



EFFECT OF *Moringa oleifera* ON CRUDE OIL MEDIATED HAEMATOTOXICITY IN WISTAR ALBINO RATS.

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Abstract

The efficacy of *Moringa oleifera* products against various diseases and toxic chemicals had been reported. The aim of this research was to assess the impact of *Moringa oleifera* on the haematological markers in rats exposed to hydrocarbon-tainted feed. To achieve this objective rats were fed moringa leaf pretreated hydrocarbon-adulterated feed. This was followed by haematological analysis after twelve weeks. The values got were compared with values in rats fed with feeds devoid of hydrocarbon. The results shown that hydrocarbon tainted feed significantly ($P < 0.05$) reduced red blood cell indices in rats relative to the values in rats fed diets devoid of hydrocarbon. Conversely, white blood cell indices were significantly increased in rats exposed to hydrocarbon tainted feed. Nevertheless, supplementation of hydrocarbon tainted feed with *Moringa oleifera* significantly ($P < 0.05$) improved the haematological profile of rats as depicted by significant increase in Hb content, RBCC, PCV, MCV, MCH, MCHC and platelet count. Moreover, WBCC, lymphocytes and granulocytes were significantly decreased. Hence, *Moringa oleifera* has a defensive consequence on hydrocarbon induced haematotoxicity.

KEY WORDS: Hydrocarbon, Haematotoxicity, Moringa

Introduction

Hydrocarbon is a potential hazardous chemical to various species of living organisms (Achuba and Ogwumu, 2014; Achuba and Ja-anni, 2018). Several studies have established hydrocarbon and allied solvents to be noxious to blood cells (Achuba and Ahwin, 2009; Achuba and Ogwumu 2014; Achuba and Nwokogba, 2015). Achuba (2018) reported negative modulation of blood chemistry in rats exposed to hydrocarbon tainted feed. In addition, Sunmonu and Oloyede (2007) and (Patrick-Iwuanyanwu *et al.* (2010) reported decrease in

haematological indices in catfish and rats exposed to crude petroleum.

Moringa oleifera is widely cultivated worldwide and it is a tree with nutritional and other beneficial properties (Anwar *et al.*, 2007; Saalu *et al.*, 2012; Ujah *et al.*, 2013). Infact, *Moringa oleifera* was reported to protect the liver in carbon tetrachloride- mediated liver damage (Al-Said *et al.*, 2012). Moreover, Saalu *et al.* (2012) reported restoration of liver morphology and function in rats treated with *Moringa oleifera* after alcohol- induced damage. The aim of this investigation was to assess the

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impact of *Moringa oleifera* on the haematological markers in wistar albino rats exposed to hydrocarbon tainted feed.

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Materials and Methods

Wistar rats were collected from the animal house of the Faculty of Basic Medical Science, Delta State University, Abraka while the moringa leaf used is a product of a moringa tree in Abraka and was authenticated by the Department of Botany, Delta State University, Abraka, Nigeria. Crude oil was supplied by the Nigerian National Petroleum Corporation (NNPC), Port Harcourt, Nigeria.

Sixty adult male wistar albino rats of weights range of between 130 – 175g were divided into five groups and each group was made up of twelve rats. Group 1(Feed); Group 2 (Feed + 5g moringa per 100g of feed); Group 3 (5 ml hydrocarbon/100 feed); Group 4 (crude feed + 5g moringa) and Group 5(hydrocarbon feed + 10 g moringa). The rats in all the groups had drinking water *adlibitum* throughout the twelve weeks of the exposure time. The feeds were prepared fresh every day and left over feeds were thrown away.

At the end of the exposure time, the rats were sacrificed under chloroform sedation and blood collected into reagent bottles. The haematological markers were determined with the aid of an automated haematology analyzer (Mindray Hematology analyzer, BC-2300).

Statistical Analysis

Analysis of variance (ANOVA) was employed to *process* the data. Multiple comparisons were performed using Duncan's Multiple Range Test (Duncan, 1955). Significant differences were set at $P < 0.05$.

Results

Rats fed hydrocarbon tainted diet experienced significant ($P < 0.05$) decrease in haemoglobin content, red blood cell properties and platelet count relative to the value in control rats. However, white blood cell profile was significantly ($P < 0.05$) increased in rats fed hydrocarbon adulterated diet (Table1).

Treatment of hydrocarbon- adulterated diet with *M. oleifera* significantly increased haemoglobin content, red blood cell properties and platelet count relative to the rats fed hydrocarbon-contaminated diet. Moreover, *M. oleifera* supplemented diet significantly decreased white blood cell profile of rats as compared to those in hydrocarbon protocol (Table 1).

