ENVIRONMENTAL INDICATORS LEADING TO CARDIAC MALFUNCTION AMONG TEXTILE WORKERS

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ABSTRACT

Background: In the Registrar General's Decennial Supplement for 1951, bronchitis and myocardial degeneration were both responsible for excessive mortality among cotton spinners and chronic rheumatic disease was an important, although relatively rare, cause of death for cotton weavers.

Aim of the work: The present study designed to investigate the environmental indicators and risk factors in textile workers that increase risk of cardiac malfunction and personal conventional risk factors in textile workers that increase risk of cardiac malfunction. In addition, the most susceptible persons to cardiac malfunction among the exposed workers in textile job to avoid exposure as preventive measures.

Subjects and methods: A cross sectional study that included workers in textile companies mainly the most exposed persons to environmental and conventional risk factors. Subjects were divided into two groups: Group A: included subjects exposed to risk factors insides textile departments [included 120 subjects who fulfilled inclusion criteria]; Group B: included non-exposed subjects in the other departments, as a control group [included 120 subjects]. Inclusion criteria included the following: male subject, age more than 30 years, work period inside factor is more than 5 years and control group not exposed to textile risk factors before. All cases were underwent full history taking, clinical evaluation, laboratory evaluation and ECG examination.

Results: There was significant increase of known environmental risk factors(chemical and physical), past history of medical risk factors, smoking, blood pressure, heart rate, lipid profile and ECG abnormalities in study group,

when compared to control group. On the other hand, there was insignificant difference between cases and controls as regard age, marital state, BMI, random blood sugar, alcohol drinking or duration of work.
Conclusion: There is an association between environmental risk factors and development of cardio-vascular disease; and it can be explained by that: environmental risk especially noise and temperature variations leads to increased traditional risk factors of CVD and subsequently development of the disease.
Key words: air pollution, cardiovascular disease, textile industry

INTRODUCTION

Cotton is a soft fluffy staple fiber that grows in a boll, or protective capsule, around the seeds of cotton plants of the genus *Gossypium.* The plant is a shrub native to tropical and subtropical regions around the world, including the Americas, Africa, India, and Pakistan. The fiber most often is spun into yarn or thread and used to make a soft, breathable textile, which is the most widely, used natural-fiber cloth in clothing today. The English name derived from the Arabic *[al] qutn,* which began to be used circa 1400 [Metcalf, 1999]

In the Registrar General's Decennial Supplement for 1951, bronchitis and myocardial degeneration were both responsible for excessive mortality among cotton spinners and chronic rheumatic disease was an important, although relatively rare, cause of death for cotton weavers [Molyneux and Tombleson, 1970]. The well-recognized conventional risk factors such as: high cholesterol level, diabetes, hypertension, obesity, physical inactivity, unhealthy diet, genetic predisposition and active or passive tobacco smoking are responsible for only about 50% cases of cardiovascular diseases [Kristensen, 1989].

There are reports on two hundred other factors, including chemical and physical hazards, factors dependent on the type of job and work organization as well as psychological and social ones that may be related to the cardiovascular diseases. Data have now become available for a further 10-year period from 1991 to 2000, and we have used this new information to explore in more detail the risk of death from diabetes in garment and textile workers, and also from ischemic heart disease [IHD], which like diabetes is more common in immigrants from the Indian Sub-Continent [Harding et al., 2008].

AIM OF THE WORK

The present study was designed to investigate the environmental indicators and risk factors in textile workers that increase risk of cardiac malfunction and personal conventional risk factors in textile workers that increase risk of cardiac malfunction. In addition, to identify the most susceptible persons to cardiac malfunction among the exposed.

MATERIALS AND METHODS

A cross sectional study that included workers in textile companies mainly the most exposed persons to environmental and conventional risk factors. Subjects were divided into two groups: Group A: included subjects exposed to risk factors insides textile departments [included 120 subjects who fulfilled inclusion criteria]; Group B: included non-exposed subjects in the other departments, as a control group [included 120 subjects]. Inclusion criteria included the following: male subject, age more than 30 years, work period

inside factor is more than 5 years and control group not exposed to textile risk factors before.

