Proximate, Phytochemical Analysis and Pharmacological Profile of Cassia Torra Native to Zuru Town, Kebbi State Nigeria

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ABSTRACT

Cassia tora, is commonly found in Nigeria, it’s annual shrub which grows in a wild land. The plant and its different parts are used for their nutritional and medicinal purposes. In the present study, an attempt was made to investigate nutritional contents, phytochemical analysis and medicinal evaluation of Cassia tora. The crude powder extracts of the leaves of the plants were taken for the study. The phytochemical screening was done for the selected plants. Phytochemistry of the plant reveals that Cassia tora contains anthraquinones, protein, carbohydrates, saponins, glycosides, fixed oils and fats. Several chemical contents such as naphthopyrone glycosides, flavonoids, glycosides, anthraquinone, etc. have been separated from this plant. The plants has been found to have hepatoprotective, antigenotoxic, antipsoriatic, antinociceptive, immunostimulatory, anticancerous, antifeedant, larvicidal, antiproliferative, hypolipidemic, antimutagenic activity. It also has a property of mild laxative and diuretics so can be used in constipation, dyspepsia and flatulence. Its decoction is used for healing and washing of wounds.

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INTRODUCTION

Herbal medicine also known as botanical medicine or phytomedicine—refers to using plants seeds, flowers, roots for medicinal purpose. Native to many societies before the era of modern medicine, traditional medicine—also referred to Native medicine, also referred to as folk medicine, is a traditional and culturally embedded method of managing and treating physical and mental health conditions. It evolved throughout many generations. (Abraham et al., 2009; WHO (2000). Despite its limitations in terms of accurate diagnosis, hygiene, standardization, dosage ethics, and occasionally overstated claims that cannot be verified scientifically, it is still widely used to maintain health. (Anupama 2017; Akshay and Manish, 2021). Herbalism has a long traditional use outside of conventional medicine. It is becoming more main stream as improvements in analysis and quality control along with advances in clinical research show the value of herbal medicine in the treating and preventing disease (Chaurasia et al., 2011). The medicinal action of plants is unique to a particular plant species, consistent with the concept that the combination of secondary metabolites in a particular plant is taxonomically distinct for three medicinal plants and their description and uses respectively (Akshay and Manish, 2021). It follows that plants have a variety of phytochemical components called secondary metabolites that can work alone, in combination, or independently to improve health conditions. There is still much to be discovered about this important resource of higher plants and structurally varied possible bioactive organic compounds as a source of novel medications. (Hostettmann et al., 1996; Elujoba 1999; Shok 1999; Kinghorn 1992; Smita and Patil 2010). There has been a recent resurgence of interest in herbal remedies because the use of plant stem bark, floras, seeds, roots, leaves, or berries for medicinal purposes has a long history of use outside of orthodox medicine and is becoming more mainstream due to advancements in investigation and quality control as well as innovations in clinical research (UMMC 2016).

LITERATURE REVIEW

In the genus Senna, Cassia tora is an annual herbaceous legume. The plant belongs to the monotypic genus Diallobus and is a shrub that can grow up to 30 to 90 cm high. It is occasionally divided. In the genus Senna, Cassia tora is an annual herbaceous legume. The plant belongs to the monotypic genus Diallobus and is a shrub that can grow up to 30 to 90 cm high. It is occasionally divided. (Chidume et al, 2002). It has grows wild in Africa, Asia, North, Central, and South America, as well as Oceania, with pinnate leaves. It is considered a major weed in many places and grows best in well-drained, fertile soil. (Serve Nature, 2007); 2010; Smita & Patil). It is said to be beneficial for the eyes and to have antiasthenic and purgative properties. It is used to treat ulcers, skin disorders, ringworm, psoriasis, leprosy, and to rejuvenate vision. To make tea, the kernels are frequently roasted before being boiled in water as a traditional remedy (Dirar, 1984). In Africa and other parts of the world, fresh cassava leaves are occasionally consumed as a vegetable. The plant is grown in homes for this purpose in a number of nations, including Cameroon, Senegal, Nigeria, Ghana, and Ethiopia. Here in the present study Cassia torra plant was taken for
phytochemical screening and plant extracts was taken and evaluated, the phytochemical constituents were studied by qualitative analysis for performing various chemical tests.

