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Some physiological parameters of the liver and the kidney as indicators to the textile workers health in Egypt.

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Abstract

Abstract. - Present study is a part of the project conducted by National Nutrition Institute to evaluate the pollution effect on the health of occupationally exposed workers in some industries in Egypt. The various blood and urine biochemical parameters of a total included 1816 workers select randomly from seven Textile factories distributed in five governorates, were compared to assess the gender, job duration time and workplace. The results indicated that the biochemical analysis of antioxidants (Glutathione (GSH), Malondialdehyde (MDA) and erythrocyte super oxide dismutase (cu/znSOD)), the mean values ofGSH and cu/znSOD were significantly higher in males, while the mean value of MDA was not effected by gender. Concerning to job duration the data showed that

the mean value of cu/znSOD in indirect group of categories II was significantly increase than of the corresponding group in category I.The mean value of MDA level of indirect & direct groups in category I were significantly increase than the corresponding groups of categories II. On the other hand, the mean value GSH level was not affected by job duration. According to work place, there was significant increase in GSH mean value of direct workers than of indirect workers in category II. While, the mean value of cu/znSOD in direct workers of category I had significant increase than in indirect of the same category. While MDA mean value was not affected by work place. At the total group level, the mean value in both of GSH &MDA in category II were significantly increase than of the total group in category I. The present study showed that results of some biochemical parameters as indicators for liver functions, the changes observed in the blood component some correlate with the age, job duration and gender. While other effecting by job duration only. On the other hand, concerning of work place significant change in AlkalinePhosphates (ALP)and value of plasma albumin. The results of some biochemical parameters as indicators for kidney functions were change by gender, job duration and work place.

Key words: Textile workers, Liver functions, Kidney functions, antioxidants and lipid peroxidation.

Introduction

Industrialization is necessary for prosperity and at times for the survival of a nation. The production is the real wealth of a nation. Only industrialization is not enough, real benefit is brought by continuous top performance of the worker which is only possible by their good health ***(Jaiswal2007)***.According to the results,20-50% of workers are subjected to hazardous exposures in industrialized countries and the rate may be even higher in developing countries.The textile industries have been dubbed as worst offenders of pollution contributors as they used more than 2000 types of chemicals and over 7000 types of dyes (WHO 2006).Workers of Textile industries in Egypt represents large segment of Egyptian labor force. Textile industriesare famous for the production of cotton, linen, wooland silk. Textile dyes contain heavy metals such as lead (Pb), chromium (Cr) and copper (Cu). It is widely used for production of color pigments of textile dyes. Textile dyes pollutants are being released to the environment at various stages of operation. Therefore, it is necessary that the pollutants are treated before discharge ***(Halimon and Yin 2010).*** Heavy metals are taken into the body via inhalation, ingestion and skin absorption. If heavy metals enter and accumulate in body tissues faster than the body's detoxification pathways can dispose of them, a gradual buildup of these toxins will occur. High- concentration exposure is not

necessary to produce a state of toxicity in the body tissues and, over time, can reach to toxic concentration levels***Momodu and Anyakora (2010)***.The workers from textile processing and dyeing industry are exposed to various processing chemicals, dyes and different pollutant for long term which may causing hazardous effects on various organs like particularly lung, liver, kidney have become important issue and less data available which explain the effects of these chemicals on biochemical parameters***Mullaet al.,(2018)***.

This study was aimed to estimate some physiological parameters of the liver and the kidney functionsas indicators to the textile workers health in Egypt.

Materials and Methods

Materials: The data were derived from a project conducted by National Nutrition Institute (NNI) Survey to evaluate the pollution effect on workers in some industries in Egypt. This part of study included five governorates; the selected factories were eight distributed as follows, onein each of Giza, Halwan and El Sharkayia, two in El Gharbia and three factories in Alexandria. The factories follow Ministry of Industry. Central Agency for Public Mobilization and Statistics provided the number of workers in each factory and their

distributed in Egypt governorates according to the survey.The characteristic of the studied sample, showed that the participants numbers of textile workers were 1816, including 1100 workers in category I (workers <5 years) and 716 workers in category II (workers > 5 years) where the workers of category I were more than those of category II. According to the working place, the workers were divided into indirect or direct exposure to the production line.

