

Preliminary Study of the Antiemetic Effect of Garcinia Kola Seed Extract in Young Chicks

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Abstract

The antiemetic effect of ethanol extract of the seed and seed skin of *Garcinia kola* in young chicks was investigated. Preparation of the seed of *Garcinia kola* is used in African traditional medicine in treatment of cough and emesis. Standard methods were used for the phytochemical screening of the extracts. Copper sulphate (50 mg/kg) was used to induce emesis in chicks divided into six groups of five chicks each. Different doses of the extracts were tested for their antiemetic properties. These were compared with the effect of a positive control antiemetic drug (Metoclopramide 2mg/kg) and a negative control (normal saline) against copper sulphate induced emesis. The phytochemical screening showed that both the seed and seed skin extracts contained saponins, alkaloids and flavonoids. Emesis was induced by copper sulphate (50mg/kg). The seed extract at 50 and 150 mg/kg produced a percentage inhibition by 71.70 and 75.47% respectively while the seed bark extract at 50 and 150 mg/kg produced a percentage inhibition by 47.16 and 62.27% respectively. Extracts at 50 and 150mg/kg showed a decrease in copper sulphate induced emesis in a dose dependent manner. These results suggest that the ethanol extract of the seed of *Garcinia kola* and its seed skin have antiemetic properties which provide for the first time the rationale for its use in African traditional medicine in the management of emesis.

INTRODUCTION

The cause of nausea and vomiting could be from a lot of conditions such as motion sickness, gastrointestinal disorders, drug toxicity, cancer chemotherapeutic agents, peptic ulcer, hepatitis, renal failure and pregnancy. Discomfort from drug induced emesis can deter a patient from taking further chemotherapeutic agent especially with the potentially curative anti neoplastic treatment (Marty et al, 1990). Vomiting that is not controlled can lead to dehydration, nutrient loss and profound metabolic imbalances

Garcinia kola, generally known in Nigeria as bitter kola (Guttiferae) (Plowden, 1972) is found in moist forest and grows as a medium size tree, up to 12 m high. It is cultivated and distributed throughout west and central Africa. It has been referred to as a 'wonder plant' because almost every part of it has been found to be of medicinal importance (Hutchinson and Dalziel, 1956).

It is commonly called "Agbilu" in Igbo land and "Namijin goro" in Hausa and "orogbo" in Yoruba land of Nigeria (Aluka, 1985). It produces a characteristic orange-like pod with seeds covered with a skin or husk. All parts of the plant

are used in traditional medicine for various therapeutic purposes. Extracts of the plant have been traditionally used for ailments such as laryngitis, liver diseases and cough (Ayensu, 1978). The seeds are used to prevent or relieve colic pains, cure head or chest colds, relieve cough and have anti inflammatory, antimicrobial and antiviral properties (Iwu, 1993). It is also used as an antidote for venomous stings and bites, and in the treatment of diarrhea and dysentery (Aluka, 1985). It has been reported that the seeds have anti ulcer properties (Ibironke et al, 1997) and the differential ethanol extract (Kolaviron) from the seeds has shown analgesic and anti inflammatory properties (Olaleye et al, 2000). It has been shown that the seed has significant potentials of ameliorating mild kidney insufficiency induced by the anticancer drug, cisplatin (Okoko and Awhin 2007). *Garcinia kola* clinically appeared to have a significant analgesic/anti-inflammatory effects in knee osteoarthritis patients (Olayinka et al, 2008). In folkloric medicine, the cold water extract of root bark with salt is used in southern Nigeria against cough and vomiting (Iwu, 1986). In southern Nigeria also, the seed is chewed to prevent emesis in pregnancy and motion sickness. Thus, the aim of this study was to investigate the antiemetic effect of *G. kola* seed and seed skin against copper - sulphate induced emesis in young

chicks.

MATERIALS AND METHODS

ANIMALS

Male and female young chickens (30-42 g; 3days old) obtained from a poultry local store in Kaduna were used in the study. After 24h fasting, the antiemetic activity was evaluated. The experiments were carried out in accordance with the Guidelines for Laboratory Procedures laid down by the Ahmadu Bello University Zaria Ethics Committee on Research as well as the Internationally accepted principles regarding the care and use of animals for experimental techniques.

PREPARATION OF PLANT MATERIAL

The seeds of Garcinia kola were bought from a local market in Kaduna. Air dried powdered seed (100g) or seed skin (100g) of Garcinia kola was marcerated with 96% ethanol at room temperature for 24hrs and then filtered through a cloth. The extract was then concentrated under reduced pressure and concentrated to dryness (yield: seed and seed skin: 27.93 and 3.07 % respectively) of chocolate coloured powder. A measured amount of the seed extract was dissolved in Tween 80 and prepared in distilled water.