**METHODOLOGY**

**Collection and Identification of Plant Material**

August is when the fresh leaves of Cassia torra are collected. (2023) from the surrounding farmlands of Zuru town. The plant was authenticated at the herbarium by experts of Department of Plant Science, Usmanu Danfodiyo University sokoto a voucher specimen (UDUS/2023/PS/01) was retained.

**Making Plant Extract Preparations**

To remove any dust or other surface contaminants, the fresh leaves were washed under running tap water. The leaves were dried for two weeks in a shaded area with good ventilation and sporadic mixing. A mechanical blender was used to grind the dried leaves into a coarse powder. In a Soxhlet apparatus, 150g of leaf powder was extracted using ethanol over the course of 24 hours. After recovering the solvent in vacuo, 35 grams of residue—known as Cassia tora ethanolic leave extract—were obtained.

**Screening With Phytochemicals**

**Check for Tannins**

In order to check for tannins, a small amount of the extract was placed in a water bath with 20 cm3 of distilled water and cooked for five minutes. The mixture was then filtered while still hot. Subsequently, tiny A small amount of cool filtrate was mixed with two to three drops of 10% ferric chloride reagent (Trease & Evans, 1996).

**Check for Glycosides in the Heart**

The cardiac glycosides test was conducted using both the legal and Killer-Kilianni methods. After adding 0.5 g of crude leaf extract to 2 cm3 of acetic acid, concentrated H2SO4 was poured into the test chamber (Evans & Trease, 1996).

**Test for Alkaloids**

On a water bath, 0.5 g of ethanolic leaf extract was combined with 5 cm3 of 1% aqueous hydrochloric acid. Then, three tiny portions of the filtered extract and two drops of each of the following reagents were added: Dragendorff's, Mayer's, and Wagner's (Tease & Evans, 1996; Soforowa, 1993).

**Test for Saponins**

The identification of saponins was done using the frothing test on a 2 g crude extract [Silva and others, 1998].
Test for Reducing Sugar

To find the presence of reducing sugar, Fehling's solution was added to a small amount of the extract and it was boiled for five minutes (Silva et al., 1998).

Test for Anthraquinones

The presence of free and combined anthraquinones was also investigated in the crude extract (2 g). The process of identifying free anthraquinones involved combining 1 g of crude extract with 10 cm³ of chloroform, shaking continuously for 5 minutes, and then filtering the mixture. 10% ammonia solution added to match the volume of the filtrate came next. One gram of powdered crude extract and two centiliters of 10% hydrochloric acid were boiled for five minutes to produce combined anthraquinones. After boiling, the mixture was split against the same volume of chloroform after it had been filtered in a test tube and allowed to cool. After pipetting off the top layer and placing it in a test tube, half of the volume of a 10% ammonia solution was added, and the container was gently shaken. (Ajayi et al., 2011).

Test for Flavonoids

The Shinoda test was used to determine flavonoids. A very small amount of the extract was dissolved in methanol. Five drops of concentrated hydrochloric acid were added after some magnesium chip bits were improved (Silva et al., 1998).

Test for Terpenoids/Steroids

The Salkowski test and the Lieberman Burchard test were used to identify terpenoids and steroids, respectively. A small amount of unrefined extract floating in chloroform was given to the former. The test tube was filled with an equivalent volume of acetic anhydride and concentrated H₂SO₄. And for the latter, two centiliters of chloroform were combined with a tiny amount of crude extract. Three drops of concentrated H₂SO₄ were applied to the layer (Silva et al., 1998; Ajayi et al., 2011).

Test for Phlobatannins

A small amount of the extract was suspended in distilled water for the phlobatannin test, and the mixture was subsequently shaken in a test tube and filtered. Using a hot plate stirrer, the aqueous solution was combined with 1% aqueous hydrochloric acid and brought to a boil (Ajayi et al., 2011).

Test for Fixed Oils and Fats

To detect the presence of an oily stain, which was used to identify fixed oils and fats, a small amount of the extract was sandwiched between two sheets of filter paper (Trease & Evans, 1996).

