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 7th, 8th and 9th day of gestation respectively. The control group received normal saline also on the 7th, 8th and 9th day of gestation. The fetuses were collected by hysterectomy on the 20th 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 burning of pipe lines is one of the fundamental sources of hazards and pollution in oil producing communities of Nigeria (Peters, 1993; Oker-erke and Ezeanya, 1987; Lambert-Aikhonobere 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 teleost species (Shore and Douben, 1994). Habitants 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 anticoags (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 7th, 8th and 9th day of gestation. Control animals received gastric intubations of 6ml/kg body weight of normal saline. On the 20th 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 resorbed 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>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>BLCO administration</th>
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<tbody>
<tr>
<td></td>
<td>3mg/kg</td>
<td>6mg/kg</td>
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<tr>
<td>Body weight (g)</td>
<td>4.74±0.02</td>
<td>4.25±0.04</td>
</tr>
<tr>
<td>Crown-rump length (cm)</td>
<td>3.02±0.05</td>
<td>2.78±0.03</td>
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<tr>
<td>Tail length (cm)</td>
<td>1.30±0.03</td>
<td>0.90±0.01</td>
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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), Udette (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 faeces. 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, 1995).

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
Effects of Bonny Light Crude Oil on the Morphology of Litters of Wistar Rats


