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Research Article

EFFECT OF POTASH ADMINISTRATION ON THE BODY WEIGHT OF PREGNANT WISTAR RATS

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ABSTRACT

Objective: Potash known as potassium carbonate (K_2CO_3) is a mixture of salt with other components, including impurities which coexist in mineral and salt is highly consumed in various forms by pregnant women. The aim of this research is to determine the effect of potash on the weight index of pregnant Wistar rats.

Methods: A total of 25 albino Wistar rat with weights ranging from 180 to 300 g were used and allocated into five groups of five animals each (four females and one male) designated as Groups A, B, C, D, and E. The experimental Groups B, C, D, and E were administered through oral route different doses of potash of 300 mg/kg, 600 mg/kg, 900 mg/kg, and 1200 mg/kg, respectively, after pregnancy was detected by checking for mucus plug in the vagina. Group A served as the control group and was administered distilled water only. The animals were allowed for 1 week for acclimatization under normal temperature (270–300°C), which they were being fed with normal feed (grower's mash) and water *ad libitum* for 1 week.

Results: The result showed a significant ($p<0.05$) reduction in weight with the highest level seen with the 1200 mg/kg group when compared to the control.

Conclusion: Therefore, the effect of potash alters the physical activity and decreases weight, by implication may induce growth retardation of the Wistar rats which is not healthy for a pregnant animal.

Keywords: Potash, Pregnancy, Weight, Wistar rat.

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INTRODUCTION

Potash known as potassium carbonate (K_2CO_3) is a mixture of salt with other components, including impurities which coexist in mineral and salt such as thermonatrite, halite, thenardite, mirabilite, and gypsum [1]. It consists of some metals such as Ca, Mg, Fe, K, Na, and Al [2-4]. In the developed west, it is a highly industrial useful product. However, for developing nations, its popularity is evident from the various domestic benefits observed among indigenous Nigerian populations and Africans at large. Notable among these usages include aiding the preservation of green color of vegetables with a concentration of 0.1–0.5% potash in cooking, also as snuff when mixed with tobacco in powder form. In the Northern part of Nigeria, it is usually utilized in large doses by the Hausa ethnic region in the form of guinea corn and millet porridges called "Kunun Potash" which is administered to women immediately after delivery for the purpose of increasing the quality and quantity of breast milk [5]. It is also used as a tenderizer, flavoring agent, and prophylactic as well as improving protein digestibility of cowpea [6]. Reports of its use as softener for food and vegetables such as cowpea, okra, and certain leaf such as ewedu have been established by Ankrah and Dovio [7]. Apart from being taken in food, it is also used as a component by some Nigeria medicinal concoctions, and sometimes it is chewed raw [8] with high potency in cough, tooth, and stomach aches and constipation [9]. It has been reported to be useful in the treatment and management of diseases. It is assumed that women consume this substance, with the belief of reducing risk for gestational complications, such as hypokalemia and preterm delivery or long-term morbidities, such as excessive bone loss as well as minimizing the spitting habit of pregnant women.

While it may seem to be an almost indispensable additive to food, experts have warned that it should be taken with caution as consumption of high amounts could be detrimental to human health [5]. In fact, based on its composition of being a mixture of salts and various other impurities, doubt on the toxicity level, and ingestion safety by humans is of concern. Of attention is findings from several studies, showing that potash can be used to increase uterine contractility, and this has been suspected to have the ability to induce abortions in the early stages of pregnancy if used in high enough concentration [10]. In fact, Davidson *et al*. [5] reported peripartum cardiac failure in fetus, 40 days after birth. The rationale behind this work is attributed to an increase in the rate of potash consumption, especially in maternity among pregnant women; hence, the need to find out the effect of potash on the weight of subject on potash administration due to its importance to complications associated with it in pregnancy.

The aim of this research is to determine the effect of potash on the weight evaluation of pregnant Wistar rats. This study is significantly important to establish the safety level of potash as well as dosage that could be detrimental on consumption toward safe pre- and post-natal life of mother and embryo.

