The Pharma Innovation Journal 2018; 7(12): 190-193

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(12): 190-193

www.thepharmajournal.com
Received: 08-10-2018
Accepted: 10-11-2018

Desh Deepak Pandey
Department of Pharmacy, SRK University, Bhopal, Madhya Pradesh, India

Alok Pal Jain
Department of Pharmacy, SRK University, Bhopal, Madhya Pradesh, India

Abhay Kumar
Department of Pharmacy, SRK University, Bhopal, Madhya Pradesh, India

Correspondence
Desh Deepak Pandey
Department of Pharmacy, SRK University, Bhopal, Madhya Pradesh, India

Caesalpinia bonducella: A pharmacological important plant

Desh Deepak Pandey, Alok Pal Jain and Abhay Kumar

Abstract
Many herbal remedies have been employed in various medical systems for the treatment and management of different diseases. The plant *Caesalpinia bonducella* has been used in different system of traditional medication for the treatment of diseases and ailments of human beings. *Caesalpinia bonducella* (L.) Fleming (Syn. *Caesalpinia bonduc* (L.) Roxb, Syn. *Caesalpinia crista* Linn.), belonging to the family Caesalpiniaceae, is a prickly shrub widely distributed all over the world specially found in tropical regions. All parts of the plant have medicinal properties so it is a very valuable medicinal plant which is utilized in traditional system of medicine. In Indian traditional plant medicine, it has been considered as an important remedy for the treatment of several diseases. It is popular in indigenous system of medicine like Ayurveda, Siddha, Unani and Homoeopathy. This review attempts to encompass the available literature on seeds of *Caesalpinia bonducella* with respect to its pharmacological activities. Therefore, this information will be helpful to create interest towards the plant and may be useful in developing new formulations.

Keywords: *Caesalpinia bonducella*, phytoconstituents, pharmacological activities, traditional uses

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 well as valuable components of medicines, seasonings, beverages, cosmetics and dyes. Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. In recent times, focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems. Today, we are witnessing a great deal of public interest in the use of herbal remedies. Furthermore many western drugs had their origin in plant extract. There are many herbs, which are predominantly used to treat cardiovascular problems, liver disorders, central nervous system, digestive and metabolic disorders. Given their potential to produce significant therapeutic effect, they can be useful as drug or supplement in the treatment / management of various diseases. Herbal drugs or medicinal plants, their extracts and their isolated compound (s) have demonstrated spectrum of biological activities. Such have been used and continued to be used as medicine in folklore or food supplement for various disorders. *Caesalpinia bonducella* is an Indian herb reported in Ayurveda, the ancient Hindi medicine system of India. Ethno pharmacological studies on herbs/medicinally important plants continue to interest investigators throughout the world. However one of the impediments in the acceptance of the Ayurvedha or Siddha formulation is the lack of standard quality control profiles [1]. World Health Organisation (WHO) has defined medicinal plants as plants that contain properties or compounds that can be used for therapeutic purposes or those that synthesize metabolites to produce useful drugs [2]. *Caesalpinia bonducella* is an Indian herb reported in Ayurveda, the ancient Hindi medicine system of India. *Caesalpinia bonducella* belongs to the Family: Caesalpiniaceae found all over the world specially, in India, Sri Lanka and Andaman and Nicobar Islands, in India especially present in tropical regions [3-5]. The plant was much confused with *Caesalpinia bonducella* (Syn. C. bonduc) and was described under the same [6-10]. Beside this, species like *C. nuga* [4-8] and *C. jayoba* are also sometimes wrongly designated as synonyms for *C. crista.* In fact, *C. jayoba* is an adulterant of *C. crista*. "Bonducella" the name of the species is derived from the Arabic word "Bonduce" meaning 'a little ball" which indicated the globular shape of the seed [5]. Despite the broad use of *Caesalpinia bonducella* in traditional medicines, very few systematic pharmacological studies are reported till date assessing its therapeutic properties.

In this review article, effort has been taken to collect and compile the details regarding *Caesalpinia bonducella* this will be useful to the society to venture into a field of alternative systems of medicine.

