The efficacy of plant extracts on cecal amebiasis in rats

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Abstract

Amebiasis caused by Entamoeba histolytica is a major public health problem in tropical and subtropical countries. Treatment failure with specific chemotherapy has been reported suggesting the possibility of drug resistance. This study investigated the anti-amoebic effects of four plant extracts on cecal amebiasis in rats. The cecal amebiasis was induced by the injection of 3.0×10⁵ troph/mL of E. histolytica parasite directly into the rat’s caecum. A total of 137 rats were used for these studies; five rats in each group for both positive and negative control, 15 rats in each group to test the four plant extracts and metronidazole. The infected rats were treated for cecal amebiasis using each of the four plant extracts at graded doses of 100 mg/kg, 200 mg/kg and 400 mg/kg and with metronidazole at a dose of 62.5 mg/kg, 100 mg/kg and 125 mg/kg for five consecutive days. The efficacy of the four plant extracts were evaluated based on Neal’s, 1951 method. The plants used for this study were Garlic (Allium sativum), Pumpkin (Cucurbita pepo), Guava (Psidium guajava) and Pawpaw (Carica papaya) are edible plants which have generated lots of interests as medicinal panacea.16 Antiprotozoan properties of Garlic have been established and recently17,18 its anti-amoebic properties have been discovered.19 Guava has also been shown to have anti-diarrheic properties.20-23 The in vitro anti-amoebic effect of Paw paw against E. histolytica has been confirmed.24,25 Pumpkin is used as an anti-parasitic agent and its anti-amoebic properties have been suggested due to its role in the treatment of intestinal parasitic.26,27 Rat has been recommended as an experimental animal model in the in vitro study of anti-amoebic plants.28,29 Intracecal inoculation of rat with trophozoites of E. histolytica parasite produces a lesion in the intestinal wall of the rat, similar to that seen in amebic colitis in human.30 This study was an attempt to determine the efficacy of the four plant extracts on cecal amebiasis in rats, and to compare the effects of the four plants extracts with that of the standard drug metronidazole.

Materials and Methods

Source/plant collection

The plants used for this study were Garlic (Allium sativum), Pawpaw (Carica papaya), Pumpkin (Cucurbita pepo) and Guava (Psidium guajava). Guava (Psidium guajava) leaves were collected from the botanic garden of Department of Botany, University of Calabar. The Paw paw seeds, Pumpkin seeds and bulbs of Garlic were purchased from the Local market in Calabar, Cross River State of Nigeria. The identification and authentication of these four plants was carried out by the Botany Department of the University of Calabar.

Plant extraction

The fresh leaves of Guava, seeds of Pawpaw, seeds of Pumpkin and bulbs of Garlic were air dried for three weeks and grounded using a manual blender to get a powdery form. One hundred grams (100 g) of powdery form for each of the four plants, Guava, Garlic, Pumpkin and Pawpaw were extracted by subjecting through maceration at 25°C for 48 hours using 80% methanol as solvent. The extracts obtained were then filtered using 1 filter paper (Whatman, Maidstone, UK). The filtrate was concentrated with a rotary evaporator at 45°C. The extracts were then stored at 4°C in sterile bottle for use when required.

Experimental animal

The 85 Wistar strain of albino rats of both sexes used for the study were obtained and also kept in cages in the animal house of Physiology Department of University of Calabar. The animals were healthy, with body...
weight range of 150-200 g. They were kept at room temperature (28±2°C) and away from direct sunlight but with good ventilation. They were fed with food pellets and water ad libitum. The animal cages were cleaned twice a week to ensure good sanitary condition until required for use.

**Parasite preparation**

The Boeck and Drbohlav's diphasic and polyxenic medium was used for the culture of the *E. histolytica* parasites. The Boeck and Drbohlav’s medium is made up of albumin slope and overlay solution. Albumin slope was prepared by mixing 270 mL of fresh egg albumin and 75 mL of sterilized Ringer’s solution (0.8 g NaCl, 0.2 g CaCl₂, 0.2 g KCl in 100 mL of distilled water). Then, 2.5 mL of the mixture was dispensed aseptically after filtration through sterile gauze into sterile culture tubes and inspissated in slanted position at 100°C for 10 minutes. The overlay solution was obtained by mixing 100 mL of sterilized Locke’s solution (0.8 g NaCl, 0.2 g NaHPO₄, 0.2 g KCl, 0.01 g MgCl₂, 0.4 g NaHCO₃ and 0.3 g kH₂PO₄) to 1 mL of calf serum. Then 5 mL of overlay solution was added to each tube containing the albumin to complete the medium.