The biochemical analysis, antioxidants (GSH, MDA and SOD) were determined to about 85-90 %from the total sample. The other biochemical analysis (ALT, AST, ALP, GG T, Albumin, blood urea, Creatinine, Uric acid and urinary B2 microglobulin) were done for sub samples about 40-50%.

Methods: Collection of samples, random venous blood sample 10 ml were collected from the workers in tube containing anti-coagulant (EDTA). GSH were determined immediately in the field from whole blood, the rest of the sample was centrifuged for 10 min at 3000 rpm to obtain the plasma. The plasma was divided into 3 Eppendorf tubes to estimate the liver, kidney functions, plasma MDA and Cu / Zn SOD.The urine was collected and freeze for determination of B**2** microglobulin.

Methods of biochemicalparameter were assayed by autoanalyzer usingdiagnosticreagent kits, according to the following: - Malondialdehyde (MDA),erythrocyte super oxide dismutase Cu/Zn (Cu/ZnSOD) and blood glutathione (GSH)levels were determined according to**Uchiyama andMihara (1978),Winterbourn*et al*., (1975) andBeutler*et al.,*.(1963)**respectively.

Liver function tests:Alanine and aspartate aminotransferase (ALT and AST) actives were determined according to the method of***Rietman and Frankel (1957)****.* Plasma Alkaline Phosphatase (ALP), Gamma Glutamyl Transferase (GGT) and albumin were by using the methods of ***Rec (1972),Szasz (1976)and Doumeset al.,(1971)]*** respectively.

- Kidney function tests:PlasmaCreatinine, Urea, Uric acid andurineB**2** microglobulin concentrations were determined according to ***Fabinyet al.,(1971), Kaplan (1984), Schultz (1984), Hemmingsenand Skaarup (1985)]*** respectively.

Statistical Analysis: The SPSS software, version 22 was used to analyze the statistical analysis. All results were calculated as mean ± SD and a“p” value of <0.05 was considered statistically significant.

Results and Discussion

Our data presented that table (1) showed some antioxidants were blood glutathione (GSH), erythrocyte super oxide dismutase (cu/znSOD) and factors were gender (males & females), job duration (<5(categoryI)&>5(categoryII) years) and work place (direct & indirect exposure to production line). Regarding to gender, mean values of GSH and cu/znSOD were significantly higher in males than in females at (P<0.001). While the mean value of MDA was not effected by gender. Concerning to job duration the data showed that the mean value of cu/znSOD in indirect group of category IIwas significantly increase than of the corresponding group in category I, while it was significantly increase in direct group of category Ithan of the corresponding group of category II at (P< 0.001). The mean value ofMDA level of indirect &direct groups in category I at (P<0.001) were significantly increase than the corresponding groups of category II. While the mean value GSH level was notaffected by job duration. According to work place, there was significant increase in GSH mean value of direct workers than of indirect worker in category II at (P<0.001). While, the mean value of cu/znSOD in direct workersof category I had significant increase than in indirect of the same category at (P<0.001). While MDA mean value was not affected by work place. At the total group level, the mean value in both of

GSH&MDA in category IIwere significantly increase than of the totalgroup in category I at (P<0.05).

Table (2) showed that the results of some biochemical parameters as indicators for liver functions. According to gender, the mean value of plasma AST was significantly higher in males than in females in category I at (P<0.001) while, all of other liver tests had not affected by gender. Regarding to job duration, the mean value of ALP at total workers of indirect, direct and total groupin category I were significantly higher than them in category II at (P<0.001). The mean value of plasma Albumin was significantly higher of direct workers in category II than the corresponding in category I at (P<0.05). While all of the other parameters were not affected by job duration. Concerning of work place, there was significant increase in ALP mean value of direct workers than of indirect workers in category I at (P<0.001). Also, the mean value of plasma Albumin was significantly higher of direct than indirect exposure workers in category II than the corresponding one in category II at (P<0.05).

