:1–23.
20. Upik R. Gambaran Pengetahuan Siswa Kelas X dan XI tentang Penggunaan Earphone di SMA Pasundan di Kota Bandung. *J Pendidik Keperawatan Indones*. 2016;
21. Ilma ZD. Pengaruh Pengetahuan dan Sikap Siswa SMA Terhadap Perilaku Penggunaan Peranti Dengar di SMAN X Tangerang Selatan. UIN Syarif Hidayatullah; 2016.
22. Notoadmojo S. Promosi Kesehatan Teori Dan Aplikasinya. Jakarta: Rineka Cipta; 2014.