

Actions Of Fresh Red Palm And Cow Fat Blend Oil On The Hemogram Status Of Treated Wistar Rats

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Abstract: *Background:* Emerging evidence suggests that blend oil could be more beneficial to health than the individual use of the oils. The red palm and cow fat oil are local dietary cooking oils commonly consumed as blend oil in Nigeria. *Aim and Objective:* The present study was conducted to assess the effect of the consumption of fresh red palm and cow fat blend oil on the hematological profile of treated wistar rats. *Materials and Methods:* A total of 60 rats weighing 150-250g were randomly divided into groups of 15 rats each. Group A served as normal control and were fed with pelleted growers feed. Group B were fed with pelleted feed mixed with 2ml/kg b.wt of red palm oil by oral gavage. Group C were fed with pelleted growers feed mixed with 2ml/kg b.wt of cow fat oil while Group D were fed with pelleted growers feed mixed with 2ml/kg b.wt of a blend of red palm oil and cow fat oil (1:1) by oral gavage. Animals were sacrificed after 28 days by euthanasia using chloroform. Three (3mls) of blood were collected by cardiac puncture into ethylene diamine tetra-cetic acid container for the estimation of the hematological profile using automated cell counter (Coulter Electronics, Luton, Bedfordshire, UK). Data was analyzed with one-way analysis of variance in the statistical package for social science version 22 (IBM Incorporated, Armonk, NY). Results were presented as mean \pm standard deviation from the mean with $p < 0.05$ considered significant. *Results:* There was a significant decrease in the white blood cell count ($p = 0.001$) of the rats treated with cow fat oil and those treated with a blend of red palm oil and cow fat oil compared to the normal rats and those treated with red palm oil. Similar result was recorded for the red blood cell count, hemoglobin concentration and packed cell volume ($p = 0.024, 0.033$ and 0.019 respectively) for the rats treated with cow fat oil compared to those treated with red palm oil or a blend of red palm oil and cow fat oil as well as the normal rats. *Conclusion:* The consumption of cow fat oil may have a deleterious effect on the hematological profile of treated rats. This study therefore recommends the consumption of red palm oil instead of the blend of

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cow fat oil and red palm oil or cow fat oil alone which is a common practice in our daily diets.

Keywords: blend oil, cow fat oil, red palm oil, hematological parameters

1. Introduction

Dietary oils are lipids (fats) made from plants, animals or synthetic compounds used in almost all types of human diet preparations including frying, baking and extrusion [1]. They are important source of lipids which cannot be synthesized by the body and a major constituent of biomembranes and building block for several hormones. There is convincing evidence that the nutrient composition of dietary oils such as the fatty acid composition (the proportion of saturated to unsaturated fats; and monounsaturated to polyunsaturated fats) and natural antioxidants such as tocopherols, tocotrienols and carotene could alter the physiology of treated animals as well human [2-4]. The hematological profile is an essential index of physiological and pathological status in experimental animals and humans [5]. Consumption of harmful dietary fats may contribute to the development of diseases by causing an alteration in the hematological profile [5-7]. Blending is a simple process of combining two or more dietary oils to alter the physicochemical and nutritional properties [8]. Emerging evidence highlights that blend oil could be more beneficial to health than the individual use of the oils [9]. The present study was therefore designed to determine the effect of the consumption of fresh red palm (vegetable) and cow fat (animal) blend oil on the hematological parameters of treated wistar rats.

2. Materials and Methods

Red Palm and Cow Fat Oils: The red palm oil and cow fat oil were purchased from a local market (Nkwo Ogbe) at Ihiala, Ihiala Local Government Area, Anambra State, Nigeria.

Wistar Rats: Male wistar rats (*rattus nervigicus*) weighing between 150-250g were procured from Chris Animal Farms and Research Laboratories, Awka, Anambra State, Nigeria. They were maintained under standard conditions of light (12/24 hours) and temperatures (25-29°C) in an aluminium wire guaze cage and fed with standard grower's pellet feed (Pfizer, Nigeria Ltd) and allowed free access to water for a two weeks of acclimatization prior to the experimental protocol.