The *E. histolytica* parasite was isolated from feces of confirmed cases of *E. histolytica* infections from parasitology laboratory of University of Calabar Teaching Hospital (UCTH), Calabar. The parasite was cultured on Boeck and Drbohlav's medium with some modification as described by Sawangjaroen et al.³¹ Calf serum (10%) was used instead of horse serum and bijoux bottle was used as parasite culture tube. The culture was incubated at 37°C and *E. histolytica* trophozoites along with associated bacteria were sub cultured every 48 hours. Just before culture, a loopful of sterilized rice starch (1 mg) was added to the medium. Then a small quantity of the faces were inoculated in the culture medium and incubated at 37°C for 48 hours. After 48 hours incubation, the culture fluid in the tube was mixed and examined microscopically for amoebic growth. In order to renew the culture medium, culture tubes were chilled on ice for 5 minutes and the upper phase (around 4 mL) was discarded. The sedimented part containing the parasites was mixed and transferred to a fresh sterile culture tube containing the medium and rice starch. This procedure was repeated after every 48 hours to maintain the amoebic strain. Rawson and Hitchcock, method for counting of amoeba was used to determine the number of *E. histolytica* parasites.³²

**Experimental protocol**

The Wistar rats used for the evaluation of the four plant extracts on cecal amebiasis were divided into 7 groups: two control groups (normal and infected-untreated) consisting of 5 rats each and 5 test groups consisting of 15 rats each.

The rats were inoculated intracecally with 3.0×10⁵/mL trophozoites of *E. histolytica* parasite, and the methods used for maintaining *E. histolytica* and inoculations procedure in rats were according to Ray and Chatterjee, method.³³ After two days of inoculation, the rats were subjected to either one of the following treatments for 5 days through oral administration using feeding needle of plant extracts and drug (metronidazole).

**Group 1: infected test subject treated with garlic extracts**

Amebiasis was induced by intracecal inoculation of *E. histolytica* parasites to all the rats in the group + treatment with the garlic extract at 100 mg/kg to 5 rats, 200 mg/kg to another 5 rats and 400 mg/kg to remaining 5 rats.

**Group 2: infected test subject treated with guava extracts**

Amebiasis was induced by intracecal inoculation of *E. histolytica* parasites to all rats + treatment with the guava extract at 100 mg/kg to 5 rats, 200 mg/kg to another 5 rats and 400 mg/kg to the remaining 3 rats.

**Group 3: infected test subject treated with pawpaw extracts**

Amebiasis was induced by intracecal inoculation of *E. histolytica* parasites to all rats + treatment with the paw paw extract at 100 mg/kg to 5 rats, 200 mg/kg to another 5 rats and 400 mg/kg to the remaining 5 rats.

**Group 4: infected test subject treated with pumpkin extracts**

Amebiasis was induced by intracecal inoculation of *E. histolytica* parasites to all rats + treatment with the pumpkin extract at 100 mg/kg to 5 rats, 200 mg/kg to another 5 rats and 400 mg/kg to the remaining 5 rats.

**Group 5: infected test subject treated with metronidazole**

Amebiasis was induced by intracecal inoculation of *E. histolytica* parasites to all rats + 62.5 mg/kg to 5 rats, 100 mg/kg to another 5 rats and 125 mg/kg to the remaining 5 rats.

**Group 6: normal control**

The rats in this group were not infected and distilled water was given as placebo to the 5 rats in this group.

**Group 7: infected-untreated control**

Amebiasis was induced by intracecal inoculation of *E. histolytica* parasites to all the 5 rats in the group without any treatment given to them.

