Phytochemical Screening of Fruit of *Azanza garckeana* and Root of *Acacia macrothyrsa*

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Abstract: The powdered fruit of *Azanza garckeana* and root of *Acacia macrothyrsa* were subjected to cold extraction using methanol. Phytochemical screening of methanol extracts revealed the presence of saponin, alkaloids, flavonoids, steroids terpenes, phenols and tannin in *Azanza garckeana*. The methanolic root extract showed the presence of flavonoids, terpenoids, tannins, cardiac glycosides and saponins in *Acacia macrothyrsa*. These secondary metabolites may be responsible uses of the plants, and the study has confirmed that these plants are of medicinal value due to their phytochemical content and can be exploited for pharmaceutical and cosmetic industries.

Keywords: phytochemicals; *Azanza garckeana*; *Acacia macrothyrsa*; saponin; alkaloids.

1. Introduction

The use of plants as medicine to cure illness and to lubricate the wheels of social interaction at interpersonal and level is a behaviour that predates civilization, it is found in every society irrespective of its level of development and sophistication (Odugbemi et al., 2007). Historically, plants have provided a source of inspiration for novel drug compounds as plants derived medicines have made large contributions to human health and well-being (Achan et al., 1980). The primary benefits of using plant-derived medicines in healing are relatively safer than synthetic alternatives, offering profound
therapeutic benefits and more affordable treatments (Kudi and Myint, 1999). The most important of these bioactive constituents are alkaloids, tannins, flavonoids and phenolic compounds (Hill, 1952).

Phytochemicals exists as long as plants exist but we only know about hundreds of years about their existence. Medicinal plants are widely used by traditional cultures all over the world. It is likely that the knowledge of traditional medicine developed through trial and error over many centuries. Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids, and phenolic compounds. Many of these indigenous medicinal plants are used as spices and food plants (Sofowora, 1982).

Synthetically made therapeutic have over the years developed problems such as toxicity, resistance by micro-organisms allergy, super infection or even addiction (Sofowora, 1982). Another limitation of synthetic drug is that they are becoming increasingly expensive. Hence this leads to the use of natural product as alternatives which Acacia macrothyrsa could not be left out. They are known to be relatively cheap, readily available and easily accessible. They are also known to be user friendly (Sofowora, 1982). They therefore constitute a better choice especially to the developing countries. Many of these natural products has limited side effects, allergic reactions and limited resistant cases. Even in the western world most synthetic drugs were initially discovered from plants. Hence investigation as a source of drugs is still actively pursued. Though many plants have been screened for antimicrobial properties with some leading to the discovery of the derived drugs known today, a vast majority of them have not yet been adequately evaluated (Farnsworth et al., 1985). Recently, the applications of most medicinal plant have been based on the use of full plants. Advances in research and development have resulted in the extraction of active principles of plants (Adewumi and Adesongan, 1984).

The objective of this research therefore is to determine the presence of phytochemicals in fruit of Azanza garckeana and root of Acacia macrothyrsa. In an attempt to confirm the phytochemistry, extraction of the samples and simple chemical tests were conducted to detect the presence of some secondary metabolites like alkaloids, saponins, tannins, glycosides, flavonoids and anthraquinones.

2. Materials and Methods

The root was collected from Yelwa market, Bauchi and was identified by the Department of Biological Science Programme of Abubakar Tafawa Balewa University, Bauchi. They were air dried for about two weeks. The fruit of Azanza garckeana was collected from Tula, in Kaltungo Local Government Area of Gombe State, and were identified by the Biological Science Department of
Gombe State University. The fruits were left to dry for some weeks, and the edible part was separated from the seed part. They were further left to sun dry for some couple of days. The samples (fruit of *Azanza garckeana* and root of *Acacia macrothyrsa*) were air dried for about two weeks, then grinded into fine powder using milling machine.

The method of cold maceration was used in the extraction using a polar solvent methanol. The extracts of fruit of *Azanza garckeana* and root of *Acacia macrothyrsa* were prepared by soaking 100 g of each in 250 mL methanol for four days with frequent agitation until soluble matter is dissolved. The resulting mixture was filtered by gravity filtration and the filtrate was concentrated by evaporation using rotatory evaporator. The extracts were kept in a refrigerator until required for testing.

Phytochemical examinations were carried out for all the extracts using standard procedures to identify the constituents. Qualitative analysis of the crude extracts were carried out as described by Brain and Turner (1975), Sofowora (1982), Ushie and Adamu (2010) and Adamuet et al. (2013) to identify the presence of the classes of secondary metabolites (alkaloids, anthraquinones, flavonoids, tannins, saponins, glycosides, cardiac glycosides, terpenes, steroids, phenol, etc).

### 3. Result and Discussion

#### 3.1. Results

The result of phytochemical screening of fruit of *Azanza garckeana* reveals the presence of alkaloids, saponins, tannin, flavonoids, phenols and steroids/terpene as shown in Table 1.

