QALAAI ZANISTSCIENTIFIC JOURNAL
A Scientific Quarterly Refereed Journal Issued by Lebanese French University – Erbil, Kurdistan, Iraq
Vol. (8), No (3), Summer 2023
ISSN 2518-6566 (Online) - ISSN 2518-6558 (Print)

The Effect of Noise Pollution on Blood Pressure and Heart Rate of Beauty Salon Workers

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ARTICLE INFO

Article History:
Received: 24/7/2022
Accepted: 11/9/2022
Published: Summer 2023

Keywords: *Noise, Cardiovascular system, Blood pressure, Hair drier, digital sphygmomanometer, systolic, diastolic.*

Doi:
10.25212/lfu.qzj.8.3.44

ABSTRACT

This study demonstrates the effect of noise on the cardiovascular system of the beauty salon workers, and to find solutions to reduce the noise in beauty salons. The measured parameters in this research are the blood pressure and heart rate at standing, rest, after 2 min, after 4 min, and after 6 min, and the intensity of the hair drier measured. The devices used in this research are the digital sphygmomanometer utilized to measure the blood pressure, and heart rate of workers, the sound meter used to measure the sound intensity of the hair dryer, and the noise level. According to the findings, 70% of workers have elevated heart rates, 70% have raised systolic blood pressure, 65% have increased diastolic blood pressure, and 65% have disturbed sleeping patterns.

1. Introduction

Environmental noise has been linked to hypertension in some studies conducted in the community, and there is also some evidence that suggests it may be a small risk factor for coronary heart disease (Stansfield, and Matheson, 2003. Munzel et .al, 2018). Health effects of noise pollution that are not audible. 68(1) British Medical Bulletin, the effects of noise pollution on human health are becoming increasingly

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important due to the expansion of noise sources. A good example of a place where noise has a negative impact is a beauty salon. Measurements of noise levels and their effects on human health were motivated by the paucity of research in this area.

Studies on the harmful effects of noise have been conducted worldwide.

The noise rate ranges from (60.5 dB to 67.1dB) in Palestinian hospitals. Continuous exposure to these noise levels may cause a decrease in hearing, a decrease in oxygen concentration in the blood, high blood pressure, and an increase in heart rate (Ruba, 2011).

It has been observed that some symptoms, such as nausea, headaches, mood changes, and anxiety, are present in workplaces where employees are routinely exposed to loud noise (Crook M. A., 1974. Thacher et.al, 2022).

Consequently, with technological advancement, and noise levels in hospitals may be damaging (Pereira R. P., 2003). Hospital noise levels were measured in Taiwan. The findings displayed that the daytime average sound levels measured inside those hospitals it is the range between (52.6 dB) and (64.6 dB) (Juang, 2010).

Cardiovascular rates of patients are elevated by noise levels bigger than (70 dB) (Falk and Woods, 1974, Hahad, 2019). Some studies in industrial factories in Nablus city found that blood pressure was raised because of contact with occupational noise (Abdel Raziq, 2003).

1.1. Noise and Its Harmful on the Human Body

Noise is a source of unsettling, uncomfortable waves that are extremely harmful to one's health. Noise is a type of physical pollution, and it affects human health, and this effect does not stop at the level of inconvenience only, but damages the ear, and causes many diseases affecting the nervous system, especially when the noise is focused. High noise drives the nervous system in the form of electrical alters and crosses the nerve fibers until they reach the brain cortex, causing the cells of that region to irritate. This irritation hurts many members of the body such as the heart which accelerates the pulse, and the digestive system, which shrinks some of its muscles.

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According to experts, prolonged exposure to noise has an impact on the blood vessels. When the noise is louder than (87 dB), the blood vessels constrict, the small arteries narrow, and the blood volume decreases; when the noise stops, it takes five minutes for these small blood vessels to expand normally, which causes the sensation of a severe headache.

The noise also affects the psychological state of the human, it has been shown from studies conducted on groups of workers that their exposure to noise leads to disturbances and changes in temperament and mood. Other research has shown that the worker's performance was slow and unstable as they were in a noisy room. (www.alkhaleej.ae/supplements). (https://dspace.univ-ouargla).

This study examines the effects of noise on employees in 16 beauty salons in Erbil, Iraq. To be more specific, the sound intensity of the hair dryer, heart rate, and systolic and diastolic blood pressure of some of the employees in these beauty salons have been measured to see how noise affects them. The noise level and risks are depicted in the following graph.

