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Effect of *Momordica charantia* (Bitter Melon) Leaves on Haemoglobin Concentration in Male Albino Rats

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors designed the study, wrote the protocol and managed the experimental process. Author AGT managed the literature searches, analyses of the study, identified the species of plant and wrote the first and subsequent drafts of the manuscript and MA. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

This research work was carried out to investigate the effect of the aqueous extract of *Momordica charantia* on haemoglobin concentration in albino rats. The aqueous extract of *Momordica charantia* was prepared from the leaves of the *Momordica charantia* plant and given orally to the experimental animals. Haemoglobin concentration was determined after two weeks of administration. The aqueous extract was prepared and given orally at doses of 80, 100, 120 and 140 mg/kg body weight daily to the experimental animals. This study was carried out at the Department of Physiology, College of Medicine, University of Ilorin between July and August 2010. The results of the work showed that there was significant decrease in mean haemoglobin concentration in test animals in comparison with the control ($p<0.05$). Oral administration of aqueous extract of *Momordica charantia* causes a decrease in haemoglobin concentration which can lead to anaemia.

Keywords: Momordica charantia; haemoglobin concentration; anaemia; malaria.

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1. INTRODUCTION

Momordica charantia is a tropical and subtropical vine of the family *Cucurbitaceae*, widely grown for edible fruit, which is among the most bitter of fruits. It has been used in various Asian traditional medicine systems for a long time [1]. *Momordica charantia* leaves have been shown to have antiprotozoal activity against *Trypanosoma brucei brucei* and *Trypanosoma cruzi* [2]. The aerial part of its aqueous extract has been demonstrated as displaying a moderate *in vivo* activity on rodent malaria against *Plasmodium vinckei petter* [3]. Though it has been claimed that bitter melon's bitterness comes from quinine, no evidence supports this claim. It is traditionally regarded by Asians, as well as Panamanians and Colombians, as useful for preventing and treating malaria. The mosquito larvicidal property of *M. charantia* against three mosquito species— *Anopheles stephensi, Culex quinquefasciatus* and *Aedes aegypti* (Diptera: Culicidae) has been confirmed [4]. This species is reported to have anti-plasmodial properties [5,6]. Laboratory studies have confirmed that various species of bitter melon have anti-malarial activity, though human studies have not yet been published [7].

2. MATERIALS AND METHODS

Fifty albino male rats of the wistar strain weighing between 200 and 250 g were employed in this study. The animals were obtained from the Central Animal House, College of Medicine, University of Ibadan, Oyo state, Nigeria. They were kept under standard conditions (12 light/12 dark cycle, 65-75°F (~18-23°C), 40-60% humidity) and fed twice daily with commercially formulated rat pellets (Ladokun feeds, Ibadan) with free access to drinking water.

Fresh leaves of the *Momordica charantia* plant were obtained and authenticated by staff of the Department of Botany, University of Ilorin, Nigeria. The leaves were sun dried, pulverized and sieved. A 25g portion of the powdered leaf was weighed out and dissolved in 250ml of distilled water, which was then filtered. The filtrate was then evaporated to dryness. Two grams of the residue was weighed and dissolved in 98ml of distilled water to serve as the stock solution to be administered. Solution to be administered was prepared fresh daily. The method of administration was through the oral gavage and administration was done early in the morning before meals via an oral cannula.

The animals were then divided into 5 groups and treated for fourteen days as follows:

Group 1 : Received 2ml of normal saline (control)
Group 2 : Received 80mg/kg body weight of the extract
Group 3 : Received 100mg/kg body weight of the extract
Group 4 : Received 200mg/kg body weight of the extract
Group 5 : Received 400mg/kg body weight of the extract

After two weeks of treatment, animals were sacrificed and blood samples taken from the apex of the heart were collected. The haemoglobin concentration of the samples were then determined.

2.1 Haemoglobin Concentration Determination

Blood was collected in EDTA anticoagulant bottles and each was suitably labelled. The haemoglobin concentration was determined using the Sahli's method. Sahli's method is a procedure of estimating blood blood haemoglobin level by means of Acid Haematin method. 100% haemoglobin on the Sahli's haemoglobinometer is equivalent to 14g haemoglobin per 100ml of blood.

2.2 Statistical Analysis

Data were presented as mean ± standard error of mean (SEM). Data were analyzed using one-way analysis of variance (ANOVA). *P* value of less than 0.05 was declared as statistically significant.

