

Research article

RAISED GASTRIC ACIDITY; INDICATION OF GASTRIC ULCER IN MUCUNA URENS (HORSE EYE BEANS) CONSUMPTION

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ABSTRACT

The secretagogue properties of mucuna urens known as horse eye beans or Ox eye liana on the gastric physiology of rats was assayed for the period of 28 days. The acidity level (HCL) was higher on 14 days ($P < 0.05$), and significantly different from that of control among the groups. Also on day, 21 the acid output was higher than that of day 14 and significantly different $P < 0.05$ as compared to that of control. On day 28, the acidity level was higher than that of day 14, and significantly different between the groups ($P < 0.05$) and control. The LD50 toxicologic analysis showed that the horse eye beans at 300mg/kg to 500mg/kg produced 100% mortality. It is concluded that consumption of horse eye beans can lead to gastric ulcer and its high concentration in meals may be life threatening. **Copyright © WJSRR, all rights reserved.**

Key words: Mucana urens, Gastric acidity, Gastric ulcer.

INTRODUCTION

Gastric acidity is a normal occurrence in the stomach as the parietal cells produce acid for the digestion of foods e.g. protein. Pepsin can only act on the protein when it is produced from its precursor; pepsinogen by the action of hydrochloric acid, Guyton (2006). Besides, the hydrochloric acid also maintains the right pH for the enzymatic activity. However, an abnormal situation could arise where there is hyper acidity implying that the acidity of the gastric is above normal. This could be as a result of increase stimulation of gastrin which in secretion will act on the CCKB-receptor and such will impact on the histamine and the subsequent response by the parietal cells to produce more hydrochloric acid depending on the type of foods eaten e.g. protein. Also, tea drinking has been associated with elevated gastrin and high hydrochloric acid production, Jimmy (2013). But low acidity level in the stomach is also an abnormal condition which would lead to impaired protein metabolism resulting in alchlorhydria, Ron, (2007).

The hydrochloric acid is found in the gastric juice which is secreted in phases; cephalic, gastric, intestinal and interdigestive, Sembulingam, (2006). These phases are influenced by stimuli, appetite centres, nervous, reflexes and hormonal mechanisms. *Mucuna urens* (horse eye beans) is a legume belonging to the family fabacea. It is mostly used as soup blending, or thickening in a popular soup called locally as white soup meaning soup without any green vegetable. It is widely eaten in Nigeria and in most parts of Africa and elsewhere Gordian (2010). Much studies on its related effects on fertility with men has been done; Etta, (2010), Paul, (2001). *Mucuna urens* is rich in protein, iron, fat, fibre, phosphorus, calcium, sodium, magnesium, manganese, copper, zinc, amino acids. The anti nutrients contents include; L.Dopa, tannin, oxalate, saponin and phylate, Philips (2005). The rich protein content of this fruit made it to be recommended for growing girls, Rajeev, (2007). Its phytochemical analysis shows the presence of phenol, flavenoid, saponin, carotenoid, vitamin c and antioxidant, Oboh, (2012) The tannin content made its extracted powdered seed to be used as dye usually black for dyeing fibres and leather. The oil extraction from *mucuna urens* could be used for industrial preparation of resin, paint, wood vanish, skin cream and also in the manufacturing of detergent. The negative effects of *mucuna urens* has been associated with infertility e.g. causing sperm abnormality; large acrosome, large head sperm, tail piece, pin head, pyriform head, Ekaluo, (2011), Etta (2010). However, no studies on the effects of *mucuna urens* on the gastric physiology has been done. The aim of the study is to evaluate the likely effects of *mucuna urens* consumption in gastric acidity and such translation in gastric pathology e.g. gastric ulcer. This study is imperative as there is high level of patronage of *mucuna urens* in soup preparation and such is likely to accumulate toxic effects in the body as indicated in the toxicology studies and could increase gastric ulcer frequency in the population based on the gastric analysis results.

MATERIALS AND METHODS

Preparation of extract.

The method of Trease and Evans 1996 was used. The hard epicarp of the fruits; *Mucuna Urens* was peeled with knife. The inner epicarp was washed and air dried and pulverized to a fine powder using mortar. The powder was

macerated in distilled water and allowed to stand for 24hrs. It was shaken at regular intervals and then filtered and the filtrate concentrated at 45°C in the water bath and left to dry. The concentrated extract was preserved in refrigerator at 4°C to be used later in the study.

A total of 28 albino male and female rats were used for the main study while 30 albino mice were used for LD50, toxicology test.

ACUTE TOXICITY STUDY (LD50):

Thirty albino mice were used with weight ranging between 20g-30g. They were fed with pellets and water and kept in a well ventilated Faculty of Pharmacy animal house. The mice were used for the toxicology studies as they are more responsive to toxicity than rats. The toxicology studies in mice enable the establishment of the standard dosage for use in rats. This is what is done elsewhere, Lorke 1983. The extract of *Mucuna urens* prepared according to methods of Trease and Evans 1996 was administered to each mouse intraperitoneally between 100mg/kg to 5000mg/kg to arrive at the LD50 of 244.95mg/kg or 245mg/kg. The mice were divided into 10 groups of 3 each in a group as follows; Group 1; Administered with 5000mg/kg, Group 2 had 4000mg/kg, Group 3 was given 3000mg/kg, Group 4 2000mg/kg, Group 5 given 1000mg/kg, Group 6 had 500mg/kg, Group 7 was given 400mg/kg, Group 8 had 300mg/kg, Group 9 had 200mg/kg while Group 10 had 100mg/kg. The extract was administered intraperitoneally, Lorke 1983. The LD50 was calculated as the geometrical mean of the maximum dose that produced 0 percent mortality and the minimum dose that produced 100 percent mortality. The LD50 for the study was 245mg/kg.

