EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 5
Issue: 9
375-380
Year: 2018

NUTRACEUTICAL POTENTIAL OF NON CONVENTIONAL SEEDS (*CASSIA FISTULA AND ALBIZIA LEBBECK*)

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Article Received on 29/06/2018 **Article Revised on 19/07/2018** **Article Accepted on 08/08/2018**

ABSTRACT
Cassia fistula and *Albizia lebbeck* used in traditional medicine for the treatment of various ailments. This study aimed to assess the proximate composition; phytochemicals screening and antioxidant activities in both seeds *Cassia fistula* and *Albizia lebbeck*. These seeds are not only help to prevent many diseases but also used as functional ingredient. This study includes the estimation of moisture, ash, fat, fiber, protein, CHO. Mineral content (calcium and iron) of *Cassia fistula* and *Albizia lebbeck* seeds powder were determined by atomic absorption spectrophotometry (AAS). The aqueous extract was screened for the qualitative phytochemical analysis. Antioxidant activity was determined by standard method. Results indicate that proximate composition was not similar in both seeds. Both seeds showed a high content of calcium (927.95±6.11 and 321.41±0.91 mg/100g) and iron (178.31±1.63 and 98.32±0.02 mg/100g). Protein was also high in both seeds (26.43±0.30 and 27.85±0.90 g/100g). Seeds were also contains many phytochemicals and high antioxidant activity. Protein, minerals, phytochemicals and antioxidants helps to maintain nutritional status as well as prevent various diseases. These seeds also help in reducing some metabolic disorders and can be used as dietary supplement. These seeds could be exploited as a non conventional source of nutrients, phytochemicals and antioxidants.

KEYWORDS: Proximate composition, Phytochemicals, Antioxidants, *Cassia fistula*, *Albizia lebbeck*.

INTRODUCTION
Nature is the source of all raw materials is that we need. In ancient time, most of the drugs were obtained from natural sources as they have fewer side effects and has economical values in traditional system of medicine.[1,2] Currently, there is a growing concern for the consumption of non conventional seeds because they are high in macro and micro nutrients, free of coast and abundant.[3] Seeds represent a major waste material can be discarded and used in animal feeding but they are listed in folk remedies for the management of diabetes, liver disorder and gastrointestinal disorder.[4] There are many non conventional seeds but in present study we focus on two seeds *Cassia fistula* and *Albizia lebbeck*.

Cassia fistula belongs to the family of *Fabaceae*, is a semi wild Indian Labernum also known as golden shower. It is distributed in various countries including Asia, South Africa, Mexico, China, West Indies, East Africa and Brazil.[5] *Cassia fistula* is a native plant of India. It is an ornamental tree with beautiful bunches of flowers. Seeds of *Cassia fistula* have good nutritive value. The whole plant is used to treat diarrhea, skin disorder, cancer, fever, abdominal pain and leprosy.[6,7] In China, it has been widely used as traditional Chinese medicine for the treatment of diarrhea, ring worm and fungal infection.[8] The *Cassia fistula* extract is known to exhibit antibacterial, antioxidant, antifungal, laxative and antidiabetic properties.[9] *Cassia fistula* extract have shown the presence of different phytochemicals such as glycosides, anthraquinones, steroids, flavonoids and antioxidants.[10,14]

Albizia lebbeck belongs to the family of *Fabaceae* is one of the most common species of worldwide. It is known by various names such as Indian siris, Flea tree, Frywood, koko and Laback in Arabic.[15] The studies related to the *Albizia lebbeck* extract reported many bioactive components.[16] The whole parts of *Albizia lebbeck* have shown protective against bronchitis asthma, allergic disorders, arthritis, burns, anxiety, depression, insomnia and diarrhea.[17,18] *Albizia lebbeck* seeds possess antipyretic, antidiabetic, analgesic, estrogenic, anti-inflammatory and also a good source of phytochemicals and antioxidants.[19,21] The present study focuses on proximate analysis, phytochemical screening and evaluate the free radical scavenging activity on aqueous extract of the non conventional seeds *Cassia fistula* and *Albizia lebbeck*.

MATERIALS AND METHODS

Collection of sample

Seeds were purchased from Neeraj Traders Jhansi (U.P). Seeds were dried in oven at 100˚C and fine powder was prepared in blender, stored in auto seal pouches at room temperature until the time of assaying.

