

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2017; 1(2): 04-07
www.biochemjournal.com
 Received: 10-05-2017
 Accepted: 14-06-2017

Ubani Clement Dimgba
 Department of Human
 Physiology, College of
 Medicine and Health Science,
 Abia State University Uturu,
 Nigeria

Amah AKuma Kalu
 Department of Human
 Physiology, Faculty of Basic
 Medical Sciences, Imo State
 University, Owerri, Nigeria

Cosmas Chidozie Ofoegbu
 Faculty of Science Central
 Washington College Campus,
 University of America Enugu,
 Nigeria

Chijioke I Ugboaja
 Department of Medical
 Laboratory Science, Abia State
 University, Uturu, Nigeria

Corresponding Author:
Ubani Clement Dimgba
 Department of Human
 Physiology, College of
 Medicine and Health Science,
 Abia State University Uturu,
 Nigeria

Evaluation of the appetite suppressing potential of aqueous extract of *Cymbopogon citratus* (Lemon grass) leaf using rat model

Ubani Clement Dimgba, Amah AKuma Kalu, Cosmas Chidozie Ofoegbu and Chijioke I Ugboaja

DOI: <https://doi.org/10.33545/26174693.2017.v1.i2a.95>

Abstract

Due to the increasing prevalence of obesity among children, adolescents and adults, it has been said to be a global health concern. Energy imbalance between calories consumption and expenditure has been identified as the major cause of obesity. Thus, the aim of this work was to evaluate the appetite suppressing potential of aqueous leaf extract of lemon grass (*Cymbopogon citratus*) in wistar rats. Freshly harvested leaf of *C. citratus* was dried at room temperature and afterwards processed into fine powder. 500 g of powdered plant sample was soaked in 3 L of distilled water for 24 hr and afterwards sieved and concentrated to dryness. The extract was reconstituted in distilled water to give the required doses of 150, 300, 600 mg/kg bw. Twenty adult male wistar rats were divided into four groups of five rats per group. Group I was the normal control and was only fed with normal rat feed and water. Groups II-IV were orally administered with 150, 300 and 600 mg/kg bw respectively. The result shows that the quantity of food consumed by the control group significantly ($P < 0.05$) increased across treatment periods. However, the amount of food consumed by group II-IV significantly decreased in a dose in a dose dependent manner across treatment periods. It also showed that the quantity of water consumed by the control group significantly ($P < 0.05$) increased across treatment periods, while a contrary observation was made on its treated counterpart. Evaluation of the weight of rats administered with varying doses of *C. citratus* indicated a significant ($P < 0.05$) reduction in body weight over treatment periods. In conclusion, aqueous extract of *Cymbopogon citratus* suppressed appetite hence animal weight was reduced.

Keywords: *Cymbopogon citratus*, appetite, obesity, body weight

Introduction

Due to the increasing prevalence of obesity among children, adolescents and adults, the condition is considered a global health concern [1]. Obesity is strongly associated with conditions such as type-2 diabetes, ischemic heart disease, stroke and cancer [2] and it is increasing globally [3]. Energy imbalance between calories consumption and expenditure has been identified as the major cause of obesity [4]. Diverse treatment approaches abound for obesity and include fundamentally intake of calorie restricted diet as well as exercise [5] others include the use of drugs which although may offer short-term benefits are associated with weight gain when withdrawn, side effect from medication and potential for drug abuse [6]. Nowadays, owing to the multiple therapies recommended for weight control, people are eager to employ methods that are cost effective and devoid of side effects [7]. Scientific reports have shown that certain traditional herbal preparations wield the potential to effectively reduce appetite and consequently reduced food consumption and weight loss [5]. *Cymbopogon citratus* commonly known as lemon grass is an aromatic perennial tall grass with rhizomes and densely tufted fibrous root. It has a short underground stems with ringed segments, coarse, green slightly leathery leaves in dense clusters [8]. It is widely cultivated in tropical and subtropical countries [9]. Lemon grass occupies an important position in the folk medicine of different regions of the world evident by the fact that it has been used effectively to treat of diverse arrays of human disease such as digestive disorders, fevers, menstrual disorder, rheumatism and other joint pains [10].

