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THE ASSOCIATION BETWEEN BLOOD PRESSURE, PULSE RATE AND NOISE EXPOSURE.

*Ahmad S. EL-Khawaldeh, **Hikmet Jamil

*Ministry of Health-Jordan, ** Dept. of Comm. Med. Coll. of Med. Univ. of Baghdad-Iraq.

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دراسة العلاقة بين ارتفاع ضغط الدم ومعدل النبض والتعرض للضوضاء

الخلاصة :

أجريت الدراسة في المنشأة العامة للغزل والنسيج في بغداد، وشملت ١٨٩ عاملاً في قسم النسيج (ضوضاء عالية) و ١٨٩ عاملاً من أقسام أخرى (ضوضاء واطئة). أظهرت نتائج الدراسة عدم وجود اختلاف احصائي في معدل ضغط الدم الانقباضي والانقباضي وكذلك في معدل النبض بالنسبة لجميع الأعمار وفي كلّي الجنسين بين المجموعتين المتباينتين في التعرض للضوضاء. كما بينت الدراسة بأن الأعراض المرضية التي يشكو منها الأفراد كانت أكثر انتشاراً في المجموعة المعرضة لضوضاء عالية منها في المجموعة الأخرى. أوصت الدراسة أعداد برنامج وقائي للحد من تأثير الضوضاء على صحة العاملين.

SUMMARY :

A cross-sectional study on the relationship of blood pressure (BP) and pulse rate (PR) to occupational noise exposure was conducted in the Iraqi State Establishment of Cotton Industries. The study included 189 workers from the high noise exposure department (Exposed group : EG) and 189 workers from a low noise exposure departments (Reference group: RG). The study showed no significant difference in the mean systolic or diastolic BP in all ages and in both sexes. Also the study showed that the reported symptoms were more prevalent in EG than the RG and in both sexes. The study recommends a hearing conservation program.

INTRODUCTION :

It is well known that noise is a stressful stimulus⁽¹⁾, but the role of occupational noise exposure on inducing high blood pressure (BP) is unclear^(2,3). Some authors^(4,5) have suggested that prolonged exposure to noise has no effect on BP, while others^(3,6,7) have found that noise did increase the B.P. Parviz poor⁽⁸⁾ and El-Samra et.al.⁽⁹⁾ observed among weavers an actual stressful effects of noise on the cardiovascular system. Several studies⁽⁹⁻¹¹⁾ showed that the mean systolic and

diastolic BP were significantly higher after shift than before or during the shift. Some studies⁽¹²⁻¹⁴⁾ showed changes in heart rate when people were exposed to low or high level noise, but still no general pattern was reached. Our study aims to investigate the association between noise exposure, blood pressure and pulse rate as no Iraqi studies were published among Iraqi textile workers.

MATERIALS AND METHODS :

This study was performed on 378 employees, who were at work throughout the year 1992; 189 served as exposed group (EG) and 189 as reference group (RG) at the Iraqi State Establishment of Cotton Industries⁽¹⁵⁾. The EG were working in the weaving department (morning shift) in which the mean noise level was above 95 dB (A), while the RG was chosen from departments (morning shift) where the level of noise was less than 80 dB (A). Arrangements were made to examine each worker at 6.30 am and at 2.30 pm (5-10 workers daily) in the medical department where noise level was ranging between 50-60 dB (A). A questionnaire form for each worker was filled; the form included general information and items on health condition, and symptoms that might reflect non-auditory effects. The BP was measured in sitting position, in the right arm with mercury sphygmomanometer by following the method of Jonsson and Hansson⁽¹⁶⁾ after 10-15 min rest. Hypertension was defined according to the recommendation of the WHO Expert Committee⁽¹⁷⁾: a systolic BP equal to or above 160 mmHg or diastolic BP equal to or higher than 95 mmHg. The BP of workers was recorded as the mean of two readings. The radial pulse rate (PR) was taken in the sitting posture, before and after work, to show the acute effect of noise. The body mass index (BMI) was calculated; workers with values above 40 kg/m² were excluded⁽¹⁸⁾. The data were analysed by computer system (IBM); student's paired t-test were used in tables 3 and 4, while chi-square test were used in table 2.

RESULTS :

Table 1 shows the age and sex distribution of EG and RG together with the mean age and BMI. There was no significant difference in the family history of hypertension between the EG (18 persons) and RG (19 persons). Table 2 shows the distribution of symptoms for EG and RG with the results of chi-square test. Table 3 shows the overall change in mean systolic or diastolic BP during the work day in the EG and RG in both sexes, while table 4 shows the mean PR change during the day in the EG and RG in both sexes.

