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Chronic Toxicity Study of The Effect of Crude Petroleum (Bonny Light), Kerosine and Gasoline on Rats Using Haematological Parameters

***DEDE, E. B.[1] IGBOH, N.M. [2] , AYALOGU O.A [2]**

1. *Dept. of pharmacology, university of Port Harcourt, Port Harcourt, Nigeria.*
2. *Dept. of Biochemistry, University of Port Harcourt, Nigera.*

ABSTRACT: Haematological parameters such as haemoglobin content (Hb), pack cell volume (PCV) and white Blood Cell Counts (WBC) were used to assess the effect of crude oil (bony light) , kerosene and gasoline on rats chronically exposed to $15kg^{-1}$,$7.5kg^{-1}$ and $5gk^{-1}$ of the respective petroleum samples of crude petroleum (bony light), kerosene and gasoline. These samples were administered intraperitoneally and monitored for first, second and third months of exposure. A significant fall in Hb and PCV were observed in the three sample groups through the 3 months duration. For gasoline injected rats the Hb decreased from 13.86 ± 0.21 of control to 6.35 ± 0.49 at third month, kerosene from 13.86 ± 0.21 of control to 9.18 ± 2.80 and crude petroleum (bonny light) from 13.86 ± 0.21 of control to 10.67 ± 0.65 at third month. Furthermore, the PCVdecreasd from 41.50 ± 0.71 of control to 19.05 ± 1.47 at the third month for gasoline, kerosene decreased from 41.50 ± 0.71 of control to 27.74 ± 8.40 at the third month, with crude petroleum (bonny light) decreasing from 41.50 ± 0.71 of control to 31.91 ± 1.95 at the third month. Finally the WBC seemed to increase marginally from 4.65 ± 0.07 of control to 5.00 ± 0.14 at the third month with gasoline, 6.85 ± 1 1.39 at third month with crude petroleum (bony light) . in conclusion, the results seemed to suggest that long term exposure of rats to petroleum samples could induce anaemia through the reduction in Hb and PCV levels as obtained in this study. @ *JASEM*

In recent years, our attention had been drawn to the deleterious effects of petroleum spillage on the environment. The fuel attendants and mechanics are constantly exposed to the harmful effects of gasoline and kerosene because of the nature of their job. Unfortunately they handle these samples without cognizance for proper protection against possible harmful effects of the petroleum samples (such as the mask, gloves etc). There is therefore possibility of exposure to light ends of these samples. There are other reported cases of the therapeutic abuse of petroleum samples. These include:
Crude oil being used as snake antidotes in rural areas where the conventional antidotes are not available.

Furthermore crude oils are employed as an anticonvulsant.

Crude oil is also reported to be used for treatment of arthritis

Equally of note is the use of gasoline or kerosene in the treatment of skin and eye infections conjunctivitis, Aczema and scabies (oral communication).

The incessant fuel and kerosene shortage often resulted in the transfer of these samples from one container to another using plastic tubes and frequent accidental ingestion of these samples often occurred during the process of suction.

Many studies have been carried out on the effects of petroleum samples on plasnts and marine lives, Anderson *et al* , (1974) , Udo and Fayemi, (1975), Kuhnold *et al* ,_(1980), Kiceniuk *et al* , (1982), Afolabi *et al*, (1985), Dheer *et al*, (1987), Powell (1987), Onuoha and Nwadukwe (1990). The reports on effect of petroleum samples on blood and rats pathology are scanty. The current study therefore deals with the laematologica changes on rats induce by the chronic exposure to crude oil (bonny light) Kerosene and gasoline.

*Corresponding author

MATERIALS AND METHODS

71 male albino rats of 0.2kg body weight obtained from Biochemistry and pharmacology department animal house, University of Port Harcourt Choba, Port-Harcourt, Nigeria were used for the current study. The animals were acclimatized in the pharmacology laboratory for six weeks. The animals were then divided into three groups (gasoline, kerosene and crude petroleum) and $5.0kg^{-1}$, $7.5gkg^{-1}$ and $15gkg^{-1}$ of the petroleum samples gasoline; kerosene and crude petroleum (bonny light) were administered into the rats respectively.

Each petroleum samples had twenty-seven rats for the three-month study. Twelve rats served as control. The animals were fed *ad libitum* and given water freely. Twelve rats were sacrificed at the end of each month, for the 3 months. The levels of the parameters haemoglobin content (Hb), pack cell volume (PCV) and white blood count (WBC) were determined from the cardiac blood collected with sample bottles with anticoagulant. The Hb contents per 100ml of blood were determined with Sahli's

haemometer. The PCV was determined with wintrobe's haematocrite pipette and-haematocrite pipette. The WBC was determined using Baker *et al* 1985 method.

RESULTS

The haematological analysis of both control and experimental animals were as presented in Table 1 (Fig. 1-3). The results indicated that there was a marked fall in Hb and PCV particularly in those rats administered gasoline (fig. 1-2). The WBC count increased significantly especially in second and third months mostly in rats injected kerosene and crude oil (bonny light) Table 1 (Fig.3). the long terexposure to the petroleum samples induced anaemia through the reduction in Hb and PCV leves.

