WORKERS' AWARENESS OF THE IMPACT OF NOISE POLLUTION ON HEARING IN DUHOK CITY

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ABSTRACT

Background: Noise has become a very important "stress factor" in the environment of man and it has been recognized as a factor contributing to hearing loss which ranks among the most common work-related illnesses. This study aimed to investigate workers' awareness, in noise induced places, about the effect of noise on their hearing sensation.

Methods: A cross-sectional study conducted among 100 workers from different noise inducing workplaces in Duhok city. The questionnaire was composed of close-ended questions on socio-demographics, sensorineural hearing loss complaints, knowledge of noise hazards and its prevention and attitude toward preventive measures.

Results: Ninety-five percent of the participants reported one or more complaints related to occupational noise-induced (sensory-neural) hearing loss, (ONIHL). The distribution of complaints suggests a gradient of hearing impairment severity, with some individuals reporting up to seven different symptoms. Occupationally, half of the participants were from industrial areas, followed by construction, general streets, and hospitality sectors. Only 29% of workers had knowledge about noise pollution hazards, and 12% of those who were aware of personal protection aids actually utilized them. Employer-provided information and instructions on noise hazards and noise hazards prevention were scarce, with only 23% and 19% of workers receiving such guidance. Statistical analysis revealed significant correlations between complaints and age, sound level, distance from the sound source, and service duration, with r values of 0.43, 0.614, -0.443, and 0.352, respectively, all with $p < 0.001$. Significant p values were also observed concerning the application of personal protection aids, provision of information about noise hazards, and instructions on noise hazards prevention by employers.

Conclusion: This study underscores the need for increased awareness and proactive measures to protect workers from ONIHL in Duhok City. The significant correlations between ONIHL complaints and various factors emphasize the urgency for educational initiatives and stricter enforcement of occupational safety regulations to prevent hearing loss among workers.

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Keywords: Noise, Pollution, Workers, ONIHL

Noise has become an important "stress factor" in the environment of man. The term "noise pollution" has been recently used to signify the hazards of sounds which are consequence of modern-day development, leading to health hazards of different types. When exposure to noise is present in the workplace and causes hearing loss, it is called occupational noise induced hearing loss (NIHL).[1] NIHL is caused by prolonged exposure to high-intensity noise, which leads to damage to the delicate hair cells of the inner ear. It has been suggested that 12% or more of

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the global population is at risk of hearing loss from noise. The World Health Organization estimated that one-third of all cases of hearing loss can be attributed to noise exposure.[2] It is estimated that 1.3 billion people suffer from hearing loss due to noise exposure.[3] Worldwide, occupational noise exposure is responsible for 16% of cases of disabling hearing loss in adults.[3,4] NIHL is a predictable and preventable disease; it is characterized as sensory neural hearing loss (SNHL) and is usually bilateral, irreversible and progressive, while the noise exposure continues at levels higher than 80dB, hearing impairment may occur.[5] Many negative impacts of noise begin to be seen with long-term daily exposure to noise levels above 65 dB or with acute exposure to noise levels above 80 to 85 dB. The most common symptom of SNHL is difficulty hearing. Other symptoms may include tinnitus, dizziness, difficulty understanding speech, especially in noisy environments, listening is hard /getting tired more easily, increased anxiety and depression due to isolation, avoiding phone conversation, withdrawal from social activities and sounds like people are mumbling.[6] This indicates that ONIHL does result in substantial disability. The effects of occupational noise exposure result in a significant financial and disease burden on both society and individuals. ONIHL can limit an individual's ability to communicate with others and can lead to increased social stress, sadness, diminish confidence, poor self-identity, and bad interpersonal relationships.[7,8] The prevention of this widespread ailment may be aided by putting preventive strategies into place, creating conditions that guard against or alleviate harm from noise exposure, and applying techniques to identify and attenuate causal elements.[9]

Duhok city in Kurdistan Region- Iraq, similar to any other city, have many sources of noise pollution, the main ones are: electric generators, towers construction, road traffic, factories, carpentry, blacksmithing, welding and industry shops, ceramic crusher, road and bridge works, excavation works, carwash places, big restaurants, hotels, wedding halls, huge malls, beauty salons etc. All involve big number of workers who are exposed to noise pollution in those places. This study aimed to investigate workers' awareness in noise-induced places about the effect of noise on their hearing sensation. The study-objectives are to estimate both the prevalence of the sensorineural hearing loss and the level of workers' awareness on noise hazards and their knowledge and practices of prevention in different work places, also to ensure the necessity of using best preventive measurements and make awareness about noise pollution hazards and about the preventive measurements among workers.