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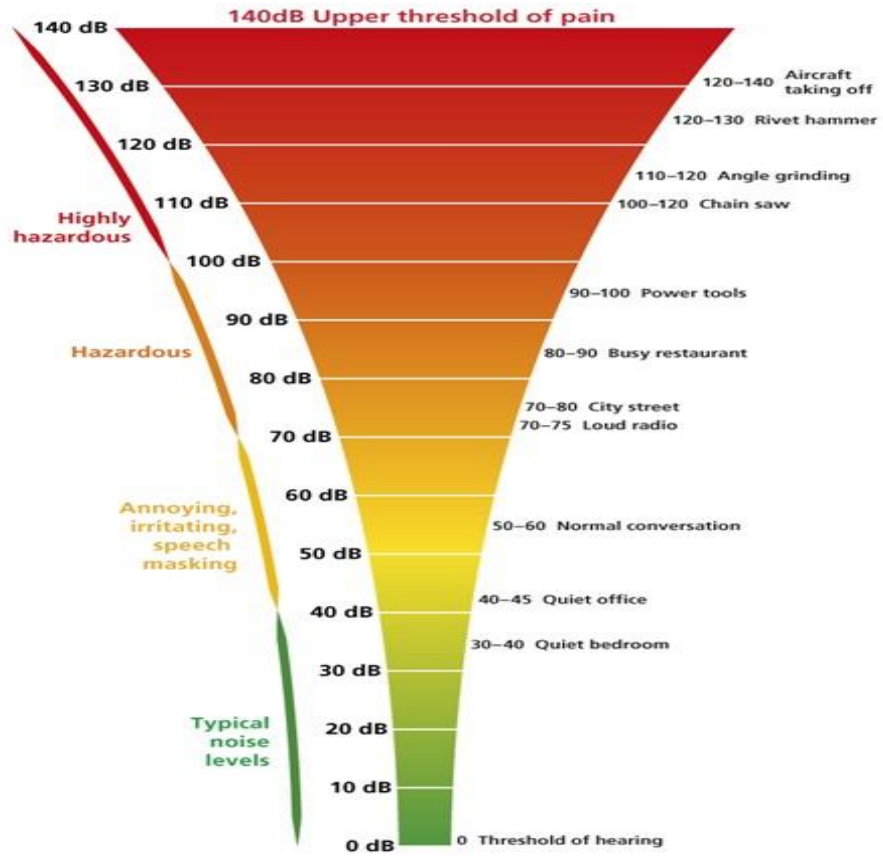

Figure (1): Noise level and hazards.

2. Materials and Methods

The data of this research consists of 20 workers. Workers' ages were between 18 to 50 years. This data was selected arbitrarily from 16 beauty salons in Erbil city. In this study, heart rate, systolic and diastolic blood pressure were measured for the beauty salons workers in the Enkawa, Zanko, and Terawa regions, also sound pressure level or sound intensity measured for a different type of hair dryers.

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Table (1): Effect of noise on the heart rate and blood pressure of beauty salon workers.

Name	Age (year)	at standing			at rest			after 2 min			after 4 min			after 6 min		
		heart beat (beat/ min)	blood pressure (mmHg)		heart beat (b/min)	blood pressure (mmHg)		heart beat (b/min)	blood pressure (mmHg)		heart beat (b/min)	blood pressure (mmHg)		heart beat (b/min)	blood pressure (mmHg)	
			systolic	Diastolic		Systolic	Diastolic		Systolic	Diastolic		systolic	diastolic		systolic	diastolic

Table (2): Type and the sound intensity of hair dryer.

name of beauty salon	Background of sound intensity(dB)	type of hair dryer	intensity(dB)		
			at 30 cm	at 50 cm	at 100 cm

2.1. Measurement devise

The intensity of Sound pressure levels are measured by using a sound level meter as shown in figure (2). A sound level meter was fixed in every salon in the center of the salon at the shoulder level.

A sound level meter is used to measure the intensity of sound pressure levels, as revealed in figure (2). Every salon had a voice level meter fixed in the center, at shoulder height.

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Figure (2): Sound meter.

Figure (3) : Beauty salon place .

Figure (4): Digital sphygmomanometer type (BP-103H).

3. Results and Discussion

3.1. Noise Effect on the Cardiovascular System of workers.

Overall results in this study indicate that all the sample workers are exposed to high continuous noise in all beauty salons (42 dB _70 dB).

