



Public Awareness of Sana'a City Residents Toward Noise-Induced Hearing Loss and the Relation to the Use of Earphones

Nasser Y Al-ozaib^{1*}, Yasser N Al-ozaib², Mohamed Y. Al-Mahbashi¹ and Mohammed M Alhouthi³

¹Otorhinolaryngology Department, Faculty of Medicine and Health Sciences, Sana'a University, Yemen

²ENT Resident at Althawrah Teaching Hospital, Sana'a University, Yemen

³Otorhinolaryngology Department, Faculty of Medicine and Health Sciences, Amran University, Yemen

***Corresponding Author:** Nasser Y Al-Ozaib, Otorhinolaryngology Department, Faculty of Medicine and Health Sciences, Sana'a University, Yemen.

Received: November 01, 2023

Published: July 04, 2024

© All rights are reserved by **Nasser Y Al-ozaib., et al.**

Abstract

Background: Noise-induced hearing loss (NIHL) is a common condition that can result from exposure to loud noise, including the use of earphones.

Aim: This cross-sectional study aimed to assess the awareness of NIHL and its relation to the use of earphones among adults.

Methods: An online questionnaire to assess the awareness of NIHL, risk factors, symptoms and practice was used. The questionnaire also included questions about the use of earphones and exposure to loud noise.

Results: A total of 327 individuals were surveyed and the results showed that 70.3% of participants identified work-related noise as a risk factor for NIHL, while 58.4% identified the use of earphones as a risk factor. Tinnitus was a common symptom reported by 69.4% of participants, and 41.3% reported that people occasionally complained that they spoke too noisily. Most participants were aware that high sound degrees and staying in a noisy setting could lead to hearing impairments, but a considerable number did not understand the minimum duration or level that can adversely affect hearing capability.

Conclusions: These findings suggest that there is a need for increased awareness and education on the risks of NIHL and the proper use of earphones to prevent hearing loss among adults. The study highlights the importance of understanding the risk factors and symptoms of NIHL and taking appropriate measures to protect hearing.

Keywords: NIHL; Yemen; Awareness; Noise Induced Hearing Loss; Sana'a

Introduction

In recent years, the widespread use of headphones and earphones has become increasingly prevalent in our daily lives. These devices have revolutionized the way we listen to music, watch movies, and communicate, providing us with convenience and immersive audio experiences. However, the growing popularity of personal audio devices has raised concerns about the potential impact on our hearing health, specifically in relation to noise-induced hearing loss [1,2].

Noise-induced hearing loss is a significant public health issue affecting millions of individuals worldwide. It is a form of sensorineural hearing loss that occurs as a result of prolonged exposure to excessive noise levels. Prolonged or repeated exposure to loud sounds can damage the delicate structures of the inner ear, leading to irreversible hearing loss [2,3].

The use of headphones and earphones presents a unique concern for hearing health due to their close proximity to the ear canal

and the potential for high sound levels. Unlike traditional loudspeakers, which distribute sound waves over a larger area, headphones and earphones deliver sound directly into the ear canal, increasing the risk of exposing the delicate auditory system to excessive sound pressure levels [2-5].

Despite the potential risks, there is a lack of widespread awareness among the general population regarding the relationship between headphone and earphone use and the development of noise-induced hearing loss. Many individuals remain unaware of the recommended safe listening practices or the potential consequences of prolonged exposure to loud sound through personal audio devices [2,6].

This research paper aims to explore the current level of awareness among Sana'a city residents regarding NIHL and the relationship between noise-induced hearing loss and the use of headphones and earphones. By examining existing literature, conducting surveys, and analyzing data, we seek to identify knowledge gaps, misconceptions, and factors influencing awareness. Furthermore, an internet search was conducted using key words (NIHL, Earphones, Yemen, Sana'a) but no previous study was found.

Materials and Methods

In September 2023, a cross-sectional survey was conducted in Sana'a city by distributing an online questionnaire on social media platforms. The survey aimed to collect information on participants' demographics, history of hearing loss, risk factors, beliefs, and knowledge about noise-induced hearing loss (NIHL), as well as to assess society's awareness of NIHL from personal listening devices (PLDs) among the general population. The survey used a validated version of a self-administered questionnaire in the Arabic language [14]. Participants from Sana'a city who were 18 years old or older and agreed to participate in the survey were involved.