MATERIALS AND METHODS

A total of 25 albino Wistar rats with weights ranging from 180 to 300 g were obtained from the animal house of Abia State University, Uturu, Nigeria, metal cages were used to house the animals. The animals were allowed for 1 week for acclimatization under normal temperature (270–300°C), which they were being fed with normal feed (grower's mash) and water *ad libitum* for 1 week. Four females and one male were assigned to each group, and also the females were examined every morning for the presence of mucus plug once mating was confirmed by the presence of copulation plug, administration of potash commenced the following day. Administrations of potash were through the oral route.

Ethical consideration

All experiment procedures were conducted in accordance with National Institute of Health Guide for the care and use of Laboratory Animals

as stated in the "guide to the care and use of Laboratory Animals Resources" on approval obtained from the ethical committee of the college for animal care and use of the university.

Materials
All chemicals used in this research were of analytical grade. Chemicals and materials used for this experiment include: A dissection set, plain bottles, diethyl ether, 10% formal saline, measuring cylinder, centrifuge, tissue bottles, ice packs, iron cages with iron netting, distilled water, cotton wool, desiccators, disinfectant, stainless plate, 25 adult Wistar rats (four females, one male), electronic balance, and potash.

Duration time
The preliminary studies, animal acclimatization, ingredients procurement (potash preparation, actual animal experiment, and evaluation of results lasted for 1 month. However, the actual administration of potash to the test animals lasted for 1 week.

Sample preparation
Potash was purchased at Eke Okigwe market, Imo State, Nigeria, grounded and poured in a clean dry container. From the container, it was measured using a sensitive electronic balance. The substance preparation process was done with care to avoid contamination.

Experimental protocols
A total of 25 animals were weighed and allocated into five groups of five animals each (four females and one male). The groups were designated as Groups A, B, C, D, and E. Group A served as the control group and was administered distilled water only. The experimental Groups B, C, D, and E were administered different doses of potash as follows:

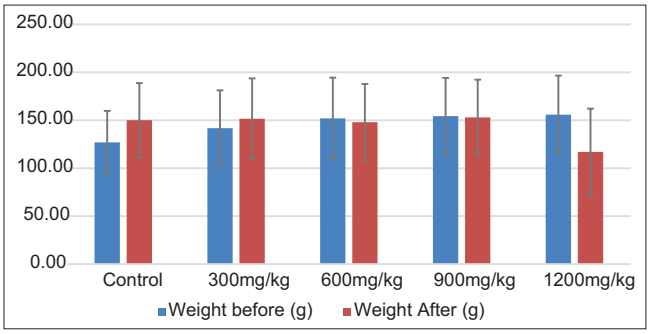

Fig. 1: Body weight of the experimental groups

Mode of potash administration
Were administered orally

- Group A: This group served as the control group which was used to check all parameters and to attain the normal range of values for histological and serum indices to serve as a comparative medium for other groups.
- Group B: This group received 300 mg/kg of potash plus feed and water was given *ad libitum* for 7 days after the detection of pregnancy.
- Group C: This group received 600 mg/kg of potash plus feed and water was given *ad libitum* for 7 days after the detection of pregnancy.
- Group D: This group received 900 mg/kg of potash plus feed and water was given *ad libitum* for 7 days after the detection of pregnancy.
- Group E: This group received 1200 mg/kg of potash plus feed and water was given *ad libitum* for 7 days after the detection of pregnancy. The extract was administered through oral route once in every 24 h for 7 days.

RESULTS

Physical observation
During the period of administration, physical activities of the rats were observed. Rats in the control group were observed to exhibit normal physical activities, such as movement, increase in appetite, which occurs because the pregnant female's body requires extra nutrients to maintain her health and strength and to nourish her growing fetuses. There was no observable change in the fur color of both the test and control animals. On the other hand, there were no recorded changes in skin surfaces on the feet, hand, tail, mouth, ears, and eyes. However, test animals in Groups D and E presented signs of aggressiveness as part of their behavior. There was no death recorded in both control and test groups. It was observed that test Groups D and E rejected water intake within the period of study. It was also observed that the control group and the test Group B gave birth within the 2nd week of the study. The feed intake was observed to be higher in the control group particularly when compared with the test groups.