Test for Proteins

In order to test the protein in the extract, 1 cm³ of 10% sodium hydroxide solution was added, heated, and then a droplet containing 0.7% solution of copper sulphate was introduced (Trease & Evans, 1996).
Gas Chromatography Mass Spectrometry Analysis and Compound Identification

Gas Chromatography An Elite-5MS, 30 M X 0.25 mm, 0.25 μm capillary column and a Perkin Elmer Claura 860 GC connected to a PE SQ-8 C mass analyzer were used for the mass spectrometry analysis. Helium is used as the carrier gas. The temperature is programmed to start at 400°C, hold for 5.0 minutes, ramp at 120°C/min to 2600°C, and then be held isothermally for 5 minutes. With an autosampler, the injector volume was 1 µl and the injector temperature was 2500°C. The injector was a Split mode operation of a programmable split-splitless injector (PSSI) (1:50). The carrier flow was 1 cm3/min. With an ionization voltage of 70 eV, the ion source temperature of the sample was used to ionize its constituent parts in the electron ionization mode. 1800°C and a transfer line temperature of 2000°C. The mass range that was employed was m/z 50–550 amu. By using standard techniques to compare the mass spectra of the compounds comparing them to the NIST/Wiley internal reference mass spectrum library, the compounds were identified (Joulain and Konig 1998).

Proximate Analysis

Calculating the Moisture Content With a few minor adjustments, the technique outlined by Udo and Ogunwele (1986) was used to determine the moisture content. This method involved placing 2 g of powdered leaves (W0) in a crucible that has been previously weighed (W1) and oven-dried it for three hours at 105°C. After cooling in a desiccator, this was weighed again and again until the weight (W2) remained unchanged, at which point the moisture content was determined.

\[
\text{Moisture content (\%)} = \frac{W_1 - W_2}{W_0} \times 100
\]

W1 = mass of crucible with sample
W2 = mass of crucible with dried sample
W0 = mass of sample.

Determination of Ash Content

The entire amount of mineral or inorganic residue in the sample is called ash. It was ascertained by adding 2 g (M1) of dried, ground leaves to a crucible (M0) that had been weighed, and then the leaves were sequentially burned for 6 hours at 550°C in a furnace. After allowing it to cool in a desiccator, this was weighed (M2). The weight fluctuations show how much ash is there (James, 1995).

\[
\text{Ash content (\%)} = \frac{M_2 - M_0}{M_1} \times 100
\]

M1 = Mass of sample
M2 = Mass of incinerated sample
M0 = Mass of unfilled crucible
**Determination of Crude Lipid Content**

The Soxhlet extraction method was used to estimate the approximate lipid content. Five grams of the crushed sample (W0) were added to weighed filter paper. After the contents was carefully organized in a thimble flask and folded and tied with thread (W1), hexane was used to extract it for six hours. Following oven drying, the sample was placed in a desiccator to cool before being weighed (W2). A rough lipid calculation was made after the procedure was completed in triplicate (Udo & Ogunwele, 1986).

\[
\text{Crude lipid (\%) } = \frac{W_1 - W_2}{W_0} \times 100
\]

W0 = Untreated sample  
W1 = Filter paper with sample before extraction  
W2 = Extracted sample

**Determination of Crude Fibre Content**

The 5 g (W0) defatted and ground sample was digested for 30 minutes using a mixture of 20% H2SO4 and distilled water in a 1:5 ratio in order to determine the crude fiber content. Following the filtration of the mixture, boiled for 30 minutes, the residue was collected in a beaker filled with a 1:10 mixture of distilled water and 10% NaOH. After filtering the solution, After treating the residue with 10% HCl, distilled water was boiled. After that, it was cleaned three times with petroleum ether and twice with ethanol. It was then moved into a weighed and clean crucible, dried at 105 degrees Celsius, cooled, and weighed (W1). Lastly, burned for 1 hour and 30 minutes at 550 degrees Celsius, cooled, and weighed (W2). The following expression is used to calculate the fraction of crude fiber (Udo & Ogunwele, 1986).