SUBJECTS AND METHODS

This self-administered questionnaire-based descriptive cross-sectional study was carried out between January and March 2024, for assessment of noise pollution impact on sensorineural hearing loss among workers in different noise-inducing workplaces in Duhok city. The respondents were the workers in workplaces of noisy environment or those working with noisy machines which have a noise level of 50 dBs and more which were measured by using a specific application from a smart cellphone. The sample size was 100 workers who have been classified into 4 groups (A, B, C, D) based on their work environment and level of exposure to the noise, representing the Industrial area, Constructing companies, General streets and big hotels with Wedding halls, sequentially.

The questionnaire's validity was assessed by the Community Medicine Department in the medical college- Duhok University. It included three parts, the first one is the

sociodemographic characteristics of the workers, the second is about their knowledge of noise hazards and preventive measures, and the third part concerned the impact of noise on sensorineural hearing loss.

The questionnaire was presented to the respondents after a comprehensive explanation of the topic and through a direct interview with them, their answers to the questionnaire were considered freely and without any pressure.

Ethical Considerations

After potential participants agreed to participate, the aims and advantages of the research were explained to them and they were given a guarantee that the information gained would be confidential and would have no effect on their job continuity progress. The Ethical Committee for Scientific Research at the General Health Directorate in Duhok approved this study.

Data analysis

Data were entered and analyzed using SPSS 27. Numerical data was described by mean and standard deviation and categorical data by frequency and percent. Pearson correlation coefficient (r) and scatter diagrams were used to test the relationship between number of symptoms (complaints) indicating sensory-neural hearing loss, and other variables. Unpaired t-test and one-way analysis of variance (ANOVA) were used to test the differences in mean sound measure and number of complaints, by awareness/ practice toward noise pollution and occupation workplace. LSD (least square difference) was used for intergroup comparisons in ANOVA. A p-value less than 0.05 was considered statistically significant.

RESULTS

During the study period there were 105 workers of both genders, the total number of the workers completing the study was 100, as 5 workers did not respond (participation rate of 95.2%). Descriptive statistics of this study revealed ages of participants were between 18 years and 50 years, the mean was 31.81, S.D 6.86. The sound measured by dBs was between 50 dBs and 200 dBs. The mean was 90.65, SD 19.46. The distance from sound source by meters was between 0.10 m. and 120m. The mean was 7.86, SD 21.8. The service duration by years was between 0.17 years and 20 years, the mean was 7.34, SD 4.29. The complaints were between 0 and 7 complaints, the mean was 2.96, SD 1.5, as shown in Table 1.

Table 1. Descriptive statistics of the study sample

Descriptive Statistics					
	No.	**Minimum**	**Maximum**	**Mean**	**Std. deviation (SD)**
Age	100	18	50	31.81	6.86
Sound measure by dBs	100	50	200	90.65	19.46
Distance from sound source by meters	100	0.10	120	7.86	21.81
Service duration by years	100	0.17	20	7.34	4.29
Number of auditory complaints	100	0	7	2.96	1.50

There were 82 (82%) male and 18 (18%) female workers. From the total respondents, those aged 18-29 years were 37 (37%), 30-39 years were 49 (49%), and 40-50 years were 14 (14%).

Regarding educational attainment, from total participants 37 (37%) were illiterate, 37 (37%) were primary school graduates, 18 (18%) were secondary school graduates, and 8 (8%) were college graduates. In regards to the complaints indicating sensory-neural hearing loss, only 5 (5%) were without complaints, 95 (95%) presented with one or more complaint; 14 (14%) presented with one complaint, 18 (18%) presented with two, 25 (25%) with three, 22 (22%) with four, 14 (14%) with five, 1 (1%) with six and 1 (1%) with seven complaints.

Regarding occupation workplace, from total participants 50 (50%) were from industrial areas, 22 (22%) were from construction companies, 13 (13%) were from general streets, 15 (15%) were from hotels and wedding halls, as shown in Table 2.

Regarding Workers 'awareness and practice toward noise pollution, from the total respondents, those who have knowledge about noise pollution hazards were only 29 (29%) while 71 (71%) have no knowledge, meantime only 25 (25%) have knowledge about personal protection aids against noise, of them only 3 (12.0%) apply it, for the causes mentioned by them 8 (36.4%) neglect it, 4 (18.2%) employers did not provide it to them, and 10 (45.5%) did not care about that. On the other hand, 75(75%), have no knowledge at all. Whether the employer provide workers with information regarding noise hazards, from the total respondents only 23 (23%) have been provided, 77 (77%) not provided. Also, from total participants only 19(19%) have been provided by the employers with instructions about noise hazards prevention 81(81%) not provided with such instructions by the employers. as shown in Table 3.