Body weight
Table 2 presented the body weight changes in pregnant Wistar rats fed with Potash for 7 days. In this study, it was observed that the mean weight of both test groups and control increased before the administration of the substance; this observation was not statistically significant ($p>0.05$). The weights of the rats in all groups were observed to vary when initial and final weights were compared. Remarkable increases in weight were observed only with the control and Group B those treated with 300 mg/kg dose. Similarly, there was significant reduction ($p<0.05$) in the body weight following the administration of potash.

Table 1: Physical observations of rats fed with potash

Observations	Control	2 (300 mg pot)	3 (600 mg pot)	4 (900 mg pot)	5 (1200 mg pot)
Fur color	–	–	–	–	–
Behavioral changes	–	–	–	+ (aggressive)	+ (aggressive)
Skin changes	–	–	–	–	–
Death	–	–	–	–	–
Water rejection	–	–	–	+	+
Pregnancy	2	4	1	3	2
Physical agility	Active	Active	Active	Weak	Weak

Values are mean standard error of mean. +: Present, –: Negative, Pot: Potash; Gp: Group

Table 2: Body weight of the experimental groups

Groups	Treatment	Dosage of potash (ml)	Weight before administration (g)	Weight after final administration (g)	No pregnant
1	Control	0.00	127.00±32.77	150.06±38.72	2
2	300 mg/kg	0.38	141.80±39.43	151.60±42.04	All
3	600 mg/kg	0.92	152.00±42.47*	148.00±39.85*	1
4	900 mg/kg	1.38	154.30±39.90*	153.00±39.34*	3
5	1200 mg/kg	1.78	155.80±40.77*	117.00±45.19*	2

Values are represented at mean±SEM, mean marked with *are significantly different from the control groups ($p<0.05$)

DISCUSSION

This study investigated the weight indices effect of potash on the pregnant Wistar rat. The results obtained showed that the administration of potash induced a significant decrease in the weight of Wistar rats fed orally for 7 days when compared with the control groups (Fig. 1). This reduction is dosage-dependent. This finding is in agreement with the study carried out by Ebadan *et al*. [11] in which they reported that the reduction in body weight could be as a result of the chemical nature of potash and probably as a result of decreased feed intake resulting from the undesirable taste of potash. Food and water intake is controlled by the lateral hypothalamic nucleus and the ventromedial hypothalamic nucleus. The lateral hypothalamic nucleus is the hunger center and so, when stimulated the animal eats and drinks voraciously. On the other hand, ventromedial hypothalamic nucleus is the satiety center and so, when stimulated the animal stops feeding. It is possible, therefore, that unknown chemical constituents of potash may have a stimulatory effect on the ventromedial hypothalamic nucleus, thus causing satiety, thereby decreasing food intake. Water intake is controlled by the "thirst" receptors in the hypothalamus. The osmoreceptors stimulate thirst when the blood concentration of electrolytes (osmolarity) is high [12,13]. Conversely, inhibition of this center reduces thirst. This finding is also supported by the work done by Okalie and Ikwuchi [14] who reported a significant reduction in body weight of rabbits that received potassium bromate. Furthermore, the result on weight reveals that the intake of potash caused some characteristic physical changes in adult Wistar rats as evident in the reduction of physical activity and feebleness (Table 1). This is in agreement with the study of Oyewo *et al*. [15] who reported the alterations in Wistar rats fed with potassium bromate.

CONCLUSION

The study concludes that the effect of potash alters the physical activity and decreases weight. Thus, induce growth retardation of the Wistar rats which is not healthy for a pregnant animal.

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CONFLICTS OF INTEREST

No conflicts of interest.

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