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Effect of hog plum (*Spondias Mombin)* water extract on the red blood cells of monosodium glutamate (MSG) induced fibroid on albino rats

Emmanuel, N Ezugwu
Department of Basic Sciences, Institute of Management and Technology, Enugu, Nigeria

Abstract
Plant metabolites are the clinically curative materials of medicinal plants. Spondias mombin is crucial in folk medicine in Nigeria and all over Africa because it is widely used to treat diseases. The current study investigated the effect of Spondias mombin leaf's aqueous content on the Red Blood Cells of Monosodium Glutamate (MSG) induced fibroid on albino rats. A total of 12 Albino rats were grouped into three groups of 4 rats each. The aqueous extract was orally administered at varying dosages for 28 days at the expiration of which the hematological parameter was carried out. The findings revealed a significant decrease in the red blood cell of the rat (7.24 ± 0.26^{b}) compared to the control group. The study concludes that Spondias mombin leaf extract could be effective in treating fibroid.

Keywords: spondias mombin, red blood cells, monosodium glutamate (MSG), rats, fibroid

Introduction

Background

Over the years, plants have been relied on for the treatment of various illnesses. Medicinal plants are used as a medical resource in almost all cultures (Jamshidi-Kia *et al*., 2018) [31]. Plant metabolites are the clinically curative medicinal plants' materials (Bindu & Narendhirakannan, 2019; Li *et al*., 2020) [14, 35]. Perhaps, the curative relevance of plants has been widely investigated (Agyare *et al*., 2009; Bibi *et al*., 2016; Budiarti *et al*., 2020; Chiru *et al*., 2020; Da Silva *et al*., 2018; Derda *et al*., 2016; Greenwell & Rahman, 2015; Gupta *et al*., 2018; Kotsia *et al*., 2020; Megersa *et al*., 2019; Patil *et al*., 2009; Shah & Rahim, 2017; Sõukand *et al*., 2017) [6, 13, 15, 17, 22, 20, 28, 29, 34, 36, 49, 52, 55]. In Nigeria, alternative medicine in treating diseases is common (Ezuruike & Prieto, 2014) [25]. Medicinal plants represent an essential resource in treating and curing diseases in Africa (Ofeimun & Temitope, 2020) [43].

Spondias mombin Linn belongs to the family *Anacardiaceae* (Ayoka *et al*., 2008) [12]. The plant is dispersed throughout the tropical regions of South America, Africa, and Asia (dos Santos Sampaio *et al*., 2018) [22]. The plant possesses phytotherapeutic potentials in the traditional medicine system in the world (Sabiu *et al*., 2016) [51]. *Spondias mombin* is crucial in folk medicine in Nigeria and all over Africa because it is widely used to treat diseases (Elufioye *et al*., 2017; Nwidu *et al*., 2018; Nworu *et al*., 2011; Osuntokun *et al*., 2018) [23, 40, 41, 47]. *Spondias mombin* is a fructiferous tree with every part of it used traditionally for medicinal purposes. The bioactive compounds in *Spondias mombin* include tannins, saponins, flavonoids, alkaloids, and phenols (Akumefula & Njoku, 2007; Igwe *et al*., 2010; Omoregie & Oikeh, 2015) [9, 30, 46]. The seed kernel contains carbohydrate, ash, crude fiber, moisture content, crude protein, crude fat, calcium, iron, magnesium, manganese, zinc, and copper (Esua *et al*., 2016) [24]. The beneficial effects of *Spondias mombin* have been widely explored. For instance, An analysis of various parts of *Spondias mombin* shows that it contains antimicrobial properties (Aromolaran & Badejo, 2014; Clementino *et al*., 2018) [11, 18] antiulcer (Da Silva *et al*., 2018) antidiabetic (Adediwura & Kio, 2009) [3], antioxidant (Afolabi *et al*., 2014; Ojo *et al*., 2018) [5, 45] anticancer (Metibemu *et al*., 2021) [38], anti-inflammatory (Cabral *et al*., 2016) [16], and antibacterial properties (Ahuchaogu *et al*., 2017) [8].

Red blood cells are usually prime target for any toxicants because their population is higher in the systemic circulation (Panghal *et al*., 2020) [48]. Monosodium glutamate (MSG) is a regular flavor enhancer widely used as a taste enhancer in several diets (Kayode *et al*., 2020) [33]. MSG is reported to be harmful to the immune system (Al-Agili, 2020) [10]. The consumption of MSG is still controversial, especially in health (Muntaza & Adi, 2020) [39]. Previous research has used MSG to create an animal model of fibroid (Ahmed *et al*., 2020; Obochi *et al*., 2009) [7, 42]. Uterine fibroids (also known as leiomyomas or myomas) are the most common form of benign uterine tumors (Donnez & Dolmans, 2016; Sohn *et al*., 2018) [21, 54]. The current study aimed to investigate the effect of aqueous extract of Spondias mombin's leaf on the red blood cell of albino rat with monosodium glutamate-induced fibroid.