Table 1: Mean ± S>D values of Hb, PCV and WBC of rats exposed to Gasoline, kerosine and Crude oil (bony light).

Samples	Parameters	Month 1	Month 2	Month 3
Control	Hb/100ml	13.86 ± 0.21	13.35 ± 1.91	13.00 ± 1.41
Gasoline		8.92 ± 3.31^{xxx}	8.50 ± 0.89^{xxx}	6.35 ± 0.49^{xxx}
Kerosene)		10.96 ± 1.83^{xx}	10.50 ± 1.64^{xx}	9.18 ± 2.80^{xx}
Crude oil – (bonny light)(15.0g/kg)		13.67 ± 1.29^{x}	11.83 ± 1.74^{x}	10.67 ± 0.65^{x}
Control	PCV(%)	41.50 ± 0.71	40.00 ± 5.66	39.00 ± 4.24
Gasoline(5.		26.75 ± 9.92^{xxx}	25.50 ± 2.69^{xxx}	19.05 ± 1.47^{xxx}
Kerosine		32.84 ± 5.49^{xx}	31.42 ± 5.00^{xx}	27.74 ± 8.40^{xx}
Crude oil – (bonny light)(15.0g/kg		41.00 ± 3.87^{x}	35.50 ± 5.25^{x}	31.91 ± 1.95^{x}
Control	WBC x 10^9/L	4.65 ± 0.07	3.55 ± 0.07	4.70 ± 0.14
Gasoline		3.00 ± 0.01^{xxx}	3.88 ± 0.12^{x}	5.00 ± 0.14^{x}
Kerosine(7.)		3.62 ± 0.47^{xx}	4.33 ± 0.39^{xx}	6.85 ± 1.39^{xx}
Crude oil – (bonny light)(15.0g/kg		4.02 ± 0.02^{x}	5.63 ± 0.87^{xxx}	6.96 ± 0.13^{xx}
P< 0.05				

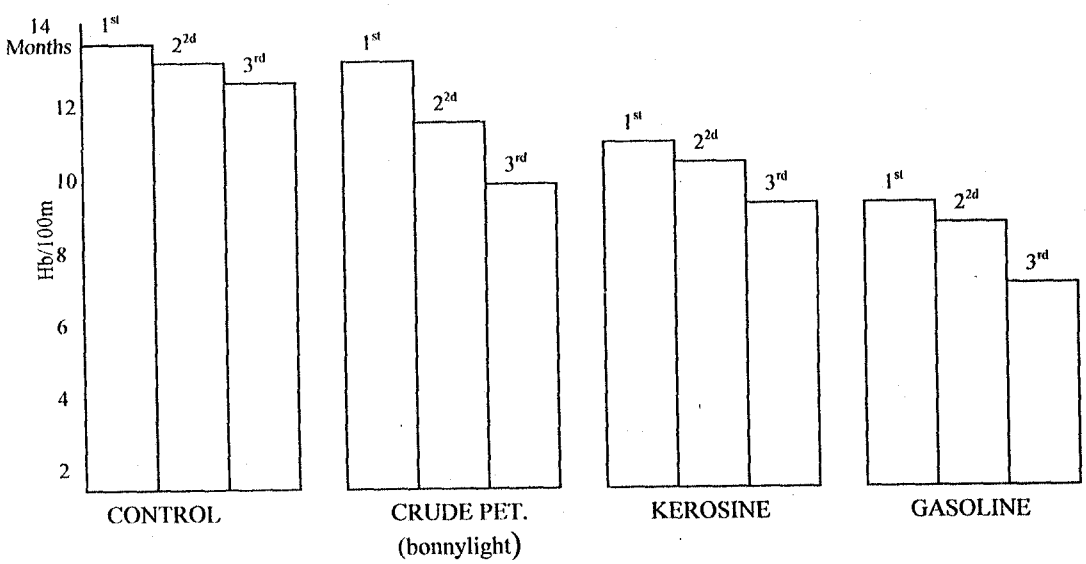

Fig. 1: Histogram of Hb Content Of Rats Exposed To Gasoline, Kerosine And Crude Petroleum (Bonny Light).

