

Photochemical Screening, Proximate Analysis and Peroxide Value of Leaves and Fruits of the tree *Cassia fistula* (L)

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ABSTRACT:

Although, the World Health Organization has recommended the use of traditional medicine, only a limited number of medicinal plants have received detailed scientific scrutiny. Thereby this area should be comprehensively investigated. The tree *Cassia fistula* is used extensively in various parts of the world against a wide range of ailments, the synergistic action of its metabolite production being most probably responsible for the plant's beneficial effects. This study investigated a phytochemical screening, proximate analysis, and peroxide value in leaves and fruits of *Cassia fistula*. Qualitative screening for phytochemical showed the presence of Saponins, tannins, flavonoids, alkaloids, and sterols. Proximate analysis of the leaves showed 5.25% moisture, 12.0% ash, 12.39% total protein, 19.63% crude fiber, 9.38% crude fat, 41.33% total carbohydrate, 299.39 calorific value, and 0.76: 1.0 fat: protein. Proximate analysis of the fruits showed 3.20% moisture, 4.93% ash, 16.62% total protein, 7.48% crude fiber, 3.06% crude fat, 64.6% total carbohydrate, 352.82 calorific value, and 0.18:1.0 fat: protein. Peroxide value in 75min with antioxidant showed (0.0) value but without antioxidant, it showed (43.3) value. The innumerable medicinal properties and therapeutic and uses of *Cassia Fistula* as well as its phytochemical investigations prove its importance as a valuable medicinal plant.

Keywords: Proximate Analysis, Peroxide Value, Leaves, Fruits, *Cassia Fistula*.

Introduction:

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years, and have served humans as well as valuable components of seasonings, beverages, cosmetics, dyes, and medicines (Luximon-Ramma *et al.*, 2002). The World Health Organization estimated that 80% of the earth's inhabitants rely on traditional medicine for their primary health care needs, and most of this therapy involves the use of plant extracts or their active components. Those plants and their components are perceived as "natural", "safe" by consumers and are already established as flavorings in human and animal feeds; furthermore, many Western drugs had their origin in a plant extract (Babbar and Madan, 1981; Craig, 1999).

The tree Cassia fistula. is native to India, the Amazon and Sri Lanka. a semi-wild Indian Labernum, it is also known as the Golden Shower. It has become extensively distributed in various other countries including Mauritius, South Africa, Mexico, China, West Indies, East Africa and Brazil as an `ornamental tree for its beautiful bunches of yellow flowers. It has been recognized by the British Pharmacopoeia (Gupta *et al.*, 2000).

In traditional medicine, *Cassia fistula* is one of the most commonly used plants in Unani and Ayurvedic medicines, the tree has also been described to be useful against skin diseases, liver troubles, tuberculosis glands and it is used in the treatment of haematemesis, pruritus, leucoderm and has been suggested for diabetes. Traditionally, the tree is also used as an infusion, decoction, or powder, either alone or in combination with other medicinal plants. In modern times, the tree is also used in any controlled clinical trials, however, commercial preparations have tended to be standardized extracts of the whole plant. The tree has documented to possess analgesic, anti-inflammatory, antioxidant, anti-diabetic, as well as hepato-protective activity. Since many disease conditions have commonly treated with *Cassia fistula* in traditional medical systems, they are considered self-limiting, and need critical evaluation (Ali, 2014).

Description: *Cassia fistula* is a moderate sized deciduous tree 10 m tall, flowers yellow, leaves alternate, pinnate, 30-40 cm long, with 4-8 pairs of ovate leaflets, 7.5-15 cm long, 2-5 cm broad. Fruits are pendulous, cylindrical, brown, septate, 25-50 cm long, 1.5-3 cm in diameter, with 25-100 seeds. Seeds lenticular, light brown, lustrous (Sayeed *et al.*, 1999). *Cassia fistula* grows throughout in Bangladesh and in many other Asian countries and is used as a traditional herbal medicine in India, China, Hong Kong, the Philippines, Malaysia, Indonesia, and Thailand.