Due to limited scientific data on the medical claims of lemon grass [10], it is imperative to deepen research effort to expand the dearth of data available on the medicinal potentials of *C. citratus*.

Materials and Methods

Collection and Processing of Plant Material

Leaves of *Cymbopogon citratus* was harvested locally and subsequently identified and authenticated at the herbarium unit of the Department of Forestry Michael Okpara University of Agriculture, Umudike Abia State.

Preparation of Plant Extract

The leaves of *C. citratus* were thoroughly washed with clean tap water to get rid of sand and debris. The leaves were dried at room temperature. The dried leaves were subsequently ground and sieved to fine powder with the aid of a mechanical homogenizer. 500 g of the sample was subsequently soaked in 3 L of distilled water for 24 hr and afterwards filtered using a clean sieve and was concentrated to dryness in a water bath for 3 days at 50°C. The extract was reconstituted in distilled water to give the required doses of 150, 300, 6000 mg/kg body weight used in this study.

Animals

Adult male wistar rats weighing 130-180 g were housed in metal cages in the Animal House of the Department of Human Physiology, Abia State University, Uturu.

Median Lethal dose 50% (LD₅₀)

Three groups of rats were separately administered with 10, 100 and 1000 mg/kg of extract orally and afterwards

observed for 24 hr for signs of toxicity. Being that mortality was not observed in any of the groups, another three groups of one rat each was each administered with 1600, 2900 and 5000 mg/kg of extract separately. The animals were observed for 48 hrs for signs of toxicity [11].

Animal Grouping

Twenty adult wistar rats were divided into four groups of five rats

Group I: Was fed with rat feed and water *ad libitum*.

Group II: Was administered with 150 mg/kg of *C. citratus* leaf extract

Group III: Was administered with 300 mg/kg of *C. citratus* leaf extract

Group IV: Was administered with 600 mg/kg of *C. citratus* leaf extract

Measurement of Feed intake, water intake and body weight

Feed and water intake was determined weekly while weight change was determined at the completion of treatment (initial weight) and after 21 days of treatment (Final treatment)

Statistical Analysis

All data were expressed as mean ± standard deviation. One-way analysis of variance (ANOVA) and Duncan test was carried out to test any significant differences between their means. P≤05 were considered statistically significant.

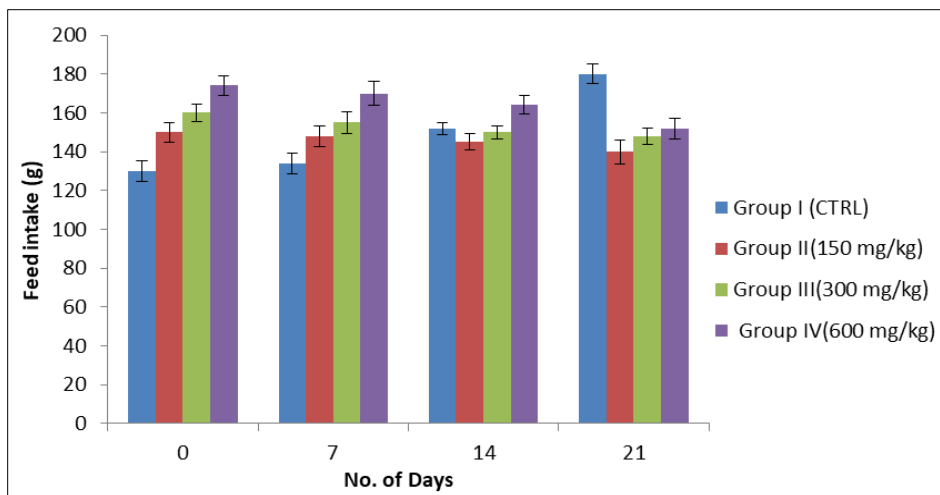


Fig 1: Feed intake of rats administered with varying doses of aqueous extract of lemon grass over treatment periods

