Phytochemical Screening, Proximate and Elemental Analyses of *Senna siamea* (Lam.) leaves from Kashere metropolis of Gombe State, Nigeria.

*Kendeson A. Christiana¹, Abdulkadir A. Gidado², Danja Abdu Bertha³, Abdu Zakari⁴, Alfazazi Amina⁵*

¹,²,³,⁴,⁵Department of Chemical Sciences, P.M.B 0182, Federal University Kashere, Gombe State, Nigeria.

*Senna siamea* has been used by various ethnicities in Nigeria for the treatment of various ailments including syphilis, herpes, swine fever, typhoid fever, jaundice, abdominal pain, menstrual pain, among others. In this study, the leaves of *Senna siamea* were collected and made to undergo proximate, phytochemical and elemental analyses. Result for the proximate analysis revealed 7.43 % moisture content, 20.62 % ash content, 3.00 % lipid content, 21.88 % protein content, 13.00 % crude fibre content and 34.07 % carbohydrate content. Phytochemical screening results indicated high presence of terpenoids, tannins and volatile oils; moderate presence of alkaloids and cardiac glycosides; low presence of saponins, steroids, flavonoids and general glycosides. Quantitative elemental analysis revealed the presence of iron, magnesium and calcium in appreciable amounts of 11.03 %, 10.83 % and 3.08 % respectively. The secondary metabolites contained in *S. siamea* leaves are hugely responsible for its use in the afore-mentioned treatments and the appreciable amounts of vital minerals suggest they could be processed and inculcated in animal feeds.

**Keywords:** Elemental, *Senna siamea*, Phytochemical, Proximate, Kashere, Gombe.

**INTRODUCTION**

Medicine in several developing countries using local traditions and beliefs is still the mainstay of healthcare. As a basis for the maintenance of good health, most developing countries use traditional medicine and medicinal plants containing natural products with medicinal properties. Medicinal plants, since time immemorial, have been used in virtually all cultures as a source of medicine (Hoareau *et al.*, 1999).

Plants have in their arsenal an amazing array of thousands of chemicals noxious or toxic to bacteria, fungi, insects, herbivores, and even humans. Fortunately, this chemical diversity also includes many compounds that are beneficial to humans: vitamins, nutrients, antioxidants, anticarcinogens, and many other compounds with medicinal value. Most plant species in the world are not edible due largely to the toxins they produce which evolve from the development of a defense mechanism generated by these plants to fight off predator (Kendeson *et al.*, 2016).

Medicinal plants have some natural products which perform definite physiological action on human body, and these bioactive substances with curative properties are secondary metabolites which include alkaloids, carbohydrates, terpenoids, flavonoids, resins, tannin, saponin, essential oils, glycosides, phenols and steroids (Abdu *et al.*, 2015).

Traditional systems of medicine continue to be widely practiced for several reasons - population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments.

*Corresponding author:* Kendeson A. Christiana, Department of Chemical Sciences, P.M.B 0182, Federal University Kashere, Gombe State, Nigeria.

E-mail: kendesonac@yahoo.com Tel: +2348065687565
Plants, especially used in traditional systems of medicine can provide biologically active molecules and lead structures for the development of modified derivatives with enhanced activity and/or reduced toxicity such as vinblastine, vincristine, taxol, morphine, codeine, aspirin, atropine, artemisinin and ephedrine among others (Joy et al., 2001).

The leaves of *S. siamea* are extensively known for their anti-gonorrheal and purgative properties as well as a guinea worm and sore-healing remedy among the Igbo in Nigeria. The fresh leaves concoction is used for curing syphilis, herpes and swine fever and for repelling or killing insects such as termites, bed bugs and mosquitoes as reported by Jimoh et al., (2013). A traditional claim has cited that *S. siamea* is used for the treatment of typhoid fever, jaundice, abdominal pain, menstrual pain, and is also used to reduce sugar level in the blood (Jimoh et al., 2013).

