Scholars Journal of Applied Medical Sciences (SJAMS) ISSN: 2347-954X (P) & 2320-6691(O)
Sch. J. App. Med. Sci., 2013; 1(5):502-505

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2013.v01i05.0037

Research Article

The Histopathological Effects of Nigeria Bonny Light Crude Oil on the Ovaries and Fallopian Tubes of Pregnant Rats

Asara, Azibalua. A; Tonkiri, Ayakeme and Ebiagbe, J. Ebiere
Department of Science Foundation, School of Foundation Studies, Bayelsa Sate College of Health Technology, Otuogidi, Ogbia-Town

Corresponding author
Tonkiri, Ayakeme
Email: tonkiriayakeme@gmail.com

Abstract: Crude oil pollution of the environment has been of great concern as crude oil pollution occurs on a daily basis through different channels. This has become more pronounced in the Niger Delta region of Nigeria. The purpose of the study was to investigate the possible effect of bonny light crude oil on pregnancy. Twenty rats weighing 160-250g were divided into control and test groups. Unpolluted feed was given to the control group whereas the test groups received different concentration of 0.73ml, 2ml and 3.8ml crude oil polluted feed for fourteen days. The result showed that the weight of the rats significantly ($p \leq 0.05$) decreased and the test group rats also lost their pregnancy while the control delivered pups. Histological study was also conducted on the ovaries and fallopian tubes. The finding of the study shows that crude oil could pose serious effect on the reproductive process in organisms found in crude oil polluted environment.
Keywords: crude oil toxicity, weight, pregnancy.

INTRODUCTION

Environmental pollution from crude oil and refined petroleum products has posed a lot of environmental problems especially in developing nations. It is note worthy, that the devastating consequences of crude oil spill in the Niger Delta region of Nigeria may pose great hazards on both the aerial and terrestrial environment. Crude oil and refined petroleum products are one of the most widespread contaminants of aquatic environment. However, before now similar research studies for hydrocarbons in the environmental samples have been widely established because of the concern over the toxic effect of these substances on aquatic organisms and to humans consuming them [1-4].

The physiological deficiencies that caused the abortions in the rats exposed to crude oil are unknown. Hormonal defects might have resulted from the exposure of crude oil to the rats which may have affected the pregnancy of the rats.

MATERIALS AND METHODS

Study Design

Male and female rats weighing (160-250g) were purchased from the department of human physiology, faculty of Basic Medical Sciences, university of Port Harcourt, Nigeria. Bonny light crude oil was obtained from Shell Petroleum Development Company (SPDC) Port Harcourt, River State, Rat feed was purchased from Choba market, Choba, River State, Nigeria.

Preparation of Feed

The crude oil polluted feed was prepared by adding different concentrations of bonny light crude oil to 20g of feed directly according to body weight and normal water given. The mixing of the crude oil with the feed was done manually and thoroughly. The concentrations used are 0.73ml, 2ml and 3.8ml.

METHODS

Male and female rats weighing (160-250g) was used for the experiment. The rats were acclimatized for one week and fed with normal rat feed and water. Three female and two male rats were placed in each cage and allowed to mate. Mating and pregnancy were assumed to have take place with presence of sperm in the vaginal fluid and the development of permanent diestrus detected by vaginal smears.

The pregnant rats were now placed in two groups, the control group and the test groups. The control group consists of five (5) rats, while the test groups consist of fifteen (15) pregnant rats which were placed in three cages of five (5) rats each. The control group rats were fed with unpolluted feed whereas the test group rats were fed with different concentration of 0.73ml, 2ml and 3.8ml crude oil polluted feed. Both control and test groups were fed for fourteen days. The weights of the rats were taken and were compared.

Histological Study

The ovaries and fallopian tubes from the rats were sliced and dehydrated with a range of concentrations of ethyl alcohol and then cleared with xylem and embedded in molten paraffin wax. The embedded tissue blocks were sectioned with a Shandon AS 325 rotatory microtome and slides were prepared with the sections. The tissues were stained with Ehrlich's haematoxylin and eosin blue using Lillie's method [5].

Statistical Analysis

The difference in weight between the control group and test groups animals were evaluated using ANOVA values of ($p \leq 0.05$) were considered statistically significant.

RESULTS AND DISCUSSION

The result showed that the weight of the rats which were fed with crude oil contaminant feed significantly ($p \leq 0.05$) decreased, when compared with the control as shown in figure 1.

Similarly, the rats lost their pregnancy by the fourteen day of the experiment which shows that crude oil when given directly or indirectly to organism will lead to abortion or reabsorption of pregnancy as shown in figure 2.

