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Phytochemical investigation and Antidiabetic potential of ethanolic flowers extract of *Bauhinia acuminata* Linn

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ABSTRACT: Background: Medicinal plants used for centuries as remedies for human diseases because they contain natural compound which play a dominant role in the development of novel drug lead for treatment and prevention of diseases. The tribal's from villages in the Koraput District, which are surrounded by the forest and located in the state of Odisha. The villagers consume decoctions from the flowers of these plants early in the morning for the treatment of ailments like anthelmintic, skin diseases, fiver, wound healing and as antidiabetics. The plant also possesses antimicrobial, antioxidant and anti inflammatory properties. **Aim:** The present investigation was aimed to investing the phytochemical constituents and antidiabetic activity of ethanolic flower extracts of *Bauhinia acuminata*. **Method:** The flowers of *B. acuminata* were extracted by Soxhlation method. The phytochemical investigation was done by using various standard chemical methods. The antidiabetic activity was carried out in alloxan induced Diabetic rats. **Results**: The phytochemical screening showed the presence of Carbohydrates, Phenolic compounds, Saponins, Flavonoids, Oils and Fats. The extract produced a significant antidiabetic effect on 1st, 3rd, 5th and 7th days at 300 mg/Kg body weight as comparable with the standard drug (Glibenclamide). The flower extract was able to reduce blood sugar level even less than the standard drug Glibenclamide from 3rd day onwards. **Conclusion**: The activity showed by the *B. acuminata* flower extract is of considerable importance and justified its use in the diabetic control in the folkore medicines.

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INTRODUCTIONS:

Diabetes mellitus is the most common endocrine disorder. More than 150 million people are suffering from it Worldwide. It is likely to increase to 300 million by the year 2025 [1]. More than one fifth of them are Indians and the International Diabetes Federation declared India Diabetic capital of the world. Synthetic antidiabetic drugs can produce serious consequences and are not suitable for use during pregnancy. In view

of the adverse effect associated with the synthetic drugs and considering natural medicine safer, cheaper and effective, traditional antidiabetic plants can be explored [2] .The recommendation made by WHO on diabetes mellitus, investigation on hypoglycemic agents from medicinal plants have become more important [3] .

The tribal's from villages in the Koraput District, which are surrounded by the forest and located in the state of Odisha frequently, used this plant for their treatment of various ailments.

Bauhinia acuminata (Family: *Fabaceae*) is a species of flowering shrub native to tropical southeastern Asia. Common names white Bauhinia, The genes Bauhinia, one of the largest genera in sub-family *caesalpiniaceous* represent more than 300 species.[4]. Bauhinia has been extensively planted as a garden, park and roadside ornamental tree in many warm temperate and sub - tropical region.[5].The bark , flower, and root of the *B. acuminata* are used for various skin diseases, worms, tumors , and diabetes. In Malaysia and Indonesia the plant is used in the treatment of common cold and cough. While in India the leaves and bark of this plant are used for treating asthma. Moreover, the leaf of *B. acuminata* is used to treat bladder stone, venereal diseases, leprosy, asthma and digestive diseases. Different part of this plant such as bark, leaves, stem, flowers and roots have been used in traditional medicine [5]. Leaves were used externally and internally in skin disease scabies and the leaves/root were ingredient of many popular herbal liver tonic and medicines for liver disorders. People use it also for the treatment of insect bites, snake bite, scorpion sting, constipation, oedema, fever, inflammation, rheumatism [6]. It roots, leaves, flowers and seeds were used as laxative and purgative.[7]. The chemical constituents found in *B. acuminata* were vitamin C (leaves), beta -sitosterol, lupeol, kamepferol. Several chemical compound including palmitic acid, three phthalic acid esters, phthalic acid, gallic acid, ursolic acid, were identified from the leaves of *B. acuminate*.[8].

MATERIAL AND METHODS:

Drugs and chemicals:

Alloxan (Hydrate - CAS: 2244‑11‑3) was procured from Oxford laboratory, Maharashtra, India. The ethanol AR was procured from Merck Pvt. Ltd., Navi Mumbai, Maharashtra, India. All other chemicals and reagents used in present work were of analytical grade and procured from authorized dealer.

Collection and authentification of plant:

The flowers of *B. acuminata* were collected from the tribal belts of the local area of Baipariguda, Koraput District (India) in the month of December 2018. The plant was identified, confirmed and authenticated by the Biju Patnaik Medicinal Plants Garden and Research Centre, Dr. M. S. Swami Nathan Research Foundation, Jeypore, Koraput (District), Odisha (Letter No. MJ/SS/P-302/18, dated (16.12.2018). After authentification flowers were collected in bulk and shade dried. The dried materials were made into coarse powder by grinding in mechanical grinder and stored in a closed air tight container for further use.

Preparation of Extracts:

The coarse powder of flowers was taken in Soxhlet apparatus and extracted successively with ethanol as solvent. A total amount of 550 g coarse powder was extracted with 1000 ml of ethanol solvent and 10 cycles were run to obtain thick slurry and the slurry was then concentrated under reduced pressure to obtain crude extract and kept in closed air tight containers under cool and dark place for further study [9,10].

Preliminary phytochemical investigation:

The crude ethanolic extracts of the flower of *B. acuminata* were subjected to preliminary phytochemical analysis in order to detect the presence of various groups of phytoconstituents by carrying out the chemical analysis [10].