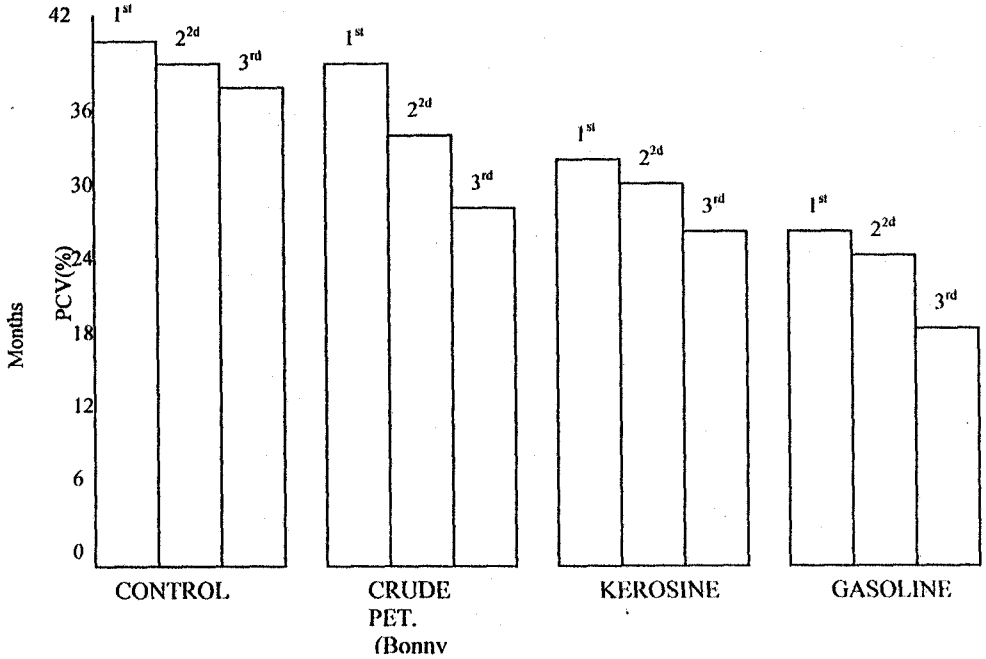

Fig. 2 Histogram Of Pcv Of Rats Exposed To Gasoline, Kerosine And Crude Petroleum (Bonny Light).

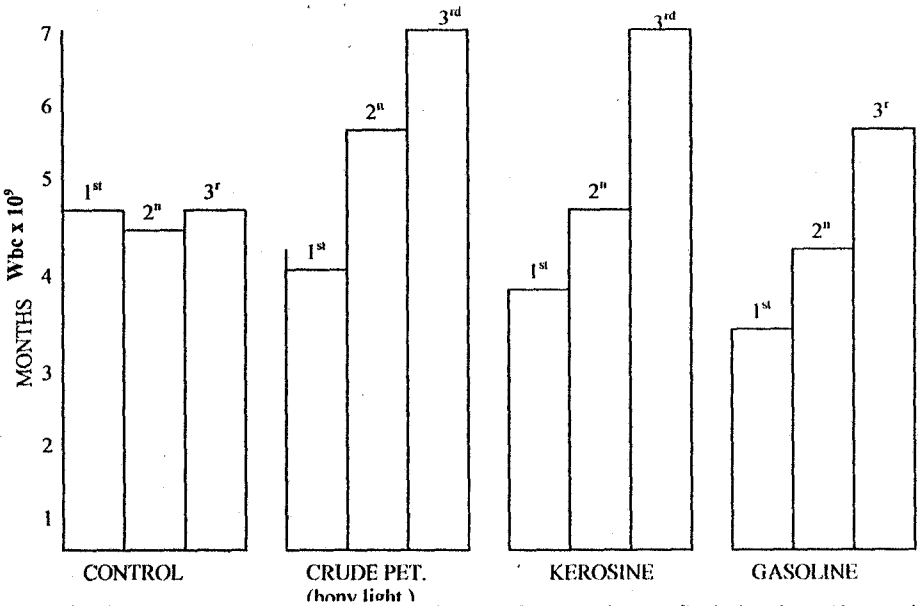

Fig.3. Histogram of WBC of Rats Exposed to Gasoline, Kerosine and Crude Petroleum (Bonny Light)

DISCUSSION

The study has demonstrated that long-term exposure to petroleum samples particularly gasoline induces anaemia. The Hb and PCV decreased significantly ($P< 0.05$) from the first month to the third month. This could be due to haemolysis, which is caused by excessive destruction of erythrocytes. Reports of Cowell 1971, Christenssen *et al* 1972, Anderson *et al* 1974, Sabo and Stegeman 1977, Connell and miller 1980, Krissha and Veena 1980, Dheer *et al* 1987, Linden 1987, Mohssen 1997, Dede and Kagbo 2001 corroborated with what was obtained in the current study.

The significant rise in WBC from the second month of exposure until the end of the experiment

mostly in rats administered crude oil (bonny light) and kerosene may be considered as defensive mechanism triggered by the immune system in the rats. It is suggested that when antigen is introduced into an organism, antibodies are produced in response to such stimulation. It is known that the produced in response after the first dose is usually slow and at the same time weak. But subsequent encounter with the same antigen usually evoke an enriched secondary or memory response characterized by high titre and persistence of antibody synthesis (Haeney, 1985). The result of this study in the aspect agreed with the report of Krishaan Veena (1980). WHO observed an increase in WBC in fish exposed to pollutants.

In conclusion, the petroleum samples (gasoline, kerosine, to a lesser extent crude oil (bony light) caused a reduction in levels of Haemoglobin and packed cell volume. However there seemed to be an increase in the levels of white blood cells (WBC) which was suggested to be due to induction of the immune system to produce WBC as a defensive mechanism. The health implication of chronic exposure to these petroleum samples based on the haematological parameter has been highlighted.

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