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Research Article

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Evaluation of chronic consumption of thermoxidized palm oil diets on blood parameters using adult albino rats

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Abstract Effect of chronic consumption of thermoxidized palm oil diets on blood parameters in albino rats fed with garlic was investigated. Twenty one albino rats were selected and assigned to three groups of seven each. Group 1 (control group) were fed normal rat chow. Group 2 were given thermoxidized palm oil diet Group 3 were given thermoxidized palm oil diet and garlic. Result showed no significant different in blood parameters among the groups (10.67±1.93, 8.25±1.8 and 12.43±2.96 for thermoxidized palm oil, thermoxidized palm oil + garlic and control groups respectively. The Red blood cell showed no significant difference among the groups (8.14±0.22, 8.18±0.18 and 7.17±0.29) for thermoxidized palm oil, thermoxidized palm oil + garlic and the control group. There was no significant difference among the groups in Hb concentration of 45.90±0.78, 56.55±1.32 and 43.92±1.16 for thermoxidized palm oil, thermoxidized palm oil + garlic and control group. Mean corpuscular haemoglobin concentrations were 16.97±0.38, 16.84±0.20 and 17.38±0.47 for thermoxidized palm oil, thermoxidized palm oil + garlic and control groups and showed no significant difference. There was also no significant difference in the mean corpuscular haemoglobin concentration among the groups with 30.02±0.18, 30.28±0.35 and 30.38±0.35 for thermoxidized palm oil, thermoxidized palm oil + garlic and control group. Finally the platelet count also showed no significant difference among the groups with 782.50±39.15, 907.00±12.34 and 821.83±160.23 for thermoxidized palm oil, thermoxidized palm oil + garlic and control group. From the results, it may be deduced that chronic consumption of thermoxidized palm oil diets in rats fed with garlic has no adverse effect on its blood parameters.

Keywords Thermoxidized palm oil, garlic, Corpuscular haemoglobin concentration, Albino rats, Mean corpuscular haemoglobin

Introduction

Palm oil is naturally reddish in color because of high beta-carotene content. It is not to be confused with palm kernel oil derived from the kernel of the same fruit, [1] or coconut oil derived from the kernel of the coconut palm (*Cocosnucifera*). The differences are in color (raw palm kernel oil lacks carotenoids and is not red), and in saturated fat content: Palm mesocarp oil is 41% saturated, while palm kernel oil and coconut oil are 81% and 86% saturated respectively [2]. Palm oil is a common cooking ingredient in the tropical belt of Africa, Southeast Asia and parts of Brazil. Its use in the commercial food industry in other parts of the world is widespread because of its lower cost and the high oxidative stability (saturation) of the refined product when used for frying [3-4]. Palm oil is thermally oxidized when the fresh form is subjected to several rounds of heating at high temperatures. High temperature is known to cause decomposition of fatty acids, peroxides and carotenoids [5].

Long term consumption of oxidized oils and fats has been reported to cause growth retardation, thrombosis, essential fatty acid deficiency and artheroslerosis leading to deactivation of key metabolic enzymes [6]. It also causes significant rise in blood pressure [7].

Garlic contains at least 33 sulfur compounds, several enzymes and the minerals germanium, calcium, copper, iron, potassium, magnesium, selenium and zinc; vitamins A, B1 and C, fiber and water. It also contains 17 amino acids to be found in garlic: lysine, histidine, arginine, aspartic acid threonine, swine, glutamine, proline, glycine, alanine, cysteine, valine, methionine, isoleucine, leucine, tryptophan and phenylalanine [8].

Garlic products are used as sources of medicine in many ways in human beings in their day today life [9]. The main interest of researchers in the medicinal values of garlic is its broad-spectrum therapeutic effect with minimal toxicity. Garlic extract has antimicrobial activity against many genera of bacteria, fungi and viruses. Garlic contains a higher concentration of sulfur compounds which are responsible for its medicinal effects. According to Sanjay and Subir (2002), garlic and its preparations have been widely recognized to prevent and treat cardiovascular and other metabolic diseases, atherosclerosis, hyperlipidemia, thrombosis, hypertension and diabetes [10].

The potency of garlic has been acknowledged for more than 500 years. In the ancient times, garlic was used as a remedy for intestinal disorders, flatulence, worms, respiratory infections, skin diseases, wounds, symptoms of aging, and many other ailments. Through the middle ages into World War II, the use of garlic to treat wounds surfaced repeatedly. It was ground up or sliced and was applied directly to wounds to inhibit the spread of infections [11].