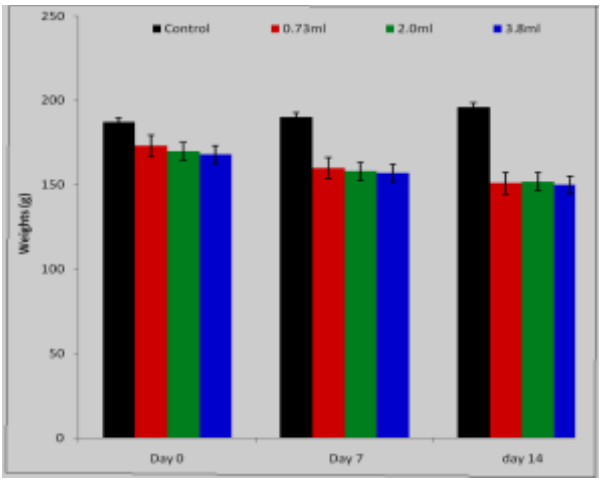

Fig. 1: Weighs of Wistar rats treated with crude oil

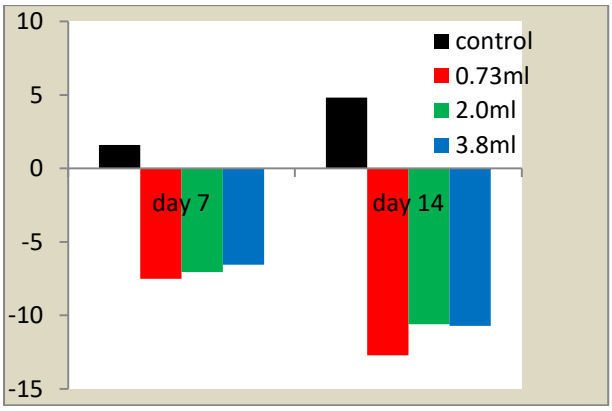

Figure 2: Effect of crude oil on pregnancy

Histological effect of crude oil on the reproductive organs

The result of histological examination on the fallopian tube of rats fed 14 days with unpolluted feed (control group) and crude oil polluted feed (test group) are shown in figures 3a, 3b, 3c and 4d.

As shown in figure 3a, the fallopian tube of the rats that received unpolluted food was lined by ciliated columnar epithelia the wall is fibro muscular. On the other hand the fallopian tube of rats that were fed with crude oil polluted food, showed the fallopian tube lumen with partial detachment of the lining. The lumen is filled by eosinophilic inflammatory material unlike the control group rats which delivered their pups around day 14 of the study; there was no sign of pregnancy in the fallopian tube of the test group rats on or around day 14 of the study.

The results of the histopathological study on the Ovaries apart from the fallopian tube are shown in figures 4a, 4b, 4c, and 4d. As shown in figure 4a the ovary of the rats that received unpolluted fed showed no ovarian tissues, while the ovaries of the rats that were fed with polluted feed showed manly luteinized ovarian stoma.

Fig. 3a: Control: Section of fallopian tube whose lumen is thrown into papillary folds lined by ciliated columnar epithelia, the wall is fibro muscular

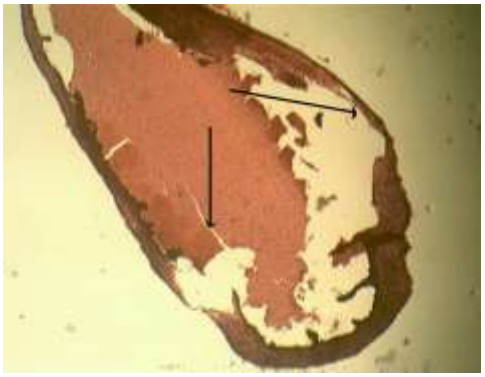

Fig. 3b: TEST A (0.73mL): Section shows the fallopian tube lumen with partial detachment of the lining, the lumen is filled by eosinophilic inflammatory materia

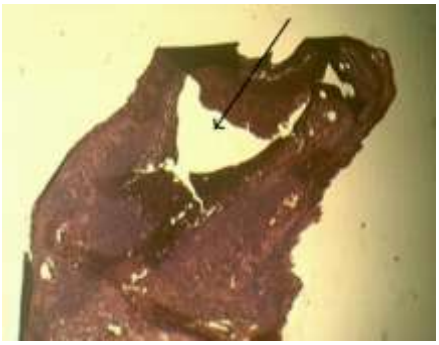

Fig. 3c: TEST B (2mL): Shows focal areas of denuded epithelial lining

Fig. 3d: TEST C (3.8mL): No histological change seen

Fig. 4a: Control: No ovarian tissues seen

Fig. 4b: TEST A (0.73mL): The ovarian tissue poorly stained, show ovarian stroma luterized