Table 2. Characteristics of the study sample

Characteristic		No.	%
Age (years)	18 – 29	37	37.0
	30 – 39	49	49.0
	40 – 50	14	14.0
Sex	Male	82	82.0
	Female	18	18.0
Educational attainment	Illiterate	37	37.0
	Primary	37	37.0
	Secondary	18	18.0
	University	8	8.0
Marital State	Married	61	61.0
	Unmarried	39	39.0
Number of complaints indicating sensory-neural hearing loss	0	5	5.0
	1	14	14.0
	2	18	18.0
	3	25	25.0
	4	22	22.0
	5	14	14.0
	6	1	1.0
	7	1	1.0
Occupation workplace	Industrial area	50	50.0
	Construction companies	22	22.0
	General streets	13	13.0
	Hotels and wedding halls	15	15.0
Total		**100**	**100.0**

Table 3. Workers 'awareness and practice toward noise pollution

Awareness/ practice toward noise pollution		No.	%
Do you have knowledge about noise pollution hazards	Yes	29	29.0
	No	71	71.0
Do you have knowledge about personal protection aids against noise	Yes	25	25.0
	No	75	75.0
If yes, do you apply*	Yes	3	12.0
	No	22	88.0
If no, mention why**	I neglect	8	36.4
	Employer did not provide it	4	18.2
	I do not care	10	45.5
Did the employer provide you with information regarding noise hazards	Yes	23	23.0
	No	77	77.0
Did the employer provide you with instructions about noise hazards prevention	Yes	19	19.0
	No	81	81.0
Total		**100**	**100.0**

* Only 25 workers.
** Only 22 workers.

The study results showed significant Pearson correlation (r) between number of complaints, and age by years, sound measure by dBs, distance from sound source by meters, and service duration by years. The correlations were (0.43), (0.614), (-0.443), and (0.352) respectively, each with a p value of < 0.001. On the other hand, there was no significant correlation between complaints and daily service duration by hours, as shown in Table 4 and Figures 1-5.

Table 4. Correlation of number of complaints with age, sound measure, distance from sound source and service duration (n = 100)

Relation of complaints with	Pearson correlation (r)	*P* value
Age (years)	0.431	**< 0.001**
Sound measured by dBs	0.614	**< 0.001**
Distance from sound source by Meters	-0.443	**< 0.001**
Service duration by years	0.352	**< 0.001**
How many hours do you work here daily	0.048	0.634

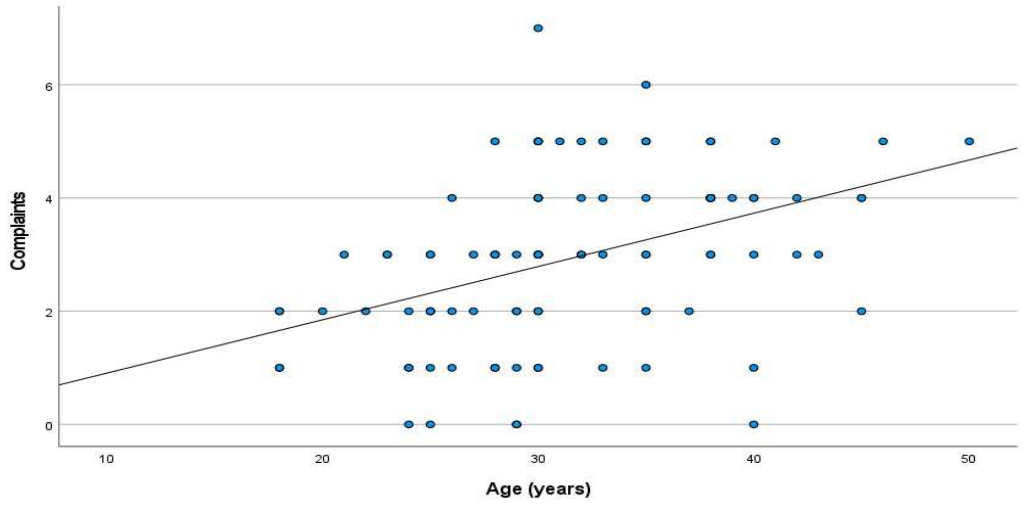

Figure 1. Scatter diagram of the correlation between complaints and age in years.