**Evaluation of the effects of plant extracts on cecal amebiasis**

**Macroscopic examination of caecum**

The effect of the four plant extracts and metronidazole on amebiasis induced by intracecal inoculation of *E. histolytica* in rats was evaluated after 5 days of treatment. The animals were sacrificed by cervical dislocation. The effects of the plant extracts and drugs were evaluated by macroscopic and gross examination of cecal walls for thickening or ulcerations. Neal’s, method was used for evaluation.³⁴

**Stool examination**

**Direct smear method:** stool samples from each of the groups were examined by direct smear method according to the method described by Cheesbrough.³⁵ A wet mount with saline and Lugol’s iodine was prepared, microscopic examination for motile trophozoites and cysts of *E. histolytica* was carried out using the low and high power (×10) and (×40) objectives.

**Concentration method:** fecal samples were collected from each of the rats into clean petri dishes; the samples were examined microscopically using the formal ether concentration technique as reported by Cheesbrough.³⁵ From each sample, about 1 g of the feces was taken, emulsified in tubes containing 4 mL of 10% formol saline and mixed properly. The emulsified feces were sieved, the sieved suspensions were transferred into centrifuge tubes and 3 mL of diethyl ether was added. The tubes were stoppered and mixed vigorously for 1 minute. The stoppers were removed and each tube centrifuged immediately at 1000 g for 1 minute. After centrifugation, 4 layers appeared in the tubes: ether layer on top, a plug of fecal debris, formol saline and sediments containing *E. histolytica* cysts. All layers were poured off except the bottom layer of the sediments. The sediments were mixed and a drop was put on a slide, covered with a cover slip and examined microscopically.

**Data analysis**

Data obtained from the study were statistically analyzed using ANOVA. Means were expressed as mean ± standard deviation. The Student’s t-test was used to test the significant differences between treated groups and infected-untreated control; significant were considered at P<0.05.

**Results**

The effects of plant extracts of Garlic, Guava, Pawpaw and Pumpkin on cecal amebiasis in rats are shown in Table 1. The Garlic

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[page 42] [Veterinary Science Development 2015; 5:5793]
extracts at concentrations of 100 mg/kg, 200 mg/kg and 400 mg/kg bodyweight per day given orally for five days in cecal amebiasis in rats gave a percentage cure rate of 0%, 40% and 80%, respectively. The average cecal score of cecal content and wall were 0.4, 0.2 and 0, respectively.

The Guava extracts at concentrations of 100 mg/kg, 200 mg/kg and 400 mg/kg bodyweights per day given orally for five days in cecal amebiasis in rats gave a percentage cure rate of 20%, 80% and 100%, respectively. The average cecal score of cecal contents and wall were 0.2, 0 and 0 respectively. The Pawpaw extracts at concentrations of 100 mg/kg, 200 mg/kg and 400 mg/kg given orally for five days gave a percentage cure of 0%, 40% and 60%, respectively. The average cecal score of cecal content and wall were 0.4, 0.2 and 0, respectively.

The pumpkin extracts at concentrations of 100 mg/kg, 200 mg/kg and 400 mg/kg given orally per day for five days gave a percentage cure of 0%, 0% and 40%, respectively. The average cecal score of cecal content and cecal wall were 2, 2 and 0.2 respectively.

The drug metronidazole at concentrations of 62.5 mg/kg, 100 mg/kg and 125 mg/kg given orally per day for 5 days gave a percentage cure of 60%, 80% and 100% respectively. The average cecal score of cecal content and wall were all 0. Two rats died in the infected-untreated control the average cecal score of cecal content and wall infected-untreated control were 3.3 and 3 respectively.

The mean parasitic count of E. histolytica parasite in the faeces of caecal amoebiasis in the four plant extracts treated rats is shown in Table 2. The effect of the four plant extracts on mean parasitic counts in feces in cecal amebiasis was discovered to be dose-dependents. There was a statistical significant difference between the effects of the four plant extracts on the mean parasitic count in the feces of rats in cecal amebiasis (F=5.98 df(3), P<0.05). There was no statistically significant difference (P>0.05) in the mean parasitic count of feces at a dose of 100 mg/kg in Garlic (38.2±3.1), Guava (37.5±2.5), Pawpaw (37.9±3.1) and Pumpkin (37.1±2.9) when compared with the infected-untreated control rats (38.9±3.4). There was statistical significant decrease (P<0.05) in the mean parasitic counts in feces of rat at a concentration of 200 mg/kg in the Guava (8.5±1.5), Garlic (23.0±2.8) and Pawpaw 0.2±2.2) extracts treated rat when compared with the infected-