Materials and Methods

Twenty one (21) adult Wistar rats of 8-10 weeks old weighing 300-350g were obtained from the Department of Pharmacology, University of Calabar, Calabar. The rats where housed in wire-wooden cages under controlled light schedule (12hours light and 12 hours darkness). The animals were allowed to acclimatize for a period of 7 days before starting the experiment.

20 liters (L) of fresh palm oil was purchased from watt market in Calabar, Cross River State, Nigeria. It was certified fresh by virtue of its low oxidation value before purchase [12]. 2L was thermally oxidized per week for easy preservation by the method described by Osim*et al.* (1994) [6]. Palm oil was head at 150ºC in stainless pots for 20 minutes and allowed to cool for 5 hours. This was done for five times. Since the level of palm oil in most Africa dishes is about 15% fats [13], 15g of cooled thermooxidized palm oil was mixed with 85g of cooled rats feed. The diet was stored in black containers at 4ºC to prevent further oxidation of the oil component.

The garlic cloves were purchased from Watt Market in Calabar, Cross River State, Nigeria. Garlic was washed thinly sliced and homogenized, it was blended for 20-25 minutes using electric blender to extract the natural juice. The blended mixture was allowed for 10 minutes to stand on in order to ensure a complete enzymatic reaction of Allin with Allinas [14].

The mixture was first filtered using filter paper and finally filtered again with a syringe filter to ensure that no particles obstructed the column. This extract was then preserved in the refrigerator at 4ºC in the research laboratory of the Department of Physiology.

Result

Total white blood cell count in different experimental groups: The mean TWBC count concentration in the control, TPO and TPO+garlic diet fed rats as 12.43±2.96, 10.67±1.93 and 8.25±1.38 x 10^3/µL respectively. The result above showed that there was no significant difference in the mean TWBC count among the groups.

Red blood cell count in the different experimental groups: The mean red blood cell count in the control, TPO and TPO+ garlic extract groups were 7.71±0.29, 8.14±0.22 and 8.180.22 and 8.18±0.18x10^6/ µL respectively. This result showed no significant different between the groups.

Haemoglobin (Hb) concentration: From the experiment, it was discovered that the mean haemoglobin concentration were 13.35±0.37, 13.77±0.22 and 13.88±0.33g/dL for the control, TPO and TPO+ garlic groups respectively. Hence there is no significant difference between among the groups.

Comparison of packed cell volume: The mean pack cell volume (PVC) count in the control, TPO and TPO+ garlic extract groups as were 43.92±1.16, 45.90±0.78 and 45.64±1.59% respectively. Thus there no was significant difference among the three groups.

Mean corpuscular volume: The mean corpuscular volume (MCV) count in the control, TPO and TPO+garlic extract group were 57.12±0.92, 56.55±1.32 and 55.70±1.11fi respectively. And it was observed that there was no significant difference among the groups.

Mean corpuscular haemoglobin: The mean corpuscular haemoglobin (MCH) count in the control, TPO, and TPO+garlic diets fed rats were 17.38.0.47, 16.97±0.38 and 30.25±0.35pg respectively. It was observed that there was no significant difference among the groups.

Mean corpuscular haemolgobin concentration: The mean corpuscular haemolgobin concentration (MCHC) in the contro, TPO and TPO + garlic diet fed rats was 30.38±0.35, 30.02±0.18 and 30.28±0.35g/dL respectively. It was observed that there was no significant difference among the groups.

Platelet count in the different groups: The platelet count (PLT) in the control, TPO and TPO + garlic diet fed rats was 821.83± 160.23, 782.50±39.15 and 907.00±12.34x10^3/µL respectively. It was observed that there was no significant difference among the groups.

Discussion

The effect of chronic consumption of thermooxidized palm oil on blood parameters in Albino Wistar rats fed with garlic was studied. From this study, it was observed that there was no significant difference in the blood parameters of the rats fed with thermoxidized palm oil (TPO) and also the rat fed with TPO + garlic when compared to the control group in the red blood cell count of the test group compared to the control, TPO and TPO + garlic (Fig 2). This agrees with earlier studies by O'sera*et al* (1979) who demonstrated that there was no significant difference in White blood cell (WBC) count.

Similarly, there was no significant difference in the white blood cell count among the groups (Fig 1). This supports previous studies by Osim, Davidson [6, 14] who stated that the chronic consumption of thermoxidized palm oil diet did not show any significant difference in the WBC count in albino wistar rats.

