

Excretion Pattern of Nickel and Vanadium in Guinea-Pigs Treated With Bonny Light Crude Oil

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Abstract: The prevalence of crude oil spillages and the attendant contamination is increasing rapidly in the Niger Delta region of Nigeria with a resultant unrestricted exposure of animals including humans in the environment. Since Nickel and Vanadium are characteristic heavy metals found in crude oil, it is therefore expedient to study to the excretion pattern of nickel and vanadium after prolong exposure to crude oil. Ten adult male guinea pigs were used for the research and separated into two groups of five animals each. All animals were given elephant grass *ad libitum* throughout the duration of the research. Group 1 served as the control (untreated) group. Group 2 was treated for ten consecutive days; urine and faeces samples were pooled and collected for analysis. The urine and faeces samples were digested with nitric acid, perchloric acid and sulphuric acid in the ratio of 3:1:1 and diluted to 50ml with distilled water. The result shows a significant increase in the concentration of nickel and vanadium in the urine and faeces of treated animals when compared to the control (untreated) animals. This may be due to the absorption of these heavy metals from the crude oil and accumulation over a period of time into the system of these treated animals. These heavy metals should have been observed more in urine than in faeces due to the route of exposure, but the reverse is the case. This may be due to the chronic exposure of the research animal to the crude oil, the metabolic system of the research animal and other factors. It is therefore reasonable to suggest that Nickel and vanadium are excreted more in the faeces than in the urine after chronic exposure in guinea-pigs in a dose-independent manner.

Keywords: Nickel, Vanadium, bonny light crude-oil, heavy metals, Guinea-pigs,

1. Introduction

The prevalence of crude oil spillages and the attendant contamination is increasing rapidly in the Niger Delta region of Nigeria with a resultant unrestricted exposure of animals including humans in the environment, as well as the application of crude oil on the skin for the treatment of various illnesses.

Odeunmi & Adeniyi (2004) identify nickel and vanadium as one of the trace element (trace metals) found in Nigerian crude oil and petroleum products. Since Nickel and Vanadium are characteristic heavy metals found in crude oil, it is therefore expedient to study to the excretion pattern of nickel and vanadium after prolong exposure to crude oil.

2. Materials and Methods

Ten adult male guinea pigs were used for the research and separated into two groups of five animals each. All animals were given elephant grass *ad libitum* throughout the duration of the research. Group 1 served as the control (untreated) group. Group 2 was treated liberally for ten consecutive days by skin application of bonny light crude oil at the dorsal part of the ear; urine and faeces samples were pooled and collected for analysis. The urine and faeces samples were digested with nitric acid, perchloric acid and sulphuric acid in the ratio of 3:1:1 and diluted to 50ml with distilled water before AAS analysis (Oruambo, 2004).

3. Results

Table 1: Margin specifications

Sample		Nickel concentration	Vanadium concentration
Urine (mg/l)	Control	0.007 ± 0.003	0.001 ± 0.0002
	Sample	3.801 ± 0.012	0.100 ± 0.005
Feces (mg/kg)	Control	0.006 ± 0.004	0.001 ± 0.0003
	Sample	14.45 ± 0.013	0.700 ± 0.015

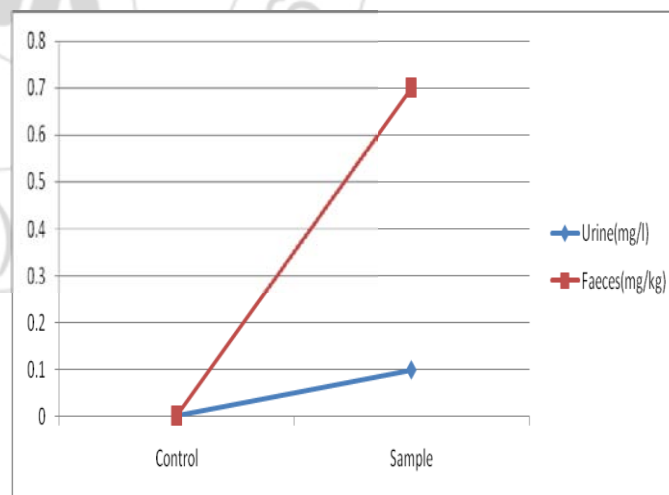


Figure 1: Graph of Nickel Concentration in urine and faeces.

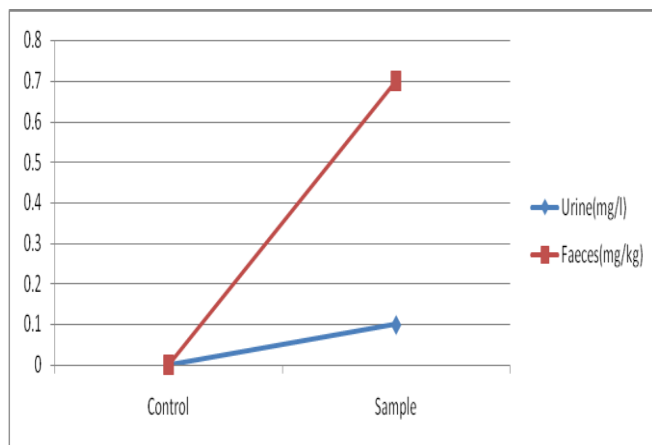


Figure 1: Graph of Vanadium Concentration in urine and faeces

4. Discussion

From the table and graphs, it was seen that there is significant increase in the concentration of nickel and vanadium in the urine and faeces of treated animals when compared to the control (untreated) animals. This may be due to the absorption of these heavy metals from the crude oil and accumulation over a period of time into the system of these treated animals. These heavy metals should have been observed more in urine than in faeces due to the route of exposure, but the reverse is the case. This may be due to the chronic exposure of the research animal to the crude oil, the metabolic system of the research animal and other factors.

This result is contrary what Oruambo (2004) obtained in his work.

5. Conclusion

From the results obtained, it is therefore reasonable to reach a conclusion that nickel and vanadium are excreted more in the faeces than in the urine after chronic exposure in guinea-pigs in a dose-independent manner.

References

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