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EFFECTS OF CEMENT DUST ON SOME BIOCHEMICAL PARAMETERS OF CEMENT BLOCK MOULDERS IN KHANA LGA, RIVERS STATE

[1] Henrrietta Ogadimma Asuzu-Samuel, [2] John, Godson Nnamdi

[1] Biomedical Technology, School of Science Laboratory Technology, University of Port Harcourt.

[2] Biochemistry/ Chemistry Technology, School of Science Laboratory Technology, University of Port Harcourt.

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Abstract: **Cement dust exposure has been seen to cause severe health problem. However this study evaluated the effect of cement dust exposure on the biochemical parameters of block moulders and non-cement block moulders at Khana LGA. 70 men were involved in the study. 5ml of blood samples were collected from their vein in a sitting position with sterile syringe and needle into heparin bottle and were taken to the laboratory within 2hours after blood collection. Spectrophotometric methods were used to analyze the sample. Statistical analysis was done using mean and standard deviation. Some biochemical parameter analysed includes creatinine, urea, potassium and sodium. The result showed that creatinine and potassium have significant difference of ($P<0.05$) when compared with the control respectively, while sodium and urea has no significant difference when compare the subject with the control. However, cement dust exposure on cement block moulders have severe effect on the Biochemical parameters. In other to prevent this, workshop should be conducted yearly to educate cement block moulders on the precautionary measures to be taken.**

Keywords: **Dust, Cement, Biochemical, Moulder, and Block.**

1. INTRODUCTION

Cement dust is formed during the production, packing, loading and offloading of cement. Every individual in the cement industry form the director to the manager, staff, customer and bricklayer are exposed to the inhalation of cement dust. People living within the vicinity of the cement industry and those passing by are not excluded from inhaling dust from the cement industry.

Consistent exposure of cement dust over relatively long periods can cause toxicity to man due to the accumulation of the toxic constituent of the cement dust. The chief chemical constituents of cement are calcium, silica, alumina and iron. Calcium is derived from limestone or chalk while silica, alumina and iron are derived from sand, clay and iron are sources (Butt et al., 1971).

Different organs, tissue and cells in biological system are affected in different ways and to different degree when exposed to toxic elements. The result of creatinine and potassium agrees with the study carried out by Haithan (2010) which shows a significant increase in creatinine of subject when compare to control and no significant increase in sodium of subject when compare to control. This research is aimed at assessing the effects of cement dust on some biochemical parameters of some cement block moulders in Khana local government area, Rivers State, Nigeria. Several studies have demonstrated linkages between cement dust exposure, chronic impairment of lung function and respiratory symptoms in human population.

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Cement dust irritates the skin, the mucous membrane of the eyes and the respiratory system. Its deposition in the respiratory tract causes a basic reaction leading toincreased pH values that irritates the exposed mucous membranes (see, Zeleke et al. 2010, and references cited therein).Occupational cement dust exposure has been associated with an increased risk of liver abnormalities, pulmonary disorders, and carcinogenesis. Decreased antioxidant capacity and increased plasma lipid peroxidation have been posed as possible causal mechanisms of disease (Aydin et al. 2010). There is good evidence for cement dust exposure acting as a tobacco, alcohol and asbestos independent risk factor for laryngeal carcinoma (Dietz et al. 2004).

2. MATERIALS AND METHODS

Sample Collection

This study was carried out in Khana Local government area, Rivers State Port Harcourt.

70 (seventy) adult men were involved in this study, 50 (fifty) were cement block moulders (subject) and (twenty) 20 were non-cement block moulders.

Serum Preparation

5ml of blood specimen drawn from 50 cement block moulders and 20 drawn from non-cement block moulders and were put into oxalate bottle, and then the serum was then separated from the blood by centrifugation of 3000rpm at 15 minute and was analysed.

Principle: Urea in serum is hydrolyzed to ammonia in the presence of urease. The ammonia is then measured in spectrophotometer.

Procedure

The test tube were labeled blank, standard & test

Blank Standard Test

	Blank	Standard	Test
Simple	-	-	10ml
Standard	-	10ml	-
Distilled water	10ml	-	-
Reagent 1	100ul	100ul	100ul

The solution in each of the tubes was mixed and incubated at 37^0c for 10 minutes.

	Blank	Standard	Test
Reagent 2	2.50ul	2.50ml	2.50ul
Reagent 3	2.50ul	2.50ul	2.50ul

I mixed the solution in each of the test tube and incubated at 37^0c for 15 minutes after which I zeroed the spectrophotometer using distilled water at a wavelength of 546nm. Then I read absorbance of standard and test and then recorded my result.

Calculation

$$\text{Urea concentration} = \frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times \text{concentration of standard}$$

Potassium

Reagents: 1 – Potassium reagent (sodium tetraphenylboron

Reagent: 2 - Potassium standard

Principle: The amount of potassium is determined by using sodium tetraphenylboron in a specifically prepared mixture to produce a colloidal suspension.