Table 1. Distribution of study Groups by age and sex.

Age Group Years	EG*			RG**		
	sex			sex		
	M	F	T	M.	F	T
less 19	-	7	7	-	5	5
20 - 29	80	23	103	45	22	67
30 - 39	43	5	48	35	16	51
40 +	24	7	31	57	9	60
Total	147	42	189	137	52	189

EG = Expose group, RG=Reference group, M=male, F=femate T= total

mean age for m* = 32.0, F* = 20.2

m** = 35.0, F** = 30.0

BmI mean $\pm$ SD

m* = 22.9 $\pm$ 3.5 F* = 22.2 $\pm$ 3.4

m** = 22.2 $\pm$ 2.9 F** = 21.5 $\pm$ 2.6

Table 2. Distribution of study Groups by age and sex.

Symptom	EG		RG.		Significant value
	No.	prev.rate	No.	prev.rate	
General Fatigue	160	84.7	125	66.1	< 0.005
Headache	114	60.0	79	41.8	< 0.001
Dizziness	98	51.9	60	31.7	< 0.005
Visual fatigue	85	45.0	61	32.2	< 0.005
Palpitation	71	37.6	19	10.0	< 0.001
Nausea	43	22.8	7	3.7	< 0.001
Los of appetite	34	18.0	16	8.5	< 0.001
Vomiting	11	5.8	1	0.5	< 0.05

note : One worker may have more than one symptom

Prev = Prevalence, EG= Expose group.

RG = Reference group.

834

Table 3. The mean systolic and diastolic BP change during day (before and after work) in EG and RG by sex.

Symptom	EG mean $\pm$ SD	RG. mean $\pm$ SD
Male		
Before	118.8 $\pm$ 12.3	123.5 $\pm$ 15.8
After	116.4 $\pm$ 10.9	122.9 $\pm$ 14.9
P	> 0.05	> 0.05
Female		
Before	114.6 $\pm$ 13.3	118.5 $\pm$ 13.0
After	114.8 $\pm$ 14.3	117.4 $\pm$ 11.5
P	> 0.05	> 0.05
Diastolic		
Male		
Before	77.6 $\pm$ 8.2	79.4 $\pm$ 9.3
After	80.6 $\pm$ 8.5	79.3 $\pm$ 9.1
P	> 0.05	> 0.05
Female		
Before	74.3 $\pm$ 7.7	75.0 $\pm$ 8.2
After	77.0 $\pm$ 8.3	75.0 $\pm$ 7.6
P	> 0.05	> 0.05

Table 4. The mean pulse rate change during day (before and after work) in EG and RG by sex.

Symptom	EG mean $\pm$ SD	RG. mean $\pm$ SD
Male		
Before	77.1 $\pm$ 10.5	74.6 $\pm$ 10.1
After	77.2 $\pm$ 10.5	74.9 $\pm$ 8.9
P	> 0.05	> 0.05
Female		
Before	81.9 $\pm$ 9.9	81.5 $\pm$ 11.4
After	77.6 $\pm$ 8.2	79.9 $\pm$ 8.7
P	> 0.05	> 0.05

DISCUSSION :

The effect of noise among 189 workers in the highly-noisy area (above 95 dB (A)) is compared with 189 workers in the less-noisy area (less than 80 dB(A)). The results showed a highly significant difference ($P < 0.001$) between EG and RG for the reported symptoms (Table 2); the difference could be due to the stress and psychological effects of noise on workers exposed to high noise level and other working conditions. These results are similar to those in an other study⁽¹⁹⁾. On the other hand, there was no significant difference ($P > 0.05$) for all ages in the mean systolic or diastolic BP between the two groups and in both sexes, when tested before and after work. Although the mean systolic BP showed a decrease after work in general while the mean diastolic BP showed an increase, this alteration agrees with other studies^(2,4;11). However, some studies^(14,20) mentioned that prolonged exposure to noise had no effect on BP and, paradoxically, other studies^(16,21) found that repeated and prolonged exposure to industrial noise might be considered a contributing factor to a rise in BP (Table 3). For PR (Table 4) the increase in EG (2-3 beats / min) was higher than RG particularly in male workers, but this was not significant ($P > 0.05$). This finding agrees with that of Dega and Kdajman⁽²²⁾. The study concluded that there were no persistent effects of long-term exposure to noise on BP and PR, but there was a temporary effect of noise on BP. Non specific complained symptoms were higher among workers in the highly noise area (weaving department) than in the less noisy area. The study recommends a hearing conservation program for the workers including the use of hearing protective device.

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836

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837

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