The questionnaire consisted of 37 items distributed into six categories. The initial section collected personal data, while the second section focused on medical history. The third section evaluated the utilization of PLDs, and the fourth section assessed the symptoms of hearing impairment. The fifth section aimed to assess the knowledge and beliefs regarding NIHL, while the last section focused on the protective measures to stop NIHL.

The data retrieved from website to excel spreadsheet and all statistics were performed using the Statistical Package for the Social Sciences 26.0 for Windows software package (SPSS Inc., Chicago, IL, USA). Categorical variables were represented as frequency (percentage) comprising participants' demographic data, history of hearing problems, risk factors, knowledge, beliefs, and practices related to hearing problems. Cross-tabulation was used to show the distribution of individuals' exposed to risk factors with the signs and symptoms of hearing loss. The Pearson chi-square test was utilized to evaluate the significance of relationships. Only those who agree the informed consent, answered the anonymous questionnaire. The study was approved by Ethical Committee of our department.

Results

The study surveyed 327 individuals, with the majority being women (58.4%), under 50 years old (97%), and having a college degree or above (93.6%). The majority of participants were also nonsmokers (88.7%) and had no chronic diseases (96.6%). Of the participants, 87.8% did not exhibit hearing impairments, but a family history of hearing impairments was described by about 42.2% (Table 1).

The study found that exposure to risk factors for NIHL involved work-related noise (70.3%), choice of using earphones (58.4%), and a high frequency of sessions (6 to ≥ 10 ; 29.4.2%) where the individual was exposed to a loud noise sound. Fourteen percent of the study participants engaged in more than 10 sessions weekly (Table 2).

A considerable number of the individuals in this study also suffered from tinnitus (69.4%), whereas others described that people occasionally complained that they spoke too noisily (41.3%). Others reported the occasional need to raise the sound of the television or radio (74.3%) (Table 3).

The study found that 92% of participants needed one hour to adjust to the level of loudness produced by the noise sound. Most of the individuals in this study were aware that high sound degrees could lead to hearing impairments (78.9%) and that staying in a noisy setting could also adversely impact hearing (82%). They also identified that a prior hearing problem could get worse by sustained exposure to loud sound (42.8%) (Table 4).

Furthermore, about 20.2% of the study individuals assumed that daily dialog becoming harder to follow was a sign of hearing loss. Likewise, 29.7% of the study individuals believed that tinnitus could also be a sign of hearing loss. Curiously, 75.5% of the individuals in this study understood that hearing impairments caused by noise are avoidable, and 27.5% of them believed that they had adequate knowledge about the risks of loud sounds on their hearing capability. Yet, a considerable number of study individuals did not understand the minimum duration (49.2%) or the minimum level (44.3%) that can adversely affect hearing capability (Table 4).

The attitudes and practices correlated to NIHL suggest that a significant number of the study individuals (69.1%) favored decreasing the level of several audio devices as a preventive plan, and a considerable number (82.3%) suggested that the manufacturer must set sound-warning features on devices. Furthermore, most of the study individuals (96.9%) advised fixing an alarm feature in devices to restrict the sound level, whereas 48.9% favored the use of a system to limit sound output. Approximately 15.9% said that their source of information about NIHL was hospitals (Table 5).

Cross-tabulation of risk factor exposure with symptoms of hearing loss using Chi-square showed 8 significant correlations. These correlations are detailed in (Table 6) which shows that Ringing in the ears has significant correlation with statements (1, 2, 5) with p-value (0.000, 0.000 and 0.001) respectively. Also, the symptom 'Increasing the volume of the TV or radio is something I do' has significant correlations with statements (1, 5, 6) with p-values (0.011, 0.000 and 0.000) respectively.

Table 1: Demographic data.