Materials and Methods

Fresh leaves of *Spondias mombin* and MSG was obtained from the local market and were botanically identified and authenticated. The leaves were dried and grounded in coarse powder. 460g of the grounded leaves were boiled with 400ml of distilled water for some minutes to make a decoction. The MSG stock solution was prepared by dissolving 500g of MSG granules in 600ml of distilled water. These stock solutions of MSG were administered to the experimental animals at 750mg/kg dosage depending on the body weights.

Experimental Animal

A total of 12 healthy albino rats weighing 160-200g were

used for this study. They were grouped into three groups comprising four rats each. They were adequately housed and fed for 14 days before the commencement of the experiment. The experimental animals were randomly distributed into three groups of four rats each. (a) Were treated with 350mg/kg of *Spondias mombin* water extract (b) distilled water only and (c) MSG. The body weight was obtained using Ohaus Beam Balance. A toxicity test was carried out using different doses of MSG ranging from 750mg-1050mg for 28 days. They were subjected to hematology studies based on the desired parameters.

The red blood cell was assayed using the method described by Mesdaghinia *et al*. (2019) [37]. The rats were weighed, and their blood was collected by the ocular puncture method into an EDTA sample bottle using a capillary tube. The blood was divided into two bottles, one EDTA for 22 hematological assays and the other for hormonal assays. The blood for the hormonal assay was not to be contaminated with EDTA. The rats were dissected using a surgical blade. Kidney, liver, heart, and uterus were collected and kept in a universal bottle with formalin. For the rats in the control group, the standard procedure for dissection was followed, but the heart was beating rapidly.

Result

The table below shows the effect of *Spondias mombin* leaf extract on rats' hematological parameters at the interval of one week.

Group	RBC[1]	RBC[2]	RBC[3]	RBC[4]
Group 1 (test animal)	7.98 ± 0.78a	7.33± 0.55b	7.05 ± 0.55b	6.78 ± 0.43a
Group 2 (negative control)	8.27 ± 0.76a	8.36 ± 0.73a	8.36 ± 0.32b	7.24 ± 0.26b
Group 3 (positive control)	7.97 ± 0.11b	7.73 ± 0.43a	7.60 ± 0.32a	7.24 ± 0.26b

Values represent the mean ± standard deviation of five animals

Discussion

The current study aimed to ascertain Spondias mombin's effect on the red blood cells of Monosodium Glutamate (MSG) induced fibroid on experimental rats. The result showed that the red blood cells of the animal decreased (7.24 ± 0.26^{b}) compared to the animals in the control group. The result indicates MSG significantly contributes to the decline in the life-span of red blood cells. Thus, the outcome is implicated in direct toxicity, mediated by the harmful effect on the hemopoietic stem cells in the bone marrow. More so, consistent with the previous study (Fakoya, 2020; Raji *et al*., 2006) [26, 50]. *Spondias mombin* showed no significant effect on the red blood cell count induced by MSG than the animals in the positive control group. Meaning that the aqueous extract was failed to mop up the red blood cells count; instead, it continued decreasing. This implies that the phytochemical extract of *Spondias mombin* can be used to treat fibroid based on its insignificant effect on the red blood cell count. The finding is in agreement with the previous study (Adedokun *et al*., 2010) [4].

Conclusion

The study was conducted to examine *Spondias mombin* leaf aqueous extract on red blood cells of MSG-induced fibroid. The analysis showed that the plant had no harmful effect on the red blood cells of the rat. It contributes to the literature by revealing *Spondias mombin* leaf extract as a potential treatment for fibroid. Furthermore, the study corroborates the literature (e.g., Abdulsalam *et al*., 2018; Ghosh, 2017; Jayabalan & Randawar, 2020; Sharma & Deshmukh, 2015) [1, 27, 32, 53]. that MSG, despite its flavoring taste, is harmful for consumption. The study recommends the application of the aqueous extract of *Spondias mombin* in combating fibroid. Also, caution should be taken in the consumption of MSG and other related addictives

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Ethical consideration

The author duly observed all ethical standards concerning human and animal involvement in the research.

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