Traditional/Ayurvedic Utilities

It is used in vast range of diseases. It is the best panacea for abdominal pain due to flatulence, as it effectively alleviates the vata dosha. The powder of its roasted seeds with ghee mitigates the condition and relieves the pain. During postpartum period, the abdominal pain is eliminated with the roasted seed powder, asafoetida, ghee and little amount of salt. The seeds powder, given with milk, controls the diarrhea. The skin of the seed being astringent is beneficial as a medicament for diarrhea, dysentery and colitis. In worm infestations, the juice of its leaves or powder of its roasted seeds is given along with palasa, amra and haridra. Latakaranja (combination of its roasted seeds powder and pippali (1:1) with honey) is the best medication for malarial fever. The combination of its roasted seeds powder, pippali (1:1) is given with honey, approximately 0.5 gm., three times a day for 3-4 days duration. Another combination recommended for malaria is the powders of marica and latakaranja (Sakra vati). The splenic enlargement due to malaria, responds well to latakarnja. The leaves fried in ghee, eliminate vata and relieve constipation, hence valuable in piles. The seeds are stimulant to the uterus, improve the menstrual discharge in Oligomenorrhea and reduce the pain in lower abdominal region. The skin of the seed is extremely beneficial in the treatment of leucorrhea. The seeds also render contraceptive activity. Latakaranja is used as a bitter tonic. It is also a useful remedy for cough and asthma, as it alleviates the Kapha dosha. For this purpose, the tender leaves (fresh juice) are given along with the honey to ward off the mucous secretions. The oil prepared from the leaves, is a valuable nervine tonic.

Reported Pharmacological Activity

Antidiabetic activity

It is used as traditional medicine for treatment of diabetics. Indian tribal people use it for blood sugar control. The powder of seed kernel of this plant is used by the local people of Assam for the diabetes treatment. The seed possesses antidiabetic and antihyperlipidemic activity. When the extract is taken orally (300 mg/kg) it causes ant hyperglycemic action by blocking the glucose absorption and decreases the BUN levels on large scale. The extracts lowered the LDL level and elevated cholesterol in diabetes induced hyperlipidemia [11, 12].

Abortifacient activity

In rural India, the seeds of *C. bonducella* are used traditionally in the fertility regulations in females. The leaves are utilized as an emmenagogue and to smooth out the delivery in pregnant women. The mixture of seed powder of *C. bonducella* and sesame oil brings about abortion. It means that the plant has abortifacient activity [13].

Antioxidant activity

The chloroform extract of *Caesalpinia bonducella* shows antioxidant activity. The ethanolic extract of *C. bonducella* possesses natural antioxidant activity. The ethanol and methanol leaves extract of *Caesalpinia bonduc* indicated free radical scavenging activity i.e. antioxidant activity against DPPH (1, 1-Diphenyl-2, Picryl- Hydrazyl). The *C. bonducella* contains flavanoids and phenolic compounds and the antioxidant activity of it may be due to them. *Caesalpinia bonduc* Roxb seed contains noticeable amounts of polyphenolic substances that posse's powerful [14].

Analgesic and anti-inflammatory activities

The activities were studied by hot plate method and acetic induced writhing response to albino mice and different doses of ethanolic extracts were given to them. The consequences observed confirm that *C. bonducella* has analgesic and anti-inflammatory activities. It may be due to the presence of phenols, tannins, oils, glycosides, saponins and flavonoides. It was observed that the action was dependent on proportion of doses. The seed oil of *C. bonducella* is good source for analgesic and anti-inflammatory agent [15, 16].

Antipyretic activity

The seed oil of *C. bonducella* is good source for antipyretic agent [16].

Antifilarial activity

The extract of seed kernel of *C. bonducella* indicated macrofilaricidal, microfilaricidal, and female-sterilizing effectiveness against *L. sigmodontis*. It showed microfilaricidal and female-sterilizing effectiveness against B. malayi in animal models. It has proved that the plant has the potentiality of new antifilarial drug [17].

Anticonvulsive activity

Traditionally *C. bonducella* seed oil plays very important role in treating convulsions. The petroleum ether extract of seed kernels of *C. bonducella* was analyzed for its anticonvulsant effect in different experimental animal models. To assess anticonvulsant activity, MES (maximal electro shock), PTZ (Pentylenetetrazole), picrotoxin and strychnine -induced convulsions models were used. Diazepam was applied as a standard reference for all models. But in MES phenytoin was utilized as a standard reference. Medium and high doses of petroleum ether extract of *C. bonducella* (600 and 800mg/kg) indicated noticeable anticonvulsant activity. It may be due the presence of proteins, saponins, carbohydrates, homoisoflavone and sterols [18].

