**PHYTOCHEMICAL SCREENING, NUTRITIVE AND ANTI- NUTRITIVE COMPONENTS OF ETHANOLIC EXTRACT OF *Senna obtusifolia* LEAF AND SEEDS**

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**ABSTRACT**

*Diabetes is a chronic metabolic disease that is characterized by elevated levels of blood glucose (blood sugar). This study is aimed at evaluating the phytochemical, proximate and anti-nutritive components of senna obtusifolia leaves and seeds. Normal standards were used to attain the proximate and anti-nutritive components of the leaves and seeds respectively. The proximate composition in percentage of senna obtusifolia seeds are: moisture content 20.16, ash 23.75, crude fat 3.90, crude protein 28.00 and carbohydrate 24.19. high proximate composition was recorded in crude protein, carbohydrate and ash content. While for the leaves, moisture content 24.86, ash 19.34, crude fat 5.11, crude protein 38.5 and carbohydrate 12.19. high proximate composition was seen in crude protein, moisture content and ash. Some of the values were within the expected range according to FAO 2019. The anti-nutrient composition in Senna obtusifolia leaves and seeds reads 205.95 and 271.62 in phytate, 163.00 and 145.00 in Oxalate, 0.07 and 0.03 in cyanide, 849.54 and 655.09 in Saponins and same value of 928.57 in both leaves and seeds for Tannins respectively. Some of the values shown here too are in accordance with the FAO 2019. Hence the result if the analysis shows that both the leaves and seeds of senna obtusifolia could serve as a good laxative, medicinal and therapeutic values for man if further processes are done to remove the inherent toxicants in the leaves and seeds.*

Keywords: *Seeds, Diabetes, Extract, Leaves, Senna obtusifolia*

**Introduction**

Nature has very rich botanical wealth and a huge number of diverse types of plants grow in various parts of our country. 75-80% of the whole population are depends on herbal medicine (Kadam *et al.,* 2015). They are used for food and a valuable part of human diet; their constituents and nutritional value has been intensively studied for decades. Primary metabolites (e.g., carbohydrate, lipid, protein and amino acids) are essential to higher plants and in addition they are also able to synthesize a different kinds of low molecular weight compounds, secondary metabolites (Khadam *et al* 2016). The Cassia tora is known as Chakvad in Hindi (Nadkarni, 2009). The plant is invasive and is considered a weed in Bangladesh. Most often the plant is found on fallow lands or by the road sides. Despite its classification as an invasive weed, the plant is considered medicinally important in many countries. The Hausa people in Kano Metropolis, Northern Nigeria, use the leaves, bark and root of the plant to treat diabetes (Negbenebor *et al.,* 2017). Crude methanol extract of the plant reportedly demonstrated alpha- amylase inhibitory activity (Anisuzzaman *et al.,* 2014). The leaf extracts having antibacterial activity against various human pathogens (Chavan, *et al.,* 2011). The Senna obtusifolia leaves are reported as antioxidant and antifungal properties (Mukherjee *et al.,* 1996). The antiarthritic activity, antidiabetic activity and anticancer activity of Senna obtusifolia leaf was reported (Balekar *et al.,* 2005).

The aim of the study is to carry out phytochemical, nutritive and evaluation of the anti-nutritive potential of the crude extract of *Senna obtusifolia* leaves and seeds.



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Plate 1*;* Senna tora leaves Plate 2: Senna seeds

**Results and Discussion**

**Phytochemical screening result**

Table 1 reflects the phytochemical compounds detected from the ethanolic extracts of the crude seeds and leaves of *Senna obtusifolia*. Analysis revealed that the bio-active agents present included saponins, tannins, phenols, glycosides are present in both the samples while the others are either or not present. The phytochemical results in table 1, revealed the presence of medicinally active constituents namely; Alkaloids, flavonoids, terpenoids, cardiac glycosides, saponins, phenols, and tannins. All of these constituents were found to be abundant in the ethanolic extract of both the leaves and the seeds. Alkaloids and terpenoids have been found to be minimally present in both the leaves and seeds extracts. Flavonoid was minimally present in the leaves but moderately present in the seeds. The presence of glycosides too was moderately present in the leaves but highly present in the seeds. Saponins were revealed to be highly present and moderately present in the leaves and seeds respectively. Phenols were shown to be highly present in the leaves but moderately present in the seeds. Tannins also eventually showed its presence in both the leaves and seeds extracts.

Table 1. Qualitative phytochemical screening of senna obtusifolia leaves and seeds extract.

|  |  |  |  |
| --- | --- | --- | --- |
| Phytoconstituents | Type of test | Leaves  | Seeds |
| Alkaloids | Wagner’s test | + | + |
| Flavonoids | Sodium hydroxide test | + | ++ |
| Terpenoids | Salkowski test  | + | + |
| Cardiac glycosides | Keller-Killian test | ++ | +++ |
| Saponins | Foam test | +++ | ++ |
| Phenols | Liebermann test | +++ | ++ |
| Tannins | Ferric chloride test | +++ | +++ |

Key: **-**Absent,+ Lowly present,++ Moderately present**,** +++ Highly present

Tannins and flavonoids have been found responsible for anti-diarrhea activity. Presence of tannins, saponins and alkaloids in plants also explains the activity of the plant against diseases caused by some certain organisms since the phytochemicals have been identified as highly anti-bacterial agents. Cardiac glycosides have also been known in the treatment of muscle complications as well as in the treatment of many forms of cancer. Generally, the distribution of phytochemical present in the solvent used, was dependent on their polarities and of course the polarity of the methanolic solvent used to extract them. Alkanols, cardiac glycosides, phenols, tannins, and saponins also have antibacterial activity against organisms and also supports its traditional use for therapeutic purposes.

