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EFFECTS OF BONNY LIGHT CRUDE OIL ON THE MORPHOLOGY OF LITTERS OF WISTAR RATS

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ABSTRACT

The morphological abnormalities induced in pregnant wistar rats following administration of Bonny Light Crude Oil (BLCO) was studied. Three groups of rats were administered 3ml/kg, 6ml/kg and 9ml/kg body weight of BLCO on the 7^{th},8^{th} and 9^{th} day of gestation respectively. The control group received normal saline also on the 7^{th},8^{th} and 9^{th} day of gestation. The fetuses were collected by hysterectomy on the 20^{th} day of gestation. Foetal body weight, crown-rump lengths and tail lengths were measured. Results showed resorption of fetuses in the highest dose (9ml/kg) group of animals. Foetal body weight, crown-rump lengths and tail lengths were significantly reduced ($P<0.05$) in the treated groups. These effects suggest that consumption of BLCO during pregnancy may interfere with the normal growth process of the developing rat fetuses.

KEYWORDS: Bonny light crude oil, body weight, crown-rump length, tail length.

INTRODUCTION

Oil spill during production, exploration, discharge from storage facilities, refineries and busting of pipe lines is one of the fundamental sources of hazards and pollution in oil producing communities of Nigeria (Peters,1993; Okercke and Ezeayina,1987; Lambert-Aikhonbare and Shaw,1982). Industrialization through exploitation and exploration of hydrocarbons has introduced into the ecosystem substances that are potentially toxic to life and the environment (Dede and Kagbo, 2002). Literature is replete with information on the toxic effects of crude oil in laboratory and non laboratory mammals, birds and aquatic organisms (Rahimtula *et al*, 1987; Payne *et al*, 1987; Engelhardt, 1985; Homles, 1984; Rice *et al*, 1977). However, the magnitude and severity of the effects produced depends on the chemical composition of each type of crude oil (Khan *et al*, 1989). Eyong (2000) revealed that there are biochemical and cyto-toxic impairment associated with ingestion of marine animals exposed to crude oil polluted waters. Ingestion of crude oil and its products in the raw or bio-accumulated form in marine life presents a potential hazard to terrestrial species (Shore and Douben, 1994). Inhabitants of Niger-Delta region of Nigeria ingest crude oil and its products directly or indirectly through various ways. Crude oil is ingested as a laxative, anti-poisoning agent, anti-convulsion agent, used for treatment of arthritis, snake antidotes (Dede *et al*, 2002). Crude oil is also ingested indirectly through eating of aquatic animals from crude oil polluted water. Ingested hydrocarbons a major component of crude oil crosses the placenta barrier (Feuston *et al*, 1997) and the developing foetus in pregnant females becomes a non benefiting recipient of the teratogenic and developmental toxicity of crude oil. This research work was therefore undertaken to investigate the effects of ingestion of Bonny Light Crude Oil (BLCO) on the morphology of wistar rat foetuses.

MATERIALS AND METHODS

Twenty-eight female albino wistar rats obtained from the animal house of the Department of Anatomy, University of Calabar was used for the study. The rats weighed between 160 and 200g and were given rat chow and water *ad libitum*. The animals were divided into four groups labeled A, B, C and D. BLCO used for this study was obtained from Shell Petroleum Development Co-operation, Port Harcourt, with permission of the Department of Petroleum Resources, Nigeria National Petroleum Cooperation (NNPC), Lagos. The animals were weighed and mated. The presence of sperm in the vaginal smear confirmed mating and the sperm positive day designated as zero day of gestation. Gastric intubations of BLCO was administered at a dose of 3ml/kg, 6ml/kg and 9ml/kg body weight to rats in groups B, C and D respectively on the 7^{th}, 8^{th} and 9^{th} day of gestation. Control animals received gastric intubations of 6ml/kg body weight of normal saline. On the 20^{th} day of gestation, the animals were anaesthetized using chloroform. The litters were removed by hysterectomy and the uteri examined for number and placement of life or resorped fetuses. The litters were counted, weighed, crown-rump and tail length measured.

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Statistical Analysis

Data obtained was analyzed by analysis of variance and student's t-test.

RESULTS

During the period of administration of BLCO, the animals appeared weak and less active. There was loss of fur which was more evident in the 9mg/kg (group D) animals. There was loss of appetite and the faeces were darker and less firm.

The results obtained are shown in table 1.The mean foetal body weight of the animals given 3mg/kg (group B) and 6mg/kg (group C) respectively was significantly lower than the control (4.74±0.02g) at $P<0.05$. The mean crown-rump length of the treated animals were reduced compared to the control. The result was statistically significant ($P<0.05$). The mean foetal tail length of the treated animals were also significantly reduced compared to the control. Incidence of resorption was observed in animals administered 9mg/kg of BLCO (group D).

TABLE 1. **Effect of maternal administration of Bonny Light Crude Oil on the 7th ,8th and 9th day of gestation on litters.**

Parameters	Control	BLCO administration	
		3mk/kg	6mg/kg
Body weight(g)	4.74±0.02	4.25±0.04	3.20±0.02
Crown-rump length(cm)	3.02±0.05	2.78±0.03	2.75±0.01
Tail length(cm)	1.30±0.03	0.90±0.01	0.90±0.01

Values presented as mean ± SEM
$P<0.05$ compared to the control.