This form the dosage for the administration in the rat.

Ethical approval and animal handling.

There is no animal right organization where the study was done. However, the animals were not tortured but used to accomplish the concept of the study for the benefit of humanity. The animals were sacrificed through administration of anaesthesia for gradual peaceful death.

ADMINISTRATION OF EXTRACT OF MUCUNA URENS IN RATS

A total of 28 albino male and female rats and grouped into four experimental groups with each group having seven rats were used. The extract was administered based on the body weights of the rats. Group 1 rats served as control and were given 5ml of distilled water. Group 2 rats were administered with 24.5mg/kg of the extract, Group 3, 49.00mg/kg and group 4, administered with 73.50mg/kg of the extract. The extract was administered orally, using canula, by-passing the esophagus and delivered into the stomach Jimmy (2007), Bertram, (2004), Robert, (1979). The animals were observed for 7, 14, 21 and 28 days and sacrificed using anaesthesia for gastric analysis.

GASTRIC ACID ANALYSIS

The animals were fasted for 24 hours, Nwafor, (2005) to exclude the effects of food as stimulant for gastric secretion. The stomach of the sacrificed rats were removed and contents diluted with 5ml of distilled water, filtered, and gastric output calculated according to methods of Baker 1983. The content which was taken as gastric secretion was titrated against 0.02M sodium hydroxide and the acid output as titrable acidity was obtained by dividing the titre of the titrated volume in 0.02M sodium hydroxide expressed as x by the original volume of the content obtained before titration as y and the result expressed in mmol/l.

Statistical analysis.

Students t test which compared mean and standard deviation among the groups through SPSS programming was used.

RESULTS

The results showed variations in the gastric acid output in the different duration of the study. On days 14, 21 and 28 the mean acid output for control group were 0.0015 ± 0.0005 , 0.0015 ± 0.00005 , 0.0030 ± 0.001 . For group 2 given 24.50mg/kg of the extract, the mean acid output on days 14, 21 and 28 were; 0.0100 ± 0.006 , 0.0120 ± 0.0030 , 0.0065 ± 0.005 .

TABLE 1: GASTRIC HCL SECRETIONS IN MUCUNA URENS EXTRACT ADMINISTRATION

DAYS	CONTROL	GROUP 2	GROUP 3	GROUP 4
14	0.0015 ± 0.0005	0.01 ± 0.006	0.0045 ± 0.005	0.014 ± 0.0020
21	0.0015 ± 0.0005	0.012 ± 0.003	0.012 ± 0.008	0.005 ± 0.0015
28	0.003 ± 0.001	0.0065 ± 0.005	0.011 ± 0.0040	0.006 ± 0.0005

For group 3 given 49.00mg/kg on days 14, 21 and 28, the mean acid output were 0.0045 ± 0.005 , 0.0125 ± 0.0085 , 0.0110 ± 0.0040 . For group 4 given 73.50mg/kg for days 14, 21 and 28 the acid output were 0.0140 ± 0.0020 , 0.0055 ± 0.0015 , 0.0065 ± 0.0005 .

DISCUSSION

The study has shown the effects of mucuna urens on the gastric secretions based on the period of study and the groupings which were dose dependent. The gastric secretions on the 14 and 21 days of the administration of the

extract at the dosage of 24.5mg/kg showed a higher gastric output except on day 28 in the control group. But slight lower acid output also spanned through the days 14, 21 but 28 recorded higher values at dosage of 49mg/kg. But the values were all higher than those of control. The increase in the acidity titre at increase dosage of 49mg/kg on the 28 day means, a dose dependent and duration variation on the gastric secretion. This implies that the mechanism of activation of the key pathways in gastric secretion is dependent on what activate its and the degree and duration of activation. At the administration of the extract, into the stomach, the major pathway of the gastric secretion here is hormonal. And gastrin is one of the hormones that is responsible for eliciting gastric secretion via its impact on the CCKB receptor and the final effect on the parietal cells through its action on histamine, Beales, 2002. But gastrin in this case, could be found in the blood to effect gastric secretion in the presence of protein. The mucuna urens contain crude protein which is assumed to be the source of stimulants for the release of gastrin in this case though gastrin could be released on ordinary swallowing when there is distension of the stomach, Guyton, 2006. But its protein, iron and, amino acid acids contents, are a good source of nutrition to the body. However, it contents of amino acid may be the reason, Delvallae, 1990, which at the dosage of 73mg/kg the acid output was reduced almost at the level of control as increase presence of acid is said to limit gastrin secretion, Guyton 2006. But the fact remains that gastric acidity is raised in relationship with the intake of mucuna urens showing that there is tendency of gastric ulcer with such intake. The study has also unveiled that the mucuna urens is toxic at the dosage of 300mg/kg – 500mg/kg meaning that the intake of mucana urens can lead to death which could be contributed by its tannin, oxalates, saponin, phylate and L.Dopa contents, Phillips, 2005.

RECOMMENDATION

The mucuna urens contents of protein, iron and amino acids make these beans a good nutritional source for good health. And thus, its consumption is encouraged but at low dosages due to its likely tendency of causing gastric ulcer and its toxicity may be life threatening.

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