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Test/method</th>
<th>Inference result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>Wagner &amp; Mayer test</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>Froth &amp; Emulsion test</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>Harbone (1973) method (ferric chloride test)</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Harbone (1973) sofowara (1993) (ammonia and ammonium chloride test)</td>
<td>+</td>
</tr>
<tr>
<td>Phenol</td>
<td>Harbone (1973) method</td>
<td>+</td>
</tr>
<tr>
<td>Steroids/terpene</td>
<td>Salkowski and Liebermans test</td>
<td>+</td>
</tr>
</tbody>
</table>

Note: +, positive; -, negative.

The result of phytochemical screening of root of *Acacia macrothyrsa* reveals the presence of saponins, tannin, flavonoids, phenols and steroids/terpene and absence of alkaloids as shown in Table 2.
Table 2. Preliminary screening of root extracts from Acacia macrotyrsa

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Reagents/Tests</th>
<th>Inference result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>a) Wagners</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>b) Mayer</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>c) Drangerdoff</td>
<td>-</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>Sample + chloroform + few drops of conc. H₂SO₄</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Extracts + ethyl acetate + ammonia</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>Frothy test</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Emulsion test</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>Extracts + 10 mL of water (boil) + 1% ferric chloride</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>Sample + chloroform + H₂SO₄</td>
<td>+</td>
</tr>
<tr>
<td>Test for reducing sugar</td>
<td>Sample + Fehling solution + heat</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: +, positive; -, negative.

3.2. Discussion

Phytochemical screening involves simple chemical tests which are so sensitive that the amount of extracts used to carry out each test. The methanolic fruit sample extract showed that saponin, alkaloids, flavonoids, steroids terpenes, phenols and tannin were the major phytochemicals detected in Azanza garckeana. The methanolic root extract showed the presence of flavonoids, terpenoids, tannins, cardiac glycosides and saponins in Acacia macrotyrsa. Alkaloid test of the basic organic portion gotten after extraction of methanolic root, Acacia macrotyrsa extracts showed a negative result.

The fruit of Azanza garckeana and root of Acacia macrothyrsais are very useful because of the presence of flavonoids. The widespread distribution of flavonoids, their variety and their relatively low toxicity compared to other active plant compounds mean that many animals, including humans, ingest significant quantities in their diet. Ojokuku et al. (2010) pointed out that flavonoids have been shown to have antibacterial, anti-inflammatory, anti-allergic, antimutagenic, antiviral, antineoplastic, anti-thrombotic and vasodilatory activities (Alan and Miller, 1996). Also, flavonoids are of immense medicinal values, it possess antioxidant and anti-inflammatory activity. It has the ability to scavenge hydroxyl radicals, super oxide anions and lipid peroxy radicals (Okwu, 2004; Okwu and Josiah, 2006). The beneficial effects of fruit, vegetables, and tea or even red wine have been attributed to flavonoid compounds rather than to known nutrients and vitamins (Félicien, 2008). They show anti-allergic, anti-inflammatory, anti-microbial (Cushnie and Lamb, 2005) and anti-cancer activities.

Saponins is detected in the fruit of Azanza garckeana and root of Acacia macrothyrsa extracts.
Saponin causes complexation with cholesterol to form pores in cell membrane bilayers, e.g., in red cell (erythrocyte) membranes, where complexation leads to red cell lysis (hemolysis) on intravenous injection (Francis et al., 2002). Saponins bind with bile salt and cholesterol in the intestinal tract. Bile salts form small micelles with cholesterol facilitating its absorption. Saponins cause a reduction of blood cholesterol by preventing its re-absorption. There is tremendous, commercially driven promotion of saponins as dietary supplements and nutriceuticals. There is evidence of the presence of saponins in traditional medicine preparations (Xu et al., 1996).

Tannins may be employed medicinally in effective protection of the kidneys, anti-inflammatory, antidiarrheal, haemostatic and antihemorrhoidal compounds. Tannins are used in the treatment of wounds emanating from varicose ulcers and hemorrhoids (Njoku and Akumufula, 2007). It is also used to stop bleeding during circumcision (Joshua, 2006). Tannins have also been reported to have anti-viral effects (Bajaj, 1988). Tannins have shown potential antiviral (Lü et al., 2004), antibacterial (Akiyama, 2001) and antiparasitic effects.

Alkaloids were detected in methanol extract of the fruit of *Azanza garckeana* and were not detected in the root of *Acacia macrothyrsa*. Hence, the beneficial effect is only obtained from fruits of *Azanza garckeana*, but not from root of *Acacia macrothyrsa*. The alkaloids contained in plants are used in medicine as anaesthetic agents (Herourat et al., 1988). Harborne (1988) also reported on analgesic properties of alkaloids. Alkaloids have contributed to the majority of the poisons, neurotoxins and traditional psychedelics and social drugs e.g. nicotine, caffeine, methamphetamine (ephedrine), cocaine, and opiates consumed by humans (Zenk and Juenger, 2007).

4. Conclusions

The results reveal the presence of phytochemicals which are medicinally active constituents in fruit of *Azanza garckeana* and root of *Acacia macrothyrsa* extracts. The phytochemical compounds identified have been documented by many researchers to be bioactive and have been confirmed by previous works to have medicinal as well as physiological activity and therefore could be said to be responsible for the efficacy of the plants studied in treatment of different ailments. These plants could therefore be seen as a potential source for useful drug, and the continued traditional medicinal use of these plants is therefore encouraged.

References