Work environment: the textile factory included three separate departments: pre-spinning, spinning, and weaving. Not all the workers wear masks because of inconvenience. In the prespinning or preparation stage, large bales containing packed cotton are manually opened within an enclosed space. The cotton is then fluffed and beaten with beater bars in order to loosen the material, and sifted in order to remove seeds and other impurities. Next, the cotton is fed through rollers until it becomes a continuous sheet. In carding, the fibers are separated and then brought together into a loose string [known as a ‘‘sliver’’]. Drawing is done to straighten and combine several slivers to be separated into ‘‘rovings’’ which are used in the spinning process. In the spinning department, the machines take the roving to be thinned and twisted, producing yarn which is wound into bobbins. This process is wet using water aerosols. The weaving process uses looms to produce fabrics.

Exposure definition: Each factory was assigned to an industry sector based on manufacturing materials and processes. The sectors were: [1] cotton spinning, weaving, and knitting [SWK]; [2] silk SWK; [3] wool SWK; [4] synthetic fiber SWK; [5] mixed fiber SWK; [6] garment assembly and sewing; [7] bleaching/dyeing/printing; [8] machine manufacturing; [9] combined; and [10] other services.

Sectors were designated as ‘‘combined’’ if the factory had multiple production lines that could be assigned with two or more sector codes. The sector of the factory workers reported at the time of enrollment [baseline] was

used as a proxy for prior exposures. The ‘‘baseline factory’’ was defined as the current factory for active employees at the time of interview, and the last place worked for men who were retired at interview. The sectors were further classified with respect to exposures of interest for which other literature suggests associations with CVD risks. Working in one of the sectors known to have high dust levels [cotton, wool, synthetic, and mixed fiber SWK] was considered a proxy for exposure to particulate matter. Since endotoxin is a known contaminant of cotton dust, working in the cotton SWK sector was analyzed as a proxy for endotoxin exposure.

METHODS

The study was performed as the following: the work place and environmental risk factors that may lead to risky diseases were studied; and they included: chemical factors such as carbon monoxide, organic solvents, dyes and particulate dusts; physical factors such as noise, hot or cold microclimate, considerable temperature variation [due to shifting from one location to another], moisture, electromagnetic field [from 50 Hz high voltages or currents in power lines and associated equipments], general or local vibration.

Comparison between exposed and non-exposed groups was done according to personal history, past & family history, occupational history (e.g., date of starting work inside company, duration of exposure, type of job); physical examination and laboratory investigations

Electrocardiogram: was done to study the cardiac properties, which included: contractility, conductivity, automaticity and rhythmicity: a 12 lead ECG was recorded at paper speed of 25 mm/s and amplification of 10mm/mV, with full analysis of ECG data: [standardization, and technical quality, heart rate, rhythm, PR interval, P wave size, QRS complex width, QT interval, QRS voltage, mean QRS electrical axis, R wave progression in chest leads, Abnormal Q wave, ST segments, T wave, U wave.

Statistical analysis of data: The collected data was organized, tabulated and statistically analyzed using statistical package of social sciences [SPSS] for windows, version 16. Categorical variables were represented as relative frequencies and percent distribution and for comparison between groups; the Chi square test [X^2] was used. Continuous, quantitative data were represented as arithmetic mean and standard deviation, and for comparison between two means, the independent samples student [t] test was used. For interpretation of results, the p value ≤ 0.05 was considered significant.

RESULTS

As regard environmental factors, there was significant increase of known risk factors in study group, when compared to control group (table 1). As regard to age of studied subjects, it ranged from 30 to 50 years with a mean of 38.52±5.18 years and there was non significant decrease of age of cases when compared to controls [38.41±5.54 vs 38.63±4.80 years respectively]. As regard marital state, 84.6% of studied subjects were married, 3.3% were single, 6.7% were divorced and 5.4% were widows and there was non significant difference between cases and controls. In study group, 81.7% were

married, 4.2% were single, 8.3% were divorced and 5.8% were widows. Regarding smoking habit, 40% of all studied subjects were smokers, with significant increase in study group when compared to control group [54.2% vs 25.8% respectively]. alcohol drinking was reported in 3.3% of all studied subjects, with no significant difference between cases and controls [it was 5.0% in cases compared to 1.7% of controls]. Regarding BMI in studied cases, it ranged from 22.39 to 38.74 kg/m2 with a mean of 29.06±2.73 and there was non significant increase in study group when compared to control group [29.31±3.24 vs 28.81±2.08 respectively] (table 2). As regard to past history, there was positive past history of hypertension in 10.8% of all studied subjects, with significant increase in study when compared to controls [17.5% vs 4.2%]. In addition, there was positive past history of both diabetes and atherosclerosis in 7.1% of all studied subjects and there was significant increase in cases when compared to controls [10.8% vs 3.3% respectively]. On the other hand, no positive past history was reported for cerebrovascular stroke, or positive family history of similar diseases (table 2).