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70% of workers have an increase in heart rate as revealed in figure (5). And as shown in figure (6) there is a difference between the heart rate at rest and standing (working).

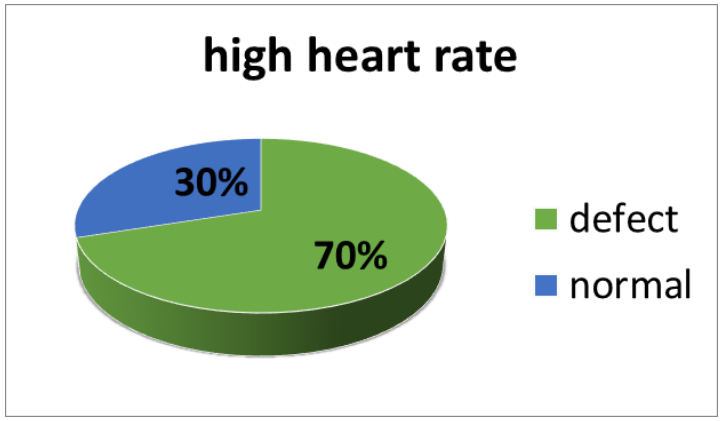

Figure (5): 70% of beauty salon workers have a high heart rate.

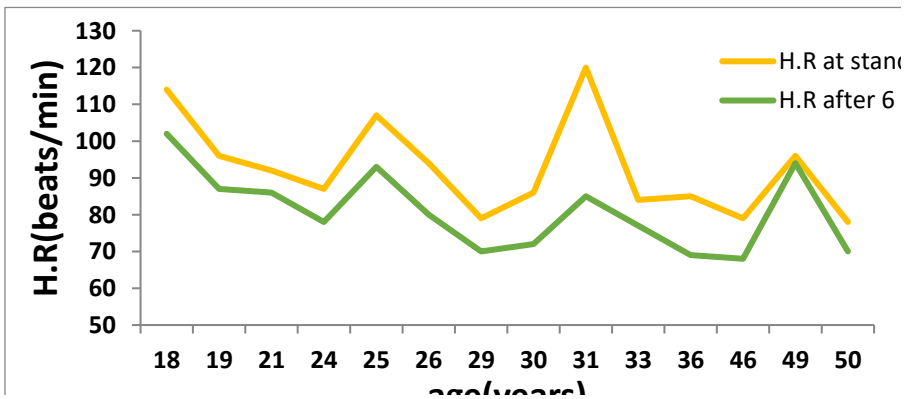

Figure (6): The difference between the number of heartbeats at work and rest.

70% of beauty salon workers have high systolic blood pressure as shown in figure (7). And as shown in figure (8) there is a difference between standing (working) and systolic blood pressure at rest.

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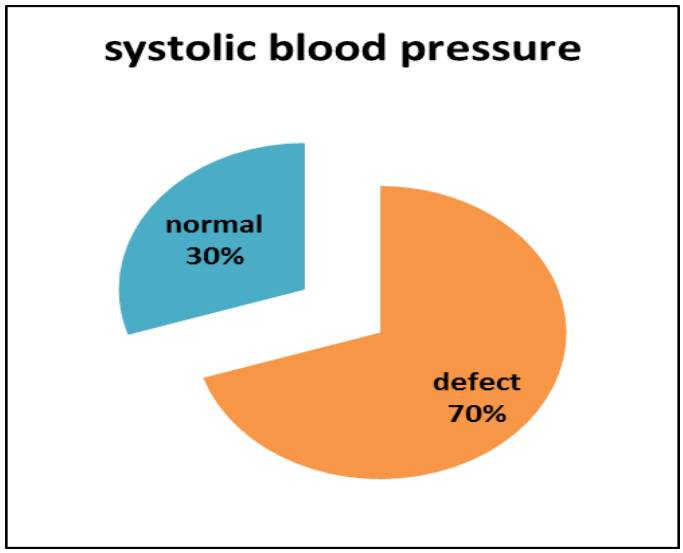

Figure (7): 70% of beauty salon workers have high systolic blood pressure.