Figure 1. Quantitative phytochemical Screening result

**Anti-nutritional analysis**

Figure 2 shows the anti-nutritional analysis of Senna obtusifolia leaves and seeds in mg/100g. The anti-nutritional analysis of senna obtusifolia leaves and seeds reveals the presence of phytate content which was found in the leaves to be 205.95mg/100g and the seeds to be 271.62mg/100g. complex formation of phytate with some proteins may inhabit the enzymatic digestion of the proteins. Although the probable content of phytate in legumes vary in most cases depending on the variety, climate conditions, location, type of soil and the year they were grown. Phytate constituents can be easily removed by soaking and cooking (Kumar *et al.,* 2010)

The results obtained from the senna obtusifolia leaves and seeds indicate its oxalate level to be 163.00mg/100g and 145.00mg/100g for the leaves and seeds respectively. When oxalate is consumed in a very large proportion, it could lead to the formation of stones in the body which can actually cause pain and blood in the urine (Jenab and Thompson, 2002).

The Saponin content that was obtained from the senna plant is very high. It contains 849.54mg/100g for the leaves and 655.09mg/100g for the seeds. Saponins are a class of chemical compounds that are amphipathic glycosides grouped by the soap-like foaming they produce when shaken in aqueous solution and structurally by their being composed of one or more hydrophilic glycosides moieties combined with a lipophilic triterpene derivative (Ogunmefum, 2018). They have a characteristic bitter taste and their foaming properties can also cause injuries to the digestive mucosa and haemocytic changes in the blood (Del Carmen *et al.,* 1999).

The amount of tannin found in senna obtusifolia leaves and seeds are both 928.57mg/100g. tannins help in hastening the healing of wound due to its ability to bind to protein of exposed tissues and precipitate the protein, which forms a slight anti-septic protective effect. It also contains tannic acid which when taken in large amount can cause effect such as stomach irritation, vomiting and liver damage.

**Constituents (mg/100g)**

Figure 2. Anti-nutritional analysis of Senna obtusifolia leaves and seeds in mg/100g

**Analysis of Cyanide for Senna obtusifolia leaves and seeds in mg/100g**

Figure 3 shows the cyanide content from the anti-nutritional analysis of Senna obtusifolia leaves and seeds in mg/100g. Cyanide was found to be present in the leaves and seeds at 0.07mg/100g and 0.03mg/100g respectively. Cyanides in the body prevent cells from using oxygen and this leads to the death of these cells. The heart, respiratory system and central nervous system are the most targeted sites of poisoning (Morgan & Homel, 2013). The low content of cyanide revealed in both the leaves and seeds tells that it is a good source of diet.

Figure 3. Cyanide Anti-nutritional analysis of Senna obtusifolia leaves and seeds in mg/100g

**Proximate analysis**

The proximate composition of senna Obtusifolia leaves and seeds as seen in Figure 4, shows that the values obtained for moisture, ash, fat, protein and fibre content respectively is almost lower than the ones of (77.83%), (5.13%), (11.68%), and (2.93%) reported by Tambari *et al.* (2015) for moisture, ash, fat, protein and fibre content each of the senna leaves.

The moisture content of senna obtusifolia seeds and leaves is within the expected range although the moisture content obtained from the seed was slightly higher than those of the leaves with a significant (< 5.0) difference. These findings were in agreement with reports of Edith(2008),that differences in nutrient composition found in plant species are due to changes caused by some factors e.g., temperature, rainfall, relative humidity, time of the day, climate, genetic factors and stage of growth of plants and leaves. Low moisture foods have a longer shelf life because microbial development is reduced (Mashark *et al.,* 2014).

The protein value obtained from senna Obtusifolia leaves and seeds were slightly in agreement with what was previously reported by AOAC (1997). Proteins are responsible for the growth and repair of worn-out tissues in the body due to their diversity, which allows for a wide range of structural and diabolic interactions with the organism (Wei *et al.,* 2019). The amount of fat that was revealed in the senna obtusifolia leaves and seeds is lower in comparison with (40%) (Malik *et al.,* 2015) and lower than (3.53%) (Tambari *et al.,* 2015). There was almost very little or no crude fibre obtained because the samples were minimally rough and it was considered appropriate because it aids absorption of glucose and fats. Although crude fibre enhances digestibility, its presence in high level can trigger intestinal irritations, lower digestibility and depressed nutrient usage (Jimoh & Oladiji, 2005).