<table>
<thead>
<tr>
<th>Test materials; dose (mg/kg per day for 5 days)</th>
<th>Rats cleared/treated (% cured)</th>
<th>Average cecal score (range)</th>
<th>Content wall</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1: Garlic bulbs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>0/5 (0)</td>
<td>0.4 (0-1)</td>
<td>0.4 (0-1)</td>
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<tr>
<td>200</td>
<td>2/5 (40)</td>
<td>0.2 (0-1)</td>
<td>0.2 (0-1)</td>
</tr>
<tr>
<td>400</td>
<td>4/5 (80)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
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<tr>
<td><strong>Group 2: Guava leaves</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1/5 (20)</td>
<td>0.2 (0-1)</td>
<td>0.2 (0-1)</td>
</tr>
<tr>
<td>200</td>
<td>4/5 (80)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
</tr>
<tr>
<td>400</td>
<td>5/5 (100)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
</tr>
<tr>
<td><strong>Group 3: Pawpaw seeds</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>0/5 (0)</td>
<td>0.4 (0-2)</td>
<td>0.4 (0-1)</td>
</tr>
<tr>
<td>200</td>
<td>2/5 (40)</td>
<td>0.2 (0-1)</td>
<td>0.2 (0-1)</td>
</tr>
<tr>
<td>400</td>
<td>3/5 (60)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
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<tr>
<td><strong>Group 4: Pumpkin seeds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>0/5 (0)</td>
<td>2.0 (2-2)</td>
<td>2.0 (2-2)</td>
</tr>
<tr>
<td>200</td>
<td>0/5 (0)</td>
<td>2.0 (2-2)</td>
<td>2.0 (2-2)</td>
</tr>
<tr>
<td>400</td>
<td>2/5 (40)</td>
<td>0.2 (0-1)</td>
<td>0.2 (0-1)</td>
</tr>
<tr>
<td><strong>Group 5: Metronidazole drug</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62.5</td>
<td>3/5 (60)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
</tr>
<tr>
<td>100</td>
<td>4/5 (80)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
</tr>
<tr>
<td>125</td>
<td>5/5 (100)</td>
<td>0.0 (0-0)</td>
<td>0.0 (0-0)</td>
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<tr>
<td><strong>Group 6: Normal control</strong></td>
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<tr>
<td></td>
<td>0/0</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>Group 7: Infected-untreated control</strong></td>
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<td></td>
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<tr>
<td></td>
<td>3/3 (3-3)</td>
<td>3 (3-3)</td>
<td>-</td>
</tr>
</tbody>
</table>

*Cecal scores were graded upon the following criteria (Neal, 1951). Wall: normal, 0; slight thickening, 1; marked local thickening and contraction, 2; extensive thickening and contraction, 3; cecum shapeless (extensive ulceration with abscess formation), 4. Contents: normal, 0; slightly less solid than normal, 1; slightly mucoid; 2, mucoid (some solid matter present), 3, no solid matter (wither or yellow mucus only), 4. Two rats died due to the parasite infections, the infected untreated control rat remaining 5.
The mean parasitic count of *E. histolytica* (trophs/cyst) in the feces of the four plant and metronidazole treated rats is shown in Table 2. The results indicate a significant decrease in the mean parasitic count in feces of rats treated with Garlic (8.6±1.0*), Guava (66.1±4.7*), Pawpaw (19.7±2.5*), and Pumpkin (35.4±2.0) extracts compared to the infected-untreated control rat (38.9±3.4). The decrease in mean parasitic count was statistically significant (P<0.05) for all plant extracts tested.

### Table 2. The mean parasitic count of *E. histolytica* (trophs/cyst) in the feces of the four plant and metronidazole treated rats.

