Available online www.jsaer.com

***Journal of Scientific and Engineering Research*, 2018, 5(8):30-33**

Research Article

ISSN: 2394-2630
CODEN(USA): JSERBR

The lipolytic potentials of leaf extract of *Vernonia amygdalina, Newboldia laevis* and *Gmelina arborea* on lard of pork

Nwnkwo, Michael O.[1], Etim, Etim Esin[2], Ogbonna, Innocent O.[1]

[1] Department of Biochemistry, Faculty of Biological Sciences, University of Nigeria, Nsukka, Nigeria
[2]Department of Clinical Biochemistry, Westminster University, London, UK

Abstract

Plant Kingdom has abundant bioactive compounds and these compounds exert different biochemical function in animals. The lipolytic potentials of three plant leaves: *Vernonia amygdalina*, *Newboldia laevis* and *Gmelina arborea* were experimented on the acclimatized grower pigs. The result of the study revealed that the phytochemicals present in the three plants leaves posse abundant emulsifying properties. However, when the extract was fed *in vivo* to the animals, there was significant ($p < 0.05$) weight reduction in the animals. Also, the *in vitro* administration showed lard emulsification and increased the absorbance of the Spectrophotometer. The three leaves concoction solubilised the lard of pork in a concentration and time-dependent manner.

Keywords ethno-pharmacy, phytochemicals, bioactive compounds, fertility, lipolytic, decoction, remedy

Introduction

Different Countries of the World have traditional medicine [1]. Most plants parts are location-specific in eliciting relief/cure to their people. The above made Heinrich, [2] defined ethnopharmacy as the inter-disciplinary Science that deals with the study of pharmaceutical means, considered in relation to the cultural determinant that characterized the use of these means in a group. This consists of the identification, classification, and categorization of acquired knowledge of the natural material from which the remedy will be formulated. *Vernonia amygdalina*, bitter leaf is of the family Verbenacea. It is a tropical rainforest as well as coastal savannah crop, although it is often grown in many parts of continents as edible vegetable. It is distributed from Sudan in the North to Southern Africa [3]. The shrub is 3 through 8 metres high, soft-wooded with alternate, oblong or elliptic lanceolate leaves, 7 through 15cm by 3 through 7cm,concentrate , are bluish-white flowering and fruiting period is usually in dry season [4]. Vernonia leaf has stomachic, anti-septic, anti-malarial, antimicrobial, diuretic and anti-helminthic properties. It contains vernodalin, vernomygdin, saponin [5]. Vitamin C, [6], cardiac glycosides, flavonoides, sesquiterpene, lactones, vernolepin and Kaempferol [3]. *Newboldia laevis* (*P. Beauv*) is called fertility tree, and it contains essential acids and flavonoids. Also, *Gmelina arborea* of moraceae family, contains eight compounds plus β-sitosterol [3]. The abundant bioactive compounds present in these three plant leaves, and their acclaimed ethno-medical efficacy prompted the researchers to investigating the lipolytic potentials of the three plant leaves decoction.

Materials and Methods

An amount 1000 g of the leaves of the three plants were collected, identified and authenticated by a Botanist-Mr Alfred Ozioko of the Botany Department, University of Nigeria Nsukka, Enugu State, Nigeria. The leaves were dried in a room at room temperature and not in an open sunshine for 24 hours to avoid sun-choking and over-desiccation. They were later washed with normal saline to prevent any mycotoxin. The leaves were dried and

weighed in the ratio of 1:1, and distilled water added in the ratio of 1:3 and boiled at 100 ^{o}C for 20 minutes. At the end of the above time, the mixture is filtered with Whatman's number 1 filter paper and the filtrate is stored in a freezer.

This study was carried out using 25 grower pigs, purchased from the College of Veterinary Medicine, University of Nigeria Nsukka, Enugu, Nigeria. On purchase, the arrival weights of the animals were weighed (electronic weighing machine) and recorded as W_1. The animals were acclimatized for 21 days and their weight recorded as W_2.

Weight gain = W_2—W_1

Experimental Design

A total of Twenty- five male grower pigs weighing between 0.8—1.2 kg were used for the study, the pigs were obtained from the Faculty of Veterinary Medicine, University of Nigeria Nsukka, Nigeria. They were acclimatized for Twenty one days in animal house of Department of Biochemistry, University of Nigeria, Nsukka. The animals were given feed and water *ad libitum.* The pigs were divided into five different groups with five pigs per group (n=5).

Group 1: Acclimatized normal animals (no concoction given).
Group 2: Acclimatized + 100 mg/kg body weight.
Group 3: Acclimatized + 200 mg/kg body weight.
Group 4: Acclimatized + 300 mg/kg body weight.
Group 5: Acclimatized + 400 mg/kg body weight.