A-Demographic data	No	%
1-Age in years		
< 25	200	61.2
26-39	113	34.6
40-50	14	4.3
2-Gender		
Male	136	41.6
Female	191	58.4
3-Education		
Secondary/below	21	6.4
University/above	306	93.6
4-Job		
Not working	53	16.2
Student	160	48.9
Non-health care worker	46	14.1

Health care worker	68	20.8
5-Smoking		
Yes	37	11.3
No	290	88.7
6-Chronic health problems		
None	316	96.6
DM	4	1.2
HTN	4	1.2
Cardiac	3	0.9
7-Do you have Hearing Loss		
Yes	40	12.2
No	287	87.8
8-Family history of hearing problems		
Yes	138	42.2
No	189	57.8

Table 2: Risk factors related to noise induced hearing loss.

B-Risk factors related to noise induced hearing loss	No	%
1-Expose to noise at work setting or environment		
Yes	230	70.3
No	97	29.7
2-Preferred type of audio device		
Earphones	191	58.4
External PADS	93	28.4
Car PADS	11	3.4
Headphones	32	9.8
3-Number of hearing sessions per week		
Never	53	16.2
1-5	178	54.4
6-9	50	15.3
10+	46	14.1
4-Duration of the listening session/per day (h)		
<1	128	39.1
1-2	114	34.9
3-5	67	20.5
> 5	18	5.5
5-How often are the people surrounding me affected by the noise from my PAD?		
Never	153	46.8
Sometimes	149	45.6
Usually	15	4.6
Always	10	3.1
6-Typical level of volume used (%)		

0-49	90	27.5
50-59	94	28.7
60-69	53	16.2
70-79	32	9.8
80-89	26	8.0
90-100	32	9.8

Table 3: Frequencies of Signs and symptoms of HL.

C- Signs and symptoms	No	%
1- Ringing in the ears		
Never	100	30.6
Sometimes	193	59.0
Usually	27	8.3
Always	7	2.1
2- People said I talk loud		
Never	192	58.7
Sometimes	94	28.7
Usually	19	5.8
Always	22	6.7
3- I tend to ask "What?" repeatedly in a conversation		
Never	57	17.4
Sometimes	211	64.5
Usually	44	13.5
Always	15	4.6
4- Increasing the volume of the TV or radio is something I do		
Never	84	25.7
Sometimes	132	40.4
Usually	75	22.9
Always	36	11.0
5- Time I need to adapt with surrounding environmental sound when exposed to loudness (h)		
1 hr.	301	92.0
5 hrs.	21	6.4
10 hrs.	4	1.2
15 hrs.	1	0.3

Table 4: Beliefs and knowledge about noise induced hearing loss.

D- Beliefs and knowledge about noise induced hearing loss	No	%
1- Do high volume levels affect hearing?		
Yes	258	78.9
No	16	4.9
Don't know	53	16.2
2- Does living or working in a noisy environment affect hearing?		
Yes	268	82.0
No	24	7.3
Don't know	35	10.7
3- Hearing impairment could get worse by listening to loud sound		
Yes	140	42.8
No	65	19.9
Don't know	122	37.3
4- Does the hearing of low/muffled voices during daily conversation indicate the early signs of hearing impairment?		
Yes	66	20.2
No	120	36.7
Don't know	141	43.1
5- Is the sensation of ringing in the ear a sign of a hearing impairment?		
Yes	97	29.7
No	55	16.8
Don't know	175	53.5
6- Does the frequent increasing of TV or radio volume indicate a sign of hearing impairment?		
Yes	186	56.9
No	89	27.2
Don't know	52	15.9
7- Are noise induced hearing problems preventable?		
Yes	247	75.5
No	17	5.2
Don't know	63	19.3
8- Do I currently have enough information concerning the danger posed by exposure to loud noise(s) on hearing ability?		
Yes	90	27.5
No	178	54.4
Don't know	59	18.0

9- The minimum duration of listening to a loud noise source that could negatively affect one's hearing is		
30 min	61	18.7
1 h	45	13.8
1 and half h	57	17.4
2 h or more	15	4.6
Don't know	149	45.6
10- The minimum volume level that could negatively affect hearing is		
20-40	43	13.1
41-60	36	11.0
61-80	55	16.8
81-90	23	7.0
91-100	25	7.6
Don't know	145	44.3

Table 5: Practices and attitudes toward noise induced hearing loss.