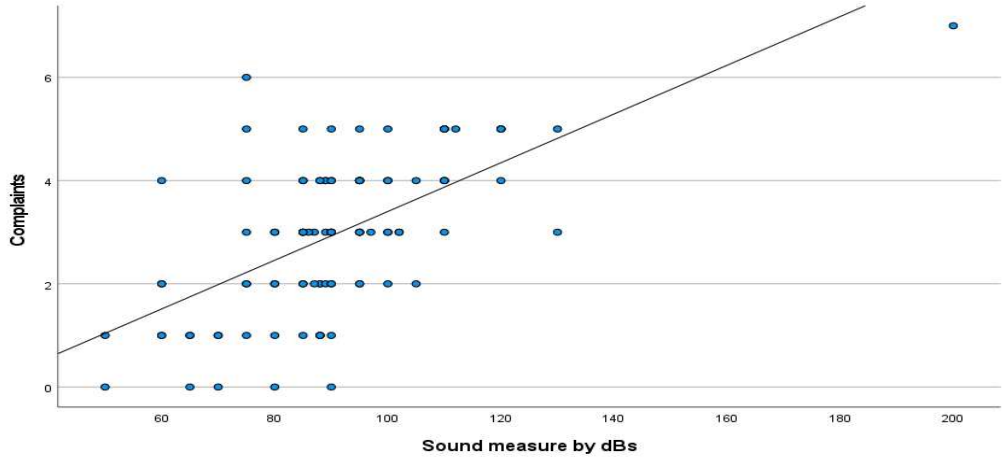

Figure 2. Scatter diagram of the correlation between complaints and sound measured by dBs

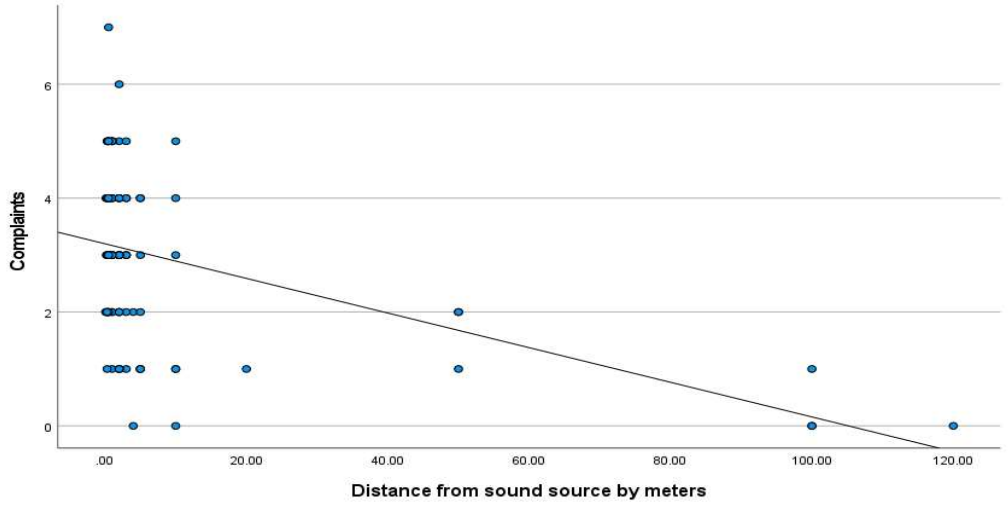

Figure 3. Scatter diagram of the correlation between complaints and distance from sound source by meters.