Table (3) showed that the results of some biochemical parameters as indicators for kidney functions. According to gender, the mean values of plasma Creatinine , Ureaand Urinary B2Microglobin of totalmale workers were significantly higher than of total female workers in category I, respectively at

(P<0.05).Corresponding to job duration, there was significant increase in mean value of plasma Creatinine in both of indirect, direct and total workers in category I than of them in category II at(P<0.05). Also, there was significant increase in the mean value of Urinary B2Microglobin of total workers in category I than the corresponding one in category II.

Antioxidants fight harmful chemical compounds (free radicals) generated during various normal cellular metabolic activities in our body. Antioxidant compounds act through several chemical mechanisms: hydrogen atom transfer (HAT), single electron transfer (SET), and the ability to chelate transition metals. The importance of antioxidant mechanisms is to understand the biological meaning of antioxidants, their possible uses, their production by organic synthesis or biotechnological methods, or for the standardization of the determination of antioxidant activity**Mulla*et al*., (2018)**.

In addition, the present study in agreement with***Pompellaet al., (2003)***mentioned that, glutathione can help to protect against diseases caused by oxidative damageand also plays an important role in the regulation of immune cells, and is a potent detoxifying agent. Also, they added that, Low levels of glutathione have been associated with hepatic dysfunction, kidney dysfunction, immune dysfunction, cardiac disease, and premature.

Also, in the same manner, the present study in agreement with the word, Superoxidedismutase knownas erythrocuprein, a common antioxidant enzyme, plays an important protective role by catalyzing the removal of superoxide radicals. It is delicate for toxic superoxide radicals and converts super oxide radicals to hydrogen peroxide, and hence hydrogen peroxide is degraded by catalase. Oxyradicals are potentially toxic molecules thus cellular efficacy of SOD enzyme reduction led to increased lipid peroxidation ***Ramasarma (2007).***

These results partially agree those reported by***Yildirimet al.,(2007)]*** who observed that textile workers with longer employment duration had MDA levels were significantly higher in workers than controls (p<0.001). Also, SOD activity was lower in workers but difference was not statistically significant. Increase in MDA level and decreases in SOD activities in textile workers, support the opinion that the noise causes the oxidative stress.While other results by***Sibel (2008) and Shimizu et al., (2002)*** they added that MDA and SOD were significantly higher in textile workers than in controls (p<0.05). Elevated MDA levels in textile workers may indicate increased lipid peroxidation as a result of long-term exposure to organic solvents, whereas elevated SOD activity suggests that the antioxidant system was activated to counter lipid peroxidation.

They reported that liver dysfunction among workers handling 5-nitro-o-toludine, a raw material for azodyes ***Halimon and Yin (2010).*** Other study reported that, hepatic malfunction in workers occupationally exposed to benzanthrone, an important dye intermediate used in the manufacture of vat dyes ***(Momodu and Anyakora 2010).***

GammaGlutamyltransferase or GGT is a liver enzyme that has traditionally been measured to detect liver health and function and alcohol consumption. GGT is a very sensitive measure than can change very quickly compared to other biochemical markers.

Various chemicals are used in dying process, which have hazardous effects on workers involved in this process ***Wernliet al., (2006)).***

Dönbaket al.,(2006) have also reported the genotoxic potential of dyes and their solvents on the liver and serum. Also,a correlation between adverse changes in liver structure and biochemical constituent has been shown in different mammals exposed to various xenobiotic***(Kazmiet al.,(2003).***

The liver enzymes in the present study were found ALP was significantly reduced and AST significantly increased in industrial

workers exposed during 20 years of job. Also, the albumin level was found change, increased in all groups. These parameters, Acid Phosphatase (AP), Alkaline phosphatase (ALP) and Lactate Dehydrogenase (LDH) were noted to be highly sensitive in relation to exposure to dyes in textile workers. The depletion of ALP due to toxicity of xenobiotic has also been reported recently. The results of this study agree with***Kazmiet al.,(2003)***they reported that, the depleted levels may either be due to impairment in their synthesis or its retention in the cells andthat symptoms are not apparent until concentrations are quite low.While, Chronic liver disease has been reported as one of the various disorders of occupational exposure. In such case there is no clinical evidence until after years of exposure. The effect of occupational exposure on the synthetic function of the liver can therefore said to be at the sub-clinical level.