Antibacterial activity

The methanol extracts and chloroform, ethyl acetate and pet. ether fractions of the *C. bonducella* leaves with different concentrations (300, 500, and 800 µg/disc) against four gram-positive and five gram-negative bacteria are assessed. It was noticed that the 800 µg/disc concentration shows better activity against all bacteria. Only chloroform extract with all concentrations exhibited better antibacterial activity against all bacteria [19].

Antidiarrhoeal activity

As traditionally the use of this plant is made to treat diarrhea, its antidiarrhoeal activity is also supported by the methanol extract of *C. bonducella* leaves [19].

Antimalarial activity

Cold ethanol, aqueous and hot ethanol extracts of seeds of *Caesalpinia bonducella* showed 56%, 65% and 76% growth inhibition of *P. falciparum* respectively. It supports antimalarial activity of *C. bonducella* [20].

Antifungal activity
The aqueous and ethyl acetate extracts of *C. bonducella* seeds show high to moderate antifungal activity against *Alternaria solani*, *Fusarium oxysporum*, *Candida albicans* and *Aspergillus niger*. It indicates *C. bonducella* possesses a potential to control important fungal pathogens. It may be due to the presence of several bioactive molecules that include oils, saponins sterols, glycosides, tannins, alkaloids, phenols, resins and flavonoides in seeds of *C. bonducella* [21].

Antispermatogenic activity
The treatment of aqueous seed extract of *C. bonducella* decreases sperm density in male albino rat. It indicates antispermatogenic activity of *C. bonducella*. Seeds may be secure and effective contraceptive [22].

Antitumor activity
The methanol extract of *C. bonducella* leaves was assessed for the antitumor activity in Ehrlich ascites carcinoma (EAC)-bearing Swiss albino mice. It caused noticeable reduction in the volume of tumor, packed cell volume and viable cell count and it extended the life of EAC- tumor affected mice. It is observed that MECB plays very important role antioxidant and antitumor activity in EAC- affected mice. In the stem bark of *C. bonducella*, the quantities of phenolics and flavonoides are abundant which is responsible for its anti-inflammatory anticancer activity [23].

Antiulcer activity
The aqueous extract of *C. bonducella* played very important role in curing ulcer and show antisecretary effect. There is scope to use this plant to treat gastric disorders. The extract also noticeably decreased the gastric volume, total and free acidity, and raised the pH of the gastric fluid. The existence of saponins, alkaloids, triterpenes, flavonoids, steroids and tannins was detected in the aqueous extract of CBD and it was found that flavonoides possessed anti-ulcer activity. The methanolic extract of *C. bonducella* (Linn.) Flem. leaves have considerable anti-ulcer activity [24].

Antipsoriatic activity
Traditionally *Caesalpinia bonducella* leaves are used to treat psoriasis in Malabar region [25].

Immunomodulatory activity
The assessment of immunomodulatory potential of ethanolic extract of seed of *C. bonducella* caused noticeable increase in percent neutrophil adhesion to nylon fibers. There was also a dose dependant increase in antibody titer values. Myelosuppression in cyclophosphamide drug treated rats was prevented by the extract. *C. bonducella* contain immunomodulatory activity and it can be used to prevent autoimmune ailments [26].

Anticataract activity
The ethanolic extract of seed Kernals of *Caesalpinia bonducella*. (L) Fleming has Anticataract and antioxidant activities, which might be useful to prevent or slowing the progress of cataract. The extract reduced opacity and tissue malondehyde (MDA) level and raised catalase and superoxide dismutase (SOD) activities. There was increase in water soluble protein levels and total proteins [27].

Anthelmintic activity
Helminth is gastrointestinal disease caused by *Pheretima posthuma*, *Ascardia galli*, *Perionyx excavates* and *Amplostoma caninum*. The parasites have become more resistant to commercial anthelmintic. Besides the scarcity and high cost of medicines led to the need of other methods to cure it. When Methanol, ethanol, hexane and aqueous extracts from leaves of *C. bonducella* were studied, it caused paralysis and death of parasites in different duration depending on doses. It was observed that it possessed good anthelmintic activity against the worms [28].