\[
\text{Crude fibre (\%) } = \frac{W_1 - W_2}{W_0} \times 100
\]

W0 = Sample’s mass  
W1 = Mass of dried sample  
W2 = Mass of incinerated sample

**Determination of Crude Protein**

The AOAC (1990) Miro-Kjeldahl method was used to calculate the percentage of crude protein. The catalyst (8 g) and crude sample (2 g) were combined, and 20 cm3 of concentrated H2SO4 was used to digest the mixture before it was heated in an inclined position. The solution was heated further, occasionally swirling, until it became colorless. Distilled water was used to fill the space up to 100 cm3. Using a 10 centiliters of 4% boric acid and 10 centiliters of 50% NaOH (10 M NaOH), the digested sample (10 cm3) was distilled. Following the addition of two drops of mixed indicator, the mixture was titrated against 0.1% HCl. The result is shown as % nitrogen,
Calculating Nitrogen Free Energy (Digestible Carbohydrate) The nitrogen free extract (NFE) underwent mathematical analysis. To do this, take 100 and subtract the total percentages of all the nutrients that have already been determined. NFE is equal to 100% - (weight on a dry basis) (% ash + % moisture + % crude protein + % crude lipid). Thus, energy was computed using Isiong and Idiong’s (1997) formula, \[ \text{ratio of (CP×4) + (CFT×9) + (NFE×4)} \].

**Statistical Analysis**
Three copies of the analysis were performed, and the mean ± standard deviation was used to express the findings. At \( t \) Values were considered statistically significant if \( P \leq 0.05 \).

**RESULTS**
Table 1 presents the findings of the initial phytochemical analysis performed on Casia tora’s ethanolic leaf extract, while Table 2 shows proximate composition of the plants ethanolic extracts.

### Table 1. Phytochemical Analysis of the Leaves of Cassia Tora

<table>
<thead>
<tr>
<th>Phytochemical Extracts</th>
<th>Tannins</th>
<th>Phlabotannins</th>
<th>Cardiac glycosides</th>
<th>Flavonoids</th>
<th>Alkaloids</th>
<th>Saponins</th>
<th>Steroids/ Triterpenoids</th>
<th>Proteins</th>
<th>Fats and Oils</th>
<th>Anthraquinones</th>
<th>Carbohydrates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: + = present, - = absent

### Table 2. Cassia Tora Leaf Approximate Composition

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (%)</td>
<td>10.23±0.52</td>
</tr>
<tr>
<td>Crude fibre (%)</td>
<td>7.54±1.08</td>
</tr>
<tr>
<td>Crude fat (%)</td>
<td>6.01±0.07</td>
</tr>
<tr>
<td>Ash (%)</td>
<td>15.01±0.63</td>
</tr>
<tr>
<td>Crude protein (%)</td>
<td>27.34±1.16</td>
</tr>
<tr>
<td>Carbohydrate (%)</td>
<td>33.69±2.38</td>
</tr>
</tbody>
</table>

The three replicates’ means and standard deviations are used to express the results.
Figure 1. GC-MS Spectral Chromatogram of Ethanolic Extract of Cassia Torra Leaves