Acute Oral Toxicity Study

The oral acute toxicity study was done according to the method of Lorke [7]. Eighteen albino mice were used. The test involved two stages. In stage one, the animals were divided in to (3) groups of three mice each and were administered with 10, 100 and 1000 mg/kg body weight of the extracts (concoction) respectively. In the second stage, 1600, 2900 and 5000 mg/kg b/w of the extracts were administered orally to another set of animals. A stabilization time of 12 hours was given to the animals, after which they were sacrificed and their pork immersed in varying volumes of the decoction. One animal from each group had its pork cut 2cm x 2cm and immersed in different volumes of the decoction and monitored also at different time lag. The UV Spectrophotometer (Jenway, 7305 USA) was standardized with distilled water and the absorbance of the emulsified pork (lard) against time was measured and recorded.

Statistical analysis

The data obtained on the lipolytic potentials of the three plant leaves were expressed as mean ± S.D. Test for significance between mean parameter in respect of group differences were performed using student t-test [8].

Results

The three leaves concoction were boiled and stored in a refrigerator at 4 ^{o}C. The extract yield was observed to be 600 g (60%). In the experiment there was no lethality or behavioural changes in the three groups of mice that received 10, 100, 1000 mg/kg body weight of the extract at the end of the first experiment. Based on this result, further increased doses of 1900, 2600, and 5000 mg/kg body weight of the extract showed that it was safe at dose above 5000 mg/kg body weight. The result of acclimatization of the animals showed a significant ($p < 0.05$) increase in the animals body weight when compared to their arrival weight. However, the result of the administration of the graded doses of the extract revealed that there was a significant ($p< 0.05$) decrease in the lard content of the pork as the concentration of the concoction increases. The result of the study also showed a dose and time-dependent increase in absorbance of the emulsified pork (lard).