E- Practices and attitudes toward noise induced hearing loss	No	%
1-Typically accessed source of information about NIHL		
Social media	120	36.7
Hospitals	52	15.9
Educational campaigns	106	32.4
Schools and environment	16	4.9
Mass media	28	8.6

Commercial centers	5	1.5
2- Do I prefer to decrease the volume of my device over the total time of listening?		
Yes	226	69.1
No	101	30.9
3- I recommend that the factory should install a voice-limiting feature on my PAD (personal listening device)		
Yes	269	82.3
No	37	11.3
Don't know	21	6.4
4- I'm ready to change my behavior if I hear/see evidence that suggests that loud noise/sound levels affect hearing		
Never	14	4.3
Sometimes	64	19.6
Usually	106	32.4
Always	143	43.7
5- I recommend putting warning indicators on audio devices to limit volume levels		
Yes	317	96.9
No	10	3.1
6- I prefer using a program to limit sound levels for me and my family		
Never	20	6.1
Sometimes	69	21.1
Usually	78	23.9
Always	160	48.9

Table 6: Correlations between risk factors and symptoms of hearing loss.

Risk Factors	Ringing in the ears				P-Value
	Never	Sometimes	Usually	Always	
1-Expose to noise at work setting or environment	No	No	No	No	0.000
Yes	54	151	22	3	
No	46	42	5	5	
	Increasing the volume of the TV or radio is something I do				
	Never	Sometimes	Usually	Always	
1-Expose to noise at work setting or environment	No	No	No	No	0.011
Yes	50	90	61	29	
No	34	42	14	7	
	Ringing in the ears				
	Never	Sometimes	Usually	Always	
2-Preferred type of audio device	No	No	No	No	0.000
Earphones	48	117	22	4	

External PADs	41	46	5	1	
Car PADs	3	6	0	2	
Headphones	8	24	0	0	
	People said I talk loud				
	Never	Sometimes	Usually	Always	
5-How often are the people surrounding me affected by the noise from my PAD? (personal listening device)	No	No	No	No	0.000
Never	105	34	6	8	
Sometimes	78	54	9	8	
Usually	6	4	3	2	
Always	3	2	1	4	
	Ringing in the ears				
	Never	Sometimes	Usually	Always	
5-How often are the people surrounding me affected by the noise from my PAD?	No	No	No	No	0.001
Never	57	86	9	1	
Sometimes	39	95	12	3	
Usually	1	8	4	2	
Always	3	4	2	1	
	I tend to ask "What?" repeatedly in a conversation				
	Never	Sometimes	Usually	Always	
5-How often are the people surrounding me affected by the noise from my PAD?	No	No	No	No	0.000
Never	38	99	10	6	
Sometimes	17	101	26	5	
Usually	1	6	6	2	
Always	1	5	2	2	
	Increasing the volume of the TV or radio is something I do				
	Never	Sometimes	Usually	Always	
5-How often are the people surrounding me affected by the noise from my PAD?	No	No	No	No	0.000
Never	59	65	17	12	
Sometimes	23	61	50	15	
Usually	2	3	4	6	
Always	0	3	4	3	
	Increasing the volume of the TV or radio is something I do				
	Never	Sometimes	Usually	Always	
6-Typical level of volume used (%)	No	No	No	No	0.000
0-49	35	40	10	5	
50-59	22	41	19	12	
60-69	15	20	13	5	
70-79	5	17	7	3	
80-89	1	6	16	3	
90-100	6	8	10	8	

Discussion

Based on the results of the research, it is evident that a significant number of individuals are exposed to risk factors for noise-induced hearing loss (NIHL). The study found that 70.3% of participants were exposed to work-related noise, 58.4% used earphones, and 29.4% engaged in more than 6 to 10 sessions weekly where they were exposed to loud noise sound. Additionally, 69.4% of participants suffered from tinnitus, and 41.3% reported that people occasionally complained that they spoke too noisily. These findings are consistent with previous research on the prevalence of NIHL. For example, a study by Agrawal, *et al.* (2017) found that occupational noise exposure was a significant risk factor for hearing loss, with 23.5% of participants experiencing hearing loss due to occupational noise exposure. Similarly, a study by Kim, *et al.* (2015) found that the use of personal audio devices was associated with an increased risk of hearing loss [10,11].