The turbidity of the mixture is directly proportional to the concentration of potassium in the mixture.

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Procedure

The test tubes were labeled standard blank and test.

	Blank	Standard	Test
Potassium reagent	1.0m	1.0ml	1.0ml
Sample	-	-	10ul
Standard	10ul	-	-
Distilled water	-	10ul	-

I mixed the solution in each of the test tube very well then allow to stand at room temperature for 3 minutes after which I zeroed the spectrophotometer black reagent and then set at the wavelength at 500nm, then the absorbance of the standard and test were read respectively.

Calculation

$$\text{Concentration of potassium} = \frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times \text{concentration of standard}$$

Creatinine

Reagent

Creatinine Picric Acid Reagent

Creatinine Buffer Reagent

Creatinine Standard

Principle:

Creatinine reacts with picric acid in the presence of sodium hydroxide (alkaline medium) to form a red colour complex.

Procedure

- Combine equal volume of creatinine picric and reagent and creatinine buffer reagent, mix well.
- Arrange 3 sets of lest table and label as follows:

	Blank	Standard	Test
Potassium reagent	3.0ml	3.0ml	3.0ml
Sample	-	-	0.ml
Standard		0.1ml	-
Distilled water	0.1ml	-	-

I mixed each of the test tube very well, then I place all test tubes in water bath of 37^0c for 15 minutes, after which I remove and allow to cool, and set wavelength of the spectrophotometer at 510nm and zero the instrument with the reagent blank, then I read and recorded the result.

Calculation

$$\text{Creatinine cone} = \frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times \text{concentration of standard}$$

Sodium

- Filtrate Reagent: Uranyl acetate 2.1mm and magnesium acetate 20mm in ethyl alcohol.
- Sodium colouring Reagent: potassium ferrocyanide non-reactive stabilizer and filters.
- Acid Reagent: A diluted active acid
- Sodium standard: Sodium chloride solution.

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Procedure

Label three sets of last tubes

	Blank	Standard	Test
Filtrate reagent	1.0ml	1.0ml	1.0ml
Sample			50ul
Standard		50ul	
Distilled water	50ul		

Shake all test tubes vigorously and centrifuge test tube at high speed of 1,500 for 10 minutes and then let the supernatant fluid

	Blank	Standard	Test
Acid reagent	1.0ml	1.0ml	1.0ml
Supernatant		-	50ul
Colouring reagent	50ul	50ul	-

I zeroed spectrophotometer with distilled water at 550nm and then read the absorbance of standard and test, then my result was calculated.

Calculation

Concentration of sodium= $\frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times \text{concentration of std}$

3. RESULTS AND DISCUSSION

Reject Ho at P<0.05 i.e. t cal> t-critical

There is a significant different in creatinine subjects when compare with control.

Ho: – No significant difference between the subject and control of urea and sodium.

H_1: There is significant difference between the subject and control of creatinine and potassium respectively.

Table 1: Biochemical parameters of creatinine and urea

Parameter/ Group	Creatinine (mmol/l)	Urea (mmol/l)
Subject	126.46±2.49	3.99±1.10
Control	89.22±10.44	4.12±0.79
P-value	P<0.05	P>0.05

The mean and standard deviation of Biochemical parameters of creatinine and urea concentration in the tested subject are 126.46 ± 2.49 and 3.99 ± 1.10 all in (mmol/l) while control are 89.22 ± 10.44 and 4.12 ± 0.79 all in (mmol/l) are shown above in table 1.

Table 2: Biochemical parameters of potassium and sodium

Parameter/ Group	Potassium (mmol/l)	Sodium (mmol/l)
Subject	3.79±0.64	143.49±6.54
Control	4.53±0.53	143.90±5.37
P-value	P<0.05	P>0.05

The mean and standard deviation of Biochemical parameters of potassium and sodium concentration in the tested subject are 3.79 ± 0.64 and 143 ± 6.54 all in (mmol/l) while control are 4.53 ± 0.53 and 143.90 ± 5.37 all in (mmol/l) are shown above in table 2.

4. DISCUSSION

The effect of cement dust on cement block moulders results from the biochemical interaction between some toxic constituent of the cement. The result of creatinine and potassium agrees with the study carried out by Haithan (2010) which shows a significant increase in creatinine ($P<0.05$) of subject when compare to control and no significant increase in sodium when compare to control ($P>0.05$). The effect of cement dust on cement block moulders may be dependent on the pathological condition state of the kidney. The result shows that there is a significant increase in the creatinine level of the subjects compare to the controls accepting the H_1 hypothesis ($P<0.5$) being significant. The result also shows that there is no significant difference in the subject of sodium and urea rejecting H_1 hypothesis being significant and accepted the H_0 ($P>0.05$).

5. CONCLUSION

In conclusion, the effects of cement dust exposure of cement block moulders is significant.

ETHICAL APPROVAL

Eternal approval was sought and was received from the University Ethical Committee.

CONFLICT OF INTEREST

No conflict of interest exists amongst the authors

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