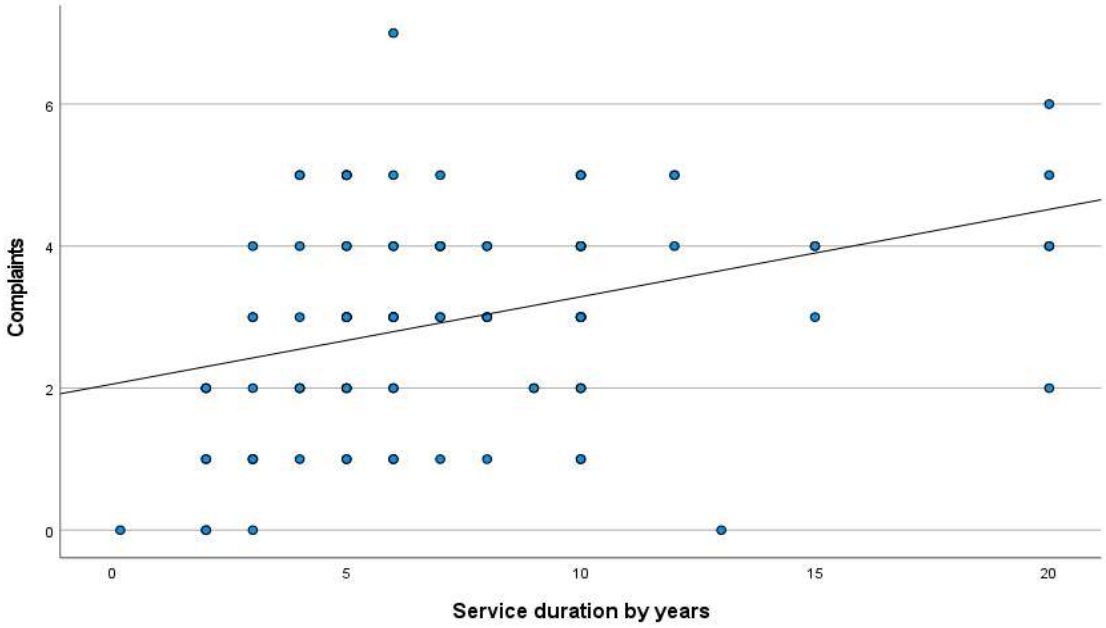

Figure 4. Scatter diagram of the correlation between complaints and service duration by years.

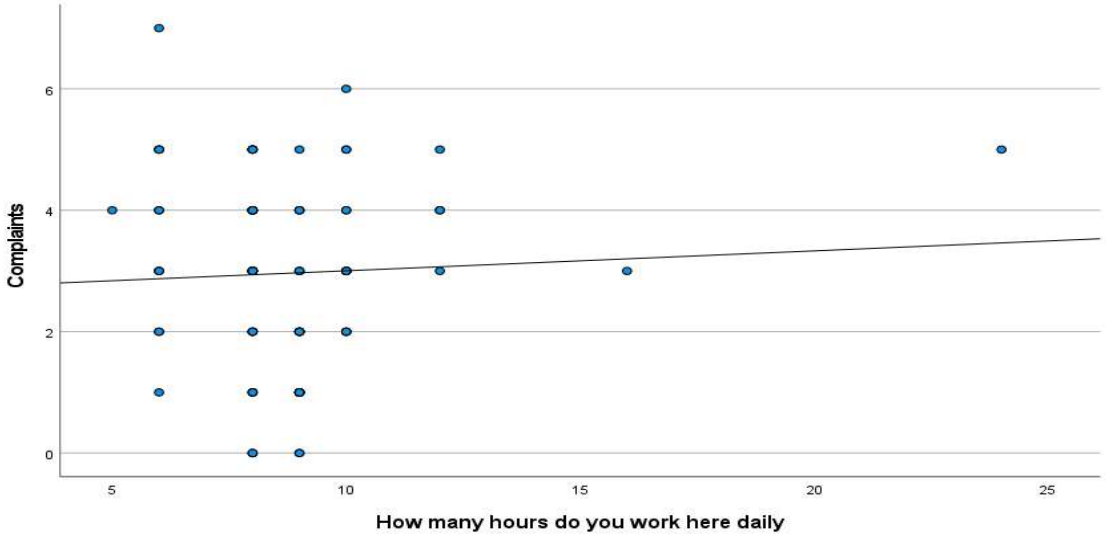

Figure 5. Scatter diagram of the correlation between complaints and duration of work per day in hours.

The study findings concerning comparison of mean number of complaints, by awareness/ practice toward noise pollution showed no significant p values in relation to participants' knowledge about noise pollution and their knowledge about personal protection aids against noise, the p values were (0.204) and (0.164). But there were significant p values (0.032), (<0.001) and (<0.001) concerning application of personal protection aids against noise, providing information about noise hazard by the employers and providing instructions about noise hazards prevention by the employers, as shown in Table 5.