Ethical Considerations: Ethical clearance was obtained from the Animal Research Ethical Committee of Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State, Nigeria.

Sample Size: the sample size was calculated using the maximum sample size relation according to one-way analysis of variance.

$$\text{Maximum sample size (n)} = \text{maximum DF/K}+1$$

where

DF = the error margin

K = the number of groups

n = the maximum number of rats per group

The maximum sample size (n) per group as obtained from the relation was 16.

Experimental Design: A total of 60 rats weighing 150-250g were randomly divided into 4 groups of 15 rats each. Group A served as normal control and were fed with pelleted growers feed. Group B were fed with pelleted growers feed mixed with 2ml/kg b.wt of red palm oil by oral gavage. Group C were fed with pelleted growers feed mixed 2ml/kg b.wt of cow fat oil while Group D were fed with pelleted growers feed mixed with 2ml/kg b.wt of a mixture red palm oil and cow fat oil (ratio 1:1) by oral gavage. Animals were sacrificed by euthanasia using chloroform after 28 days. Three millilitres (3mls) of blood were collected by cardiac puncture into ethylene diamine tetra-acetic acid container for the estimation of hematological parameters.

Estimation of Hematological Parameters: The blood samples were analyzed using an automated cell counter (Coulter Electronics, Luton, Bedfordshire, UK). The machine was switched-on and allowed to boot for 10 minutes a period during which it auto-rinses its diluents, after which it becomes ready for sample analysis. The sample identification number is inputted and after vortex mixing of the sample, it is introduced to the sample aspirator. The machine performs auto analysis within 30 seconds of the sample aspiration and displays the result on the screen.

Statistical Analysis: Data was subjected to inferential statistics in the statistical package for social science (SPSS) for window version 22 (IBM, Armonk, NY, USA) using one-way analysis of variance test at 95% confidence interval, probability value less than 0.05 was considered significant.

3. Result

Administration of cow fat oil revealed a significant decrease in the white blood cell count of treated rats compared to the rats treated with palm oil alone, a blend of cow fat oil and palm oil as well the normal rats ($p=0.001$). Similar decrease was observed for the red blood cell count, hemoglobin concentration and packed cell volume ($P = 0.024, 0.033$ and 0.019 respectively) for the rats treated with cow fat oil alone compared to those treated with red palm oil alone, a blend of red palm oil and cow fat oil as well as the normal rats. There was no significant difference in the platelet count for all the treated rats compared to the control ($p=0.318$).

Table 1. Some hematological parameters of wistar rats fed with red palm oil, cow fat oil and a blend of red palm oil and cow fat oil

Parameters	Group A (control)	Group B (RPO)	Group C (CFO)	Group D (RPO + CFO)
PLT (x10 ⁹ /L)	200±2.26	201±3.11	200±2.94	198±1.88
RBC ((x10 ¹² /L)	4.16±0.55	4.91±0.84	2.01±1.08	2.46±0.31
HB (g/dl)	10.07±0.96	10.6±1.16	5.43±2.11	7.21±1.44
PCV (%)	30.53±2.83	31.38±3.48	27.13±2.05	28.11±1.20
WBC (x10 ⁹ /L)	6.44±2.09	6.82±1.74	3.40±1.98	4.4±2.17

Result represent mean ± standard deviation of the values obtained from each group (n=15) for each parameter, significant level at p<0.05, RBC – red blood cell count, WBC – white blood cell count, PCV – packed cell volume, HB – hemoglobin, PLT – platelet count.