3. RESULTS AND DISCUSSION

The results for the experimental studies on the mean haemoglobin concentration in animals treated with bitter melon are shown in Table 1 and Fig. 1 below. The mean haemoglobin concentration of the control group was 12.98 ± 0.1. When compared with the control group, the second group (treated with 80mg/kg of the extract) showed a significant decrease in mean haemoglobin concentration (10.40 ± 0.05). The third, fourth and fifth groups had mean haemoglobin concentrations of 10.62 ± 0.15, 10.90 ± 0.1 and 11.10 ± 0.1 respectively. When compared individually with the control groups, each of the test groups showed a highly significant decrease in haemoglobin concentration. The results suggest that the aqueous extract of *Momordica charantia* decreases haemoglobin concentration in experimental animals.

Table 1. Effects of aqueous extract of *Momordica charantia* on haemoglobin concentration

Group	Group 1 (Control)	Group 2 (80mg/kg)	Group 3 (100mg/kg)	Group 4 (120mg/kg)	Group 5 (140mg/kg)
Mean Haemoglobin Concentration (g/dl)	12.98	10.40	10.62	10.90	11.10
Standard Deviation	0.32	0.16	0.47	0.32	0.32
Standard Error of Mean	0.1	0.05	0.15	0.1	0.1
P- Value		$P < 0.001$	$P < 0.01$	$P < 0.001$	$P < 0.001$

In many tropical countries, malaria is a major cause of anaemia. It results from the obligatory destruction of parasitized erythrocytes, the accelerated destruction of normal erythrocytes, and variable dyserythropoiesis. Anaemia is assessed either by measurement of the haematocrit or the haemoglobin concentration [8]. By Sahli's method's ability to diagnose anaemia has sensitivity of 83.7% & 90% and specificity of 63.2% & 60.2% in capillary & venous blood respectively. Sahli's method has significant ($p<0.01$) positive correlation coefficient in capillary blood & venous blood [10]. According to the research findings of Waako et al. in 2005 [7], *Momordica charantia* has antimalarial activity and can thus be used

in the prevention and treatment of malaria. Other findings also showed that crude extracts of *Momordica charantia* show significant antiplasmodial activity *in vitro* [5,6,9]. However, the findings of our study imply that the use of *Momordica charantia* as a therapy for malaria could come with a serious consequence; a decrease in haemoglobin concentration in already-anaemic, malaria-infected patients. The implication of this is that the oxygen-carrying capacity of the blood is severely compromised. This will be confirmed by checking this in malaria-infested animals.

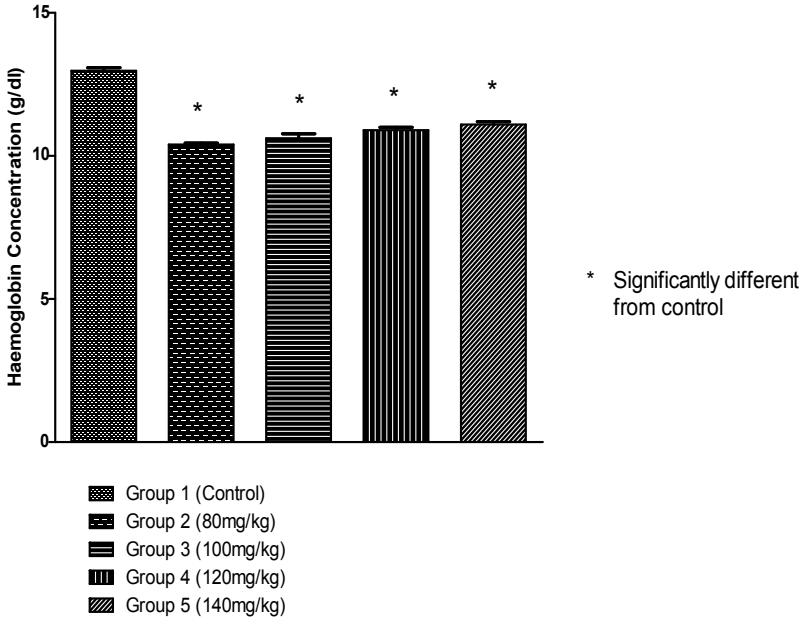

Figure 1: Effect of *Momordica charantia* on Haemoglobin concentration in albino rats

4. CONCLUSION

In this initial study, the aqueous extract of *Momordica charantia* causes a significant decrease in mean haemoglobin concentration in test animals. As an antimalarial, there is a tendency cause an increase in anaemia. This will be affirmed by future investigations on animals in which malaria has been induced.

CONSENT

Not applicable.

ETHICAL APPROVAL

Principles of laboratory animal care" (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the appropriate ethics committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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