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# SAFETY POTENTIAL OF YOYO BITTER ON LIPID INDICES, HEMATOLOGY AND RENAL FUNCTION IN EXPERIMENTAL ANIMALS

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## AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between all authors. Author MAA performed the study concept, research design and manuscript preparation. Author BSF performed the project supervision, manuscript supervision and organization. Author RMS managed the manuscript preparation, literature review and data collection. Author OAO performed the manuscript preparation. Author BRB managed the data analysis, presentation and interpretation. Author FAO performed the data analysis and manuscript preparation. All authors read and approved the final manuscript.

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## ABSTRACT

There are many herbal medicines in Nigerian drug markets these days and the Government seems to have supported alternative therapy as this has become part of the curricula for the Medical Programmes of Nigerian Universities lately. Yoyo bitters and other bitters take the lead in indigenous herbal preparations. This study was carried out to determine the safety potential of the consumption of Yoyo bitters. The potential effect of Yoyo bitters on hematology and renal function in male Wister rats was determined. The rats were divided into three groups with seven rats per group. The control group (group 1) was administered 30 ml/kg normal saline while group 2 and 3 were administered 15 and 30 ml/kg Yoyo bitters respectively through oral route daily for 30 days. The animals were sacrificed on day 31. There was no significant change ($P > 0.05$) in lipid indices (artherogenic index and coronary risk index), hematological parameters (packed cell volume, platelet, white blood cell, neutrophil and lymphocyte count) and renal function test (sodium, potassium, urea and creatinine) of the treatment groups. The result of this study showed that Yoyo bitters may not trigger atherogenicity and coronary risk problems and have no adverse effect on the hematological parameters and renal function and thus can be said to be safe for human consumption.

**Keywords:** Hematology; herbs; lipid indexes; oral route; renal; yoyo bitters.

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## 1. INTRODUCTION

In recent years the use of complementary and alternative therapies has increased. This recent increase is due to the belief that natural products from medicinal and herbal plants have fewer side effects when compared with synthetically produced drugs [1,2,3,4,5]. Virtually every culture and civilization, throughout history, has used a range of plants or plant derivatives for the prevention and treatment of diseases. Medicinal plants, popularly known as herbal medicine, have since been unabatedly used to treat various diseases [1,2,3,4,5]. They are exclusively employed in some Nigerian communities as well as in the other developing countries for the treatment of certain disease conditions [1,6,7]. Traditional or folkloric medicines are used by about 60% of the world population both in the developing and developed countries where modern medicines are predominantly used [3,7,8]. Since herbal medicines put on the market worldwide, are available not just in health food stores, but in drug stores and even grocery shops, without need for prescriptions, consumers naturally assume that they are harmless [3,9].

Herbalist uses and recommends the mixtures of diverse herbal ingredients of varying potency and the potency depends on the part of the plant used - for example root, stem, leaves or fruits - the time of the year it is picked, and the actual species of plant used: for example, ginseng may refer to many *Panax* and *Eleutherococcus* species [10,11]. Potency refers to the amount of drug required evoking a response, if the potency of the formulation of the herbal remedy is unknown it is difficult to know what dose to prescribe to get the desired effect without causing problems of toxicity.

Yoyo bitters (a poly-herbal formula) is produced by Abllat Company Nigeria Limited, Ikeja, Nigeria and it is recommended ethnomedicinally to be taken at night daily at a dose of 30 ml per adult for the cure of indigestion, muscle pains (colic), joint pains, backache, menstrual pain, regulating blood sugar, blood cleanser, keeping healthy (immune booster) among others. The aim of the research work is to evaluate the potential effect of Yoyo bitters on haematology (packed cell volume, platelet, white blood cell, neutrophil and lymphocyte count) and kidney function (sodium, potassium, urea and creatinine) in experimental animals.

