International Journal of Pharmaceutical Science and Research
www.pharmacyjournal.net
ISSN: 2455-4685
Received: 26-05-2025, Accepted: 25-06-2025, Published: 11-07-2025
Volume 10, Issue 2, 2025, Page No. 1-2

Phytochemical, bioactive and pharmacological compunds used as antidiabetic, antioxidants, anticancer, antimycotic activites from *Cassia javanica* linn. plants

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Abstract
Cassia javanica Linn. plant is a small tree. It belongs to family- Leguminosae. It is commonly known as the apple blossom cassia, pink lady, apple blossom shower and java shower. It is widely cultivated in the tropical regions of Asia. Previous studies proved the presence of various phytochemical compounds as anthraquinone glycosides, flavonoids, alkaloids, sterols, tannins, saponins and reducing sugars in different parts of the plant. *Cassia javanica* Linn. plant has various pharmacological activities as antidiabetic, antioxidant, anticancer and antimycotic activities. It was used in traditional medicine to cure various diseases. It has been used as antipyretic, laxative and antimalarial drug. It is known to decrease virulence of pathogenic organisms. It is used in the treatment of gastric pain and cold. Due to complex nature of the disease there is a worldwide need for an ideal drug therefore, there are many antidiabetic herbs recommended in traditional medicaments. This review gives the information concerning the, chemical constituents. bioetivities of the plant.

Keywords: *Cassia javanica*, bioactive, phytochemical, pharmaceutical activities, plant constituents

Introduction

Nature is a source of medicinal agents for many thousands of years and an impressive amount of new drugs have been isolated from natural sources, many based on their use in traditional 717 medicine [1]. Medicinal plants play an important role for the growth of new drugs. Indian medicinal plants are now known to have great potential for preparing clinically helpful drugs that might even be used by allopathic physicians [2]. *Cassia* species are well known medicinal plant commonly found in India and other tropical countries. Different medicinal properties have been attributed to this plant in the traditional system of Indian medicine. The genus *Cassia* comprises of 580 species of herbs, shrubs and trees. It is widely dispersed throughout the world, of which only twenty species are native to India. Many of the *Cassia* species own a good amount of medicinal properties and a few among them supply tanning 132 materials, which are of great economic importance [3]. *Cassia javanica* Linn. is an important member of this plant family- Caesalpiniaceae It has several common names such as pink cassia, pink shower, rainbow shower and white shower due to the presence of typical pink to crimson flowers. *Cassia javanica* Linn. plant is distributed naturally from India to Malaysia, Sumatra, Indonesia, Southern China and the Phillipines. It is also cultivated in the tropical regions of Asia. It is known to be used as antidiabetic, anticancer, antifungal and antioxidant drug [4]. The various phytochemical constituents found were anthraquinone glycosides, flavonoids, alkaloids, sterols, tannins, saponins and reducing sugars in different parts of the plant. *Cassia javanica* possesses various pharmacological activities like antioxidant, and antimycotics, antipyretic, laxative and antimalarial drug and for the treatment of gastric pain. It is also known to decrease virulence of pathogenic organisms [5].

Materials and Methods

Flavonoids: From the ethanolic extract of the flowers of *Cassia javanica* Linn. Four flavonoid glycosides have been isolated. The compounds have been found to be, leucocyanidin-4-0-methyl ether-3-0-β-10-galactopyranoside: dihydrorhamnetin-3-O-β-D-glucopyranoside; quercetin-3',4', 7-trimethyl ether-3-0-α-1-rhamnopyranoside; kaempferol l-3-rhamnoglucoside. Quercetin was also obtained [6].

Anthraquinone pigments: From the seeds of *Cassia javanica* Linn., chrysophanol, physcion, 1,5-dihydroxy 4,7-dimethoxy 2-methyl anthraquinone 3-O-alpha-L (-) rhamnopyranoside and 1,3,6,7,8-pentahydroxy-4-methoxy 2-methyl anthraquinone have been isolated. Chrysophanol and physcion are commonly occurring anthraquinones but 1,5-dihydroxy 4,7-dimethoxy 2-methyl anthraquinone 3-0-alpha-L (-) rhamnopyranoside and 1,3,6,7,8-pentahydroxy 4-methoxy 2-methyl anthraquinone have not been reported earlier; are reported. [7].

Compounds from the roots: Emodin-8-rhamnoside, 5-hydroxyemodin-8-rhamnoside; 1.3- dihydroxy-5,6,7-trimethoxy-2-methylanthraquinone;1,4-dihydroxy-8-methoxy-2-methylanthraquinone-3-O-B-D-glucopyranoside;1,8-dihydroxy-6,7-dihydroxy-2-methylanthraquinone.3',6'dihydroxy-4-methoxychalcone,1,6-dihydroxy and 1,5,6-trihydroxy-3-methylanthraquinone. 8-O-a-L-537 rhamnopyranoside [3] from roots of *Cassia javanica* Linn. plants.