Table 5. Comparison of mean number of complaints, by awareness/ practice, toward noise pollution

Awareness/ practice toward noise pollution		No. of complaints			*P*- value
		No.	Mean	Standard deviation	
Do you have knowledge about N. Pollution hazards	Yes	29	2.6	1.8	0.204
	No	71	3.1	1.3	
Do you have knowledge of Personal Protection Aids against noise	Yes	25	2.5	1.9	0.164
	No	75	3.1	1.3	
If yes, do you apply	Yes	3	0.3	0.6	**0.032**
	No	22	2.8	1.8	
Did the employer provide you with information regarding noise hazards	Yes	23	2.0	1.8	**< 0.001**
	No	77	3.2	1.3	
Did the employer provide you with instructions about noise hazards prevention	Yes	19	1.8	1.5	**< 0.001**

In regard to the comparison of mean sound measure (dBs), and number of complaints, by occupation workplace groups, the results revealed overall mean of sound measure by dBs 90.7with a highest mean 104.3 for construction companies and overall p value of 0.001. While the total mean of complaints was 3.0, with the highest mean in the hotels and wedding halls 3.7, with overall p value of 0.019.

Table 6. Comparison of mean sound measure (dBs) and number of complaints, by occupation workplace groups

Occupation workplace	Sound measure by dBs		Significant intergroup difference	Complaints		Significant intergroup difference
	Mean	Standard deviation		Mean	Standard deviation	
Industrial area (A)	86.0	21.5	A X B	2.7	1.6	A X D
Construction companies (B)	104.3	17.1		3.4	1.6	
General streets (C)	84.0	14.4	B X C	2.4	1.1	B X C
Hotels and wedding halls (D)	91.9	5.2	B X D	3.7	.9	C X D
Total	90.7	19.5		3.0	1.5	
P- value	**0.001**			**0.019**		

DISCUSSION

This study is the first of its kind conducted in Duhok city. Notably, the sound levels encountered by the workers ranged from 50 dBs to 200 dBs, with an average of 90.65 dBs, indicating significant exposure to potentially harmful noise levels. The demographic breakdown revealed a majority of male participants. Educational levels varied, but a significant portion had not received formal education, which may correlate with the low awareness levels observed regarding noise pollution and its hazards and suggests a specific population at higher risk for ONIHL. This is supported by literature indicating that men are more likely to experience hearing loss

than women, and socioeconomic factors can influence the risk of ONIHL.10 Alarmingly, 95% of participants reported one or more complaints related to sensory-neural hearing loss, underscoring the high prevalence of ONIHL within this population. The distribution of complaints suggests a gradient of hearing impairment severity, with some individuals reporting up to seven different symptoms. Occupationally, half of the participants were from industrial areas, followed by construction, general streets, and hospitality sectors. This diversity in workplace environments provided a broad perspective on noise exposure across different occupational settings. This study highlights a low level of awareness among workers in Duhok City regarding the hazards of noise pollution, with only 29% having knowledge about noise pollution hazards. This is consistent with global trends where awareness of noise and its implications on human health is not widespread among the public.11 Moreover; the prevalence of ONIHL in the current study is indicated by the high percentage of workers reporting complaints related to sensory-neural hearing loss. This aligns with the findings that occupational noise exposure is responsible for a significant portion of disabling hearing loss in adults worldwide.12 It is worthwhile to mention the small percentage of workers who had knowledge about noise pollution hazards; only 12% of them actually utilized personal protection aids. The reasons for non-use varied from neglecting to lack of provision by employers, indicating a critical gap in occupational health practices. Employer-provided information and instructions on noise hazards were scarce, with only few percentages of workers receiving such guidance. This lack of information could contribute to the high prevalence of ONIHL symptoms reported. This critical gap in occupational health practices has been identified in other studies as well.13 The importance of interprofessional collaboration among employers, regulatory agencies, and healthcare providers in the prevention and treatment of NIHL is emphasized as a key factor in mitigating risks.11 The significant correlations between complaints and age, sound level, distance from the sound source and service duration, suggest that older age, higher sound levels, closer proximity to the sound source, and longer service duration are associated with increased complaints of hearing loss. This is in line with research that has found noise exposure to contribute to both temporary and permanent threshold shifts, with even temporary shifts potentially leading to eventual permanent hearing loss.12 Interestingly, there was no significant correlation between complaints and daily service duration, indicating that even limited daily exposure to high noise levels could be detrimental.14,15 This is corroborated by literature that emphasizes the preventability of NIHL and the urgent need for increased awareness and preventative strategies.16, 17

CONCLUSIONS & RECOMMEND.

This study's findings are consistent with existing research that underscores the need for increased awareness, education, and proactive measures to protect workers from ONIHL. The correlations /identified here between various factors and ONIHL complaints add to the body of evidence that supports the implementation of comprehensive noise prevention programs in the workplace.