In the present study, the level of alkaline phosphatase (ALP) was found to be low while those of aspartate aminotransferase (AST) and albumin were higher in textile industry workers. These changes did not correlate with the age and job duration. A significant ($p \leq 0.05$) depletion in ALP and elevation in ALT was recorded in most of the age groups along with alterations in AP, LDH, AST and globulin. On the other hand, significant decrease in AP, ALP, LDH and increase in AST was observed in workers involved in the dying processes for 6-10 years. The study suggests that occupational exposure to textile

dyes causes adverse effects on the health of industrial workers, though these effects are not related to the age or duration of exposure, this study in a harmony *with* ***Soyinka et al .,(2007)***.Also *Kazmiet al., (2003)* added that the activity of ALP and the concentrations of total protein and albumin were significantly lower levels in the exposed group, may either be due to impairment in their synthesis or its retention in the cells. While, ALT and AST activities were significantly higher (P <0.05) in the exposed group. Occupational exposure to vat dyes may result in sub-clinical adverse effects on the liver, involving inhibition of its synthetic function.

The present studyin a harmony with ***Liaqatet al., (2009)*** demonstrated that mean of serum bilirubin, ALT and AST and alkaline phosphatase is more in Textile processing and dyeing industry workers than controls. There was no significant change in mean difference of serum proteins, serum albumin and serum globulin but highly significant change seen in serum albumin as compared to control. These significant changes were associated with the increased risk of dysfunction of the liver among the textile processing and dyeing industry workers.

The significant differences observed with ALT and AST in this study may suggest sub-clinical hepatocellular damage, which may have to do with disturbance of membrane integrity.

The fact that there are significant differences (consistent with the above trend) between some indices of liver function of the exposed group, compared with the unexposed may indicate some impairment of liver function(**Müller *et al*., 2018)**.

Specific urinary measurements of low molecular weight molecules of protein such β2-microglobulin are quite sensitive for any tubular injury, but they are not specific for any disease.An elevated urinary excretion of β2-microglobulin has proved to be useful in detecting the more subtle signs of cadmium nephrotoxicity.Almost immediately after absorption, cadmium is bound with metallothionein and stored in the erythrocytes. In contrast to the other heavy metals, chelators seem to increase cadmium nephrotoxicity**(Manzoorand and Sharma 2020).**

The results of the studyby ***Vallianouet al., (2019)*** revealed statisticallyhighly significant difference between the Urinary –N-Acetyl glucosaminidase activity (NAG index) as well as B2microglobulin in the workers that exposed to organic solvents and their matched controls. The results revealed statistically insignificant difference between the occupationally exposed workers of the paint factory and their matched unexposed controls in the proportions of renal function tests. 6.4% of exposed workers have abnormal elevated urea levels which are three times higher than the proportion of their matched

control (2%).On the other hand, the exposed workers that have abnormal elevated serum creatinine are higher than (4.8%) that in matched control group (3%) but this difference is also statistically insignificant. This result may carry clinical significance in the medical field in general and occupational medicine especially despite of its statistical insignificance which may be attributed to the working in the factory under controlled environmental conditions***(Mohammed., 2013)***. Textile workers in developing nations at risk ***(Barsouket al., 2021).***

Conclusion: The study proved that the three factors affected textile workers health status; were job duration and gender, while work placing either direct or indirect had an effect. Results of this study point to a possibility of early renal effects, but not to a serious to influence on the routine kidney and liver function tests.The results suggest that textile workers occupationally exposed to volatile organic solvents make a risk group and require more frequent periodic examinations. Furthermore, significant physiological changes of some functions observed in this study are in need to be elucidated so that the after-effects of toxicant contamination may be monitored and eliminated. This will not only help in the protection of the surrounding environment, but also in the prevention of malignant, liver and kidney diseases in the present populations working in the factories as well as those residing in the industrial area.