Regarding duration of work in studied subjects, it ranged from 6 to 22 years with a mean of 10.0±3.38 and there was non significant increase of work duration in study group when compared to control group [10.35±4.11 vs 9.66±2.40 years respectively]. Job type was spinning was reported in 16.7%, weaving in 17.5%, bleaching in 15.8%, printing in 16.7%, dye sector in 21.7% and knitting in 11.7% (Table 3). Regarding blood pressure, there was significant increase of systolic, diastolic and mean blood pressure in study group when compared to control group. In addition, there was significant increase of HR in study group in comparison to control group. Random blood

sugar ranged from 125 to 270 with a mean of 144.73±19.61g/dl with a non significant increase in study when compared to control group. On the other hand, there was significant increase of cholesterol, triglycerides, LDL and significant decrease of HDL in study group when compared to control subjects (Table 4).

As regard ECG abnormalities, it was in the form of dysrhythmia in 7.1%, prolonged PR interval in 5.4%, enlarged P wave in 7.5%, widened QRS complex in 11.2%, pathological Q wave in 5.4%, increased QRS amplitude in 3.8% and depressed ST segment in 10.8% and there was significant increase of all ECG abnormalities in study group when compared to control group. In study group, dysrhythmia was reported in 13.3%, prolonged PR interval in 10.0%, enlarged P wave in 12.5%, widened QRS complex in 17.5%, pathological Q wave in 9.2%, increased QRS amplitude in 6.7% and depressed ST segment in 18.3% (table 5).

Table(1): Comparison between cases and controls as regard to environmental risk factors

	Study[120]		**Control[12]**		**Total [120]**		**Statistics**	
	n	**%**	**n**	**%**	**n**	**%**	**X^2**	**p**
Exposure to hazardous chemical	78	65.0%	20	16.7%	98	40.8%	58.01	<0.001*
Exposure to noise	52	43.3%	25	20.8%	77	32.1%	13.94	<0.001*
Wide temperature variations	51	42.5%	20	16.7%	71	29.6%	19.22	<0.001*
High humidity	63	52.5%	42	35.0%	105	43.8%	7.46	0.006*
Exposure to electromagnetic fields	90	75.0%	56	46.7%	146	60.8%	20.22	<0.001*
Exposure to vibration	94	78.3%	63	52.5%	157	65.4%	17.69	<0.001*

Table(2): Comparison between cases and controls as regard subject characteristics and past history

		Study	Control	Total	test	p
Age (mean±SD); Range		38.41±5.54; 30-50	38.63±4.80; 31-48	38.52±5.18; 30-50	0.32	0.74[NS]
Marital state (n,%)	Single Married Divorced Widow	5(4.2%) 98(81.7%) 10(8.3%) 7(5.8%)	3(2.5%) 105(87.5%) 6(5.0%) 6(5.0%)	8(3.3%) 203(84.6%) 16(6.7%) 13(5.4%)	1.81	0.61[NS]
Smokers (n,%)		65(54.2%)	31(25.8%)	96(40.0%)	20.06	<0.001*
Alcoholics (n,%)		6(5.0%)	2(1.7%)	8(3.3%)	2.06	0.15(NS)
BMI (mean±SD); Range		29.31±3.24; 22.39-38.74	28.81±2.08; 22.65-31.28	29.06±2.73; 22.39-38.74	1.42	0.15(NS)
Past history (n,%)	Hypertension DM Atherosclerosis	21(17.5%) 13(10.8%) 13(10.8%)	5(4.2%) 4(3.3%) 4(3.3%)	26(10.8%) 17(7.1%) 17(7.1%)	11.04 5.12 5.12	0.001* 0.024* 0.024*

Table (3): work duration and job type in studied subjects

		Study	Control	Total	test	p
Work duration (mean±SD);Range		10.35±4.11; 6.0-22.0	9.66±2.40; 6.0-16.0	10.0±3.38; 6.0-22.0	1.57	0.12(NS)
Job type (n,%)	Spinning; Weaving Bleaching; Printing Dye sector; Knitting	20(16.7%); 21(17.5%) 19(15.8%); 20(16.7%) 26(21.7%); 14(11.7%)				