The following recommendations aim to create a safer and healthier work environment, reduce the incidence of ONIHL, and improve the quality of life for affected individuals. Implementing these measures requires a collaborative effort among workers, employers, healthcare providers, and policymakers:

Increase awareness and education: Implement comprehensive educational programs to raise awareness about the

risks of noise pollution and ONIHL. These programs should target workers, employers, and the general public, emphasizing the importance of hearing conservation.

Employer responsibility: Encourage employers to take responsibility for the auditory health of their employees by providing regular training, information about noise hazards, and effective noise prevention strategies.

Support services: Establish support services for workers affected by ONIHL, including counseling, rehabilitation programs, and assistance with communication strategies.

COMPETING INTEREST

There was no competing interest.

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پوختە

هوشمەندییا کارکەران لسەر باندورا قریژیا دەنگی (ژاوەژاو) لسەر بهیستنێ دناڤ باژێرێ دهوکێ دا

پێشەکی و ئارمانج: ژاوەژاو یا بوویە هوکارەکێ فشارێ یێ گرنگ لسەر ژینگەها مروڤی و هەروەسا هوکارەکێ ناسیارە و پشکدارە د بابەتێ ژدەستدانا بهیستنێ کو بەردەوامە و لرێزبەندیا بەربەلاڤترین نەخوشیێن پەیوەست ب کاری ڤە یە. ئارمانجا ڤێ توێژینێ ڤەکولینا ڤێ چەندێ یە دناڤ کارکەرێن کار دکەن ل جهێن کاری بێن ب ژاوەژاو و بێ ئاگەهن ژ کاریگەریێن ژاوەژاوەیا کاری لسەر هەستێ بهیستنێ، و ژبو پێشکێشکرنا رێنمایێن سیاسەتا کارێ دروست ژپێخەمەت پاراستنا ڤان کارکەران ل گوێرەی ئەنجامێن ڤێ توێژینەیێ..

رێکێن ڤەکولینێ: ئەڤ توێژینەیا بربرەیی هاتیە کرن لسەر 100 کارمەندان ژ جهێن کاری بێن جیاواز کو دبنە ئەگەرێ هە بوونا ژاوەژێ د باژێرێ دهوکێ دا. ڕاپرسی پێکدهێت ژ پسیارێن گرتی لدور پێکهاتەیا دیموکرافي ، و گازندەیێن ژدەستدانا گوهلێبوونا هەستەیيا دەماری، و زانینا مەترسیێن ژاوەژێ و خو پاراستن ژێ، و هەلویست دەربارەی رێکارێن خو پاراستنێ.

ئەنجام: رێژا 95% ژ بەشداربوویان گازندەک یان پتر هەبوون سەبارەت ژدەستدانا گوهلێبوونێ (یا هەستەیی یا دەماری(ONIHL) کو پەیدا دبیت ژ ئەنجامێ ژاوەژاوا کاری، دابەشکرن و وەشانا گازندان ئاماژە ددەن ب هەبوونا پلە پلەییێ د توندیا لاوازبوونا گوهلێبوونێ، کو چەندەها کەسان ئاماژە دایە ب حەفت نیشانێن جودا جودا، و ژلایێ پیشەیی ڤە، نیڤەکا بەشداربوویان ژ ناوچەیێن پێشەسازی بوون. لدویڤرا ژی سێکتەرێ ئاڤاکرنێ و سێکتەرێ جادەیێن گشتی و هەروەسا سێکتەرێ مێڤاندارێ. هەروەسا 29% بتنێ ژ کارکەران زانینا هەی سەبارەت مەترسیا قریژیا دەنگی یا ژاوەژاوێ، و 12% ژ ئەوانێن کو زانین هەی لسەر ئامرازێن پاراستنێ بێن کەسی ئەو ئامرازە بکارئینانە. پێزانین و رێنمای بێن کو هاتینە دان ژلایێ خودانێن کاری ڤە سەبارەت مەترسیێن ژاوژاوێ و ریکارین خوباراستنێ دکێم بوون، 23% و 19% بتنێ ژ کارمەندان ئەڤ پێزانین و رێنمایی وەرگرتینە. شیکارا ئامارەیی هەبوونا پێکڤەگرێدانێن گرنگ دیارکر دناڤبەرا گازندەیان و تەمەنی، ئاستێ دەنگی، دویراتی ژ ژێدەرێ دەنگی، و دەمێ کاری،دگەل رێژەیا (r) 0.43، 0.614، 0.443 و0.352 لسەر ئێك، و هەمی یێ دگەل $p < 0.001$. هەروەسا تێبینیا رێژەیێن (پی) بێن مەزن هاتە کرن سەبارەت جێبەجێکرنا رێنمایێن خو پاراستنێ، و بەردەستکرنا پێزانینان سەبارەت مەترسیێن ژاوەژاوێ، و رێنمایێن خو پاراستنێ ژ مەترسیێن ژاوەژاوێ ژلایەنێ خودانێن کاری ڤە.