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Retention Time</th>
<th>Peak area%</th>
<th>Name of the compound</th>
<th>Molecular Formula</th>
<th>Molecular weight</th>
<th>Chemical structure</th>
<th>Reported biological activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>16.779</td>
<td>25.049</td>
<td>Laminarin or 1-Methyl-1,2,3,4,5,6-cyclohexanetol</td>
<td>C_{16}H_{18}O_{9}</td>
<td>194.18 g/mol</td>
<td><img src="image" alt="Chemical structure" /></td>
<td>Anti-malarial [9]</td>
</tr>
<tr>
<td>2.</td>
<td>21.096</td>
<td>8.247</td>
<td>Palmitic acid or n-hexadecanoic acid</td>
<td>C_{16}H_{32}O_{2}</td>
<td>256.42 g/mol</td>
<td><img src="image" alt="Chemical structure" /></td>
<td>Not reported</td>
</tr>
<tr>
<td>3.</td>
<td>25.703</td>
<td>6.187</td>
<td>D-L-ALPHA-TOCOPHEROL or Alpha-tocopherol</td>
<td>C_{20}H_{32}O_{6}</td>
<td>430.71 g/mol</td>
<td><img src="image" alt="Chemical structure" /></td>
<td>Antioxidant, Neuroprotective [10]</td>
</tr>
<tr>
<td>4.</td>
<td>23.012</td>
<td>6.075</td>
<td>Linolenic acid</td>
<td>C_{18}H_{28}O_{3}</td>
<td>278.43 g/mol</td>
<td><img src="image" alt="Chemical structure" /></td>
<td>Antioxidant, Neuroprotective [11]</td>
</tr>
<tr>
<td>5.</td>
<td>22.727</td>
<td>3.361</td>
<td>Phytol or 3,7,11,15-Tetramethyl-2-hexadecen-1-ol</td>
<td>C_{30}H_{52}O</td>
<td>296.50 g/mol</td>
<td><img src="image" alt="Chemical structure" /></td>
<td>Neuroprotective, Antimicrobial, Antiallergic [12]</td>
</tr>
<tr>
<td>No.</td>
<td>MW</td>
<td>PI</td>
<td>Compound Description</td>
<td>Molecular Formula</td>
<td>MW/mol</td>
<td>Property</td>
<td></td>
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</tr>
<tr>
<td>6.</td>
<td>15.884</td>
<td>1.012</td>
<td>Trehalose</td>
<td>C₁₂H₂₂O₁₁</td>
<td>342.29</td>
<td>Neuroprotective [13]</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>16.999</td>
<td>2.652</td>
<td>5,8-Diethyl-6-dodecanol</td>
<td>C₁₅H₂₄O₂</td>
<td>242.44</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>13.043</td>
<td>2.642</td>
<td>Methyl-alpha-D-Glucopyranoside</td>
<td>C₆H₁₂O₆</td>
<td>191.18</td>
<td>Pro-apoptotic activity [14]</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>26.168</td>
<td>2.221</td>
<td>Phthalic acid di (2-propylpentyl) ester</td>
<td>C₂₄H₃₈O₄</td>
<td>390.56</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>25.508</td>
<td>2.095</td>
<td>Terphenyl acetate or Vitamin E acetate</td>
<td>C₂₆H₄₀O₂</td>
<td>472.75</td>
<td>Neuroprotective [15]</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>7.781</td>
<td>1.502</td>
<td>Huperyl acetate</td>
<td>C₁₄H₂₀O₂</td>
<td>216.34</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>25.893</td>
<td>1.711</td>
<td>2-Phamintyglycerol</td>
<td>C₁₅H₂₄O₃</td>
<td>320.50</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>18.500</td>
<td>1.685</td>
<td>Megastigmatrienoic or 4-(1,3-Butadiene)-1,5,5-trimethylcyclohexane-2-one</td>
<td>C₁₅H₂₀O</td>
<td>298.28</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>21.601</td>
<td>1.162</td>
<td>2-Abdo-1,4-dimethoxy-3-methyl-benzene</td>
<td>C₁₅H₁₄O₂</td>
<td>195.25</td>
<td>Not reported</td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

The phytochemicals The phytochemical screening results showed that Cassia tora leaves contained alkaloids, anthraquinones, flavonoids, tannins, carbohydrates, steroids/triterpenoids, protein, fats, phlobatannins, and glycosides (Table 1). Apart from the presence or absence of saponins and triterpenes, respectively, the phytochemical constituents observed bear a strong resemblance to those reported by a team of Indian researchers. (Syafii et al., 201). Several pharmacologic and nutritional activities have been linked to these phytochemical constituents. Plant-based foods, medications, and dietary supplements are consumed by humans in large quantities. In addition to many other substances referred to as phytochemicals or secondary metabolites, plants also supply vitamins, minerals, carbs, protein, fats, and dietary fiber (Hatano et al., 1999). Food that contains these five basic components makes up every human body (Micheal, 1997). This plant contains high concentrations of the macronutrients protein (27.34%) and carbohydrates (33.69%), both of which are essential for healthy bodily function and must be consumed in large quantities. Carbohydrates give the glucose found in the body, which is converted into energy and powers the nervous system. Moreover, glucose provides energy for muscles to work and is essential for brain function. (Valentine et al, 2017). However, according to Sharma et al. (2005), proteins are macronutrients that account for 15% of a person's weight in the body. The body breaks down this essential metabolite to power muscle mass, which improves immunity and supports metabolism. (2011) Mozaffararian et al.