Table (4): Comparison between cases and controls as regard to clinical and laboratory findings

	Study	**Control**	**Total**	**test**	**p**
Systolic BP (mean±SD); Range	123.42±17.35; 100.0-170.0	116.79±8.06; 110.0-150.0	120.10±13.90; 100.0-170.0	3.79	<0.001*
Diastolic BP (mean±SD); Range	81.12±13.10; 60.0-115.0	76.70±6.90; 70.0-105.0	78.91±10.68; 60.0-115.0	3.26	0.001*
Mean BP (mean±SD); Range	95.22±14.44; 73.33±131.67	90.06±7.25; 83.33±120.0	92.64±11.69; 73.33	3.49	0.001*
HR (mean±SD); Range	81.30±5.53; 72.0-100.0	79.79±4.50; 74.0-87.0	80.5±5.09; 72.0-100.0	2.32	0.021*
Random BS (mean±SD); Range	146.39±25.18; 125.0-270.0	143.07±11.51; 125.0-200.0	144.73±19.61; 125.0-270	1.30	0.19(NS)
Cholesterol (mean±SD); Range	131.85±33.57; 90.0-230.0	113.48±11.68; 90.0-160.0	122.66±26.71; 90-230.0	5.66	<0.001*
TG (mean±SD); Range	88.58±27.30; 9.0-140.0	76.80±28.38; 9.0-120.0	82.69±28.41; 9.0-140.0	3.27	<0.001*
HDL (mean±SD); Range	45.44±7.12; 30.0-58.0	49.23±5.67; 35.0-58.0	47.33±6.70; 30.0-58.0	4.55	<0.001*
LDL (mean±SD); Range	102.69±14.66; 78.0-140.0	96.89±12.25; 78.0-130.0	99.79±13.79; 78.0-140.0	3.32	0.001*

Table (5): Comparison between cases and controls as regard ECG abnormalities

	Study [120]		**Control [120]**		**Total [120]**		**Statistics**	
	n	**%**	**n**	**%**	**n**	**%**	**X^2**	**p**
Dysrhythmia	16	13.3%	1	0.8%	17	7.1%	14.24	<0.001*
Prolonged PR interval	12	10.0%	1	0.8%	13	5.4%	9.84	0.002*
Enlarged p wave	15	12.5%	3	2.5%	18	7.5%	8.64	0.003*
Widened QRS complex	21	17.5%	6	5.0%	27	11.2%	9.39	0.002*
Pathological Q wave	11	9.2%	2	1.7%	13	5.4%	6.58	0.010*
Increased QRS amplitude	8	6.7%	1	0.8%	9	3.8%	5.65	0.017*
Depressed ST segment	22	18.3%	4	3.3%	26	10.8%	13.97	<0.001*

DISCUSSION

Cotton is one of the oldest and most popular natural raw materials used by man. It is a renewable, biodegradable and biocompatible polymer, which can be used to manufacture a variety of products [Chmielewska and Sartowska, 2012].

Cardiovascular disease [CVD] is the leading cause of morbidity and mortality worldwide.1 Most of CVD is attributable to modifiable risk factors, such as diabetes, hypertension, obesity, dyslipidemia, smoking, dietary factors, psychosocial stressors, alcohol consumption patterns, and physical inactivity, which account for more than 90% of myocardial infarction [MI] cases and more than 80% of stroke cases globally [O'Donnell *et al.*, 2010]. Environmental factors, such as particulate air pollution, have also been implicated in the increasing risk of cardiovascular events from short- and long-term exposure **[**Miller *et al.*, 2007; Brook *et al.*, 2010]. Similar particulate exposures can occur in the workplace, as well as exposures to metals, solvents, and pollutant gases that have also been shown to increase

the incidence of CVD [Bhatnagar, 2006; Sjogren *et al*., 2012]. Many of these exposures can be found in the textile industry, including fiber dusts and endotoxin, a component of gram-negative bacteria. Endotoxin is widespread in the cotton textile industry and in other industrial and agricultural settings, and may trigger or accelerate atherosclerosis [thickening of arterial walls] either by acting as a source of inflammation or other mechanisms [Stoll et al., 2004].

The aim of the present study was to estimate environmental indicators and risk factors for cardiac malfunction. It was carried out on 240 subjects working on textile factories. 120 of them working in textile industry proper. The other 120 subjects were none exposed and assigned as a control group.