Fig. 4c: TEST B (2mL): Section from ovary shows a few secondary follicles against a luterized stroma

Fig. 4d: TEST C (3mL): Section shows mainly luterized ovarian stroma

The effect of Nigeria bonny light crude oil on pregnant rats were investigated in this study, the weight of the rats fed with crude oil polluted feed decreased significantly. This may be due to the unpalatability of the feed. This observation is in agreement with studies reported on rats, guinea pigs and other species [6- 13]. The loss of pregnancy in the study might be explained by the crude oil induced destruction of the epithelial lining of the fallopian tubes and the ovarian stroma that is seen in the ovaries.

We also observed slight effect on fecundity and survival of rats exposed to various concentration of crude oil contaminated feed. The greatest effect was on the 3.8ml treated group where no fecundity was recorded. This gives a vivid evident of the effects on the reproductive system. This may imply that crude oil is acting as an anti-androgenic compound, and thereby inducing spontaneous abortion, stillbirths and reproductive malfunction [14]. At present the adverse effects on endocrine system in animals have resulted in reproductive malfunction and developmental disorder [15].

In conclusion the findings of the present study have shown that Nigeria bonny light crude oil is toxic to the reproductive system of rats and this toxicity is expressed by progressive and significantly ($p \leq 0.05$) decreasing in weight and loss of pregnancy. These

effects of crude oil on the reproductive system of the rats may have contributed to the miscarries or abortions observed in the rats.

REFERENCES

1. United State Environment protection Agency (USEPA) summary table of field methods for petroleum hydrocarbon analysis. USEPA, Washington, D.C., 2004.
2. Giger W, Rein hard FM, Scaffner C, Stuman W; Petroleum derived and Indigenous hydrocarbons in recent sediments flake Zig, Switzerland. Environ mental science Technology, 1974; 8: 44-45.
3. Farringdon JW, Quinn JI; Petroleum Hydrocarbon in Narragansett Bay. 1 Survey of Hydrocarbon in sediments and clans (mercenaria mercenaria). Estuarine and costal mar. Sci, 1973; 2: 171-179.
4. Dasilva EM, Peso-Aqular MG, Navarro M, De F, Chastinct CBA; Impact of petroleum pollution on aguatic coastal ecosystem in Brazils Environ. Toxicol and chem., 1997; 16(1):112 – 118.
5. Lillie RD, Fullmer HM; Histopathologic Technique and practical Histochemistry. 4th edition. NY, McGraw-Hill, 1976: 88-92.
6. Nwankwoala RNP, Ziworitin BJ; The Histopathological changes in the Liver, Lungs, Kidneys, Heart, testes and Endometrium of rats exposed to crude oil. Book of Abstracts WASP Conferenle XXVIII, 2002.
7. Nwankwoala RNP, Georgewill OA; The effects of exposure of Nigerian crude oil on Rats and Guinea pigs. Book of Abstracts XXV11th WASP Conference, pp 57-58, 2001.
8. Nwankwoala RNP; Effects of Nigeria Crude oil spillage on the inhabitants of Asitubo Gbanraun in June 1997. Book Abstracts XXV11th WASP Conference, pp58, 2000.
9. Baker J; Ecological effect of marine oil pollution. Cons Int Explor Mer., 1977; 171: 196-199.
10. Idoniboye BE, Andy AJ; Effect of oil pollution on aquatic environment. Research and development Department. NNPC, Port Harcourt, pp 311-314, 1985.
11. Afolabi OA, Adeyemi SA, lmevbore AMA; studies on toxicily of some Nigeria crude oil to some aquatic organisms. Proceedings of the NNPC 1985 seminar, pp 269-272, 1985.
12. Vander Muellen JH; Some conclusions regarding long term biological effects of some major oil spills. Phil. Trans. Roy. Soc. London B, 1982; 297:335-351.
13. Neff, Anderson J; Response of marine animals to petroleum and specific hydrocarbons. Applied Science Essex England, 1981.
14. Alvarez L, Randi A, Alvarez P, Piroli G, Chamson-Reig A, Lux Lantos V; Reproductive effects of hexachlorobenzene in female rats. J Appl Toxicol., 2000; 20: 81-87.
15. Indarto D, Izawa M; Steroid Hormones and Endocrine disruptors: Recent advances in receptor-mediated actions. Yonago Acta Medica, 2001; 44(1):1-6.