## 2. MATERIALS AND METHODS

### 2.1 Reagents and Chemicals

Fields Yoyo bitters were purchased from Abllat Company Nigeria Limited, Ikeja, Nigeria. (DTNB) was purchased from Sigma Chemical Company, USA. Trichloroacetic acid (TCA), metaphosphoric acid and reduced glutathione (GSH) were obtained from J.T. Baker, USA. Sodium hydroxide was obtained from Aldric Chemicals, UK. Leishman stain and ammonium oxalate solution were obtained from BDH Chemicals, England. All other chemicals are of analytical grade.

### 2.2 Experimental Animals and Treatment

All procedures involving animals in this study conformed to the guiding principles for research involving animals as recommended by the Declaration of Helsinki and the Guiding Principles in the Use of Animals [12]. Twenty one male Wistar rats weighing between 102200g were obtained from Physiology Department, University of Ibadan, Oyo State, Nigeria. The rats were acclimatized under ambient temperature for two weeks and were fed with commercially available rat pellet diets and water *ad libitum*. The animals were randomly grouped into three with seven rats per group. Group 1 were administered 30 ml/kg normal saline [control), group 2 and 3 were administered 15 and 30 ml/kg Yoyo bitters respectively through oral route for thirty days. The animals were sacrificed 24 hours after the last administration (on day 31). The animals were sacrificed by cervical dislocation and the blood samples were collected by cardiac puncture into EDTA and heparinized bottles. Blood samples in heparinized bottles were centrifuged at 5,000 rpm for 10 minutes and the supernatant (plasma) was decanted and used for renal function analysis. Blood samples in EDTA bottles were used for analysis of haematological parameters (packed cell volume, white blood cell count, neutrophil count and platelet count).

### 2.3 Biochemical Assays

Total cholesterol and HDL-cholesterol levels were determined by the method of De Hoff *et al.* [13] and LDL-cholesterol level was calculated by the method of Nauck *et al.* [14]. Serum creatinine and urea concentration was determined by the method of AOAC [15], serum urea concentration was estimated by the method of Burtis and Ashwood [16]. Sodium and potassium ion levels were determined by atomic absorption as described by Vaessen and van de Kamp [17]. Artherogenic index (AI) and coronary risk index (CRI) were calculated as described by Ajibola *et al.* [18].

### 2.4 Statistical Analysis

Data were analyzed by SPSS (version 17) and mean ± SEM were determined for all parameters. Significant differences among the groups were determined by one-way analysis of variance (ANOVA) and levels of significance were evaluated using Duncan's Multiple Range Test (DMRT) at $P< 0.05$.

## 3. RESULTS

The result of plasma lipid values (Table 1) shows reduction in the concentration of total cholesterol and LDL-cholesterol but no difference in the concentration of HDL-cholesterol in the test animals. The result of plasma lipid indices (Table 2) shows no difference in the artherogenic index and coronary risk index in the test animals. The result of hematological parameters (Table 3) shows no significant

difference in the levels of packed cell volume (PCV), white blood counts (WBC), neutrophil, lymphocyte and platelet in the test animals. The effect of yoyo bitters on renal function of the test animals shows no significant difference in the levels of urea, creatinine, sodium ion and potassium ion as shown in (Table 4).

## 4. DISCUSSION

The study revealed that a reduction in the concentration of total cholesterol and LDL-cholesterol but no difference in the concentration of HDLcholesterol in the test animals. This was similar to the results obtained by Oyewo *et al*. [6] and Alabi *et al*. [7]. Lowering of total cholesterol and LDLcholesterol helps to reduce the risk of hypercholesterolemia and hyperlipidemia [6,7,18]. This was observed in the plasma lipid indices results showing Yoyo bitter do not pose artherogenic or coronary risk.

