Phytochemical and proximate composition of leaves of Anacardium occidentale

Abstract: Phytochemical analysis is an important step leading to the isolation and characterization of novel compounds with promising biological and pharmacological activities. The aim of this study was to investigate the phytochemical and proximate composition of leaves of Anacardium occidentale. Qualitative phytochemical screening and proximate analysis were performed on the plant leaves using standard procedures. The results revealed the presence of alkaloids, flavonoids, tannins, glycosides, saponins, and terpenoids. However, steroids were not detected. With the exception of glycosides, all the detected phytochemicals were more relatively abundant in air-dried sample than in sun-dried sample. Results of proximate analysis showed that the leaves of A. occidentale contained more Nitrogen-Free Substances (NFS) and low protein content. These results show that the leaves of Anacardium occidentale is a reservoir of important phytochemicals.

Keywords: Anacardium occidentale, Extract, Flavonoids, Terpenoids, Proximate analysis.

INTRODUCTION

Plant materials are the major source of drugs. They are readily available and affordable (Arumugam G. et al., 2013). Plants have been the basis for medical treatments through much of human history, and such traditional medicine is still widely practiced today (Yakubu et al., 2015). Traditional herbal medicines are naturally-occurring, plant-derived substances with minimal or no industrial processing that are used to treat illness within local or regional healing practices (Willcox and Bodeker, 2004). They are getting significant attention in global health debates. In China, traditional herbal medicine plays a prominent role in the control and treatment of severe acute respiratory syndrome (SARS) (SARS, 2003). Eighty percent of African populations use some form of traditional herbal medicine, and the worldwide annual market for these products approaches $60 billion. Many hope traditional herbal medicine research will play a critical role in global health (Turner et al., 2005). China, India, Nigeria, the United States of America (USA) and world health organization (WHO) have all made substantial research investments in traditional herbal medicines (Zaslawski, 2005; Zhao and Chan, 2005). Industry has also invested millions of US dollars looking for promising medicinal herbs and novel chemical compounds (Emanuel et al., 2004). This is still a relatively modest investment compared to the overall pharmaceutical industry; however, it raises interesting ethical questions, some of which are not faced in more conventional drug development (Miller et al., 2004).

As attention and public funding for international traditional herbal medicine research collaborations grows, more detailed analysis of ethical issues in this research is warranted (WHO traditional medicine strategy 2002 – 2005).

Medicinal plants contain large varieties of chemical substances which possess important therapeutic properties that can be harnessed for the treatment of human diseases (Gowthami et al., 2012; Manokaran et al., 2008).

Widely grown in tropical climates for its nuts and apples Anacardium occidentale (cashew tree) is native to Brazil, Portugal, India, Southeast Asia and Africa (Sokeng, D.S. et al., 2001). Extracts of the plant have been reported to possess hypoglycemic effect (Braga, A. et al., 2010; & Akinpelu D.A. 2001). The young and tender leaves of A. occidentale are consumed raw or sometimes blanched to reduce the stringent taste. In traditional medicine, the leaves are used for the treatment of dysentery, diarrhea, piles, toothache, sore gums, rheumatism, and hypertension (Andarwulan et al., 2012; Nugroho et al., 2013). This study investigated the phytochemical and proximate composition of leaves of Anacardium occidentale.
MATERIALS AND METHODS

Phytochemical Analysis

Qualitative phytochemical screening was performed using standard procedures. The air- or sun-dried plant leaves were pulverized and a given portion (5 g) was boiled with 20 mL of distilled water gently on a water bath for 10 min. The mixture was allowed to cool and filtered. The resultant filtrate was used for the different tests.

Test for Alkaloids

Mayer’s Test

To 1 mL of filtrate, few drops of Mayer’s reagent were added by the side of the test tube. Formation of white or creamy precipitate confirmed a positive result (Trease and Evans, 2002).

Wagner’s Test

To 1 mL of filtrate, few drops of Wagner’s reagent were added by the side of the test tube. Formation of reddish-brown precipitate confirmed the presence of alkaloids (Wagner, 1993).

Test for Flavonoids

A given volume (5 mL) of 1% ammonia solution was added to a portion of the aqueous filtrate followed by addition of concentrated H₂SO₄. Appearance of yellow colour which disappeared on standing indicated the presence of flavonoids (Sofowora, 1993).

Test for Tannins

A few drops of 0.1% ferric chloride was added to 3 mL of the filtrate and observed for brownish green or a blue-black colouration (Sofowora, 1993).