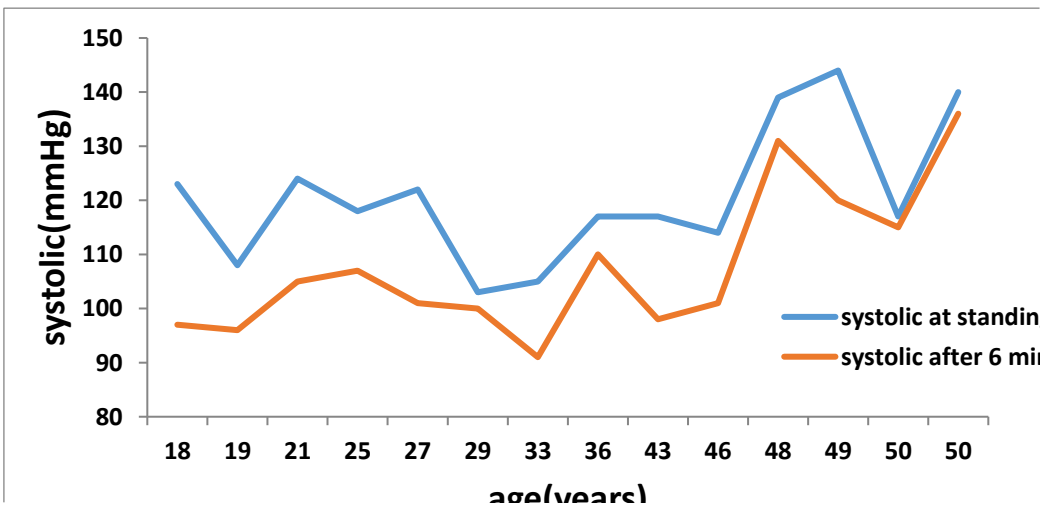

Figure (8): The difference between the systolic blood pressure at work and rest.

65% of workers have high diastolic blood pressure as shown in figure (9). And as shown in figure (10) there is a difference between diastolic blood pressure at rest and standing (working).

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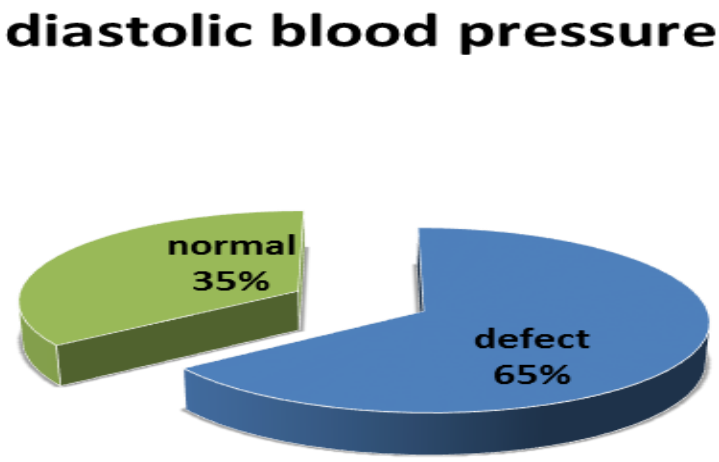

Figure(9): 65%of workers have high diastolic blood pressure.

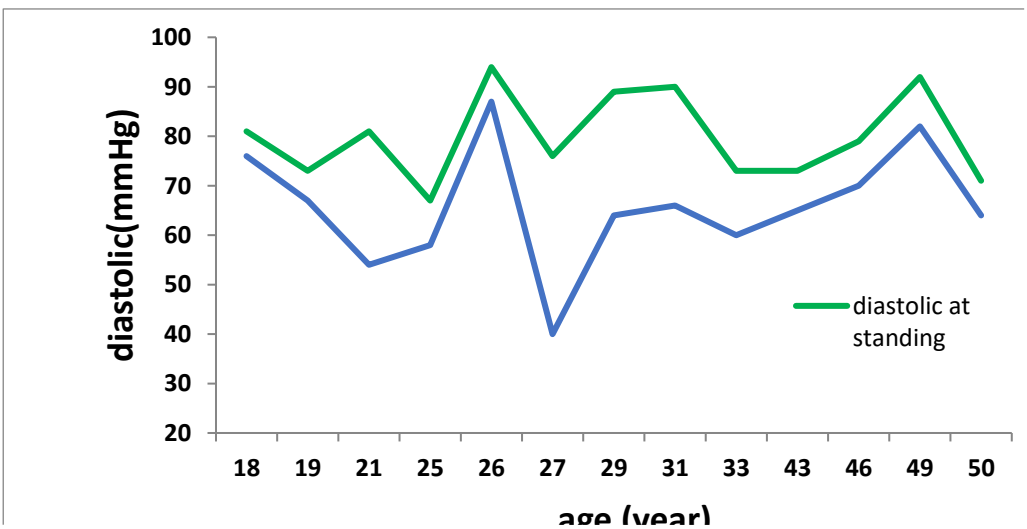

Figure (10): The difference between the diastolic blood pressure at work and rest.