PHYTOCHEMICAL SCREENING

Phytochemical screening was carried out on the ethanol extracts of the seed and seed skin. Standard methods were used to test for saponins, flavonoids and alkaloids (Trease and Evans, 1983).

TEST FOR FLAVONOIDS

Shinoda test: To an alcoholic solution of the extract three pieces of Magnesium chips were added followed by a few drops of concentrated hydrochloric acid. Appearance of an orange, pink or red to purple colour indicates the presence of flavonoids.

Sodium hydroxide test: 2 ml of the extract was dissolve in 10% aqueous sodium hydroxide solution and filtered to give yellow colour, a change in colour from yellow to colourless on addition of dilute HCl indicate the presence of flavonoids.

TEST FOR SAPONINS

One gram of the powdered sample was boiled with 10mls of distilled water for ten minutes. The sample was filtered while hot and cooled.

Frothing test: 2.5ml of the filtrate was diluted to 10mls with water and was shaken vigorously for 2mins. A honey comb

formed for more than 30 minutes indicates presence of saponin.

TEST FOR ALKALOIDS

0.5 g of the extract was stirred with 5 ml of 1% aqueous hydrochloric acid on a water bath and filtered. 3 ml of the filtrate was divided into three. To the first 1 ml few drops of freshly prepared Dragendoff reagent was added and observed for formation of orange to brownish precipitate. To the second, 1 drop of Mayer reagent was added and observed for formation of white to yellowish or cream color precipitate. To the third 1 ml 1 drop of Wagner reagent was added to give a brown or reddish or reddish-brown precipitate.

ANTIEMETIC ACTIVITY

The antiemetic activity was evaluated using the method explained by Akita et al, with an emetic agent (Akita et al 1998). Copper sulfate, 50 mg/kg (0.5 ml,) was used to induce emesis in young chickens. Three doses of extracts, positive control (metoclopramide 2 mg/kg i.p) and negative control (normal saline) were administered to the chicks. The doses 50 and 150 mg/kg were used for ethanol extract of the seed or seed skin. One hour later 50 mg anhydrous copper sulphate/kg body weight (0.5ml) was administered orally to each chick, and then the number of retches (an emetic action without vomiting gastric material) was counted for 20 min. The antiemetic effect was assessed as the decrease in number of retches in the treated group in contrast to the control. The inhibition (%) was calculated as follows:

$$\text{Inhibition (\%)} = [(A-B)/A] \times 100$$

Where A is the control frequency of retching and B is the frequency of retching of the treated group.

RESULTS

The ethanol extract of the seed and seed skin of Garcinia kola showed the presence of saponins, flavonoids and alkaloids. Doses, 50 and 150mg/kg of the seed or seed skin extract reduced the emesis induced by copper sulphate in 3 day old chicks. The frequency of retching was found to decrease with increase in dose of the extracts but less with metoclopramide the antiemetic drug. The frequency of retching by the chicks treated with the seed ethanol extract 50 and 150 mg/kg was 15 and 13 respectively (fig.I) while that seen with chicks treated with the seed skin extract 50 and 150 was 28 and 20 respectively (Fig.II).

Figure 1

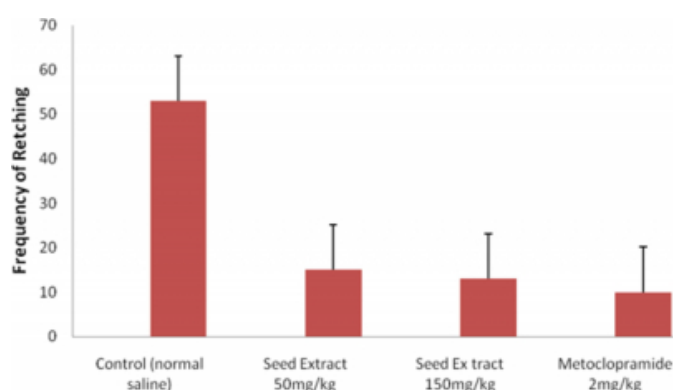


Fig. 1. Antiemetic activity of *Garcinia kola* seed extract on copper-sulphate-induced emesis in young chicks