Herbal Medicine Uses: There are many *Cassia* species worldwide which are used in herbal medicine systems. These particular families of plants are used widely for their laxative actions. *Cassia fistula* is no exception; it is often used as a highly effective moderate laxative that is safe even for children. However, in large doses, the leaves and bark can cause vomiting, nausea, abdominal pain and cramps (Ross, 2001). The tree *Cassia fistula* is also employed as a remedy for tumors of the abdomen, glands, liver, stomach, and throat, for burns, cancer, constipation, convulsions, delirium, diarrhea, epilepsy, gravel, hematuria, pimples, and glandular tumors. In Ayurvedic medicine systems, the seeds are attributed with antibilious, aperitif, carminative, and laxative properties while the root is used for adenopathy, burning sensations, leprosy, skin diseases, syphilis, and tubercular glands. The leaves are employed for erysipelas, malaria, rheumatism, and ulcers. In Brazilian herbal medicine, the seeds are used as a laxative and the leaves and/or bark is used for pain and inflammation. **Ayurvedic Medicine Uses:** In Ayurvedic medicine, Golden Shower Tree is known as "disease killer". Its fruit pulp is used as mild laxative, As well as, cardiac conditions and stomach problems such as acid reflux. The flowers used for fever, and the root as a diuretic. The bark and leaves are used for skin diseases. The seeds are recognized as ant bilious, aperitif, carminative, and laxative while the root is used for curing adenopathy, burning sensations, leprosy, skin diseases, syphilis, and tubercular glands (Bahorun *et al.*, 2005). The leaves of the tree are used for erysipelas, malaria, rheumatism, and ulcers, the buds are used for biliousness, constipation, fever, leprosy, and skin disease and the fruit for abdominal pain, constipation, fever, heart disease, and leprosy. Thus every part of the tree is recognized for its medicinal properties. The tree is being considered as a firewood source in Mexico.

The reddish wood, hard and heavy, strong and durable, is suited for cabinetwork, farm implements. The bark has been employed in tanning, often in conjunction with avaram. The drug "*Cassia fistula*", a mild laxative, is obtained from the sweetish pulp around the seed (Zaid and Nasser, 2010).

Material And Methods:

Source of Plant Material

Leaves and fruits of *C. fistula* were collected from Khartoum and Wad Madani City, Sudan.

Phytochemical screening

A stock of dried powder (SDP) of leaves and of fruits of *C. fistula* was made in the following tests.

Test for Saponins

Five gm of SDP were extracted with 20 ml of 50% ethanol and filtered. A 10 ml of each extract was evaporated to dryness under reducing pressure and the residue was dissolved in 4 ml distilled water and filtered. The filtrate was vigorously shaken, if a voluminous froth was developed and persisted for almost one hour, this indicates the presence of saponins (Harborne, 1998).

Test for Tannins

Five gm of SDP were extracted with 20 ml of 50% ethanol and filtered. A Ferric chloride reagent (5%w/v); in methanol was added to the filtrate. The appearance of green colour which changes to a bluish black or precipitate is indicative of the presence of tannins.

Test for flavonoids

Twenty gm of SDP were macerated in 50 ml of 1% HCl acid overnight, filtered and the filtrate was subjected to the following test:

- a) 10 ml from each filtrate was rendered alkaline with 2 ml of 10% Na OH, if a yellow colour is formed it indicates the presence of flavonoids.
- b) Shinoda Test: 5 ml of 1% HCl acid and magnesium turnings was added. The formation of red colour indicates the presence of flavonoids, flavanones and/or flavonols (Harborne, 1998).

Test for sterols and/or triterpenes

One gm from each SDP was extracted with petroleum ether and filtered. The filtrate was evaporated to dryness and the residue was dissolved in 10 ml chloroform. 3 ml of the chloroformic extracts were mixed with 3 ml concentrated acetic anhydride and a few drops of sulphuric acid were added. The formation of a reddish violet ring at the junction of the two layers; indicates the presence of unsaturated sterols and/or triterpenes (Harborne, 1998).

Test for Alkaloids and/or nitrogenous bases

Five gm from each SDP were extracted with ethanol and filtered. 10 mls from each were mixed with 2 ml of 10% HCl acid and filtered. The filtrate was rendered alkaline with ammonium hydroxide and extracted with successive portions of chloroform. The combined chloroform extract was evaporated to dryness, the residue was dissolved in 2 ml of 10% HCl acid and tested with Mayer's reagent, and Dragendorff's reagent, respectively. Formation of a precipitate indicates the presence of alkaloids and/or nitrogenous bases (Balbaa, 1974).

Proximate analysis

Moisture, protein, fat, ash and fiber contents were determined according to the Association of Official Analytical Chemists (2010). Total carbohydrate was determined mathematically as follows:

Total carbohydrates = 100% - (Moisture % + Protein % + Fat % + Ash %).