In haemoglobin concentration (Hb) in the control, TPO and TPO + garlic die fed rats, there was no significant difference among the groups (Fig 3). And also in total packed cell volume (PCV) in the control, TPO and TPO + garlic fed rats, the result obtained shows that there is no significant difference among the groups (Fig 4).

There was no significant difference in mean corpuscular volume (MCV) in control, TPO and TPO + garlic diet fed rats (Fig 5). It was observed that there was no significant difference in total mean corpuscular haemoglobin (MCH) in control, TPO and TPO + garlic diet fed rats (Fig 6).

In total mean corpuscular haemoglobin concentration (MCHC) in the control, TPO and TPO + garlic diet fed rats was observed that there was no significant difference among the groups (Fig 7). The results also indicated that there was no significant difference among the groups in platelet count (Fig 8).

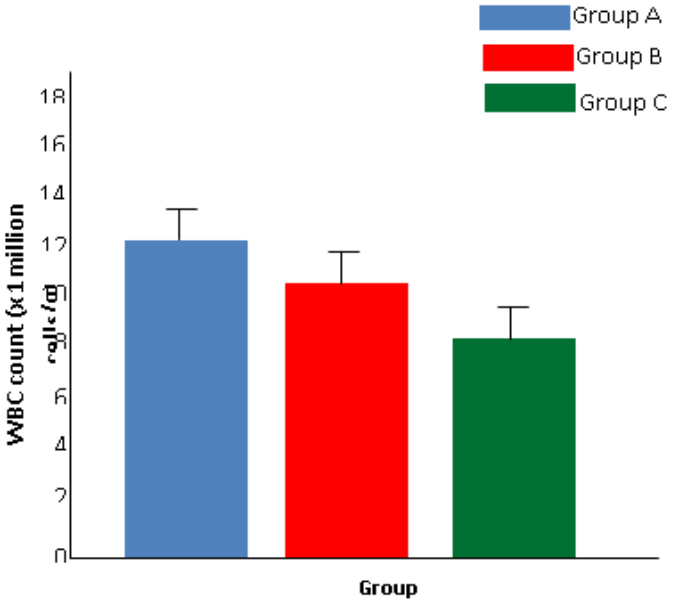

Figure 1: Comparison of total white blood cell count in the different experimental groups. Values are expressed as mean ± SEM, n =6
No significant difference among groups

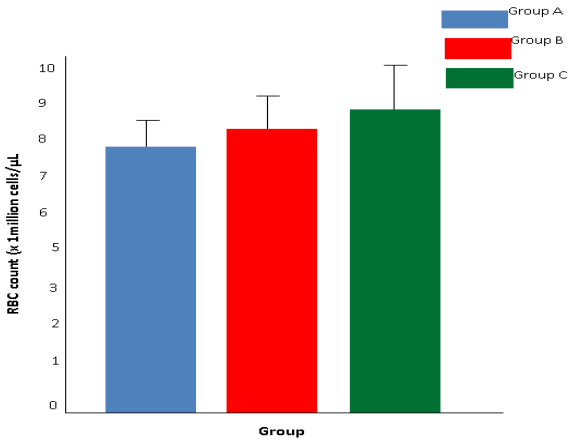

Figure 2: Comparison of red blood cell count in the different experimental groups. Values are expressed as mean ± SEM, n=6.
No significant differences among groups

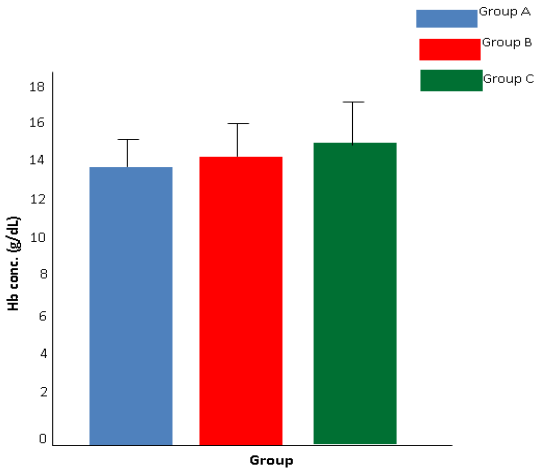

Figure 3: Comparison of haemoglobin concentration in the different experimental groups. Values are expressed as mean ± SEM, n=6.
No significant differences among groups

