

Study the Effect of Cement Dust Exposure on Liver and Kidney Parameters in some Cement Field workers in Al-Ramadi City

Ali M. Sameen

University of Al-Anbar - College of medicine



ARTICLE INFO

Received: 20 / 11 /2012
Accepted: 22 / 11 /2012
Available online: 16/2/2014
DOI: 10.37652/juaps.2013.84964

Keywords:

Cement Dust ,
Liver ,
Kidney ,
Al-Ramadi.

ABSTRACT

The aim of this study is determine the effect of cement dust on liver and kidney parameters that include liver enzymes (S.ALP , S.ALT ,S. AST) , total serum protein , urea and creatinine in workers that exposing to cement dust in AL-Anbar mosaic factory . The results show that an increased in urea (workers= 46.7 ± 0.826 , control= 30.26 ± 0.613), creatinine (workers= 1.23 ± 0.074 , control= 0.653 ± 0.0601) and in S.AST activity (workers= 29.3 ± 0.809 , control= 6.29 ± 0.720) S.ALT activity (workers= 24.04 ± 1.163 , control= 6.63 ± 0.822) , while no significantly difference in S.ALP activity (workers= 4 ± 0.477 , control= 5.23 ± 0.657) and serum total protein (workers= 6.239 ± 0.13 , control= 6.387 ± 0.18) when compared between the workers and control group.

Introduction:

The major pollution problem in cement factories is cement dust(1). Production of cement is a dusty industrial process and the health's of the workers has been studied for many year (2) . Cement is known to be a mixture of different substances , each molecules of primary importance in cement dust basically include 60-67% calcium oxide , 17-25% silicon oxide , 3-5% aluminium oxide , with some amount of iron oxide , chromium , potassium , sodium . sulphur and magnesium oxide(3)(4). Silica which is a major constituent of cement dust has been mostly implicated to cause or contribute of several diseases including acute silicosis, pulmonary tuberculosis, interstitial fibrosis, rheumatoid complications, vascular disease, cancer, glomerulonephritis and immunological reactions(5) (6) (7) (8) (9). The exposure to aluminium could increase lipid peroxidation in different tissues resulting in neurotoxicity , renal failure and anemia(10). also chromium has been reported to be strong oxidizing agent and highly toxic effect in vital organs such as lung , kidney and liver (11)(12).

Many of previous studies on mega cement factory workers have been reported that the toxic effect of the exposure to cement dust and concentrated on its effects on the prevalence of chest infections and liver function tests like the study of (13) observed that cement dust exposure have toxic effects on haematologic and liver functions in workers at the Sokoto cement factory , and the study of (14)(15)(16) observed that the constituents of cement (such as chromium and silica) stimulates inflammatory responses from workplace exposures and result in specific target organs derangement such as the lungs, skin, liver and the immune system might be affected .

The present study aimed to investigate the effect of exposure to cement dust on liver by measuring serum liver function tests and kidney by measuring kidney parameters in workers at cement field (in Ramadi mosaic factory) .

Materials and methods:

We collected twenty three (23) blood samples from workers were randomly selected among the workers of AL-Ramadi mosaic factory compared with 23 normal persons as control. These workers have a shift work from 7 A.M to 3 P.M six days a week. For period of 8-15 years , that period varies from one worker to another . Five ml of venous blood was

* Corresponding author at: University of Al-Anbar - College of medicine. E-mail address:

obtained from each worker and allowed to clot and spun at 3000rpm for 5min to obtain serum . The serum was obtained used to estimate S.ALP ,S.ALT , S.AST , total serum protein , urea and creatinine by using colorimetric method. Kits from Cromatest company were used in the estimation of all parameters .

Results are expressed as mean \pm SEM, Comparisons of variables were done using F-test. The probability value (p) less than 0.05 was considered significant .

Results:

The results in the table 1 show the serum level of S.AST (workers 29.3 ± 0.809 , control $.29 \pm 0.720$), S.ALT (workers $=24.04 \pm 1.163$, control $=6.63 \pm 0.822$), urea (workers $=46.7 \pm 0.826$, control $=30.26 \pm 0.613$) and creatinine (workers $=1.23 \pm 0.074$, control $=0.653 \pm 0.0601$) were significantly higher in workers than in control group .On the other hand the S.ALP (workers $=4 \pm 0.477$, control $=5.23 \pm 0.657$) and Total serum proteins (workers $=6.239 \pm 0.13$, control $=6.387 \pm 0.18$) were not significantly different in the workers compared to the control group .