4. Discussion

Consumption of harmful oils may contribute to the development of diseases due to the alteration of hematological parameters. The red palm oil and cow fat oil are two commonly blended oil during food preparation in Nigeria. The significant decrease in the total white blood cell count of the rats treated with cow fat oil compared to those treated with red palm oil suggests that the red palm oil may contain a better mixture of fatty acids and antioxidants beneficial to health compared to the cow fat oil. Similar decrease in the rats treated with the blend of palm oil and cow fat oil may be ascribed to the cow fat oil content of the mixture. These decreases in the parameters suggests that the cow fat oil or a blend of red palm and cow fat oil may have inhibitory effect on the immune response to xenobiotics. This is because white blood cells are defensive mechanisms that fights against xenobiotics. The immune response is triggered upon detection of xenobiotics leading to an increased proliferation of white blood cells to combat the actions of such xenobiotics. Similar decrease observed in the red blood cell count, hemoglobin concentration and packed cell volume for the rats treated with cow fat oil compared to the normal rats and those treated with red palm oil or blend of cow fat and red palm oil suggests that cow fat oil could contain some substances capable of generating reactive oxygen species through some signaling pathways like the microsomal metabolism pathway involving cytochrome p450 whose effects depletes endogeneous antioxidants causing characteristics destruction of red blood cells. This suggests that the red palm oil may contain a better combination of fatty acids compared to the cow fat oil or the blend of cow fat oil and red palm oil though this is not in agreement with the findings of some researchers who reported less formation of peroxides and greater oxidative stability of a blend of coconut oil, sunflower and rice bran oil than the individual oils as well as the beneficial effect for the prevention of diseases by a blend of soya bean oil with rice bran oil, sesame oil, sea buckthorn oil, camellia oil and peanut than the individual oil due to improvement in the antioxidant content [9, 10].

5. Conclusion

Consumption of cow fat oil and a blend of cow fat oil and red palm oil had a deleterious effect on the red blood cell and white blood cell counts of treated rats compared to red palm oil. This study therefore recommends that consumption of red palm oil is more beneficial to health than the consumption of cow fat oil or a blend of red palm oil and cow fat oil which is a common practice in Nigeria.

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References

- [1] Folade, A.O., Oboh, G., and Okoh, A.I. Potential health implications of the consumption of thermally-oxidized cooking oils – a review. *Polish J Food, Nutri Sci* 2017;67(2):95-105.
- [2] Rauchova, H., Vokurkova, M., Pavelka, S., Vaneckova, I., Tribulova, N., and Soukup, T. Red palm oil supplementation does not increase blood glucose or serum lipids level in wistar rats with different thyroid status. *Physiology Res* 2018; 67:307-315.
- [3] Gugolek, A., and Kowalska, D. Animal fats in rabbit feeding – a review. *Ann Animal Sci* 2020; 20(4):1185-1215.
- [4] Olaniru, B.O., Ocholi, M.I., Etukudoh, N.S., Dawal, A.F., Iheanacho, C.U., Obeta, M.U., Ugwu, B.K., and Ntuhun, B.D. Effect of nsukka Red palm oil on hematological parameters of paracetamol treated albino wistar rats. *Food Sci Nutri Technol* 2020; 5(2):00219.
- [5] Ebhohon, S.O., Asoya, E.V., Iyare, H.E., Akerele, O.R., and Ezedimba, M.C. Effect of aqueous leaf extract of *justiciacarne* on hematological parameters of male wistar rats exposed to thioacetamide. *Trop J Phytochem Pharm Sci* 2023;2(2):55-58.
- [6] Rita, I.K.A., Jude, J.R., and Olusegun, O.A. Biochemical changes in hematological and liver parameters in albino rats exposed to Azo dye adulterated palm oil. *Int J Biomed Clin Sci* 2021;6(4):137-141.
- [7] Dalall, M.M., Edrees, G.M., Hassan, H.A., Abdel-Mogib, M., and El-Dein, M.A. Impacts of dietary lipids derived from animal or vegetable sources on healthy rats. *Egyptian J Basic Appl Sci* 2023;10(1): 618-631.
- [8] Dhyani, A., Chopra, R., and Garg, M. (2018) A review on blending of oils and their functional and nutritional benefits. *Cheml Sci Rev Letters* 2018;7(27):840-847.
- [9] Bhatnagar, A.S., Kumar, P.P., Hemavathy, J., and Krishna, A.G. Fatty acid composition, oxidative stability and radical scavenging activity of vegetable oils blends with coconut oil. *J Am Oil Chem Soc* 2009;86(10):1769-1776.
- [10] Khatoun, S. (2000) Semi-solid fat by inter-esterification of red palm oil with other vegetable oils. *J Food Lipids* 2000; 7(2):83-93.