*S. siamea* is an Arabian name and the herb was first brought into use by the Arabian physicians - Serapion and Mesue in the year 1809, it is also known as *Cassia siamea* Lam, cassod tree and Cassia tree; an Angiosperm belonging to the family Fabaceae (Bukar et al., 2009).

*S. siamea* is used ethno-medicinally especially when decocted, as anti-malaria, laxative, blood cleaning agent, cure for digestive system and genitourinary disorders, herpes and rhinitis (Bukar et al., 2009). The leaves of *S. siamea* are extensively known for their anti-gonorrheal and purgative properties as well as a remedy against guinea worm and sore-healing among the Igbo in Nigeria. The fresh leaves concoction is used for curing syphilis, herpes and swine fever and for repelling or killing insects such as termites, bed bugs and mosquitoes as reported by Jimoh et al., (2013). A traditional claim has cited that *S. siamea* is used for the treatment of typhoid fever, jaundice, abdominal pain, menstrual pain, and is also used to reduce sugar level in the blood (Jimoh et al., 2013).

The leaves of *S. siamea* were reported to contain anthraquinones, both aglycones and glycosides (Aurapa and Wandee, 2009). Anthraquinones found in the leaves of *S. siamea* are rhein, cassiamin, phycion, chrysophanic acid, and sennosides (Gritsanapan, 1983 and Nualkaew, 1999). Saponin, alkaloids and phlobatannins are the major phytochemical identified in *S. siamea* leave extract (Smith, 2009). These phytochemical exhibit diverse pharmacological and biochemical actions when ingested by animals (Amadi et al., 2006).

*S. siamea* is effective in managing constipation, in association with a number of causes including surgery, childbirth and the use of narcotic pain relievers (Hill, 1992). It is used locally as anti-malaria drugs, especially when it is used in form of decoction (the leaves, bark) (Lose et al., 2000). In traditional medicine, the fruit is used for the treatment of fever, skin disease, constipation, diabetes, hypertension, and insomnia (Kinhorn and Balquadrin, 1992). Various extracts of leaves, stem bark, and flowers of *S. siamea* were screened for its anti-malarial activity. Most of the activities described were determined in vitro on *Plasmodium falciparum* strains (Jun et al., 2012 and Hussian, 1991).

**MATERIALS AND METHODS**

Sample collection and preparation

*S. siamea* leaves were collected within Kashere metropolis from the available *S. siamea* trees. The leaves were identified at the Department of Biological Sciences, Faculty of Science, Federal University Kashere. They were washed, air-dried and stored away for the various analyses.

Extraction

The sample was extracted using cold extraction, in an aspirator bottle with 2.5 liters of distilled water for 48 hours after which it was filtered and concentrated using rotary evaporator at a 100°C to yield a dark greenish gum. This was then used for phytochemical screening following standard procedure as described by Sofowora (1993), Trease and Evans (2002).

Elemental and Proximate Analyses

Determination of elemental proximate compositions of *S. siamea* leaves were done using the methods described by AOAC (1990) and James (1995).

**RESULTS AND DISCUSSION**

**Table 1:** Result showing the Phytochemical screening of *S. siamea* leaves

<table>
<thead>
<tr>
<th>Phytochemical Constituent</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids (Dragendoff’s)</td>
<td>++</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>+++</td>
</tr>
<tr>
<td>Steroids</td>
<td>-</td>
</tr>
<tr>
<td>Anthraquinones</td>
<td>-</td>
</tr>
<tr>
<td>Phlobatannins</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>+++</td>
</tr>
<tr>
<td>Volatile Oils</td>
<td>++</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>+</td>
</tr>
<tr>
<td>Glycosides (general)</td>
<td>-</td>
</tr>
<tr>
<td>Resins</td>
<td>-</td>
</tr>
</tbody>
</table>