Recommendations: Textile workers should change their working methods and use proper protection equipment's to minimize exposure to different chemicalsProper treatment for heavy metals overload follows a three-part treatment, first avoidance of exposure, second nutritional supplementation to reduce toxic induced damage and stimulate toxin excretion and third cleaning toxin from the body using chelating agents.

Table (I): Malondialdehyde (MDA), erythrocyte super oxide dismutase Cu/Zn/SOD) and blood Glutathione (GSH) levels in Textile industry workers (Mean±SD)

	Sex		category I (<5 years)			Category II (>5 years)			Group total		
			Indirect	Direct	Total	Indirect	Direct	Total	Indirect	Direct	Total
Blood ReducedGlutathion (GSH) mg/dl	M	N	324	650	974	**170**	**493**	**663**	**494**	**1143**	**1673**
		Mean±SD	38.5±12.4	37.5±11.7 e	37±11.9	**30.1±8.9**	**33.7±11.4**	**32.8±10.9**	**35.6±12**	**35.9±11.7**	**32.8±11.8**
	F	N	29	81	110	**18**	**34**	**52**	**47**	**115**	**162**
		Mean±SD	29.7±10.9	31±12.4	30.7±11.9	**30.2±10.8**	**31.2±9.8**	**31.1±10.1**	**29.9±10.6**	**31±11.7**	**30.7±11.3**
	Total	N	353	731	1084	**188**	**527**	**715**	**541**	**1258**	**1799**
		Mean±SD	37.8±12.5	36.8±11.9	31.7±16.9 g	**30.1±9**	**33.6±11.3 d**	**32.6±11**	**35.1±12**	**35.47±11.82**	**35.5±11.8**
Erythrocyte Super Oxide Dismutase (SOD)Cu/Zn units/ml blood	M	N	321	638	959	**164**	**468**	**632**	**485**	**1106**	**1591**
		Mean±SD	218.6±150.7	318.7±182.9 e	283±162	**257.1±138**	**272.93±125.7**	**269±128**	**231±147**	**299±162.4**	**277±150**
	F	N	30	78	108	**17**	**33**	**50**	**47**	**111**	**158**
		Mean±SD	227±159	156.1±90.87	175±117	**257.2±181.1**	**230.58±127.02**	**239±145**	**237.9±166.5**	**178.22±107.5**	**195±130**
	Total	N	351	716	1067	**181**	**501**	**682**	**532**	**1217**	**1749**
		Mean±SD	219.3±151.3	301±181.93 b c	272±161	**257.1±42.1 a**	**270.14±126.12**	**267±130**	**232±149.1**	**288±162**	**270±150**
Malonaldhyde (MDA)	M	N	305	576	881	**160**	**449**	**609**	**465**	**1025**	**1490**
		Mean±SD	2.1±1.7	2.0±1.5	2.0±1.6	**1.6±0.9**	**1.7±1.2**	**1.7±1.1**	**1.9±1.5**	**2.69±1.77**	**1.9±1.4**
	F	N	29	72	101	**17**	**32**	**49**	**46**	**104**	**150**
		Mean±SD	2.1±1.7	1.8±1.5	1.9±1.5	**1.65±0.9**	**1.3±0.5**	**1.48±0.66**	**1.9±1.4**	**3.21±2.5**	**1.7±1.3**
	Total	N	334	648	982	**177**	**481**	**658**	**511**	**1129**	**1640**
		Mean±SD	2.1±1.7 a	2.0±1.5 b	2.0±1.6g	**1.6±0.9**	**1.7±1.2**	**2.15±1.43**	**1.9±1.5**	**2.74±1.86**	**1.9±1.4**

a: Significant difference between (indirect) <&> 5 years
b: Significant difference between (direct) <&> 5 years
c: Significant difference between (indirect & direct) < 5 year
d: Significant difference between (indirect & direct) in > 5 yeas e:Significant difference between(male & female) < 5 years
f: Significant difference between (male & female) > 5 years
g: Significant difference between (total)<&> 5 years