**Table 1: Change in plasma lipid values**

| Group | TC (mg/mL) | LDL (mg/mL) | HDL (mg/mL) |
|---|---|---|---|
| **Control** | 181.71±5.50$^{b}$ | 64.76±10.77$^{b}$ | 99.31±10.11$^{a}$ |
| **Test I** | 162.78±2.19$^{a}$ | 39.32±2.22$^{a,b}$ | 105.53±2.44$^{a}$ |
| **Test II** | 155.82±2.8$^{a}$ | 29.89±6.72$^{a}$ | 108.31±5.75$^{a}$ |

All values are expressed as mean ± SEM. Values with different superscript indicate significant difference at $P < 0.05$.

**Table 2: Change in lipid indices (Artherogenic Index and Coronary Risk Index)**

| Group | Artherogenic Index (AI) | Coronary Risk Index (CRI) |
|---|---|---|
| **Control** | 0.65±1.07$^{a}$ | 1.83±0.54$^{a}$ |
| **Test I** | 0.37±0.91$^{a}$ | 1.54±0.89$^{a}$ |
| **Test II** | 0.28±1.17$^{a}$ | 1.44±0.55$^{a}$ |

All values are expressed as mean ± SEM. Values with different superscript indicate significant difference at $P < 0.05$.

**Table 3: Change in Hematological Parameters.**

| Group | PCV (%) | WBC $10^9$ ($L^{-1}$) | Neutrophil (%) | Lymphocyte (%) | Platelet $10^3$ (µL) |
|---|---|---|---|---|---|
| **Control** | 44.9±1.8$^{a}$ | 12.4±1.9$^{a}$ | 19.1±1.9$^{a}$ | 80.0±3.1$^{a}$ | 224.3±47.4$^{a}$ |
| **Test I** | 48.7±1.6$^{a}$ | 15.8±1.4$^{a}$ | 22.3±3.0$^{a}$ | 77.0±7.0$^{a}$ | 276.7±76.3$^{a}$ |
| **Test II** | 49.6±2.8$^{a}$ | 15.9±2.5$^{a}$ | 20.2±6.5$^{a}$ | 80.0±6.5$^{a}$ | 254.0±55.3$^{a}$ |

All values are expressed as mean ± SEM. Values with different superscript indicate significant difference at $P < 0.05$.

**Table 4: Renal Function Test**

| Group | Urea (mg/mL) | Creatinine (mg/mL) | $Na^+$ | $K^+$ |
|---|---|---|---|---|
| **Control** | 43.6±4.2$^{a}$ | 1.0±0.1$^{a}$ | 139.3±2.7$^{a}$ | 15.3±0.3$^{a}$ |
| **Test I** | 41.6±2.0$^{a}$ | 0.9±0.1$^{a}$ | 135.7±4.4$^{a}$ | 13.3±1.2$^{a}$ |
| **Test II** | 49.0±2.9$^{a}$ | 1.2±0.1$^{a}$ | 147.0±4.5$^{a}$ | 12.3±0.9$^{a}$ |

All values are expressed as mean ± SEM. Values with different superscript indicate significant difference at $P < 0.05$.

The study also revealed that Yoyo bitters has no effect on the hematological parameters such as packed cell volume (PCV), white blood counts (WBC), neutrophil, lymphocyte and platelet. No difference in the levels of urea and creatinine similar to the results obtained by Oyewo *et al*. [6]. This indicates that there is no tissue degeneration that could cause by protein turn over due to trauma, oxidative stress and localized inflammation [19]. Sodium ion and potassium ion was also observed as obtained by Oyewo *et al*. [6]. Hence, Yoyo bitters have no adverse effect on the kidney. Ogbonnia *et al*. [20] reported that bitters help to prevent kidney and bladder infections, help to regulate blood pressure and dilate arteries.

## 5. CONCLUSION

The present results show that intake of bitters lower total cholesterol and LDL-cholesterol. Its intake also has no effect on hematological parameter (packed cell volume, platelet, white blood cell, neutrophil and lymphocyte count), lipid indices (artherogenic index and coronary risk index) and some parameters of kidney function. Hence, it could be regarded safe when taken.

## CONFLICT OF INTEREST

None declared by the authors who have substantially contributed to the research and the manuscript.

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