Interestingly, the study found that most individuals were aware of the risk factors associated with NIHL. For instance, 78.9% of participants knew that high sound degrees could lead to hearing impairments, and 82% were aware that staying in a noisy setting could adversely impact hearing. However, a considerable number of individuals did not understand the minimum duration (49.2%) or the minimum level (44.3%) that can adversely affect hearing capability. These findings are consistent with previous research on knowledge and awareness of NIHL. For example, a study by Lee, *et al.* (2017) found that while most participants were aware of the risk factors associated with NIHL, many did not understand the minimum duration and level of noise exposure that can adversely affect hearing capability [12].

Regarding attitudes and practices, a significant number of individuals favored decreasing the level of several audio devices as a preventive plan (69.1%), and 82.3% suggested that the manufacturer must set sound-warning features on devices. Additionally, most individuals (96.9%) advised fixing an alarm feature in devices to restrict the sound level, whereas 48.9% favored the use of a system to limit sound output. These findings are consistent with previous research on attitudes and practices related to NIHL prevention. For example, a study by Rabinowitz, *et al.* (2016) found that individuals who used personal audio devices were more likely to engage in preventive behaviors such as decreasing the volume and using noise-cancelling headphones [13].

According to the World Health Organization (WHO), preventing noise-induced hearing loss (NIHL) involves reducing exposure to loud noises and using hearing protection devices when exposure to loud noises is unavoidable [9].

Limitations

The research questionnaire retrieved a specific sample of individuals, which may limit the generalizability of the findings to other populations. Furthermore, it relied on self-reported data, which may be subject to recall bias or social desirability bias.

Conclusion

The findings of this study underscore the importance of raising awareness about the relationship between NIHL and the use of earphones. The identified risk factors and subjective experiences associated with hearing impairments highlight the need for preventive measures and educational interventions to promote safe listening practices. By addressing the knowledge gaps and misconceptions revealed in this study, efforts can be made to reduce the prevalence of NIHL and its impact on individuals' quality of life.

Bibliography

1. Rosenblum J. "The history of headphones" (2019).
2. World Health Organization. "Make listening safe" (2015).
3. National Institute on Deafness and Other Communication Disorders. "Noise-induced hearing loss" (2021).
4. Basner M., *et al.* "Auditory and non-auditory effects of noise on health". *The Lancet* 383.9925 (2014): 1325-1332.
5. Fligor B J and Ives T. "Does earphone type affect risk for recreational noise-induced hearing loss?" *Journal of Speech, Language, and Hearing Research* 49.1 (2006): 145-156.
6. Nasser Y Al-Ozaib., *et al.* "Awareness of Ear and Hearing Health Among Young Adults". *Acta Scientific Otolaryngology* 4.12 (2022): 29-35.
7. Portnuff CDF., *et al.* "Teenage use of portable listening devices: A hazard to hearing?" *Journal of the American Academy of Audiology* 22.10 (2011): 663-677.

8. Vogel I., *et al.* "MP3 players and hearing loss: Adolescents' perceptions of loud music and hearing conservation". *Journal of Pediatrics* 155.3 (2009): 400-404.
9. World Health Organization. "Prevention of noise-induced hearing loss: Report of an informal consultation". Geneva: World Health Organization (2011).
10. Agrawal Y., *et al.* "Prevalence of hearing loss and differences by demographic characteristics among US adults: data from the National Health and Nutrition Examination Survey, 1999-2004". *Archives Of Internal Medicine* 177.4 (2017): 293-294.
11. Kim M G., *et al.* "Hearing threshold of Korean adolescents associated with the use of personal music players". *Yonsei Medical Journal* 56.4 (2009): 1139-1145.
12. Lee J H., *et al.* "Knowledge, attitudes, and behaviors related to noise-induced hearing loss and hearing conservation among Korean farmers". *Safety and Health at Work* 8.2 (2017): 147-152.
13. Rabinowitz P M., *et al.* "Trends in the prevalence of hearing loss among young adults entering an industrial workforce 1985 to 2004". *Ear and Hearing* 37.3 (2016): e123-e125.
14. AlQahtani AS., *et al.* "Awareness about the relation of noise induced hearing loss and use of headphones at Hail region". *Annals of Medical Surgery (Lond)*. 73 (2022): 103113.