Nutritional analysis

The seeds powder used to determine the moisture content. It was examined by air oven method at 105°C and till to get the constant weight. Ash, crude protein, fat, crude fiber were analyzed by reported methods. Ash content was determined by the sample incineration in a muffle furnace at 600˚C hr until the ash turned white.[22] Crude protein was estimated by the Kjeldahl method.[23] Determination of carbohydrates by the difference method.[24] Crude fiber was determined by the enzymatic gravimetric method.[25] Fats was determined in a Soxhlet extractor.[26]

Mineral analysis, aliquots were prepared from the seeds powder. Calcium and iron were determined by atomic absorption spectrophotometric method.[27,28]

Extraction and Phytochemical Screening

Aqueous extract preparations, the powder of seeds were extracted with water by boiling method. The extracts were completely evaporated by vacuum distillation and stored in refrigerator at 4^0C until used. The extract was screened for the presence of different primary and secondary metabolite using different phytochemical tests. The aqueous extract was screened for the presence or absence of alkaloid, glycosides, flavonoids[29], steroids, and terpenoids[30] by standard methods.

Antioxidant Activity

DPPH radical scavenging assay

The free radical scavenging activity of the extracts and ascorbic acid as positive control was measured in terms of hydrogen donating or radical scavenging ability using the stable radical DPPH, 2 ml of each sample and control at various concentrations (µg/ml) were added to 2 ml of freshly prepared DPPH solution.

The reaction was allowed for 30 minutes in dark and absorbance was measured at 517 nm using a spectrophotometer (Shimadzu UV-VIS spectrophotometer). All experiments were repeated three times independently. The degree of decolorization of DPPH from purple to yellow indicated the scavenging efficiency of the sample. The percentage scavenging effect of DPPH was calculated using the following equation:

Percentage scavenging effect = $1 - [(A_{sample} - A_{sample\ blank})/A_{control}] \times 100$

Where,

A_{sample}= Absorbance of extract with DPPH in methanol,

$A_{sample\ blank}$= Absorbance of sample (sample/ascorbic acid),

$A_{control}$= Absorbance of DPPH in methanol.

The % inhibition data were then plotted against log concentration fitted in a graph and half-maximal inhibitory concentration (IC_{50}) value was calculated by linear regression analysis.[31,33]

RESULTS AND DISCUSSION

Nutritional analysis

Nutritional analysis of *Albizia lebbeck* and *Cassia fistula* seeds were indicated in table- 1. Moisture content was 5.27±0.01 and 3.34±0.39 (g/100g) in dry weight both seeds. The ash content of both seed ranged from 4.99±0.85 and 9.53±0.05 (g/100g) in dry weight. Fat content revealed that both seed were showed the moderate level of fat content that were 6.53±0.21 and 6.29±0.05 (g/100g). Fiber content was low in *Albizia lebbeck* seed 4.48±0.58 (g/100g) and high in *Cassia fistula* seeds 7.48±0.01 (g/100g). It can be used as an important source of good dietary fiber and can be recommended to individuals suffering from obesity. Both seeds showed the high protein content (26. 43±0.30 and 27.85±0.90 (g/100g) thus indicated its nutritional power our other conventionally consumed seeds. CHO highly contribute for energy signifies the role of seeds as a good source of nutrition. CHO Content was high in both seeds *Albizia lebbeck* and *Cassia fistula* (49.21±0.50 and 19.49±0.09 (g/100gm). Human body daily needs more than 100mg of major minerals. As per the results of mineral analysis calcium content in both seeds was high (927.95±6.11 and 321.41±0.91 (mg/100g) which is within the recommended ratio for human health and very essential in muscle contraction, oocyte activation, building strong bones and teeth, blood clotting, nerve impulse, transmission, regulating heart beat and fluid balance with in cell (35). Iron was also remarkably reported in high amount in both seeds (178.31±1.63 and 98.32±0.02 (mg/100g). Thus the use of wild edible seeds in our diet could help to boosting the blood level especially in anemic conditions.[34,35] The nutritional analysis revealed that seeds are used as healthy diet for human being.

Table 1: Results of Proximate Composition of *Cassia fistula* and *Albizia lebbeck* Seeds Powder.

Nutrients (DW)	*Cassia fistula* seeds	*Albizia lebbeck* seeds
Moisture (g/100g)	5.27±0.01	3.34±0.39
Ash (g/100g)	4.99±0.85	9.53±0.05
Fat (g/100g)	6.53±0.21	6.92±0.05
Fiber (g/100g)	7.48±0.01	4.48±0.58
CHO (g/100g)	49.21±0.50	19.49±0.09
Protein (g/100g)	26.43±0.30	27.85±0.90
Calcium (mg/100g)	927.95±6.11	321.41±0.91
Iron (mg/100g)	178.31±1.63	98.32±0.02

Legend :- Each value represent the mean ±SD deviation of three determinations (n=3) on dried weight of seeds. DW: Dry Weight.