**Key:**

+++ Present in high amount
++ Present in Moderate amount
+ Present
- Absent

---

Phytochemical Screening, Proximate and Elemental Analyses of *Senna siamea* (Lam.) leaves from Kashere metropolis of Gombe State, Nigeria.
The results showed that the leaves of *S. siamea* contain the following metabolites: alkaloids, saponins, tannins, steroids, terpenoid, flavonoids, volatile oils, glycosides, which are the basis of therapeutic potentials of medicinal plants. Anthraquinones and Phlobatannins were not detected which negates the findings of Gritsanapan (1983) and Nuvalkaew (1999). This probably could be the result of geographical and climatic differences between regions where both plant samples grow. The presence of tannins as reported by Maynard (1997) is responsible for lowering available protein by competition and can therefore elicit protein deficiency syndrome, “Kwashiorkor”. It is believed that the role of saponin in plant is to protect against attack by potential pathogens (Sparg et al., 2004). Flavonoids elicit a wide range of therapeutic activities as antihypertensive, anti-rheumatism as well as antimicrobial as identified with flavonoids of *Cassia siamea* (Veerachari and Bopaiah, 2011). Essiet et al., (2010) reported that many plant containing flavonoids are diuretic and antioxidants, the leaves and stems of this plant can be equally applied in each case. Cardiac glycosides were detected in this extract and this compound has been useful in the treatment of asthma (Trease and Evans, 2002).

**Table 2: Proximate chemical composition of *S. siamea* leaves**

<table>
<thead>
<tr>
<th>Chemical composition</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content</td>
<td>7.43</td>
</tr>
<tr>
<td>Ash Content</td>
<td>20.62</td>
</tr>
<tr>
<td>Crude Lipids</td>
<td>3.00</td>
</tr>
<tr>
<td>Crude Protein</td>
<td>21.88</td>
</tr>
<tr>
<td>Crude Fibre</td>
<td>13.00</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>34.07</td>
</tr>
</tbody>
</table>

Proximate analysis of a food is the nutritional composition of that food. It is the estimate of the nutritive value of human food in its chemical form. The proximate analysis result shown in Table 2 above, revealed that *S. siamea* contains essential nutrients, energy sources for good human and animal health because of the high percentage of protein, carbohydrate and fibre contents. The moisture content was not high, indicating less chances of microbial degradation of the drug during storage because excess moisture can result in the breakdown of important constituents by enzymatic activity and as a result may encourage the growth of yeast and fungi during storage.

**Table 3: Result for Elemental Analysis of *S. siamea* leaves**

<table>
<thead>
<tr>
<th>Elements Determined</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca</td>
<td>3.08</td>
</tr>
<tr>
<td>Fe</td>
<td>11.03</td>
</tr>
<tr>
<td>Pb</td>
<td>0.38</td>
</tr>
<tr>
<td>Cd</td>
<td>0.07</td>
</tr>
<tr>
<td>Mg</td>
<td>10.83</td>
</tr>
</tbody>
</table>

Some minerals are essential, required for normal metabolism of organisms and various physiological processes such as calcium, while others are non-essential and play no significant biological roles. These mineral values are useful for body functions which could be why it is used in medicinal application (Kendeson et al., 2016). The mineral profile (Table 3) showed the presence of Fe and Mg, followed by Ca. However, the presence of Pb and Cd in the leaves could be due to the toxicity of the environment and hence detrimental to health as the action level for Pb and Cd as recommended by WHO has been exceeded (Abdulkadir et al., 2017).

**CONCLUSION**

*S. Siamea* leaves from Kashere metropolis were subjected to proximate, phytochemical and elemental analysis. Results obtained revealed 7.43 % moisture content, 20.62 % ash content, 3.00 % lipid content, 21.88 % protein content, 13.00 % crude fibre content and 34.07 % carbohydrate content. Phytochemical screening results indicated high presence of terpenoids, tannins and volatile oils; moderate presence of alkaloids and cardiac glycosides; low presence saponins, steroids, flavonoids and general glycosides. Quantitative elemental analysis revealed the presence of iron, magnesium and calcium in appreciable amounts of 11.03 %, 10.83 % and 3.08 % respectively. *S. siamea* leaves is known traditionally to cure malaria and typhoid fever within Kashere metropolis; hence the study was to justify part of the claim by traditional healers (herbalists).

**REFERENCE**


Accepted 9 January 2018


Copyright: © 2018 Kendeson et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are cited.