Test for Cardiac Glycosides (Keller-Killani Test)

Aqueous filtrate (5 mL) was mixed with 2 mL of glacial acetic acid containing a drop of ferric chloride solution. This was underlayed with 1 mL of concentrated sulphuric acid, and appearance of a brown ring at the interface was indicative of the presence of cardiac glycosides. Gradual formation of a violet ring below the brown ring, or a green ring in the acetic acid layer was also taken as a positive test (Sofowora, 1993).

Test for Saponins

A portion of the filtrate (10 mL) was diluted with 5 mL of distilled water and shaken vigorously for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously, and then observed for the formation of an emulsion (Sofowora, 1993).

Test for Steroids (Liebermann-Burchard’s Test)

To 2 mL of the filtrate was added few drops of chloroform, 3 – 4 drops of acetic anhydride and a drop of concentrated H₂SO₄. The colour changed from violet to blue or green in some cases, indicating the presence of steroids (Finar, 1986).

Test for Terpenoids (Salkowski Test)

Aqueous filtrate (5 mL) was mixed with 2 mL of chloroform, and 3 mL of concentrated H₂SO₄ was carefully added to form a layer. Reddish brown colouration at the interface was taken as a positive test for terpenoids (Sofowora, 1993).

STATISTICAL ANALYSIS

Measurement data are expressed as mean ± SEM. Statistical analysis was performed using SPSS (21.0).

RESULTS

Percentage Yield

As shown in Table 1, the yields of aqueous and ethanol extracts of air-dried plant leaves were significantly higher than those of sun-dried sample (p < 0.05).

<table>
<thead>
<tr>
<th>Extract</th>
<th>Yield (%)</th>
<th>Air-dried sample</th>
<th>Sun-dried sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>13.65</td>
<td>10.74</td>
<td></td>
</tr>
<tr>
<td>Aqueous</td>
<td>11.75</td>
<td>9.80</td>
<td></td>
</tr>
</tbody>
</table>

Data are percentage yield of extract, and are expressed as mean ± SEM (n = 3).

Results of Phytochemical Evaluation of Anacardium occidentale Leaves

The results of qualitative phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, glycosides, saponins, and terpenoids. However, steroids were not detected. With the exception of glycosides, all the detected phytochemicals were more relatively abundant in air-dried sample than in sun-dried sample (Table 2). Results of proximate analysis showed that the leaves of A. occidentale contained more NFS and low protein content (Table 3).

Table 2: Phytochemicals Present in Anacardium occidentale Leaves
Grains and other plant nutrient plant compounds present in fruits, vegetables, against predators. Phytochemicals are bioactive non-normal metabolic activities which they use for defence refined to produce drugs (plant metabolites can be isolated, characterized and for extraction (location, method of extraction and type of solvent used biochemical variations within species, geographical Phytochemical constituents of plant differ as a result of modern medicine include detailed analysis of herbal products are aimed at enhancing their uses. The use of plant materials for the treatment of illnesses and maintenance of general wellbeing remains the oldest and most popular form of healthcare practice (Chikezie et al., 2015). While modern medical practice requires that compounds be extracted first from a plant and used singly, allowing for quantification of dose, herbal medicine involves the use of plant parts without isolating specific phytochemicals (Chikezie et al., 2015).

The current efforts towards standardization of herbal products are aimed at enhancing their uses. The efforts of modern medicine include detailed analysis of phytochemical constituents of plant materials. Phytochemical constituents of plant differ as a result of biochemical variations within species, geographical location, method of extraction and type of solvent used for extraction (Ojezele & Agunbiade, 2013). Secondary plant metabolites can be isolated, characterized and refined to produce drugs (Ojezele & Agunbiade, 2013).

Plants produce phytochemicals as part of their normal metabolic activities which they use for defence against predators. Phytochemicals are bioactive non-nutrient plant compounds present in fruits, vegetables, grains and other plant foods (Muller, 1998). Phenolics, flavonoids and phytoestrogens have potential antioxidant effect; they are antiestrogenic, anti-inflammatory, immunomodulatory, cardioprotective and anticarcinogenic compounds (Muller, 1998).

Discussion

Anacardium occidentale (cashew) is a perennial tree crop which originated from South America, and it’s now widely grown in the tropics. It is a tree of the Amazon that grows up to 15 m high. Anacardium occidentale has a thick and tortuous trunk with branches so winding that they frequently reach the ground. As a multipurpose tree crop, almost all parts of the plant are useful. The nut is considered the most valuable product (Sokeng et al., 2001; & Braga et al., 2010; Akinpelu, 2001).

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Conclusion

The results obtained in this study show that the leaves of Anacardium occidentale is a reservoir of important phytochemicals.

References