Phytochemical Screening

Phytochemicals screening were performed to identify the classes of compound in the extracts. The results of the phytochemicals screening of *Cassia fistula* and *Albizia lebbeck* on aqueous extract were given in table 2. The results of phytochemical revealed the presence of major bioactive compounds including alkaloids, terpenoids and flavonoids. Glycosides were absents in both seeds extracts. Steroids were present in *Cassia fistula* but absent in *Albizia lebbeck* seeds extract.

Table 2: Results of Phytochemical Screening of *Cassia fistula* and *Albizia lebbeck* Seeds on Aqueous Extracts.

Phytochemical Screening	*Cassia fistula* seeds (aqueous extract)	*Albizia lebbeck* seeds (aqueous extract)
Alkaloids	+	+
Glycosides	_	_
Steroids	+	_
Terpenoids	+	+
Flavonoids	+	+

Legend:- Where (+) and (-) indicate the presence and absence of phytochemicals respectively.

Cassia fistula and *Albizia lebbeck* has been used for the treatment of a variety of disorders in traditional system of medicine.[36] The therapeutic properties of medicinal seeds are possible due to the presence of many bioactive compounds such as alkaloids, steroids, terpenoids and flavonoids which immense medicinal properties. In present finding reveals that *Cassia fistula* seeds extracts were positive for steroids, which are known to be important for sex hormones in pharmaceuticals.[37] Alkaloids are present in both seeds, these compounds important for the treatment of syphilis and other venereal diseases treatment.[38] Terpenoids are also present in both seeds extracts; these are considered as an important compound for the antimicrobial and antioxidant activities.[39] Flavonoids are observed in seeds which have contained many properties like antioxidant, anti-inflammatory activity, estrogenic activity and antimicrobial activity.[40,41] The phytochemical screening of *Cassia fistula* and *Albizia lebbeck* seeds on different extracts showed the fact that these seeds were effective for different diseases, which will lead to the production of seeds based medicine with no side effects.

Antioxidants Activities

DPPH radical scavenging activity

The stable DPPH radical model is a widely used, relatively quick method for the evaluation of free radical scavenging activity. DPPH is a stable free radical and accept an electron or hydrogen radical to become a stable diamagnetic molecule. Antioxidants on interaction with DPPH both transfer electron or hydrogen atom to DPPH and thus neutralizing its free radical character and convert it to DPPH and the degree of discoloration indicates the scavenging activity of drug. The reduction capacity of DPPH radical is determined by the decrease in its absorbance at 517nm induced by antioxidants. The decrease in absorbance of DPPH radical caused by antioxidants because of the reaction between antioxidants molecules and radical progress which results in the scavenging of the radical by hydrogen donation. It is visually noticeable as a change in color from purple to yellow. Hence, DPPH is usually used as a substance to evaluate the antioxidant activity.[42] Figure 1 showed free radical scavenging activity of standard ascorbic acid and *Cassia fistula* extracts, respectively. The highest % inhibition of *Cassia fistula* seeds was 60.40% at the concentration of 0.5 µg. The bioactive fraction of *Cassia fistula* showed lowest DPPH scavenging activity as a compared with ascorbic acid as standard IC_{50} value is 1.74 mg/ml. The IC_{50} value of *Cassia fistula* seeds and ascorbic acids were given in following order: ascorbic acid (1.74 mg/ml), aqueous extract of *Cassia fistula* (0.55 mg/ml). Figure 2 showed the % DPPH scavenging activity of ascorbic acid and aqueous extract of *Albizia lebbeck* seeds extract at highest % inhibition was 30.8% at the concentration of 0.5 µg. The bioactive fraction of *Albizia lebbeck* showed lowest DPPH scavenging activity as a compared with ascorbic acid as standard IC_{50} value is 1.74 mg/ml. The

IC_{50} value of *Albizia lebbeck* seeds and ascorbic acids were given in following order: ascorbic acid (1.74 mg/ml), aqueous extract of *Albizia lebbeck* (0.07 mg/ml).