Discussion:

The silica exposure was described as being associated with renal insufficiency (17) . Increase in creatinine and urea levels in this study suggests that the nephrotoxic effect of cement dust in the test group. These results consist with (18) (19) (20) they are all reported the nephrotoxic effects of silica exposure in separate studies . Our results is not consistent with the study of (21) they are reported that there is no effect of cement dust on urea and creatinine. The elevate in S.AST and S.ALT activity suggest that workers are more susceptible to hepatic damage, and this rise generally suggest that a lesion in the liver(9). In this study the S.ALP and total serum proteins of cement workers compared with those of the control subjects were not statistically significant, that suggest the cement dust did not have effect on synthetic function of liver(9). There are limitations in this study which tell that the sample size is relatively small; and larger population of mega cement factory workers may be needed to investigate the effect of cement dust on liver and kidney parameters. Also workers have not spent equal years in service.

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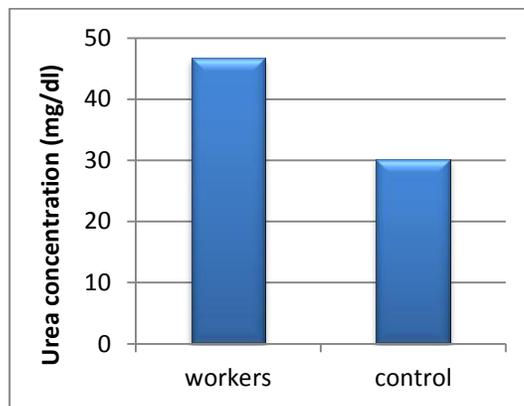