3.2. Sound Level of Different Types of Hair Dryer

The figure below showed the different types of hair dryers and their sound intensity at different distances.

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As we get far from the noise (sound) source its intensity becomes less and less because the intensity of the sound coming from the source may be scattered over a larger field， and the sound intensity strength decreases with distance from the source according to the (Inverse Square Law). For each doubling of distance from the noise source, the sound level (intensity of sound) decreases by 6 decibels.

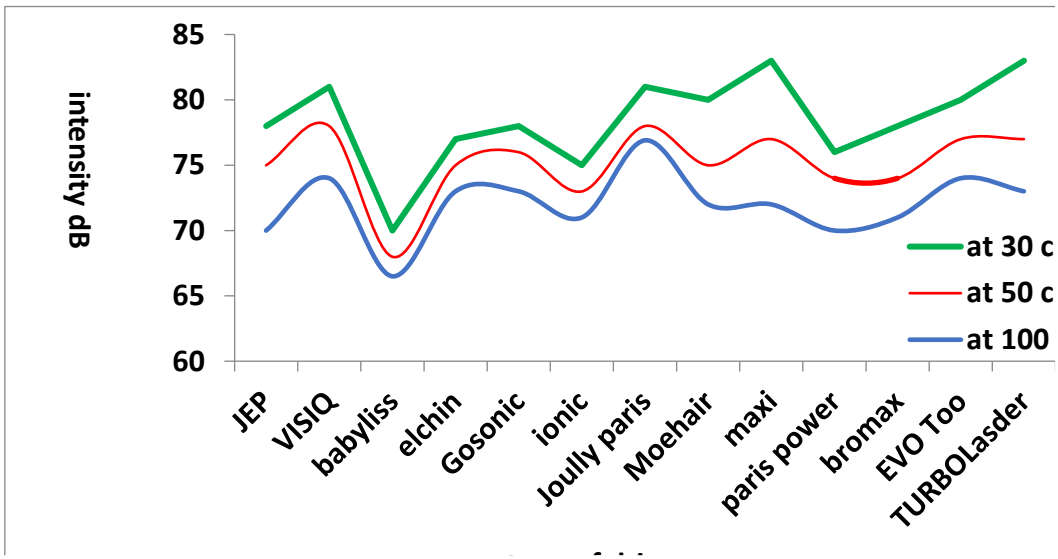

Figure (11): Intensity of different types of a hair dryer as a function of distance.

The best type of hair dryer is a baby less because it has the least value of intensity, and the worst kind is maxi and turboloader because they have the highest value of intensity.

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Figure (12): Turbo laser hair dryer.

Figure (13): Babyliss hair dryer.

3.3. Relation between the Noise and Sleep Disorder

Due to long exposure to noise and tiredness during the hours of work which may reach ten hours daily most workers have sleep disturbances where they may sleep (**5** to **6**) hours per day, **65%** of them had problems as shown in the figure below.

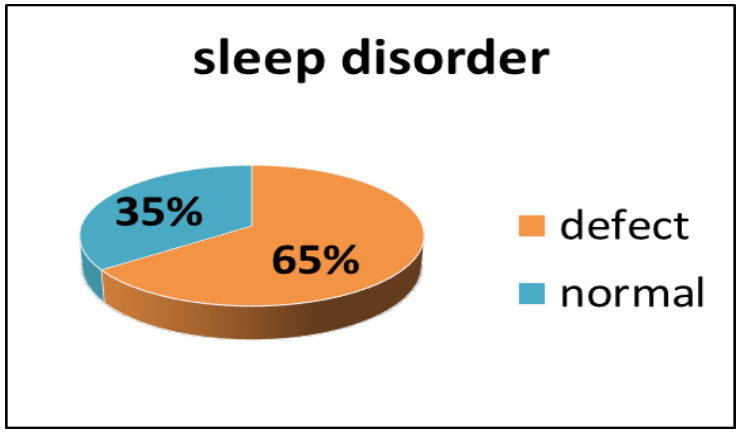

Figure (14): 65% of beauty salon workers have a sleep disorder.

4. Recommendation

This study supports some of the recommendations to decrease noise levels. These recommendations are:

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1- Design the building according to precise measures which assist to decrease noise levels. Of course, utilizing rough and curved surfaces made of special materials helps a lot in dropping the noise effects.