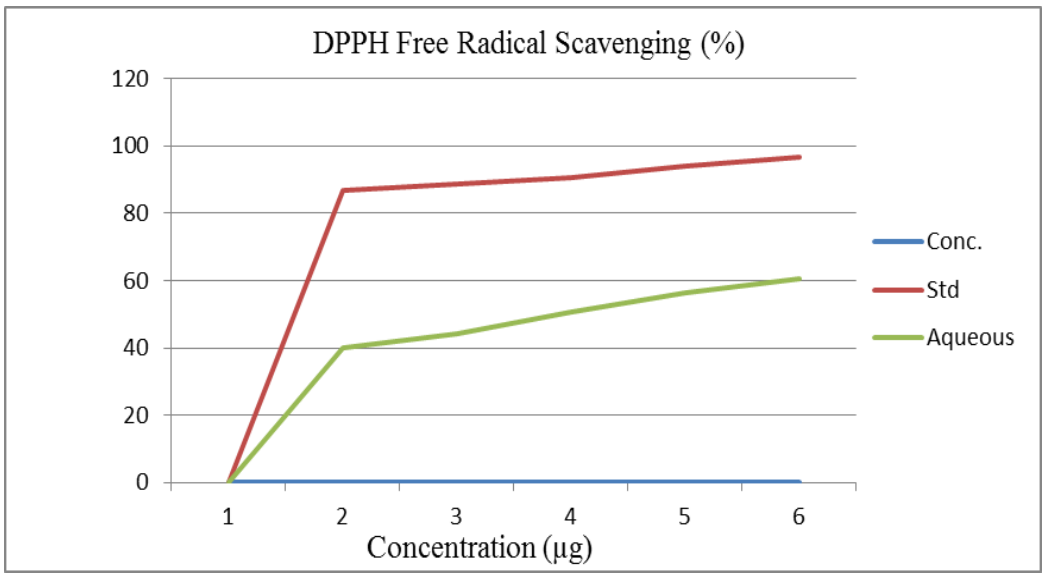

Figure 1: DPPH Free Radical Scavenging % Inhibition of Ascorbic Acid (Std) and Aqueous Extracts of *Cassia fistula* Seed.

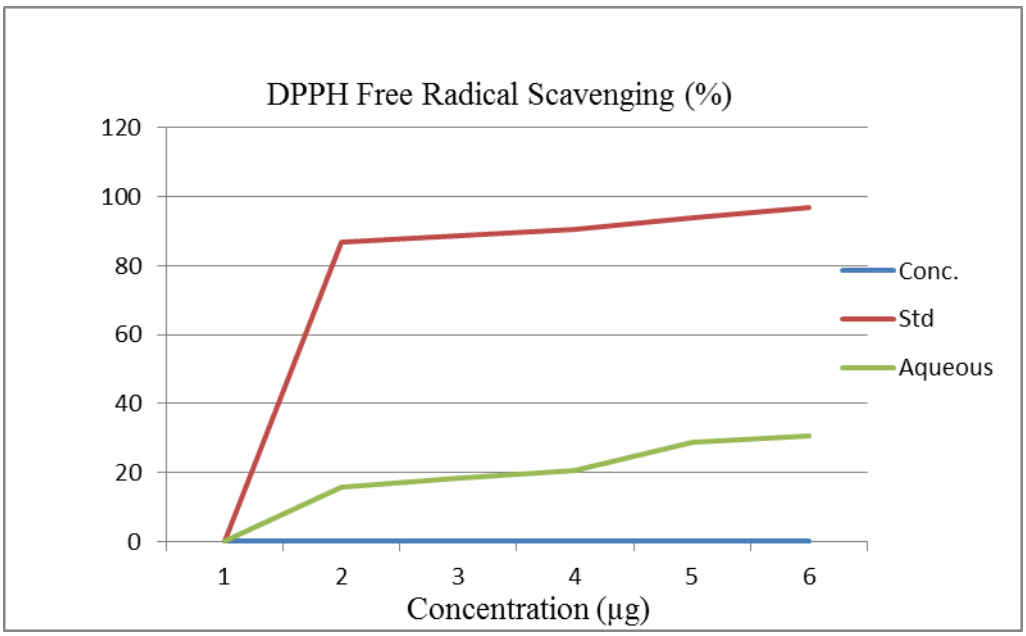

Figure 2: DPPH Free Radical Scavenging % Inhibition of Ascorbic Acid (Std) and Aqueous Extracts of *Albizia lebbeck* Seeds.

CONCLUSION

This study indicates that *Cassia fistula* and *Albizia lebbeck* seeds are cheap, reliable and safe plant based resource to meet the demand of nutrient rich foods. It may provide many nutrients to the human body such as high in protein, fiber, minerals and low in fats. It is conclude that extract of both seeds have significant antioxidant activity due to the presence of phytochemicals. These seeds are helpful to maintaining health and protect from different condition therefore it can be recommended for human consumption.

ACKNOWLEDGMENT

The authors are grateful to the Banasthali University, Rajasthan, Department of food science and nutrition for providing lab facility and valuable guidance.

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