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Changes in liver function markers in albino rats exposed to crude petroleum (Bonny light)

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ABSTRACT

The use of petroleum samples as medicaments either due to poverty or ignorance is becoming a source of worry. Unfortunately, the elderly and children are most vulnerable. Crude petroleum is usually given to some children when they convulse as anticonvulsant. Incidentally, the liver is the site where most drugs and other ingested substances are metabolized and detoxified. It was based on this, that some liver function enzymes such as the transaminases and alkaline phosphatase activities were employed to assess the state of the liver in albino rats after exposure to crude petroleum (Bonny light). The rats were placed in four groups and were intraperitoneally administered 6.0, 12.0 and 30.0gkg^{-1} of crude petroleum (Bonny light) respectively, for 2 phase periods of 1and 2 months. .At the end of each period, rats were withdrawn from each group for analysis. The control rats were similarly treated with normal saline. Blood samples were taken for serum enzymes aspartate transaminase (AST), alanine transaminase (ALT), and alkaline phosphatase (ALP). The results revealed significant increases in the activities of AST and ALP in rats exposed to crude petroleum in a dose-dependent manner, compared with control ($P<0.05$). Similarly, significant increase in bilirubin level was observed in the groups treated with crude petroleum (Bonny light). The second month values were proportionately higher than the first.

Key words: Bonny light, Serum enzymes, Transaminases, Alkaline phosphatase, Crude petroleum.

INTRODUCTION

The use of petroleum samples as medicaments either due to poverty or ignorance is becoming a source of worry. Unfortunately, the elderly and children are mostly victims. Crude petroleum is usually given to some children when they convulse as anticonvulsant in rural areas of the country. This act is carried out in spite of the mounting evidence that petroleum samples are harmful (Ayalogu*, et al.,* 2001,Igboh, *et al.,* 2001 and Dede, *et al.,* 2002).

Incidentally, the liver is the site where most drugs and other ingested substances are metabolized and detoxified. Assessing the excretory and synthetic functions of the liver can provide valuable clinical information on the state of the liver and could therefore indicate the impact of such substances on the liver (Ayalogu, *et al.,* 2001). The levels of liver enzymes in serum reflect the severity of damage to the hepatocytes by ingested substances. Thus, offer useful information in categorizing damage on the basis of liver cell necrosis (Ayalogu *et al.,* 2001).

Putting these into consideration, we measured the activities of the serum enzymes, specifically the transaminases: ALT and AST. Equally monitored were alkaline phosphatase (ALP) and bilirubin level, noting that these enzymes will indicate any possible damage to the hepatocytes after exposure to crude petroleum (Bonny light), since these enzymes are located in the liver and bile ducts.

MATERIAL AND METHODS

Animals

Thirty six male albino rats with an average body weight of 0.2kg obtained from the Departments of Biochemistry and Pharmacology University of Port Harcourt Rivers State, Nigeria, were used for the study. The animals were acclimatized in the Pharmacology Laboratory for two weeks.

The crude petroleum (Bonny light) used in the study was obtained from the Port Harcourt Refinery Company (PHRC), Alesa Eleme. Port Harcourt, Rivers State, Nigeria . These were stored in four litre industrial bottles, well corked, and kept in the dark to avoid lost of any volatile components and reaction with light.

The rats were randomly divide into four groups and were intraperitoneally administered 6.0, 12.0 and 30.0 gkg^{-1} of crude petroleum (Bonny light) respectively, for first and second month. The doses used were based on LD_{50} determined by Igboh, *et al.* (2001) which indicated LD_{50} for crude petroleum (Bonny light) as 29.9gkg^{-1}. At the end of 30 days, three rats were withdrawn from each group for analysis. The control rats were injected normal saline. The animals were fed *ad libitum* with normal feed and given water freely.