Table 2 provides the results of the proximate analysis of Cassia tora leaves. According to the findings, it contains 15.01 percent ash, 6.01% crude fat, 10.23 percent moisture, 33.69% carbohydrates, 27.34% crude protein, and 7.54% crude fiber. According to the data, crude fat has the lowest value and carbohydrates the highest. The leaves' 15.01% ash content indicates their high mineral element content. While it is less than some leafy vegetables typically consumed in Nigeria, like 20% Talinum trangulare, the value in sweet potato and leaves of Tribulus terrestries exceeds 1.80% and 12%, respectively (Akindahunsi & Salawu, 2005). Because the leaves have a low moisture content of 10.23%, microorganism growth is inhibited and storage life is increased...
(Adeyeye & Ayejuyo, 1994). According to Iniaghe et al. (2009), Compared to Acalypha hupsida (11.02%), Acalypha recemosa (11.91%), and Acalypha maginata (10.83%), the leaves have a lower moisture content. According to studies by Ishida et al. (2000) and Sui-ming et al. (1989), dietary fiber can reduce blood cholesterol levels, the risk of coronary heart disease, hypertension, constipation, diabetes, and breast and colon cancer. According to the study's findings, nutritional principles related to the treatment of malnutrition disorder may be present in the ethanolic leaves extract of Cassia tora.

One of the most popular methods for identifying the components of volatile matter, long- and branched-chain hydrocarbons, alcohols, acids, esters, etc. is GC-MS with NIST library. Using the GCMS-NIST library, twenty The methanolic extract of C. tora leaves yielded twenty major compounds that were identified. These primary substances and information about their purported pharmacological actions were gathered from the body of current literature. The following substances are antioxidative and neuroprotective: DLAlpha-tocopherol, Phytol, Tocopheryl acetate, trehalose, stearic acid, 3,7,11,15-tetramethyl-2-hexadecen-1-ol. The discovered compounds also possess anti-inflammatory, antimicrobial, antibacterial, antiviral, antiasthmatic, anticancer, antimalarial, antituberculosis, antirheumatic, and cholesterol-lowering qualities, according to published reports in the literature. The identification of Cassia tora's bioactive compounds reported in this study supports the plant's use in the treatment of a variety of illnesses (Yu et al., 2008; Islam et al., 2018). Utilizing this plant to lessen the toxicity of Al in this area is justified by the presence of antioxidant and neuroprotective molecules. With a concentration of 25.049%, laminitol has been determined to be the main phytoconstituent in this investigation. It has been reported that an Strychnos ligustrina wood with a high laminitol content was extracted using ethanol. antimalarial properties (Syafii et al., 2016).

CONCLUSIONS

Analyzing the proximate and phytochemical composition of Cassia tora leaves showed that the leaves contain a significant amount of anthraquinones, flavonoids, phthalocyanins, and steroids in addition to adequate amounts of proteins and carbohydrates. The high protein and carbohydrate contents in food can support their use as vital nutritional supplements and as a major source of energy and body building, respectively. The plant has also being widely used in ayurvedic as well as chinese medicine. Pharmacological profile reveals the plant is rich in anthraquinone glycosides and their derivatives. The plants also posses antioxidant and neuroprotective activity. Other pharmacological activities are anti properties that reduce cholesterol and have antirheumatic, antibacterial, antiviral, antimicrobial, anticancer, antimalarial, antituberculosis, and anti-inflammatory effects.
FURTHER STUDY
This research still has limitations so further research needs to be done on the topic “Proximate, Phytochemical Analysis and Pharmacological Profile of Cassia Torra Native to Zuru Town, Kebbi State Nigeria.”

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