As regard environmental factors, there was significant increase of known risk factors in study group, when compared to control group. The job type was spinning was reported in 16.7%, weaving in 17.5%, bleaching in 15.8%, printing in 16.7%, dye sector in 21.7% and knitting in 11.7%. These results are in agreement with Brook *et al.* [2010] who reported that, jobs in the cotton SWK and wool SWK sectors commonly include exposure to fiber dusts, considered similar to particulate exposures. Short- and long-term exposures to ambient particulate matter have been shown consistently to increase risk of cardiovascular events in epidemiological studies of community air pollution. Pathogenetic mechanisms are uncertain, but inhaling small particles may induce changes in blood pressure, inflammation, autonomic balance, and blood coagulation **[**Bhatnagar, 2006]. Increased blood pressure as a pathogenic mechanism was supported in the present study, as it

was found that, there was significant increase of systolic, diastolic and mean blood pressure in study group when compared to control group. In addition, there was significant increase of HR in study group in comparison to control group.

Workers react with noise by a complex set of bodily responses known as stress, or arousal. Such changes may include increase in blood pressure, change in heart rate, rise in blood cholesterol, or excessive secretion of hormones. Occupational noise in industries has been pointed out as a stressor that could potentially induce hypertension. Fears have arisen about the adverse health effects [e.g. cardiovascular disease] in workers exposed to noise from textile industries [Kalantari, 2006]. Also, endotoxin exposure is widespread in the textile industry, particularly in cotton factories, and may potentially contribute to an inflammatory response. This may contribute to atherosclerosis [Stoll *et al.*, 2004].

In addition, results of the present study are in agreement with Wernli *et al.* [2006] who reported that, prevalent exposures in the synthetic sector were reportedly synthetic fiber dusts, solvents, resins and dyes. Similarly, in the bleaching/dyeing/printing sectors a wide variety of expected chemicals include bleaching agents, solvents, acids, bases, caustics, dye chemicals, inks, and resins. In addition, in agreement with results of the present work, studies on noise exposure indicate elevations in blood pressure which could contribute to CVD [Price, 2004].

Also, results of the present study are comparable to that reported by Tekriwal and Parmar [2012] who reported that, an important extra auditory effect of noise is on blood pressure. The proposed cause of hypertension is stress response. Stress due to noise causes release of adrenocortical hormones which eventually leads to high blood pressure.

As regard to age of studied subjects, it ranged from 30 to 50 years with a mean of 38.52±5.18 years and there was non significant decrease of age of cases when compared to controls [38.41±5.54 vs 38.63±4.80 years respectively]. Comparable results were reported by Jahanbani [2003] who reported that, in their study, 1070 men aged 18–69 years [mean = 31.8 years] were included. In addition, Bayil *et al*. [2008] reported that, the age of cases was 31.75±2.12 compared to 31.35±3.12 in controls with no significant difference. Finally, results of the present study are comparable to those reported by Shousha *et al.* [2008] who reported that, there is no significant difference between the two groups [cases and controls; exposed and non-exposed to cotton mill] according to their age.

Regarding smoking habit, 40% of all studied subjects were smokers, with significant increase in study group when compared to control group [54.2% vs 25.8% respectively]. In contradiction to results of the present study Bayil *et al*. [2008] reported that, there was no significant difference between cases and controls as regard to smoking habit, although the percentage is higher than that the present study. The possible explanation for this contradiction may be attributed to small number of cases included in their study [20 cases in each group], and different inclusion criteria. On the other hand, it was

demonstrated that smokers were at increased risk of myocardial infarction or sudden death. Moreover, risk was related to the number of cigarettes smoked each day [O'Donnell and Elosua, 2008]. These results were confirmed by other epidemiological studies [Lakier, 1992], placing smoking as a high priority on the preventive agenda.

Regarding duration of work in studied subjects, it ranged from 6 to 22 years with a mean of 10.0±3.38 and there was non significant increase of work duration in study group when compared to control group [10.35±4.11 vs 9.66±2.40 years respectively]. Comparable results are reported by Bayil *et al.* [2008] reported that, the mean duration of work in study group was 8.27±3.87 years.