Experimental protocol:

Animals were selected, weighed (25 to 30 g) and divided in to four groups (n=6), namely control, diabetic control, standard drug and one test groups belonging to ethanolic flower extract of *B. acuminata*. All the studies conducted were approved by the Institutional Animal Ethical Committee (1200/ac/08/CPCSEA), Dadhichi college of pharmacy, Vidya vihar,Cuttack, according to prescribed guide-lines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

Acute toxicity studies:

The acute toxicity was performed according to OECD 423, 2001.The selected female albino rats were used to determine the dose. The animals were fasted overnight prior to the acute experimental procedure. Distilled water was used as vehicle to suspend the flowers extract of *B. acuminata* and administered orally as following doses of 100, 300, 600, 1000 and 2000 mg/kg body

weight. Immediately after dosing, the animals were observed continuously for first 4 h for behavioral changes and for mortality at the end of 24 h and daily for 14 days respectively. Acute toxicity study revealed that no mortality was found in any solvent extract at any dose in Swiss albino mice, which confirmed that *B. acuminata* flower extract would be non‑toxic in living body but whereas the LD_{50} of the extracts was found to be (LD_{50} > 1000 mg/kg). Therefore *B. acuminata* flower extract of 300 mg/kg b.w. was selected as the therapeutic dose for the evaluation of antidiabetic activity [11,12].

Antidiabetic activity:

The antidiabetic activity was carried out on albino rats as described by the method based on alloxan induced diabetes. Here the blood sugar level of rats was raised by administration of alloxan. Wister rats were divided into four groups of six animals in each group. The animals were fasted for 16 h with water *ad libitum*. Group I animals received 1.0 ml of normal saline orally, and served as non diabetic control, the Group ‑ II was served as diabetic control which received alloxan (150 mg/Kg of body weight) with normal saline water subcutaneously, Group ‑ III was served as standard control which received alloxan 150 mg/Kg of body weight of rat along with Glibenclamide at a dose of 10 mg/Kg orally, Groups ‑ IV was served as test groups which received alloxan 150 mg/kg of body weight along with single dose (300 mg/Kg, b.w.) of ethanol flower extract respectively.

Rats were made diabetic by a single intraperitoneal injection of alloxan monohydrate (150 mg/Kg of body weight). Two days after of alloxan injection, rats with plasma glucose levels of more than 200 mg/dl were included in the study and at this stage the blood glucose level of each rat was consider as basal value in each group.

Treatment with plant extracts and standard drug was started after 48 h of alloxan injection. The blood sample were obtained through the tail vein puncturing with hypodermic needle, 0.2 ml of blood was withdrawn from all the animals of all the groups at an interval of initial 0, 1st, 3rd, 5th and 7th hour of administration of single dose and blood glucose levels was measured using Glucometer (Counter Digital Glucometer, India) and the results were compared with standard Glibenclamide group [13,14].

Statistical analysis:

The observation values are reported as mean and standard deviation of each observation. The significance of difference among the various treated groups and control group were analyzed by means of Dunnet's t-test. The value of less than 5 % ($p < 0.05$) was considered statistically significant [15].

Table 1. Phytochemical screening of flowers extracts of *B. acuminata*.

Extract	AL	GS	CH	PC	FN	TN	SN	OF
Ethanol	--	--	++	++	+++	--	++	++

+++ = Strong, ++ = moderately, + = poor presence and -- = absent. PC - Phenolic compounds, AL – Alkaloids, GS – Glycosides, CH – Carbohydrates, FN – Flavonoids, TN- Tannins, OF – Oils and Fats and SN - Saponins.

RESULTS AND DISCUSSIONS:

The phytochemical screening revealed that the B. *acuminata* flower showed the presence of Carbohydrates, Phenol compounds, Saponins, Flavonoids, oils and fats (Table 1). Acute toxicity study revealed that no mortality was found in any solvent extract at any dose in Swiss albino mice, which confirmed that *B. acuminata* flower extract would be non‑toxic in living body. The extracts produced a significant antidiabetic effect on first, third, fifth and seventh days at 300 mg/Kg body weight which showed in Table 2. These effects are well comparable with the standard drug (Glibenclamide). The flower extract was able to reduce blood sugar level even less than the standard drug Glibenclamide from 3rd day onwards. The activity showed by this extract is of considerable importance and justified its use in the diabetic control in the folkore medicines.

Table 2. Antidiabetic activities of flower extracts of B. *acuminata* by alloxan induced diabetic model.

Blood glucose level (mg/dL) (X±S.D.)					
G	**BV**	**1st day**	**3rd day**	**5th day**	**7th day**
I	70±0.24	87±0.3	82±0.55	87±0.2	78±0.15
II	324±0.5	324±0.7	324±0.83	305±0.4	300±0.83
II	271±0.9	243±0.9	162±0.51	134±0.9	116±1.03*
I	377±1.1	265±1.1	163±1.02	122±1.1	91±1.2***

Each values is represented as mean ± standard deviation (*n*=6). Where **P*<0.05, Group I - Control (Normal saline water), group II - Diabetic control (Alloxan - 150 mg/kg), group III - Standard control (Glibenclamide 10 mg/kg), groups IV - Alloxan (150 mg/kg) with ethanol extracts (200 mg/kg of b.w.). GP – Groups.

CONCLUSION:

Based on the results of the present study, we conclude that the different extract of *Bauhinia acuminata* flowers possesses antidiabetic activity. However, further studies are necessary to examine underlying mechanisms of antidiabetic activities and to isolate the active compound responsible for these pharmacological activities. Hence further investigations using more experimental paradigms are warranted for further confirmation of the treatment of various ailments, diseases and disorders of this plant.

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