2- utilizing of sound-insulating material in buildings and on the doors and windows as shown in figure (15).

Figure (15): Sound Insulating materials.

3- Do not play songs inside the salon.

4- Put earplugs where they are made of rubber, plastic, wax, or cotton, which can decrease noise by 30 Db.

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5- Put Sound insulating helmet: is equipment covering the head and ears at the same time, and consists of two layers separated by a substance that absorbs the sounds, and the benefits of this equipment are the ability to absorb noise more than the plugs, and it is one size fit most of the individual and easy to wear and can be worn when an ear infection occurs.

6- Cover floors with material that absorb sounds like (carpets).

7- Workers must post signs demanding customers in the beauty salon to decrease their voice as much as probable.

8-use (Babyliss) hair drier because it has less intensity.

9- Do not use (maxi and turbo laser) hair driers because they have a higher intensity.

Figure (16): Earplugs.

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Figure (17): Absorbed sounds materials.

5. Conclusion

We concluded in this research that all the sample workers are visible to high continuous noise in all beauty salons (42 dB _70 dB). The research has been done in Erbil city and showed that there are some dangerous belongings on people who work in beauty salons because of the noise level they have been exposed to during their daily work. The consequence of noise on the workers was evident, where the results are shown that 70% of workers have an increase in heart rate, 70% had a rise in systolic blood pressure, 65% have an increase in diastolic blood pressure, and 65% have a sleep disorder.

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کاریگەری پیسبوونی ژاوەژاو لەسەر پەستانی خوێن و لێدانی دڵی کرێکارانی ئارایشتگا

پـوختـه:

ئەم توێژینەوەیە ئامانجی دەرخستنی کاریگەری ژاوەژاوە لەسەر سیستەمی دڵ و خوێنبەرەکانی کرێکاران و دۆزینەوەی چارەسەر بۆ کەمکردنەوەی ژاوەژاو لە ئارایشتگاکان. ئەو پارامێتەرانەی لەم توێژینەوەیەدا پێوراون بریتین لە پەستانی خوێن و لێدانی دڵ لە کاتی وەستان، پشوودان، دوای 2 خولەک، دوای 4 خولەک، و دوای 6 خولەک، چڕی وشککەرەوەی قژەکەش پێوانە کرا. ئەو ئامێرانەی

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لەم توێژینەوەیەدا بەکارهێنراون بریتین لە ئامێری دیجیتاڵی (sphygmomanometer) کە بەکاردێت بۆ پێوانی پەستانی خوێنی سیستۆلیک، و دیاستۆلیک و لێدانی دڵ، پێوەرێکی دەنگ کە بۆ پێوانی توندی وشککەرەوەی قژ بەکاردێت، هەروەها ئاستی دەنگە دەنگ. دەرەنجامەکان دەریانخستووە کە ٧٠٪ی کرێکاران لێدانی دڵیان بەرزبووەتەوە، ٧٠٪ پەستانی خوێنی سیستۆلیک بەرزبووەتەوە، ٦٥٪ پەستانی خوێنی دیاستۆلیک بەرزبووەتەوە، ٦٥٪یش تێکچوونی خەویان هەیە.

تأثير التلوث الضوضائي على ضغط الدم ومعدل ضربات القلب للعاملين في صالون التجميل

ملخص:

يهدف هذا البحث إلى دراسة تأثير الضوضاء على الجهاز القلبي الوعائي للعاملين وإيجاد حلول لتقليل الضوضاء في صالونات التجميل. المتغيرات التي تم قياسها في هذا البحث هي ضغط الدم ومعدل ضربات القلب عند الوقوف ، الراحة ، وبعد دقيقتين ، وبعد 4 دقائق ، وبعد 6 دقائق ، تم أيضًا قياس شدة مجفف الشعر. الأجهزة المستخدمة في هذا البحث هي مقياس ضغط الدم الرقمي المستخدم لقياس ضغط الدم الانقباضي والانبساطي ومعدل ضربات القلب ، ومقياس الصوت المستخدم لقياس كثافة مجفف الشعر ومستوى الضوضاء. وأظهرت النتائج أن 70٪ من العاملين لديهم زيادة في معدل ضربات القلب ، و 70٪ لديهم زيادة في ضغط الدم الانقباضي ، و 65٪ لديهم زيادة في ضغط الدم الانبساطي ، و 65٪ يعانون من اضطرابات النوم.