Figure-1 Urea concentration of workers and control in serum

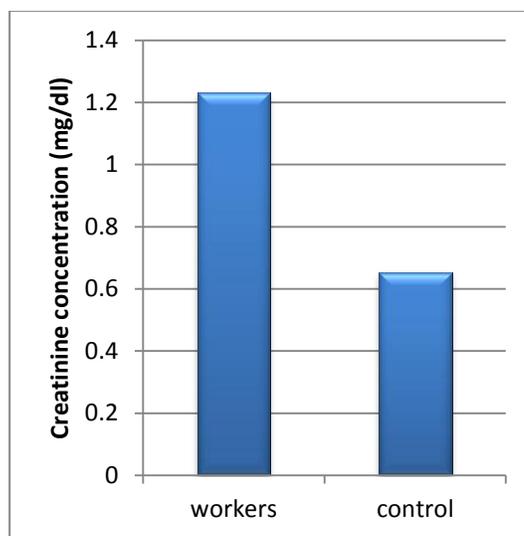


Figure-2 Creatinine concentration of workers and control in serum

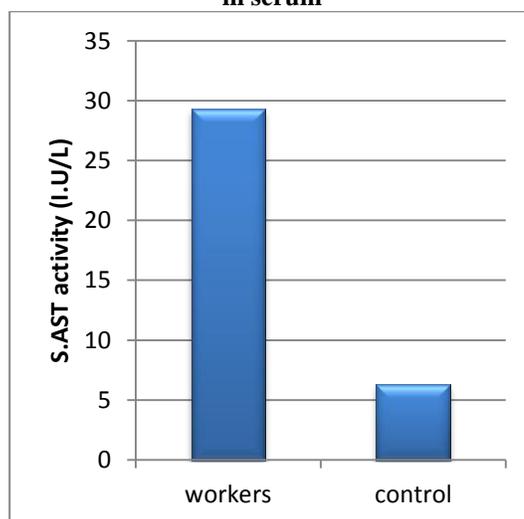


Figure-3 S.AST activity of workers and control in serum

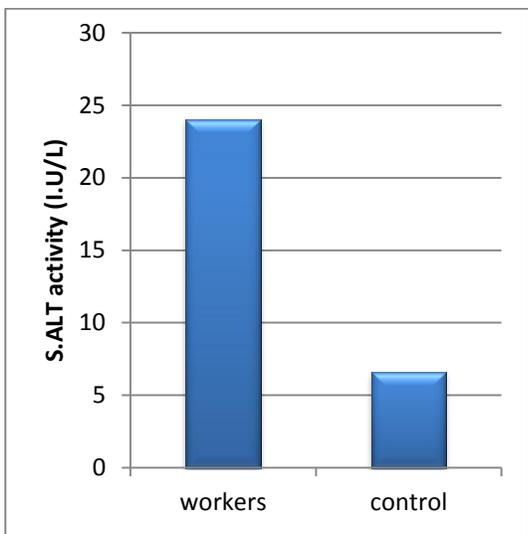


Figure-4 S.ALT activity of workers and control in serum

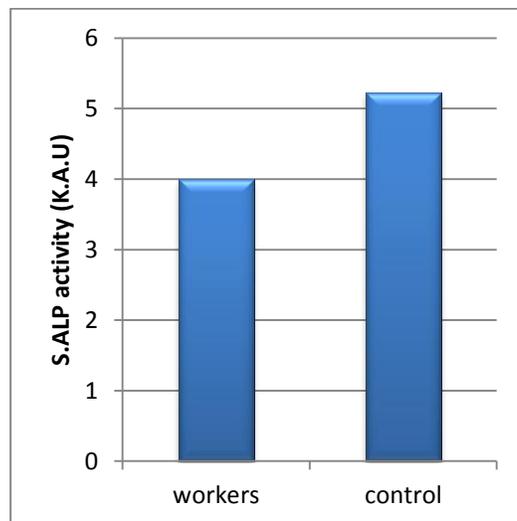


Figure-6 S.ALP activity of workers and control in serum

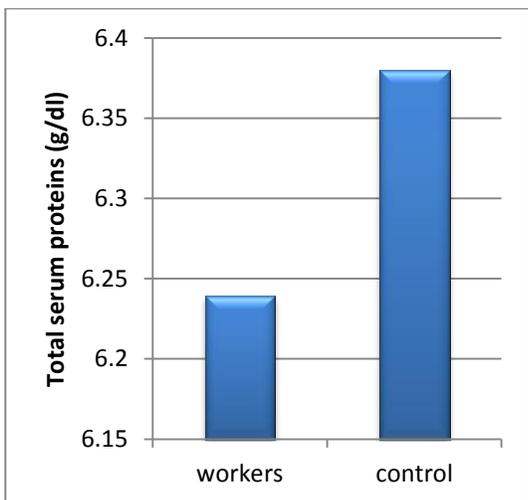


Figure-5 Total serum proteins of workers and control in serum

Table 1: The results of statistical analysis in test compare with control

Parameters	Mean ± SE		F-value
	Workers	Control	
S .Urea (mg/dl)	46.7±0.826	30.26±0.613	0.826*
S .Creatinine (mg/dl)	1.23±0.074	0.653±0.0601	0.985*
S.AST (I.U/L)	29.3±0.809	6.29±0.720	0.932*
S.ALT (I.U/L)	24.04±1.163	6.63±0.822	0.798*
S.ALP (K.A.U/L)	4±0.477	5.23±0.657	0.075
Total serum protein (g/dl)	6.239±0.13	6.387±0.18	0.428

*significant

دراسة تأثير التعرض لغبار الاسمنت على مؤشرات وظائف الكبد والكلية لدى بعض العاملين في مجال الاسمنت في مدينة الرمادي

علي محمد سمين

E-mail : ali85xp@yahoo.com

الخلاصة:

هدفت الدراسة الحالية الى التحري عن تأثير التعرض لغبار الاسمنت على مؤشرات وظائف الكبد والتي تشمل فعالية إنزيمات الكبد (S.ALT, S.AST and S.ALP) والتركيز الكلي لبروتينات للمصل و مؤشرات وظائف الكلية (تركيز اليوريا والكرياتينين) لدى العمال المعرضين لغبار الاسمنت في معمل كاشي وموزانيك الانبار . أوضحت النتائج ارتفاع معنوي في تركيز اليوريا (العمال = 46.7 ± 0.826 ، مجموعة السيطرة = 30.26 ± 0.613) والكرياتينين (العمال = 1.23 ± 0.074 ، مجموعة السيطرة = 0.653 ± 0.0601) و فعالية S.AST (العمال = 29.3 ± 0.809 ، مجموعة السيطرة = 6.29 ± 0.720) و فعالية S.ALT (العمال = 24.04 ± 1.163 ، مجموعة السيطرة = 6.63 ± 0.822) بينما لا يوجد أي فرق معنوي في تركيز Total serum protein (العمال = 6.239 ± 0.13 مجموعة السيطرة = 6.387 ± 0.18) و فعالية انزيم S.ALP (العمال = 4 ± 0.477 ، مجموعة السيطرة = 5.23 ± 0.657) لدى العمال مقارنة بمجموعة السيطرة .