Peroxide value

A 4g of the sample were taken and clearly rancid into a dry 250 stoppered conical flask. Then 10 ml chloroform were added to dissolve the fat by swirling, and 15 ml of glacial acetic acid and 1ml fresh saturated aqueous potassium iodide solution were added. The flask was then Stoppered, and shaken for 1 min and placed for 5 min. in dark. About 75% l water starch solution soluble was used as an indicator.

EXPERIMENTAL RESULTS:

Saponin and flavonoids are found in the fruits but not in leaves, tannins are found in both leaves and fruits, alkaloids and sterols are found in the leaves but not in fruits (Table 1 and 2).

Table (1) Phytochemical Screening of the leaves and fruits of *Cassia fistula*.

| Class chemical | Leaves | Fruits |
|----------------|--------|--------|
| Saponin | - | + |
| Tannins | + | + |
| Flavonoids | - | + |
| Alkaloids | + | - |
| Sterols | + | - |

Table(2) Proximate analyses leave and fruits of *Cassia fistula*.

| Constituent | Leaves | Fruits |
|-----------------|-------------|-------------|
| Moisture | 5.25 | 3.20 |
| Protein | 12.39 | 16.62 |
| Fat | 9.38 | 3.06 |
| Ash | 12.0 | 4.93 |
| Fiber | 19.63 | 7.48 |
| Carbohydrates | 41.33 | 64.6 |
| Calorific value | 299.39±3.58 | 352.82±0.78 |
| Fat: Protein | 0.76±0.03 | 0.18±0.00 |

The relationship between peroxide value with antioxidant and time (Table 3) was very highly negative (p.001) as the correlation coefficient (r= -0.947). The regression equation is:

$$Y = 65.808 - 1.488X$$

The relationship between peroxide value without antioxidant and time (Table 3) was very highly positive (p.001) as the correlation coefficient (r=0.967). The regression equation is:

$$Y = 1.643 - 0.957X$$

Table (3:) Peroxide value per (m-Eq-Oxygen Kg.oil)

| Time (min) | With antioxidant | Without antioxidant |
|------------|------------------|---------------------|
| 15 | 33.3 | 10.0 |
| 30 | 26.6 | 16.6 |
| 45 | 10 | 33.3 |
| 60 | 0.0 | 36.6 |
| 75 | 0.0 | 43.3 |

DISCUSSION:

Cassia fistula aqueous extract of seeds was found to act as antifertility (Yadav and Jain, 1999) and of bulb as hepatoprotective (Das *et al.*, 2008) its leaves acted as anti-microbial (Panda *et al.*, 2011). The bark extracts inhibit lipid peroxidation in rat liver and kidney (Ilavarasana *et al.*, 2005) and enhances wound healing and tissue regeneration at the wound site (Srividhya *et al.*, 2017) isolated from *C. fistula* leaves bioactive Amentoflavones with therapeutic efficacy. According to Luximon-Ramma, *et al.* (2002), the leaves of *C. fistula* contain 15.88% crude protein, 6.65% crude fat, 20% crude fiber, and 39.86% carbohydrates. The present findings in leaves were comparable to their results.

The fruits, stem, bark and leaves of *C. fistula* contain a variety of biologically active compounds such as flavonoids, flavon-3-ol derivatives, alkaloid, glycosides, tannins and steroids with various medicinal properties. The fruit and stem bark extract shows various activities like anti-inflammatory, antioxidant, antidiabetic, hepato-protective, antimicrobial, antitumor, etc. (Ali, 2014). Alkaloids were reported in this study from the leaves of *C. fistula*.

Tzekiat and Chiang (2013) analyzed *C. fistula* bark, stem, leaf and root extracts under different age classes for their total tannin content. They recorded the following means 3.12% for bark, 2.615% for stem, 1.267% for leaf and 2.112 for root. The present work reported tannins from the leaves and fruits of *C. fistula*.

The present study confirmed the presence of flavonoids in *C. fistula* leaves which was reported by (Kashiwada *et al.*, 1996; Luximon-Ramma *et al.*, 2002). Bahorun *et al.* (2005) extended the knowledge of the numbers of flavonoids. They recorded 14 in pods, 9 in young leaves, 8 in flowers, 6 in old leaves and 4 in bark. The findings of this work confirmed the reported therapeutics effects of *C. fistula*.

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