Sample Collection/Analysis

ALP, ALT, AST and total bilurubin were determined from cardiac blood collected with sample bottles without anticoagulant. About 5ml blood was collected for the analysis. The activities of AST and ALT were determined using Reitmen and Frankel (1957) method. ALP activity was determined by the Bower and McComb (1970) method. Total bilirubin was estimated using Mac Donald (1965) method. The statistical analysis used

Table 1: Effect of crude petroleum (Bonny light) on serum liver enzyme activities and total bilirubin levels in albino rats

Group	Doses	Parameters	After one month exposure	After two months exposure
C_1	0.0gkg^{-1}	Alanine	7.20 ± 1. 21	7. 00± 1. 40
C_2	6.0gkg^{-1}	Transaminase,	7. 80 ± 2. 4*	8.20 ± 1. 6*
C_3	12.0gkg^{-1}	ALT	12.0 ± 2. 8*	14. 0 ± 2. 00*
C_4	30.0gkg^{-1}		23.0 ± 3. 1*	25. 0 ± 2.9*
C_1	0.0gkg^{-1}	Aspartate	9.0 ± 2. 8	9. 5 ± 1. 2
C_2	6.0gkg^{-1}	Transaminase,	12. 5 ± 3. 0*	14. 0 ± 1. 8*
C_3	12.0gkg^{-1}	AST	18.0 ± 3. 6*	19. 5 ± 2. 5*
C_4	30.0gkg^{-1}		40.0 ± 5.5*	85.0 ± 5.4*
C_1	0.0gkg^{-1}	Alkaline	160.0 ± 1. 4	159. 2 ± 1. 4
C_2	6.0gkg^{-1}	Phosphatase,	170. 0± 2. 1*	176. 5 ± 2. 3*
C_3	12.0gkg^{-1}	ALP	178. 3 ± 2. 8*	188.6 ± 2.5 *
C_4	30.0gkg^{-1}		189.0 ± 3.5*	202.8 ± 3. 3*
C_1	0.0gkg^{-1}	Total bilirubin	0.19 ± 0.2	0.18 ± 0.2
C_2	6.0gkg^{-1}	mg/dl	0.25 ± 0.2*	0.35 ± 0.2*
C_3	12.0gkg^{-1}		0.40 ± 0.2*	0.42 ± 0.4*
C_4	30.0gkg^{-1}		0.60 ± 0.3*	0.80 ± 0.6*

Values are expressed as Mean ± SD *P<0.05

was the one-way analysis of variance ANOVA Obi (1986).

RESULTS AND DISCUSSION

The data obtained are summarized on Table 1. Table 1 shows the changes in the serum activities of some liver enzymes (AST, ALT and ALP) and total bilirubin levels in rats given varied doses (0.0, 6.0, 12.0 and 30.0gkg^{-1}) of crude petroleum. When compared with control (0.0g crude petroleum/ kg) values, AST, ALT, ALP and total bilirubin levels in serum of crude petroleum treated rats increased ($p<0.05$) in a manner that depends on both the dose administered and duration of exposure. The group given the highest dose (30gkg^{-1}) and exposed for longer periods (2months) had the highest increases (Table 1).

Elevation of AST and ALT along with the increase in ALP activity may reflect some inflammatory diseases or injury to the liver. In this study the maximum activity of ALP obtained was very high. Thus, suggesting the possibility of hepatocellular damage. Some investigators have illustrated that enzyme patterns in the serum, reflect the physiological state of the organ, for instance increase in serum levels of AST, ALT and ALP was observed in serum of fish exposed to 2, 3, 4 triaminoazo benzene resulting in hepatocellular damage (Krishan and Veena, 1980). Other studies indicate an increase in the activities of the hepatic enzymes following liver damage in fish and albino mouse exposed to toxic substances (Dheer *et al*., 1987, Mohssen, 1997, Sharp *et al*., 1996).The result of this study is in conformity with these findings. Evidence from the experimental data indicate that crude petroleum could induce liver dysfunction, and when exposure becomes high and chronic, it could damage the liver. Thus, any source of crude petroleum into the body should be avoided.

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