Table (2): Liver function tests levels in Textileindustrial workers

	sex		<5 years	>5 years	Group total						
			Indirect	Direct	Total	Indirect	Direct	Total	Indirect	Direct	Total
Plasma Aspartate Transaminas (AST)(U/L)	M	N	122	234	356	54	178	232	Indirect	Direct	Total
		Mean ±SD	22.55±12.63	24.46±14.17[a]	23.81±13.82	22.83±15.02	23.82±13.84	23.59±14.09	176	412	588
	F	N	9	26	35	0	11	11	22.58±13.66	24.18±14.02	23.9±13.9
		Mean ±SD	25.1±12. 9	17.92±13.05	19.64±13.2	0	26.27±12.49	26.27±12.49	9	37	46
	Total	N	131	260	391	54	189	243	25.1±12.9	20.4±13.29	21.06±12.7
		Mean ±SD	22.67±13.04	23.8±14.18	23.42±13.58	226±14.55	23.96±13.75	23.64±13.92	185	449	634
Plasma Alanine Transaminase (ALT) (U/L) normal range	M	N	122	233	355	54	178	232	176	411	587
		Mean ±SD	18.4±12.5	20.47±13.24	20±13.3	20±13.7	20.7±12.9	20.0±13.1	18.2±12.7	20.8±13.11	20.2±13.49
	F	N	9	26	35	4	11	15	13	37	50
		Mean ±SD	19±.12	17.23±14.38	17.69±13.3	19.75±5.43	21.8±11.6	18.6±11.5	16.1±9.7	18.9±13.62	17.796±12.6
	Total	N	131	259	390	58	189	247	189	448	637
		Mean ±SD	18.39±12.33	20.14±13.36	19.79±13.6	17.8±13.4	20.7±12.8	19.9±13.0	18.0±12.5	20.42±13.15	19.85±13.43
plasma alkaline Phosphatase (ALP)	M	N	122	232	354	54	178	232	176	410	586
		Mean ±SD	99.38±31.74	106.03±32.3	103.78±32.08	89.8±21.69	95.7±22.49	94.33±22.4	96.1±29.27	101.54±28.9	99.88±29.02
	F	N	9	26	36	0	11	11	9	37	46
		Mean ±SD	90.67±17.57	97.54±34.05	95.19±30.37	0	87.45±17.1	87.45±17.1	88.084±15.49	94.54±30.13	52.5±26.9
	Total	N	131	258	389	54	189	243	185	447	636
		Mean ±SD	98.6±30.42 [a]	105.17±32.5 [c] [b]	102.96±31.98 [g]	89.8±21.69	95.22±22.26	93.83±22.1	95.3±28.23	100.97±29.1	99.3±29.01

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	Sex		<5 years			>5 years			Group total		
			Indirect	Direct	Total	Indirect	Direct	Total	Indirect	Direct	Total
Plasma gamma glutamyl transferase (GGT) 50–70 U/L for men and 40–45 U/L for women	M	N	122	233	355	54	178	232	176	411	587
		Mean ±SD	15.6±12.17	17.1±12.72	16.56±12.53	17.15±14.53	19.7±13.68	19.11±19.69	16.07±12.92	17.62±12.7	16.95±12.08
	F	N	9	26	35	0	11	11	9	37	46
		Mean ±SD	15.44±8.38	13.04±10.16	13.66±9.66	0	13±6.96	13.03±6.72	15.44±8.3	13±9.23	13.9±8.87
	Total	N	131	259	390	54	189	243	185	448	633
		Mean ±SD	15.59±11.9	16.65±12.5	16.3±12.32	17.5 ±14.1	19.2±20.8	18.78±12.4g	16.04±12.61	17.24±12.5	16.7±11.8
normal range 3.8 – 5.1 mg/dl plasma Albumin gm/dl.	M	N	115	223	338	54	169	223	169	392	561
		Mean ±SD	5.18±1.09	5.12 ±1.12	5.13 ±1.11	5.1±0.9	5.41±1.05	5.34±1.05	5.16±1.05	5.23±1.1	5.21±1.09
	F	N	6	27	33	0	12	12	6	39	45
		Mean ±SD	4.67±0.81	5.26 ±1.19	5.16±1.15	0	5.21±1.6	5.21±1.6	4.67±0.81	5.23±1.31	5.17±1.28
	Total	N	121	250	371	58	181	239	179	431	610
		Mean ±SD	5.16±1.08	5.13-1.13	5.15 ±1.11	5.04±1.02	5.4±1.09db	5.32±1.09	5.11±1.06	5.24±1.12	5.21±1.1