Anticancer activity
It has been shown by *in vitro* anticancer assay that the petroleum ether fractions of ethanolic extract of *C. bonducella* seeds possess anticancer activity. It is capable of killing Ehrlich *Ascites carcinoma* (EAC) cell lines by way of induced apoptosis. 78.4% growth inhibition against human breast cancer cells lines (MCF-7) was indicated by the methanol extract of *Caesalpinia bonducella* (L) Roxb seed. *Caesalpinia bonducella* possess phenolics and flavonoids in noticeable amount it may cause the anticancer properties [29].

Safety profile
The maximum tolerated dose of the 50% ethanolic seed extract was found to be more than 1000 mg/kg body weight when tested in adult male albino mice [30].

Conclusion
The nutraceuticals potential of this plant in terms of its efficacy and versatility is such that further detailed research appears crucial. Also the plant shows the many pharmacological actions on various diverse disease and illness, so the plant is beneficial asset for the Indian nutraceuticals industry. So this herb will be more useful for marketed nutraceuticals preparation. *Caesalpinia bonducella* is widely distributed and easily available plant throughout the India. It has various pharmacological properties. It is very important plant from medicinal point of view as it contains various phytochemical. Still there is scope for further research.

References

1. Bagul MS, Ragani. Phytochemical evaluation of classical formulation. A case study. Indian Drugs. 2005; 42:15-19.
2. Jayakrishnan BM, Perumal N, Hashim KM. *In vitro* antioxidant studies and phytochemical screening on the seeds of Caesalpinia bonduc. European Journal of Experimental Biology. 2014; 4:47-51.
3. Wadkar GH. Phytochemical studies and hepatoprotective activity of the leaves of *caesalpinia bonducella* (linn.) flem [dissertation]. Belgaum, Karnataka KLE University; 2009.
4. Kapoor LD. Hand of ayurvedic medicinal plants. CRC Press 2000; 88:10.
5. Konan AB, Bleyere MN, Amonkan AK, Bouafou MKG, Datte JY. Why African traditional birth attendants used ceasalpinia bonduc leaves to facilitate childbirth in parturient women. International Journal of Pharmacy Review & Research. 2014; 4(1):11-16.
6. Jabbar A, Zaman MA, Iqbal Z, Yaseen M, Shamim A. Anthelmintic activity of *chenopodium album* (L.) and *caesalpinia crista* (L.) against trichostrongylid nematodes of sheep. Journal of Ethnopharmacology. 2007; 114(1):86-91.
7. Asolkar LV, Kakkar KK, Chakre OJ. To glossary of