Figure 2

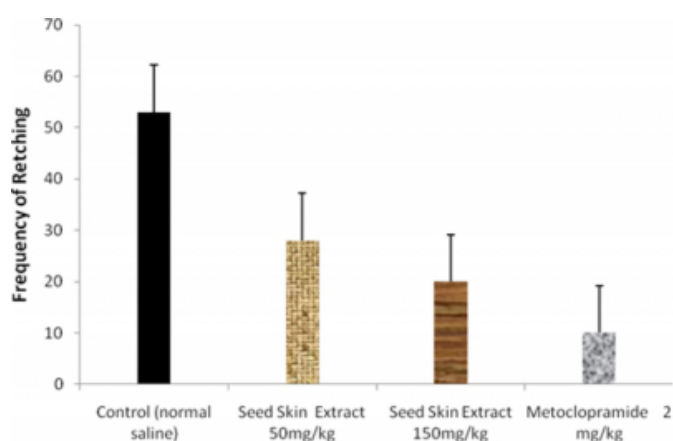


Fig.2. Antiemetic activity of seed skin extract of *Garcinia kola* on copper-sulphate-induced emesis in young chicks

Metoclopramide treated group showed the least frequency of retching of 10 compared with the control having 53.

The percentage of retching inhibition induced by copper sulphate for doses of 50 and 150mg/kg of the seed extract was 71.70 and 75.47% respectively while for doses of 50 and 150 mg/kg of the seed bark was 47.16 and 67.27% respectively. Metoclopramide treated group produced the highest percentage of inhibition with 81.13% (Fig. III).

Figure 3

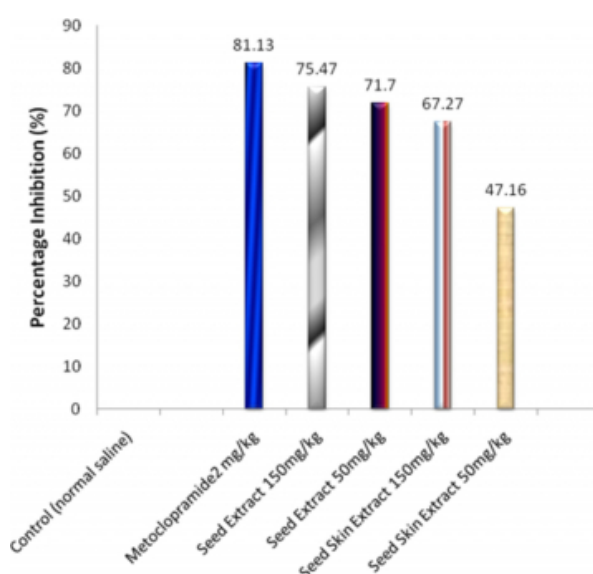


Fig. 3. Antiemetic activity of the seed and seed skin extract of *Garcinia kola* on copper sulphate induced emesis in young chicks

DISCUSSION

The phytochemical test of the ethanol seed skin extract of *Garcinia kola* revealed the presence of saponins, alkaloids and flavonoids.

The extracts of the seed and seed skin of *Garcinia kola* prevented emesis induced by copper sulphate. This was dose dependent. From the result, the seed extract protected the young chicks against emesis better than the seed skin extract. The 75% inhibition produced by the seed extract especially the maximum dose of 150mg/kg administered was closer to the 81% inhibition produced by metoclopramide. Nausea and vomiting are caused by interaction of the gastrointestinal system, the vestibular system and various parts of the brain (Gan et al, 2003). The various areas of the brain and gastrointestinal tract (GIT) that are involved in the process of nausea and vomiting are the chemoreceptor trigger zone (CTZ) in the brain, the vestibular system, the visceral afferents from the GIT and the cerebral cortex (ASHP, 1999). Metoclopramide which has already been known to produce antiemetic effect through acceleration of gastrointestinal tract movement (Akita et al, 1998) was seen to be more effective than the seed and seed skin extracts though closer to the antiemetic effect elicited by the maximum dose (150mg/kg) of the seed extract

Oral copper sulfate induces emesis by peripheral action (Bowman and Rand, 1980) through excitation of visceral afferent nerve fibres of the GIT, and it has been reported that peripheral 5-HT₄ plays an important role in emesis induced

by copper sulphate (Bhandar and Andrews, 1991; Fukui et al, 1994). The extracts were able to effectively prevent this induced antiemetic effect, it could be implied that extracts have a peripheral antiemetic activity. The observed antiemetic effect of *Garcinia kola* seed and seed skin extracts could be attributed to its saponins, alkaloids or flavonoid contents. This is the first result to show the antiemetic effect of *Garcinia kola* and thus provides scientific basis for its use in folkloric medicine for the management of emesis.

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