DISCUSSION

The results in the study indicates that administration of Bonny Light Crude Oil to pregnant rats have effects on their litters. BLCO treated rats showed a sickly appearance, loss of appetite and exhibited increased activity evidenced by rapid and random movements immediately after administration. This period was closely followed by a period of reduced activity, which lasted between 5-20minutes. However, the time of reduced activity increased as the dose of BLCO increased. These agrees with the findings of Didia *et al* (2003) and Eyong (2000). Except for the control animals which recorded increase in total body weight during the experimental period, the BLCO treated animals recorded insignificant increase in body weight as the pregnancy progressed. This is in agreement with studies by Didia *et al* (2003), Eyong (2000), Udoette (1996), and Khan *et al* (1989).

The dose dependent weight decrease observed in this study may be due to the laxative effect of BLCO which may have caused a decrease in bioavailability of nutrients in the feed enhancing their loss in the feaces. It is also possible that crude oil in the stomach and intestine could affect absorption of substances. Crude oil has been shown to penetrate placenta barrier to embryonic tissues and toxic to some tissues of the body (Eyong, 2003; Feuston *et al,* 1997; Feuston ,1996). In this study, it was observed that BLCO had effect on the gross features of the litters of pregnant rats (table 1). When the weights, crown-rump and tail lengths were compared, statistically significant differences were observed. This is consistent with previous studies in which congenital malformation was observed in the litters of rats treated with crude oil during pregnancy (Feuston *et al,* 1997; 1996; Mackerer ,1996).

The developmental abnormalities observed in this study may be attributed to the toxicity of BLCO resulting in the disruption of physiological and biochemical activities as a result of hydrocarbon constituents in the food web.

CONCLUSION

This study revealed that ingestion of BLCO by pregnant wistar rats resulted in alterations in some of the anthropometric indices. These effects suggests that consumption of BLCO during pregnancy may interfere with the normal growth process of the rat foetus.

REFERENCES

Dede, E.B and Kagbo, H.D 2002. A study on the acute toxicological effects of commercial diesel fuel in Nigeria on rats (Ratus ratus) using haematological parameters Appl Sci., Environ. Mgt.

Didia, B. L.; Dede, E.B. and Dapper D.V., 2003. Effect of crude oil contaminated water on haematocrit and histopathology of guinea pig: Animal model for investigating crude oil pollution. Journal of Experimental and Clinical Anatomy 2(2) 6-11

Engelhardt, F R., 1985. Effects of petroleum on marine mammals in: Engelhardt, F R. ed. Peroleum effects on the environment Lond, Elsiever, pp 217-243.

Eyong, E.U., 2000. Biochemical and toxological implication of ingestion by rats of shellfish exposed to crude oil poliuted water Ph. D. Thesis, University of Calabar, Nigeria.

Feuston, M.H. and Hamilton, C.E., 1997 Developmental toxicity in study rats exposed dermally to clarified slurry oil for a limited period of gestation. J. Toxicol – Environ Health 49 (2): 207-220.

Feuston, M.H. and Mackerer, C.R., 1996. Chronic Dermal Studies of petroleum streams in mice. Fundamental Application of Toxicology 301 (1): 47-54.

Holmes, W. N.,1984. Petroleum pollutants in the marine environment and their possible effect on seabird. In reviews in environmental Toxicology, Hodgson E. (ed). Vol. 1. Amsterdam. Elsiever. pp 251-317.

Khan, S., Irfan, M. and Rahimutla, A., 1989. Hepatotoxic Potential of Prudhoe Bay Crude oil. Effect on mouse liver weight and composition. Toxicology 46: 95-105.

Lambert-Akhonbare A. and Shaw H., 1982. Environmental Effects of crude oil spillage. Global journal of Pure and Applied Sciences 1(182): 85-90

Mackere, C.R and Feuston, M.H., 1996. Developmental toxicity of clarified slurry oil, syntower bottoms and distillate aromatic extract administered as a single dose to pregnant rats. Journal of Toxicology and Environmental Health 43(1): 45-66.

Okereke, C and Ezeanyina I 1987 Environmental effects of crude oil spillage Global journal of pure and applied sciences 1 (182): 85-90.

Payne, J. F. Framcey, L.. L., Rahimtala, A. D. and Peter E. L., 1987. Reviews and perspective on the use of mixed function oxygenase enzymes in biological monitoring com. Pharmol. Phziol. 86 (c) 233-245

Peters, S W , 1993. Crisis in our environment Nigerian Environmental Education and management. University of Calabar press, Nigeria, pp 126-148.

Rehimutla, A.D. Lee, Y and Sila, J., 1987. Induction of epidermal and hepatic orinthine decaboxylase by a Prudhoe buy crude oil. Fund Appl. Toxicol 8: 408-414

Rice, S.D, Short, J.W and Karimen, J.F, 1977. Comparative oil toxicity and compararive animal sensitivity. In: Wolfe, D.A (ed). Fate and effect of petroleum in marine organisms and ecosystems, Oxford. Pergamon Press pp 78-94.

Shore, F.R. and Douben, P E., 1994. Predicting ecotoxicological impacts of environmental contaminants on terrestrial small mammals Rev. Environ Contain Toxicol. 134. 49-89.

Udoette, U.B., 1996. Toxicological evolutionof a Nigerian crude oil (Qua Iboe, Light) in rats M.Sc. Thesis, Biochemistry Department, University of Calabar, Calabar. Nigeria.