a: Significant difference between (indirect) <&> 5 years b: Significant difference between (direct) <&> 5 yearsc: Significant difference between (indirect & direct) < 5 year d: Significant difference between (indirect & direct) in > 5 yeas e:Significant difference between(male & female) < 5 years f: Significant difference between (male & female) > 5 years
g: Significant difference between (total) <&> 5 years

Table (3) Kidney function tests In Textile industry workers (Mean ±SD)

	sex	<5 years			>5 years			Group total		
		Indirect	Direct	Total	Indirect	Direct	Total	Indirect	Direct	Total
Plasma Creatinine (normal range 0.7-1.4 (male) & 0.6-1.1 (female) mg/dl.	M	115	223	338	55	169	224	170	392	562
		0.96±0.3	0.87±0.25	0.87±0.27 e	0.76±.22	0.77±0.29	0.77±0.27	0.89±.26	0.83±0.27	0.83±0.28
	F	6	27	33	4	12	16	10	39	49
		0.87±0.31	0.76±0.7	0.78±0.22	0.73±.1	0.7±0.24	0.71±0.21	0.81±0.25	0.74±0.22	0.75±0.22
	Total	121	250	371	59	181	240	180	431	611
		0.95±0.71 a	0.85±0.24 b	0.86±0.266 g	0.75±0.21	0.77±0.31	0.76±0.28	0.89±.6	0.82±0.27	0.83±.28
blood Urea (mg/dl) normal range 15-45 mg/dl	M	115	223	338	55	169	224	170	392	562
		29.7±13.4	37.6±8.89	37.9±8.5 e	36.85±11.97	38.07±10.22	37.76±10.2	24.27±15.0	37.81±9.47	37.35±9.26
	F	6	27	33	0	12	12	10	39	49
		21.47±15.3	30.11±10.7	31.95±10.39	0	42.92±10.82	42.92±10.82	25.38±12.5	34.1±11.6	34.85±11.6
	Total	121	250	371	59	181	240	180	431	611
		29.3±13.54	36.8±9.28	36.63±8.87	36.39±9.96	38.4±10. 3	37.91±10.23	24.3±15.0	37.47±9.73	37.13±9.4

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	sex	<5 years			>5 years			Group total		
		Indirect	Direct	Total	Indirect	Direct	Total	Indirect	Direct	Total
Plasma uric acid (mg/dl) normal range 3.6-7.7(male) 2.5-6.8 (female)	M	115	223	338	54	169	223	169	392	561
		5.38±1.85	5.96 ±1.98	5.95 ±1.93	5.87±1.49	6.1±1.65	6.04±1.61	5.96±1.74	6.09±1.81	5.6±1.81
	F	6	27	33	0	12	12	6	39	45
		6.72±2.47	5.64 ±1.76	5.97 ±1.87	0	5.34±1.29	5.34±1.29	6.13±2.14	5.55±1.62	5.75±1.74
	Total	121	250	371	54	181	239	179	431	610
		6.07±1.89	5.93-1.96	6.95±1.9	5.82±1.47	6.04±1.63	5.99±1.6	5.97±1.76	6.04±1.8	6.02±1.79
Urinary B2Microglobin µg/ml normal range 0.0-0.3	M	151	339	490	69	224	293	220	563	783
		0.12±0.02	0.11±0.011	0. 11±.012 e	0.088±.007	0.080±0.09	0.082±.08	0.104±0.017	0.096±0.1	0.09±0.11
	F	8	30	38	0	14	14	8	44	52
		0.06±0.027	0.072±0.06	0.068±0.065	0	0.057±0.034	0.057±0.034	.06±0.027	0.067±0.06	0.07±0.06
	Total	159	369	528	69	238	307	228	607	835
		0.11±0.019	0.1±0.11	0.11±0.12 g	0.088±.007	0.0793±0.08	0.08±0.08	0.102±0.16	0.094±0.10	0.098±0.1