Regarding BMI in studied cases, it ranged from 22.39 to 38.74 kg/m^2 with a mean of 29.06±2.73 and there was non significant increase in study group when compared to control group [29.31±3.24 vs 28.81±2.08 respectively]. These results are in agreement with previous studies, where it had been reported that, obesity is a chronic metabolic disorder associated with numerous co-morbidities such as CHD, CVD [Wilson *et al.*, 2002], type 2 diabetes [Eckel *et al*., 2006], hypertension, certain cancers, and sleep apnea. In addition to alterations in metabolic profile, various adaptations in cardiac structure and function occur as excess adipose tissue accumulates [Poirier *et al*., 2006]. Similar to data observed with LDL-C(low density lipoprotein – cholesterol) and supporting the idea that the progression of athero-sclerosis should be viewed as a continuous process beginning early in life, a more recent study reported that higher BMI during childhood is associated with an increased risk of CHD in adulthood. This association seems to be stronger in

boys than in girls and increases with the age of the child in both sexes [Baker *et al.,* 2007].

Regarding blood pressure, there was significant increase of systolic, diastolic and mean blood pressure in study group when compared to control group. In addition, there was significant increase of HR in study group in comparison to control group. These results agreed with van den Hoogen *et al.* [2000] who demonstrated that systolic and diastolic blood pressure has a continuous, independent, graded, and positive association with cardiovascular outcomes. It had been further reported that, even high-normal blood pressure values are associated with an increased risk of cardiovascular disease [Vasan *et al*., 2001]. In addition, it had been reported that, for individuals aged 40 to 70 years, each increment of 20 mmHg in systolic blood pressure or 10 mmHg in diastolic blood pressure doubles the risk of CVD across the entire range of blood pressure from 115/75 to 185/115 mm Hg [Lewington *et al.,* 2002].

Regarding random blood sugar, it ranged from 125 to 270 with a mean of 144.73±19.61g/dl with a non significant increase in study when compared to control group. These results are in agreement with previous studies in literature, where it was reported that, diabetes is associated with a 2- to 3-fold increase in the likelihood of developing CVD, glucose intolerance is also associated with a 1.5-fold increase in the risk of developing cardiovascular disease [Fox *et al.,* 2004]. Moreover, diabetes is also associated with a higher probability of presenting with hypertriglyceridemia, low HDL-C, high blood pressure, and obesity, which usually precede the onset of diabetes. Insulin resistance has been suggested to be a common mechanism for these risk

factors, the association of which is referred to as the metabolic syndrome [Grundy *et al*., 2005], but there are still some doubts about the common mechanism and the added value of this diagnosis instead of the individual diagnosis of each component [Kahn *et al.,* 2005].

In the present work, there was significant increase of cholesterol, triglycerides, LDL and significant decrease of HDL in study group when compared to control subjects. These results are in agreement with several studies in literature, where these studies showing a strong relation between serum total cholesterol and cardiovascular risk [Anderson *et al.,* 1987]. In light of these studies, clinicians and epidemiologists agreed that total plasma cholesterol was a useful marker for predicting CVD. These findings were confirmed when low density lipoprotein cholesterol [LDL-C], the principal lipoprotein transporting cholesterol in the blood was also directly associated with CVD. Moreover, LDL cholesterol levels in young adulthood predict development of CVD later in life, supporting the idea that the relationship between LDL-C and development of CVD should be viewed as a continuous process beginning early in life [Stamler *et al*., 2000]. Meanwhile, other studies were beginning to highlight the fact that individuals with high HDL levels were less likely to present CHD than individuals with low HDL levels [Law *et al*., 1994].

As regard ECG abnormalities, it was in the form of dysrhythmia in 7.1%, prolonged PR interval in 5.4%, enlarged P wave in 7.5%, widened QRS complex in 11.2%, pathological Q wave in 5.4%, increased QRS amplitude in 3.8% and depressed ST segment in 10.8% and there was significant increase of all ECG abnormalities in study group when compared to control group. In

study group, dysrhythmia was reported in 13.3%, prolonged PR interval in 10.0%, enlarged P wave in 12.5%, widened QRS complex in 17.5%, pathological Q wave in 9.2%, increased QRS amplitude in 6.7% and depressed ST segment in 18.3%. These results are in agreement with Tuchsen et al. [1992] who reported **i**ncreased hospitalization for ischemic heart disease was seen among workers self employed in textile industry.

Kamal *et al.* [1991] were the first to demonstrate more convincing results in ECG pathologic changes in the exposed workers. However, they were unable to relate the values of ECG components to the duration of the exposure to the chemical as well. Kuo *et al*. [1997] were also unable to show the duration of employment is an important factor.