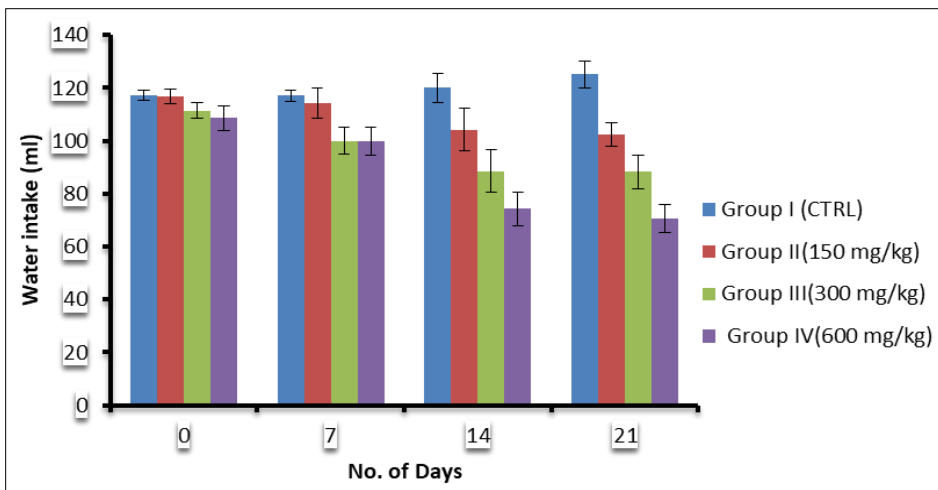


Fig 2: water intake of rats administered with different doses of aqueous extract of lemon grass over treatment periods

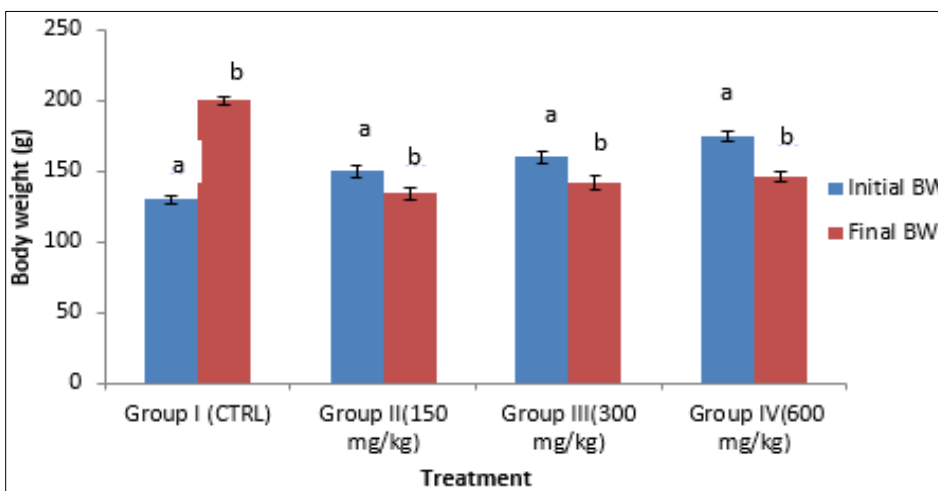


Fig 3: Body weight changes of rats administered with different doses of aqueous extract of lemon grass

Discussion

The indispensability of *C citratus* (lemon grass) in folk medicine of different regions of the world in the treatment of diverse arrays of human disease such as digestive disorders, fevers, menstrual disorder, rheumatism and other joint pains is established [10]. Figure 1 shows the feed intake of rats administered with varying doses aqueous extract of lemon grass indicating that the quantity of food consumed by the control group significantly ($P<0.05$) increased across treatment periods. However, the amount of food consumed by group II-IV significantly ($P<0.05$) decreased in a dose dependent manner over treatment periods. Figure 2 shows the water intake of rats administered with different doses of aqueous extract of lemon grass showing that the quantity of water consumed by the control group significantly ($P<0.05$) increase over treatment periods. However, a contrary observation was made on the treated groups. Figure 3 shows the weight change of rats administered with varying doses of lemon grass indicating a significant ($P<0.05$) reduction in the weight of treated rats over treatment periods. The result is consistent with the finding of Savas *et al.* [11] which reported a significant ($P<0.05$) decrease in the body weight of quails fed diet supplemented with 3% lemon grass at the 7th, 21st and 35th day of feed consumption compared to the control. In conclusion, it can be deduced from this study that wields the potential to suppress feed intake hence body weight and thus constitutes an ideal candidate in research effort to effectively manage obesity.

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