a: Significant difference between (indirect) <&> 5 years.

b: Significant difference between (direct) <&> 5 years

C: Significant difference between (indirect & direct) < 5 year

d: Significant difference between (indirect & direct) in > 5 yeas e:Significant difference between(male & female) < 5 years

f: Significant difference between (male & female) > 5 years

g: Significant difference between (total) <&> 5 years

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بعض القياسات الفسيولوجيه لوظائف للكبد والكلى كمؤشر لصحة عمال النسيج فى مصر

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قسم كيمياء التغذية ، المعهد القومي للتغذية ، القاهرة .

الملخص العربي

الدراسة الحالية هي جزء من المشروع الذي ينفذه المعهد القومي للتغذية لتقييم اثر التلوث على صحة العمال المعرضين مهنيا في بعض الصناعات في مصر ,حيث تضمنت القياسات الفسيولوجية المختلفة للدم والبول لمجموعة ١٨١٦ عامل تم اختيارهم عشوائيا من سبعة مصانع نسيج موزعة في خمس محافظات .وتم مقارنتها مع الاخذ فى الاعتبار كلا من الجنس (ذكر او انثى) ومدة العمل (اقل او اكثرمن خمس سنوات) واخيرا مكان العمل (مباشر او غير مباشر من التعرض لخط الانتاج) .اشارت النتائج الى ان التحليل لمضادات الاكسدة (GSH, MDA and cu/znSOD) كانت القيم المتوسطة GSH , cu/znSODاعلى بشكل ملحوظ عند الذكور ,في حين ان متوسط قيمة MDA لم يتاثر بالجنس. اظهرت النتائج ان متوسط MDA وقيمةcu/znSOD في المجموعة غيرمباشرة من الفئات الثانية زاد بشكل كبير عن المجموعة المقابلة في الفئة الاولى و زادت القيمة المتوسطة لمستوىMDA للمجموعات غيرالمباشرة والمباشرة في الفئة الاولى بشكل كبير من المجموعات المقابلة من الفئات الثانية. من ناحية اخرى لم يتاثر متوسط قيمة GSH بمدة الوظيفة وفقا لمكان العمل , كانت هناك زيادة كبيرة في متوسط قيمة GSH للعاملين المباشرين مقارنة بالعاملين غير المباشرين في الفئة الثاينة. في حين ان متوسط قيمة cu/znSOD في العمال المباشرين من نفس الفئة الاولى كان لديهم زيادة كبيرة مقارنة بالقيمة غير مباشرة من نفس الفئة بينما لم تتاثر قيمة MDA بمكان العمل. على مستوى المجموعة الاجمالية في كل من في الفئة الثانية زيادة كبيرة مقارنة بالمجموعة الكلية GSH وMDA في الفئة الاولى واظهرت الدراسة الحالية ان نتائج بعض قياسات البيوكميائية كمؤشرات لوظائف الكبد التي لوحظت في بعض مكونات الدم ترتبط بالعمرو مدة الوظيفة والجنس في حين ان البعض الاخر يتاثر بمدة العمل فقط .من ناحية اخرى تغير كبيرفي ALP فى انزيم وقيمة البومين البلازما تتعلق بمكان العمل .وكانت نتائج بعض المتغيرات البيوكميائية كمؤشرات لوظائف الكلى تتغير حسب الجنس ومدة الوظيفة ومكان العمل.