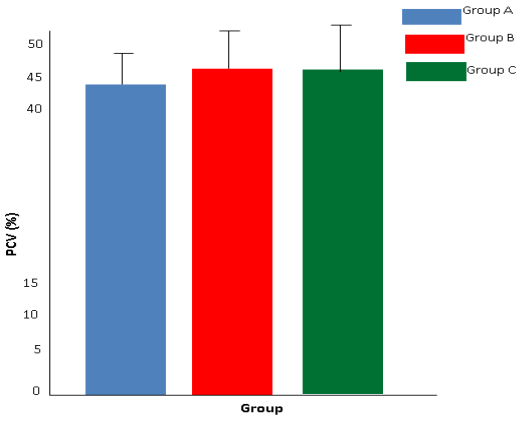

Figure 4: Comparison of packed cell volume in the different experimental groups. Values are expressed as mean ± SEM, n = 6.
No significant differences among groups

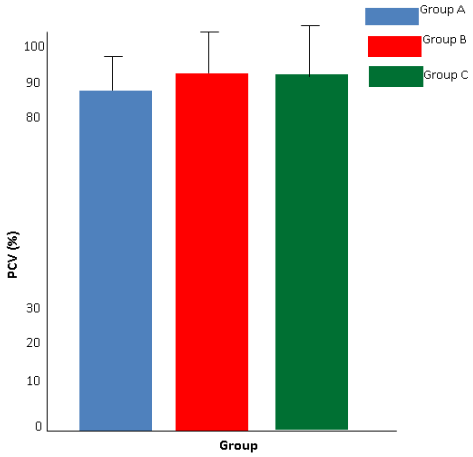

Figure 5: Comparison of mean corpuscular volume in the different experimental groups. Values are expressed as mean ± SEM, n = 6.
No significant differences among groups

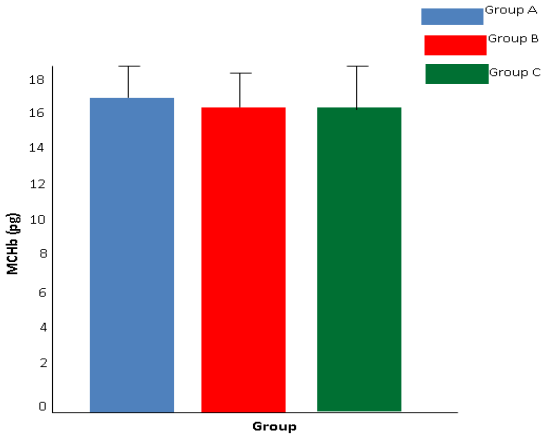

Figure 6: Comparison of mean corpuscular haemoglobin in the different experimental groups. Values are expressed as mean ± SEM, n = 6.
No significant differences among groups

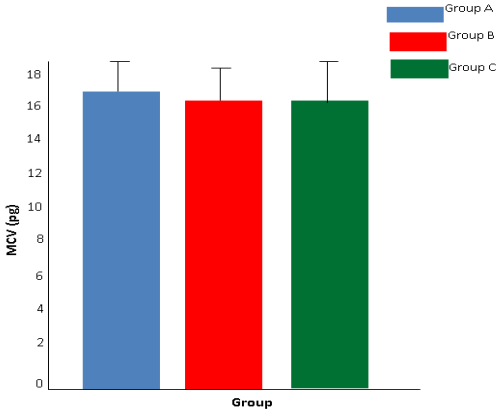

Figure 7: Comparison of mean corpuscular haemoglobin concentration in the different experimental groups. Values are expressed as mean ± SEM, n = 6.
No significant differences among groups

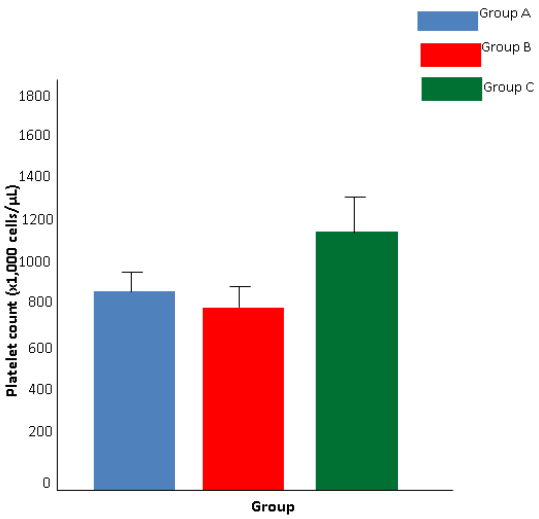

Figure 8: Comparison of platelet count in the different experimental groups. Values are expressed as mean ± SEM, n =6

No significant differences among groups

Conclusion

From the above results, it may be deduced that chronic consumption of thermoxidized palm oil diets in rats fed with garlic has no adverse effect on its blood parameters.

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