دەرئەنجام: ئەڤ ڤەکولینە پشترِاست دکەت کو پێدڤیاتی ب زیدەبوونا ئاگەهیێ و کاراکرنا رێکارێن خوپاراستنێ بێن پێشوەخت هەیە، بو پاراستنا کارمەندان ژ ژدەستدانا بهیستنێ یا هەستەیی یا دەماری (ONIHL). پێکڤەگرێدانێن گرنگ دناڤبەرا گازندەیان ژ ڤێ نەخوشیێ و هوکارێن وێ بێن جودا جودا پشتراست دکەت کو گرنگی و پێدڤیاتی هەیە بو دەسپێشخەریێن فێرکرنێ و جێبەجێکرنەکا رژد تر بو رێنمایێن سیستەمێ سەلامەتیا پیشەی، بو رێگرتنێ ل ژدەستدانا گوهلێبوونێ دناڤ کارکەران دا.

الخلاصة

وعي العمال بتأثير التلوث الضوضائي على السمع في مدينة دهوك

الخلفية والأهداف: لقد أصبحت الضوضاء "عامل ضغط" هامً في بيئة الإنسان وتم الاعتراف بها كعامل يساهم في فقدان السمع الذي يعد من بين الأمراض الأكثر شيوعًا المرتبطة بالعمل. هدفت هذه الدراسة إلى التعرف على مدى وعي العاملين في الأماكن التي يحدث فيها الضجيج بتأثير الضجيج على حاسة السمع لديهم، وذلك لعمل ورقة سياسات لحمايتهم وفقاً لنتائج هذا البحث .

طُرق البحث: أجريت هذه الدراسة المقطعية على 100 عامل من أماكن عمل مختلفة تسبب الضوضاء في مدينة دهوك. يتألف الاستبيان من أسئلة مغلقة حول التركيبة السكانية الاجتماعية، وشكاوى فقدان السمع الحسي العصبي، ومعرفة مخاطر الضوضاء والوقاية منها، والموقف تجاه التدابير الوقائية.

النتائج: أبلغ خمسة وتسعون بالمائة من المشاركين عن شكوى واحدة أو أكثر تتعلق بفقدان السمع (الحسي العصبي) الناجم عن الضوضاء المهنية (ONIHL). ويشير توزيع الشكاوى إلى وجود تدرج في شدة ضعف السمع، حيث أبلغ بعض الأفراد عما يصل إلى سبعة أعراض مختلفة. ومن الناحية المهنية، كان نصف المشاركين من المناطق الصناعية، تليها قطاعات البناء والشوارع العامة والضيافة. وكان 29% فقط من العمال لديهم معرفة بمخاطر التلوث الضوضائي، و12% ممن كانوا على دراية بوسائل الحماية الشخصية استخدموها بالفعل. كانت المعلومات والتعليمات التي قدمها أصحاب العمل بشأن مخاطر الضوضاء و طرق الوقاية منها نادرة، حيث حصل 23% و19% فقط من العمال على مثل هذه التوجيهات. كشف التحليل الإحصائي عن وجود ارتباطات هامة بين الشكاوى والعمر، ومستوى الصوت، والمسافة من مصدر الصوت، ومدة الخدمة، مع قيم r قدرها 0.43، 0.614، -0.443، و0.352، على التوالي، وكلها مع p <0.001. كما لوحظت قيم p كبيرة فيما يتعلق بتطبيق وسائل الحماية الشخصية، وتوفير المعلومات حول مخاطر الضوضاء، وتعليمات حول الوقاية من مخاطر الضوضاء من قبل أصحاب العمل.

ألإستنتاجات: تؤكد هذه الدراسة على الحاجة إلى زيادة الوعي واتخاذ التدابيرالاستباقية لحماية العمال من فقدان السمع الحسي العصبي (ONIHL)في مدينة دهوك. تؤكد الارتباطات المهمة بين شكاوى ONIHL والعوامل المختلفة على الحاجة الملحة للمبادرات التعليمية والتطبيق الأكثر صرامة لأنظمة السلامة المهنية لمنع فقدان السمع بين العمال.