Compounds from the leaves : Alkaloids, tannins, glycosides, sterols, flavonoids, and saponins [8] ,heptacosane, octacosane, hentriacontane, ceryl alcohol, octacosanol and hentriacontanol [9] 1,3,4,6-tertrahydroxy-5-dimethoxy-2-methylanthraquinone and 1,3,5,8-tetrahydroxy-6-methoxy-2-methylanthraquinone; quercetin, emodin, chrysophanic acid, aloe-emodin, F107 chrysophanol, physcion and its glucoside [10] Nonacosane, triacontane, behenic acid, ß-

amyrin, emodin, kaempferol-3-0-B-D glucosyl-6-O-a-L-rhamnopyranose: methyl mehenate, tetracosane, javanin [3] from leaves of *Cassia javanica* Linn. plants.

Results and Discussion

Anticancer and antimycotic activity: The anticancer and antimycotic activities of the flowers of Egyptian *Cassia javanica* Linn. against colon, breast and liver tumor cell lines (HCT-116, HTB-26 and HepG2) and over clinical dermatophytes 717 (Tricophyton, Microsporum and Epidermophyton) have been evaluated [11].

Antimicrobial potential: This present study investigated the antimicrobial activity and characterization of bioactive constituents from flower extract of *Cassia javanica L*inn. Antimicrobial activity was tested against human pathogens in six different solvents using the well diffusion method. Of these, ethyl acetate and ethanolic crude extracts showed effective antimicrobial activity against all the tested human pathogens. The bioactive constituents of the flower extract revealed the presence of some biologically active substance (alkaloids, cardiac glycosides, flavonoids, glycosides, phenolic compounds, phlobatannins, triterpenoides, saponins, volatile oils and tannins). In the GC-MS analysis, 14 bioactive compounds were identified. Present study concludes that the different extracts of *Cassia javanica* Linn. flower contain a broad spectrum of bioactive compounds and also exhibit antimicrobial activity against all the tested human pathogens, therefore, *Cassia javanica* Linn. flowers can be tapped source to discover the natural bioactive products that may serve as leads in the developments of novel therapeutic drugs [12]

Hypoglycemic activity of *Cassia javanica* Linn: *Cassia javanica* Linn. has been explored for hypoglycemic potential. It aimed to check the Leme hypoglycemic effect of *Cassia javanica* Linn. leaves on normal and streptozotocin (STZ)-induced diabetic rats by acute and subacute studies. Prior to the hypoglycemic study, acute oral toxicity testing of drug was performed. Later, the effects of single and multiple doses of test drug were studied using various parameters. Dried powdered leaf material was used as an oral drug. The preliminary phytochemistry of drug was done by standard qualitative tests. Diabetes was induced in rats by single intraperitoneal injection of STZ. Single and multiple doses of test drug (0.5 g/kg body weight/day) were given to normal and diabetic rats. The parameters studied were blood glucose. serum cholesterol, serum triglycerides, and serum proteins. The results of test drug were compared with standard hypoglycemic drug-glibenclamide (0.01 g/kg/day). Statistical analysis was done by 'Student's 't' test' and one-way ANOVA test. In preliminary phytochemistry, antidiabetic compounds were detected. Unlike acute, subacute treatment of test drug showed highly significant reduction (37.62%) in blood glucose level of diabetic rats in ten days. This effect was considerably good in comparison with standard drug (63.51%). The test drug and standard drug exhibited insignificant change in the abnormal levels of serum metabolites of diabetic rats. Preclinically, *Cassia javanica* Linn. was proved to be effective hypoglycemic agent [8].

Antiviral activity of *Cassia javanica* Linn: Herpes simplex virus (HSV) is a ubiquitous organism that causes infections in human populations throughout the world. It causes a variety of diseases ranging in severity from mild to life-threatening. In this study, ent-epiafzelechin-(4alpha-->8)-epiafzelechin (EEE) extracted from the fresh leaves of *Cassia javanica* Linn. (Leguminosae) was investigated for its in *vitro* anti-HSV-2 activity using XTT and plaque reduction assays. Results showed that EEE inhibited HSV-2 replication in a dose-dependent manner. The IC50 value was 83.8 +/- 10.9 and 166.8 +/-12.9 microM for XTT and plaque reduction assays, respectively. EEE did not affect the viability and the proliferation of cells at antiviral concentrations. Mechanistic studies demonstrated that EEE prevented HSV-2 from penetrating the cell and also interfered with HSV-2 replication at the late stage of its life cycle. It also disturbed virus attachment but the inhibitory effect was minor. In summary, the conclusion of this study was that EEE exhibits various modes of action in 7137 suppressing HSV-2 multiplication [13].

Antioxidant activity: Antioxidant potential of methanolic extract of leaves from *Cassia javanica* Linn. plant was evaluated in superoxide anion radical scavenging assay and it revealed a strong antioxidant potential of 50.4% at a concentration of 300µg/ml [14].

Conclusion

This manuscript showed that the pharmacological, bioactive, pharmacological and chemical compounds of *Cassia javanica* Linn. plant. The phytochemical compounds have been used as flavonoids, anthraquenone pigment, anti diabetic, anti oxidants, anti cancer, anti mycotic activities etc.

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