Discussion

Haematological profile provides useful information about the internal chemistry of animals when they are prone to changes in nutritional and environmental insults. The significant ($P < 0.05$) decrease in red blood cell qualitative and quantitative indicators (Table 1) in rats exposed to hydrocarbon adulterated diet relative to the control corroborates the findings of several previous studies on the noxious implications of

hydrocarbons on blood cells (Achuba and Awhin, 2009; Achuba and Ogwumu, 2014). The observed decrease in Hb content, RBCC and PCV may be attributed to retarded haematopoietic process and increased haemolysis as hydrocarbon has been reputed with the depression of haematopoietic activities and interaction with red cell membrane (Cheers brought, 2006; Uboh *et al.*, 2012). The significantly lower values of MCV, MCH and MCHC may be explained by decrease in haemoglobin synthesis and increased destruction of red blood cell

(Ita and Udofia, 2011). Meanwhile, adding *Moringa oleifera* to hydrocarbon adulterated diet significantly restored Hb content, RBCC, PCV, MCV, MCH, MCHC and platelet count close to values obtained in control rats.

On the contrary, there was a significant ($P < 0.05$) increase in white blood cell count (WBCC), lymphocyte count and granulocyte count in rats exposed to hydrocarbon tainted diet relative to the control.

Table 1: Effect of *Moringa oleifera* leaf treatment of crude oil contaminated diet on the haematological profile of wistar albino rats

Sample	WBC ($10^3/\mu\text{l}$)	HGB (g/dl)	RBC($10^3/\mu\text{l}$)	PCV (%)	MCV(μM^3)	MCH (pg)	MCHC (g/dl)	LYM ($10^3/\mu\text{l}$)	PLT ($10^3/\text{ul}$)
Group 1	12.23 \pm 2.84 ^a	14.08 \pm 1.27 ^a	8.66 \pm 1.08 ^a	34.53 \pm 8.91 ^a	55.90 \pm 3.21 ^a	37.35 \pm 7.40 ^a	48.43 \pm 18.31 ^a	7.03 \pm 0.98 ^a	581.25 \pm 314.09 ^a
Group 2	16.40 \pm 4.15 ^b	14.38 \pm 0.65 ^a	8.42 \pm 1.60 ^a	41.25 \pm 5.01 ^a	64.05 \pm 8.99 ^b	50.78 \pm 9.43 ^b	44.70 \pm 21.51 ^a	9.15 \pm 2.30 ^a	518.50 \pm 158.96 ^b
Group 3	40.53 \pm 22.22 ^c	10.33 \pm 0.74 ^b	5.77 \pm 1.48 ^b	21.80 \pm 4.68 ^b	42.75 \pm 5.54 ^c	24.10 \pm 9.60 ^c	27.55 \pm 5.60 ^a	25.05 \pm 12.20 ^b	369.75 \pm 248.50 ^c
Group 4	12.40 \pm 2.26 ^a	15.15 \pm 0.35 ^c	7.67 \pm 0.99 ^c	38.75 \pm 4.46 ^c	50.50 \pm 0.57 ^a	33.45 \pm 5.16 ^a	34.60 \pm 1.27 ^a	8.25 \pm 2.19 ^a	605.00 \pm 313.96 ^a
Group 5	8.18 \pm 2.87 ^d	15.05 \pm 0.60 ^c	7.30 \pm 1.57 ^c	33.50 \pm 12.22 ^d	51.80 \pm 2.01 ^d	44.05 \pm 16.25 ^d	38.73 \pm 6.47 ^a	5.54 \pm 1.69 ^c	389.00 \pm 246.66 ^d

The results are expressed in mean \pm standard deviation. Values sharing different superscript across a column differ significantly. The mean difference is significant at the 0.05 level, n = 12 for all groups.

The increase in white blood cell parameters agrees with previous studies (Patrick- Iwuanyanwu *et al.*, 2010; Achuba and Ogwumu, 2014) who had reported increases in white blood cell indices due to exposure to various forms of hydrocarbons. The increases in

WBCC, lymphocytes and granulocytes is indicative of increase in infection (Marieb, 1995; Cheersbrough, 2006; Achuba and Ahwin, 2009). However, low platelet count, observed may be due to reduced synthesis resulting from the depression of

haematopoiesis (Cheersbrough, 2006). Moreover, *Moringa oleifera* supplemented diet significantly decreased WBCC, lymphocytes and granulocytes as compared to values in rat given diet tainted with hydrocarbon alone. This implies that *M. oleifera* is haematoprotective and the potentials of *Moringa oleifera* against chemical toxicity were previously reported (Hamza, 2007; Sreelatha and Padma, 2010; Al-said *et al.*, 2012; Saalu *et al.*, 2012; Asomugha *et al.*, 2014). The protective capacities of *Moringa oleifera* have been linked to the rich polyphenolic compounds present in the plant (Anwar *et al.*, 2007).

Conclusion

It is worth noting that administration of *Moringa oleifera* confers protection against the deleterious effect of hydrocarbon constituents on the haematological profile of wistar albino rats

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