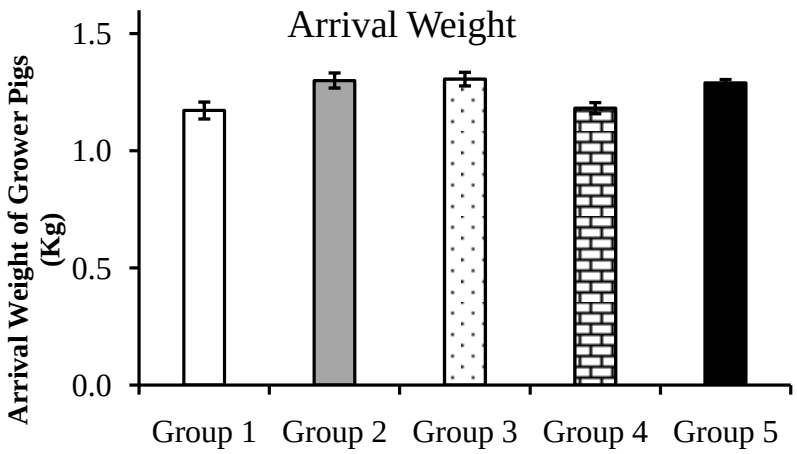

Figure 1: Initial weight of the pigs used for the study

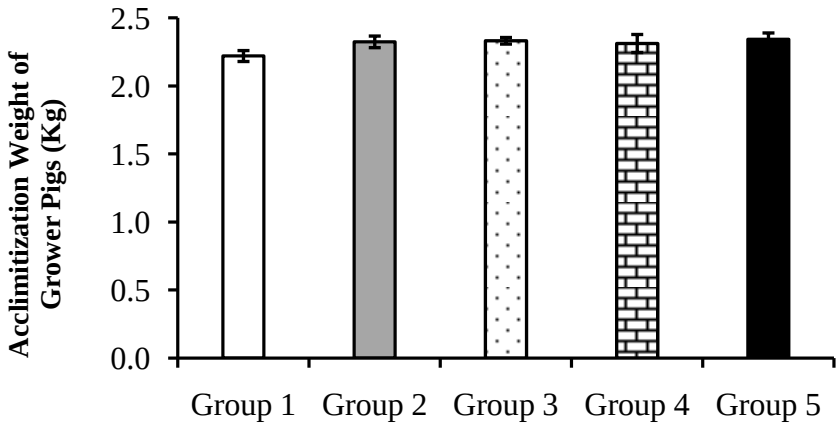

Figure 2: Weight of the animals due to acclimatization

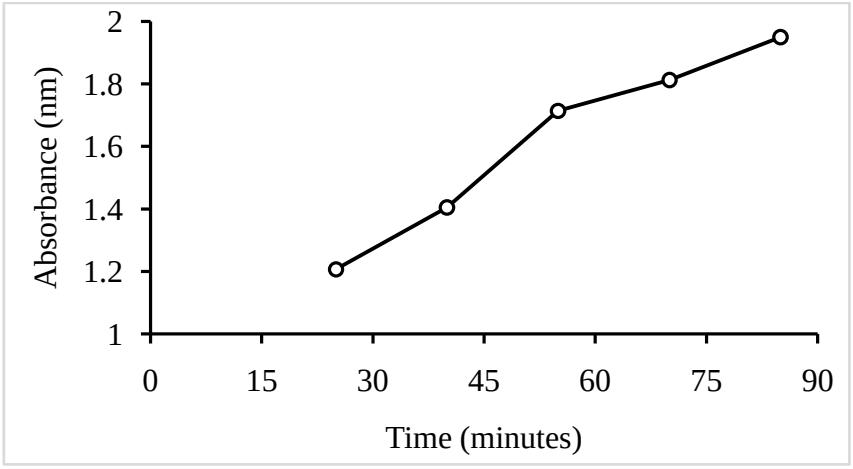

Figure 3: Absorbance vs time

Discussion

The lipolytic activity of the decoction of *Vernonia amygdalina*, *Newboldia laevis* and *Gmelina arborea* supports the work of Longer and Robinson [9], indicating that since the beginning of humanity, the struggle against diseases has been part of everyday life and that plant materials have played a primary role in the treatment of diseases. The use of concoction and decoction in the treatment of diseases globally has been location specific [1,

3]. Phytochemicals are not vitamins or minerals, but chemicals that are found in plants. However, the phytochemicals present in these three plant parts such as flavonoids, saponins, cardiac glycosides, sesquiterpene, vernolepin and kaempferol perform different biologic functions in animals. Other bioactive compounds present are apigenin, quercetin, β-sitosterol and clutyl ferulate [1]. Hollman *et al.* [10] reported the mechanism of bioavailability of the dietary antioxidant flavonol and quercetin in man. The results of this study as shown in Tables 1 and 2 was evident of the fact that the *in vivo* experiment with the pig indicated an obvious weight loss in the animals. However, in order to corroborate the *in vivo* results, we conducted an *in vitro* test which confirmed the degree of emulsification (solubilisation) of the lard (pork) of the laboratory animals used in the study. These plant materials contain β-sitosterol, which facilitate the esterification and final excretion of cholesterol that is contained in the lard. Also, the saponin in decoction act like soap and in that way emulsifies/solubilizes the lard *in vitro* and may be of immense assistance to the β-sitosterol in the overall solubilisation/emulsification of the lard *in vitro* [11]. Hence, the soapy nature of saponin, the plant sterol β-sitosterol is known for esterification and final excretion of cholesterol and probably the assistance of other phytochemicals facilitated the solubilisation /emulsification of lard and so the increase in the absorbance with time as depicted in the graph of Figure 3.

Conclusion

The results of the study indicate the presence of emulsifying agents in the extract which emulsify the lard an increased the turbidity of the concoction.

References

[1]. Saganuwan, A .S. (2010). A Photo Album of some Medicinal Plants of the Nigerian Middle Belt. Taylor and Francis Group LLC.

[2]. Heinrich, M. (2001). *Ethnopharmazie und ethnobatanik eine Eifubrung, Wissnchafliche Verlagsgeselischft*, Stutttgart, Germany.

[3]. Iwu, M.M. (1993). *Vernonia amygdalina*. Del. (Compositae). Handbook of African Medicinal Plants. C R C Press Boca Arbor London. Pp. 256.

[4]. Mann, A., Gbate, N, and Umar, A.N. (2003). *Vernonia amygdalina*. Medicinal and Economic Plants of Nupe land. Jube Evans Books and publications. pp. 80.

[5]. Kupchan, N., Hemingway, R.J., Karin, A and Werner, D. (1969). Journal of Organic Chemistry; 34; 3908-3911.

[6]. Ghana Herbal Pharmacopoeia (GHP) (1992). Technology Transfer Center (TTC), Council for Scientific Industrial Research (CSIR) Accra, Ghana pp. 40.

[7]. Lorke, D. (1983). A new approach to practical acute toxicity testing .Archives of Toxicology 53: 275-280.

[8]. Petrie, A. and Watson, P. (2002). Hypothesis test -1 the test comparing one or two means. Statistics for Veterinary and Animal Science. Blackwell Science Ltd, UK. pp. 78-88.

[9]. Longer, M. A. and Robinson, F.R. (1985). History of pharmacy. International Journal of pharmacy. Remington Pharmaceutical Sciences. 17th Edition Mack Publishing Company Inc. Plainview MN USA.

[10]. Hollman, P.C., Van Trijp, J.M., Mengellers, M.J., de Vries, J. H., and Katan M.B., (1997). Bioavailability of the dietary antioxidant flavonol, quercetin in Man. Cancer let. 114(1-2); 139-140.

[11]. Baggot, J. D. (1988). Veterinary drug formulations for animal health care: an overview. Journal of Controlled Release, 8(1), 5-13.