<table>
<thead>
<tr>
<th>Test materials; dose (mg/kg per day for 5 days)</th>
<th>Mean number of <em>E. histolytica</em> (trophs/cyst) g feces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected-untreated control</td>
<td>38.9±3.4</td>
</tr>
<tr>
<td>Group 1: Garlic bulbs extracts</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>38.9±3.1</td>
</tr>
<tr>
<td>100</td>
<td>23.0±2.5*</td>
</tr>
<tr>
<td>200</td>
<td>8.6±1.0*</td>
</tr>
<tr>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Group 2: Guava leaves extracts</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>37.5±3.2*</td>
</tr>
<tr>
<td>200</td>
<td>8.5±1.5*</td>
</tr>
<tr>
<td>400</td>
<td>0.0±0.0*</td>
</tr>
<tr>
<td>Group 3: Pawpaw seeds extracts</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>37.9±3.1</td>
</tr>
<tr>
<td>200</td>
<td>23.2±2.2*</td>
</tr>
<tr>
<td>400</td>
<td>19.7±2.5*</td>
</tr>
<tr>
<td>Group 4: Pumpkin seeds extracts</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>37.1±2.9</td>
</tr>
<tr>
<td>200</td>
<td>35.4±2.0</td>
</tr>
<tr>
<td>400</td>
<td>23.3±2.5</td>
</tr>
<tr>
<td>Group 5: Metronidazole</td>
<td></td>
</tr>
<tr>
<td>62.5</td>
<td>11.0±1.2*</td>
</tr>
<tr>
<td>100</td>
<td>0.5±0.1*</td>
</tr>
<tr>
<td>125</td>
<td>0.0±0.0*</td>
</tr>
</tbody>
</table>

Values expressed as mean ± standard deviation, n=5. *P<0.05 compared to the infected-untreated control.

**Discussion and Conclusions**

Amebiasis is a common parasitic disease in developing countries and its eradication is very difficult due mainly to poverty, characterized by the absence of portable drinking water, proper sanitary habits, absence of good fecal disposal system and poor hygienic practices.6 With reported cases of treatment failure of *E. histolytica* with the commonly used drug metronidazole,10 it has become imperative to explore other potential sources of drug therapy. The results illustrate a significant decrease in the mean parasitic count in feces of rats treated with Garlic (50.7±2.6) and Pawpaw (49.7±2.8) extracts compared to the infected-untreated control rats (82.5±5.6). This decrease in mean parasitic count was statistically significant (P<0.05) for all plant extracts tested.

The three remaining rats in the infected-untreated control were all positive for amoebae at the time of sacrifice. This amoebic infection generally produces cecal score of content and wall ranging between 3 and 4 with the average of 3.3 and 3.0, respectively. This further re-confirms the virulence of the *E. histolytica* parasite used in this study.

The result of this study though with another plant disagrees with that of Sawangjaroen et al.,37 on effects of *Piper longum* fruits, *Piper sarmentosum* roots and *Quercus infectoria* nut gall on cecal amebiasis in rats who reported cecal score of content and wall of rats ranging between 2 and 3 with average of 2.55 and 2.40, respectively. Phillips et al.,40,41 in their study observed that axenic strain of *E. histolytica* parasite becomes non-invasive after prolonged *in vitro* cultivation. From the result obtained in this study, the trophozoites of *E. histolytica* isolated from human bloody stool was still virulent in rats even after prolonged *in vitro* cultivation in Boeck and Drbohlav’s medium. This is in agreement with a similar study by Sawangjaroen et al.,37 who reported that amoebae isolated from control mice Infected with *E.
histolytica parasite was still virulent in the study of the effects of Piper longum fruits, Piper sarmentosum roots and Quercus infecto-
ria nut gall on cecal amebiasis in mice.

Guava extracts are medicinal plant used in tropical and subtropical countries to treat many disorders such as diarrhea, cough and
gastrointestinal disorders. Jaiarj et al. reported that leaf extracts of Guava has a wide spec-
trum of biological activities such as anti cough and antibacterial. From the results in this
present study Guava extract appears to be most effective at a concentration of 400 mg/kg per
day as this concentration cleared all E. histolytica from the caecum as seen in the percentage
cure of 100%. The mean parasitic count in both the cecal contents were (0.0) and feces (0.0)
on the day of examination. This can compared with metronidazole at a dose of 125mg/kg with
percentage cure of 100% and mean parasitic counts of cecal content (0.0) and feces (0.0).

The concentrations 100 mg/kg and 200
mg/kg of Guava extracts gave a percentage cure of 20% and 80% in cecal amebiasis in rats.
The mean parasitic count of E. histolytica para-
site in the cecal contents showed a statistical significant difference (P<0.05) from the
infected-untreated control rats in 100 mg/kg, 200 mg/kg and 400 mg/kg concentrations but
was only significantly different (P<0.05) at concentrations of 200 mg/kg and 400 mg/kg in
feces of rats.