Figure 4. Proximate composition of senna obtusifolia leaves and seeds

The total carbohydrate content value is higher than the ones reported by (Malik *et al.,* 2015). The result probably differs because of the different varieties, genetic environment and the ecology of harvesting conditions of the plant. The relatively high carbohydrate content observed in both the leaves and seeds can be used as energy sources, also it is necessary for the digestion and assimilation of other food.

Proximate Composition in %

Figure 5. Energy level composition of senna obtusifolia leaves and seeds

**Conclusion**

The results of the phytochemical screening and nutritional composition of Senna Obtusifolia seeds and leaves reveals the bioactive compounds needed for human treatment and normal ecological functions. These bioactive compounds that are present include steroids, anthraquinones, glycosides, phenolic mixes, flavonoids and so on. It also suggests that if the plant is consumed in its most appropriate quantity, its therapeutic actions against various infections and diseases like ring worms and diabetes will be made known since it contains the phytochemicals and this will also contribute immensely to the normally desired body growth especially here in Nigeria. This study can give valuable information on the need for medicinal plants in the treatment of serious ailments like diabetes and also in the development of drugs for sufficient human and animal health.

**References**

Anisuzzaman M, Ahsan MQ, Kuddus MR, Rashid MA (2014): Pharmacological activities of Senna obtusifolia Linn: *A medicinal plant of Bangladesh. Bangladesh Pharmaceut J*. 17(2): 182-186

Balekar N, Pasi AK, Parihar G, (1985). Antiarthritic hydroalcoholic seed extract of Cassia tora Linn. *Topclass J Herbal Med.* 2;254-260

Chavan RT, Deshmukh VL, Kadam AS. Antibacterial activity of Cassia tora leaves. Recent R es ci Tech 2011; 3; 12-14.

Del Carmen, J., Gernat, A. G., Myrman, R., Carew, L. B., (1999). Evaluation of raw and heated velvet beans (*Mucuna pruriens*) as feed ingredients for broilers. Poult. Sci., 78 (6): 866-872

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Janeb, M. & Thompson, L.U.. (2002). Role of phytic acid in cancer and other diseases. Food Phytates. 225-248.

Jimoh F.O. and Oladiji A.T. (2005). Preliminary Studies on Piliostigma thonningii seeds: Proximate analysis, mineral composition and phytochemical screening. *African Journal of Biotechnology*. 4 (12), 1439-1442

Kadam VB, Dore SV, Bhagwat MG (2015). Determination of alkaloids and amino acids in leaves of 10 medicinal plants of Lling Forest, Dhule Dhist. Maharashtra, *World J pharma Res.* 4;2355-2361.

Khadam VB, Deore SV, Gaykhe RC. (2016). Historical investigation of trigonella foenumgraecum Linn. *World J Pharmacy Pharmaceutical Sci.* 5; 1132-1139.

Kumar, V., Sinha, A.K., Harinder, P.S & Becker, k. (2010). Dietary roles of phytate and phytase in Human Nutrition. *Review on food chemistry*, 120, 945-959

Malik, Abdur Rahman & Butt, Arif Nazir & Choi, Jin. (2014). Rewards and employee creative performance: Moderating effects of creative self-efficacy, reward importance, and locus of control*. Journal of Organizational Behavior*. 36. 10.1002/job.1943.

Mashark, S. & Mohammed, Haruna & Akromah, Richard & Abudulai, Mumuni & Issah, A. (2014). Genetic Analysis of Resistance to Pod Shattering in Soybean. *Journal of Crop Improvement*. 28. 10.1080/15427528.2013.853013.

Morgan, Anthony & Homel, Peter. (2013). Evaluating crime prevention: Lessons from large-scale community crime prevention programs. Trends and issues in crime and criminal justice. 458.

Mukherjee PK, Saha K, Sinha BP, (1916). antifungal screening of Cassia tora Linn. *Phytotherapy Res*. 10;521-522.

Nadkarni KM (2009). Indian material Medical, Bombay popular Prakashan. 1; 285-286.

Negbenor HE, Shehu K, Mairami FM, Adeiza ZO, Nura S, Fagwalawa LD (2017): ethnobotanical survey of medicines used by Hausa people in the management of diabetes mellitus in Kano Metropollis, Northern Nigeria. *Eur J Med plants.* 18(2): 1-10.

Ogunmefun, O.T. (2018). Phytochemicals Gods endowment of curative power in plants. Phytochemicals: source of antioxidants and role in disease prevention, 7-10.

Tambari, U., B. L. Aliero, S. Muhammad and L.G. Hassan (2015). Interaction Effect of Season, Habitat and Leaf Age on Proximate Composition of Senna occidentalis and Senna obtusifolia Leaves Grown in Fadama and Upland Locations in Sokoto, Nigeria. *Nigerian Journal of Basic and Applied Science*, 23(1): 39-44.

Wei, Holly & Fazzone, Patricia & Sitzman, Kathleen & Hardin, Sonya. (2019). The Current Intervention Studies Based on Watson's Theory of Human Caring: A Systematic Review. *International Journal for Human Caring*. 23. 4-22. 10.20467/1091-5710.23.1.4.