Indian medicinal plants with active principles. Ethnobotanical Database of Bangladesh. 1992; 1:150.
8. Kirtikar KR, Basu BD. Indian medicinal plants. 2nd Edt, New Delhi. International book distributors, 1975.
9. Moon K, Khadabadi SS, Deokate UA, Deore SL. Caesalpinia bonducella F, An overview. Report and Opinion. 2010; 2(3):83-90.
10. Rastogi RP, Mehrotra BN. Compendium of Indian medicinal plants. New Delhi: Central Drug Research Institute and Publications & Information Directorate; 1990.
11. Sagar V, Ahamad RN. Antihyperlipidemic effect of alcoholic seed extract of *caesalpinia bonduc* (Lin.) roxb in alloxan induced diabetic male albino rats. International Journal of Diabetes and Endocrinology. 2015; 1(1):1-9.
12. Kannur DM, Hukkeri VI, Akki KS. Antidiabetic activity of caesalpinia bonducella seed extracts in rats. Fitoterapia 2006; 77(7-8):546-549.
13. Lilaram Raichur NA. Abortifacient potential of ethanolic seed extract of Caesalpinia bonducella in female albino rats. Journal of Basic and Clinical Physiology and Pharmacology 2014; 25(4):445-451.
14. Sachan NK, Verma S, Sachan AK, Arshad H. An investigation of antioxidant activity of Caesalpinia bonducella seeds. Annals of Pharmacy and Pharmaceutical Sciences. 2010; 1(2):88-91.
15. Sagar MK, Ashok PK, Chopra H, Singh M, Upadhyaya K. Analgesic and anti-inflammatory properties of caesalpinia (bonduc) seeds. The Pharma Research. 2009; 01:54-59.
16. Shukla S, Mehata A, Mehata P, Vyas PS, Shukla S, Bajpai VK. Studies on anti-inflammatory, antipyretic and analgesic properties of Caesalpinia bonducella F. seed oil in experimental animal models. Food and Chemical Toxicology. 2010; 48(1):61-64.
17. Gaur RL, Sahoo MK, Dixit S, Fatma N, Rastogi S, Kulshreshtha DK, *et al*. Antifilarial activity of Caesalpinia bonducella against experimental filarial infections. Indian Journal of Medical Research 2008; 128:65-70.
18. Ali A, Venkat Rao N, Shalam MD, Shivaraj Gouda T, Shantakumar SM. Anticonvulsive effect of seed extract of *Caesalpinia bonducella* (Roxb.). Iranian Journal of Pharmacology & Therapeutics. 2009; 8(2):51-55.
19. Billah MM, Islam R, Khatun H, Parvin S, Islam E, Islam SMA, *et al*. Antibacterial, antidiarrhoeal and cytotoxic activities of methanol extract and its fractions of *Caesalpinia Bonducella* (L.) Roxb leaves. BMC Complementary and Alternative Medicine. 2013; 13:101.
20. Irshad S, Mannan A, Mirza B. Antimalarial activity of three Pakistani medicinal plants. Pakistan Journal of Pharmaceutical Sciences. 2011; 24(4):589-591.
21. Shukla S, Mehta P, Mehta A, Vyas SP, Bajpai VK. Preliminary phytochemical and antifungal screening of various organic extracts of Caesalpinia bonducella seeds, Romanian Biotechnological Letters. 2011; 16(4):6384-6389.
22. Kanerkar UR, Bhogaonkar PY, Indurwade NH. Antispermatogenic effect of *Caesalpinia bonduc* (L.) Roxb. Seeds, International Research Journal of Science & Engineering. 2015; 3(4):173-178.
23. Gupta M, Mazumder UK, Kumar RS, Sivakumar T, Vamsi MLM. Antitumor activity and antioxidant status of Caesalpinia bonducella against Ehrlich ascites carcinoma in Swiss albino mice. Journal of Pharmacological Sciences. 2004; 94(2):177-184.
24. Ansari JA, Ahmad S, Jameel M. Effect of Caesalpinia Bonducella L. on ulcer and gastric secretions in pylorus legated rat model. Journal of Drug Delivery & therapeutics. 2012; 2(5):102-104.
25. Muruganantham N, Basavaraj KH, Dhanabal SP, Praveen TK, Shamasundar NM, Rao KS. Screening of *Caesalpinia bonduc* leaves for antipsoriatic activity. Journal of Ethnopharmacology. 2011; 133(2):897-901.
26. Shukla S, Mehta A, Johna J, Mehta P, Vyas SP, Shukla S. Immunomodulatory activities of the ethanolic extract of Caesalpinia bonducella seeds. Journal of Ethnopharmacology. 2009; 125(2):252-256.
27. Kurmi P, Konwar M, Das S. *In-vitro* anticataract activity of ethanolic extract of seed kernel of *Caesalpinia bonducella* (L.) Fleming on goat. Pharma Science Monitor. International Journal of Pharmaceutical Sciences. 2015; 6(1):244-253.
28. Wadkar GH, Kane SR, Mathapati SS, Hogade MG. *In-vitro* anthelmintic activity of Caesalpinia bonducella (Linn). Flem. Leaves. Journal of Pharmacy Research. 2010; 3(5):926-927.
29. Deepika KSN, Rama NK, Muthuraman MS, Natesan R, David RC, Pemaiah B. Evaluation of *in vitro* anticancer potential of ethanolic extract and its different fractions of *Caesalpinia Bonduc* (L) Roxb Seeds. International Journal of Pharmacy and Pharmaceutical Sciences. 2014; 6(8):311-314.
30. Biswas TK, Bandyopadhyay S, Mukherjee B, Mukherjee B, Sengupta BR. Oral hypoglycemic effect of Caesalpinia bonducella. International Journal of Pharmacognosy. 1997; 35:261-264.