The results obtained from this study is in
disagreement with the observation of
Moundipa et al., and Tona et al., who reported a less pronounced effects in the in vitro
studies on amebicidal effects of Guava extracts. These further re-confirms previous
studies of antidiarrheal properties of leaves extracts of Guava which quercetin, a chemical
constituent of the extracts is thought to be responsible for its antidiarrheic properties.21,
23,25,46 Garlic extract have been reported to
have antiparasitic properties in traditional medicine. Lan et al. reported the in vitro
antiparasitic activity of Garlic on pathogenic protozoa such as E. histolytica, G. lamblia and
Trypanosoma sp.

The results of this study shows that Garlic at
concentrations of 100 mg/kg, 200 mg/kg and
40 mg/kg gave a percentage cure of 0%, 40%
and 80% of cecal amebiasis in rats, respective-
ly (Table 1). In the present study the mean para-
sitic count of E. histolytica in Table 2 and
Figure 1 reduce from 62.2 to 18.5 in cecal con-
ents and 38.2 to 8.6 in feces of rats indicating
the effectiveness of Garlic extract in reducing
the severity of the parasite but not completely
eradicating it. This study is in consistence with that of Behnia et al., who demonstrated
that Garlic is effective against trophozoites of E. histolytica parasite in vitro and the essen-
tial oil exhibits the greatest anti-amebic activity at the lowest minimum inhibitory concen-
tration. Ankri et al., and Mirelman et al., in
their in vitro studies showed that allcim from
freshly crushed garlic inhibited the activity of
cysteine proteinases, an important contributor
to amoebic virulence. Pawpaw seeds extracts is used in tropical and subtropical countries as
remedy for parasitic infection. Okeniyi et al. established the effectiveness dried seed
extract against human intestinal parasite. Pawpaw extracts at concentrations of 100
mg/kg, 200 mg/kg and 400 mg/kg gave a per-
centage cure of 0%, 40% and 60% of cecal ame-
biasis in rats, respectively. There was no sta-
tistical significant difference (P>0.05) in the
mean parasitic count of E. histolytica parasite
at concentration of 100 mg/kg when compared
with the infected-untreated control rats. However, there was a statistical significant dif-
ference (P<0.05) at concentrations of 200 mg/kg and 400 mg/kg. These indicates reduc-
tion of the severity of the parasitic infections but not completely eradicating it. The findings
is in agreement with Kumar et al., who report-
ed less effects in in vitro studies on the ame-
bicidal effects methanol extract of Pawpaw seed
extracts. Pumpkin is used all over the world
both as vegetable and medicinal plant. Diaz
Obregón et al. reported the use of Pumpkin as an antiparasitic agent. There was no sta-
tistical significant difference (P>0.05) in the
mean parasitic count of E. histolytica parasite
at concentrations of 100 mg/kg, 200 mg/kg when compared with the infected-untreated
control however there was a significant differ-
ence (P<0.05) at concentration of 400 mg/kg. These indicate slight reduction of the severity
of the parasitic infections but not completely
eradicating it. Previous studies have reported
on the anti-parasitic properties of pumpkin
extracts, its anti-amebic activity is unknown.26,49-53 From the results of this study,
injected rats treated with metronidazole at
concentrations of 62.5 mg/kg, 100 mg/kg and
125 mg/kg gave a percentage cure of 60%, 80%
and 100% of cecal amebiasis in rats, confirm-
ing that this strain of E. histolytica was still
sensitive to metronidazole. Our result on the
effectiveness of metronidazole on cecal ame-
biais in rats were similar to the studies of
Bhopale et al., Sohni et al., Ghoshal et al., Sawangjaroen et al., who reported a 60%,
80% and 100% cure of cecal amebiasis both in
rats and mice at concentrations of 62.5 mg/kg,
100 mg/kg and 12 mg/kg respectively.

This study has revealed that Guava at a high
dosing level (400 mg/kg BW) is as good as the
standard drug in reducing the both parasite
load (probably with limited side effect). It is
therefore recommended that a similar and
more comprehensive work be done possibly
on human subjects.

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