In short, results of the present study revealed an association between environmental risk factors and development of cardio-vascular disease; and it can be explained by that: environmental risk especially noise and temperature variations leads to increased traditional risk factors of CVD and subsequently development of the disease.

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المؤشرات البيئية المؤدية للاختلال القلبي لدى عمال النسيج

[٧]

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المستخلص

صممت الدراسة الحالية بهدف تحديد العوامل البيئية وعوامل الخطورة لأمراض القلب المختلفة لدي عمال النسيج. وقد اشتملت الدراسة علي ٢٤٠ من عمال النسيج، ١٢٠ منهم تعرضوا لعوامل الخطورة (مجموعة الدراسة)، بينما ١٢٠ لم يتعرضوا لتلك العوامل (المجموعة الضابطة).

وقد أسفرت نتائج الدراسة عن الآتي: وجدت زيادة يعتد بها إحصائيا في نسبة عوامل الخطورة البيئية لدي مجموعة الدراسة مقارنة بالمجموعة الضابطة.

تراوح العمر بين ٣٠ و ٥٠ سنة بمتوسط عمر بلغ ٣٨,٥٢ سنة وانحراف معياري مقداره ٥,١٨ سنة ولم توجد فروق ذات دلالة إحصائية بين مجموعة الدراسة والمجموعة الضابطة.

وجد أن ٨٤,٦% من المشاركين في الدراسة كانوا متزوجين، ولم توجد فروق دالة إحصائيا بين مجموعة الدراسة والمجموعة الضابطة.

وجد أن ٤٠% من المشاركين في الدراسة كانوا من المدخنين، مع وجود زيادة يعتد بها إحصائيا في عدد المدخنين في مجموعة الدراسة مقارنة بالمجموعة الضابطة.

وجد تناول الكحوليات لدي ٣,٣% من المشاركين في الدراسة مع عدم وجود فروق ذات دلالة إحصائية بين مجموعتي الدراسة.

تراوحت مدة العمل في الوظيفة الحالية من ٦ – ٢٢ سنة بمتوسط بلغ ١٠,٠±٣,٣٨ سنة، ووجدت زيادة غير دالة إحصائيا لدي مجموعة الدراسة مقارنة بالمجموعة الضابطة.

كان ١٦,٧% من مجموعة الدراسة يعملون في قسم الغزل، بينما كان ١٧,٥% في النسيج، ١٥,٨% في قسم قسم التبييض، ١٦,٧% في قسم الطباعة، ٢١,٧% في قسم الصباغة.

تراوح مؤشر كتلة الجسم بين ٢٢,٣٩ و ٣٨,٧٤ كجم/ متر مربع بمتوسط ٢٩,٠٦±٢,٧٣ كجم/ متر مربع مع زيادة لم يعتد بها إحصائيا لدي مجموعة الدراسة مقارنة بالمجموعة الضابطة.

وجدت زيادة يعتد بها إحصائيا في قياسات ضغط الدم، ومعدل النبض لدي مجموعة الدراسة مقارنة بالمجموعة الضابطة.

تراوح معدل قياس السكر العشوائي بين ١٢٥ و ٢٧٠ بمتوسط ١٤٤,٧٣±١٩,٦١ جم/مل مع زيادة لا يعتد بها إحصائيا لدي مجموعة الدراسة مقارنة بالمجموعة الضابطة.

وجدت زيادة يعتد بها إحصائيا في معدلات الكوليسترول، الدهون الثلاثية، الدهون منخفضة الكثافة وزيادة يعتد بها إحصائيا في الدهون عالية الكثافة في مجموعة الدراسة مقارنة بالمجموعة الضابطة.

وجدت زيادة يعتد بها إحصائيا في الاختلالات القلبية علي رسام القلب الكهربائي لدي مجموعة الدراسة مقارنة بالمجموعة الضابطة.

وباختصار فقد أسفرت نتائج الدراسة عند وجود ارتباط بين عوامل الخطورة البيئية وظهور الاعتلالات القلبية لدي عمال النسيج، وهو ما يمكن تفسيره بزيادة عوامل الخطورة البيئية مثل الضجة، وتغيرات درجة الحرارة التي تزيد من ارتفاع عوامل الخطورة المعروفة لحدوث أمراض القلب مثل ارتفاع ضغط الدم، وزيادة الدهون مما يؤدي بدوره إلي أمراض القلب.