

Review



## A REVIEW ON ANTIDIABETIC POTENTIAL OF GENUS *BAUHINIA*

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Submitted on: 22.08.2015

Revised On: 24.08.2015

Accepted on: 26.08.2015

### Abstract:

In all over the world, medicinal plants play a key role in the cure of Diabetes mellitus. The aim of this paper is compile data of different plants genus *Bauhinia*, against diabetes on the basis of secondary data published. A total of ten *Bauhinia* species were reported in literature to have anti-diabetic potential. These species include: *Bauhinia purpurea*, *Bauhinia variegata*, *Bauhinia megalandra*, *Bauhinia forficata*, *Bauhinia monandra*, *Bauhinia divaricate*, *Bauhinia candicans*, *Bauhinia vahlii*, *Bauhinia Tomentosa*, *Bauhinia kalbreyeri* and *Bauhinia rufescens*. It is concluded that genus *Bauhinia* have potential of antidiabetic activity. Many species of this genus grow widely. As natural drugs are with no or less side effects and safe for human health so they can greatly replace synthetic drugs in the forth coming future.

### Keywords:

Diabetes mellitus, Anti-diabetic potential, Secondary data, Genus *Bauhinia*.

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Indian Research Journal of Pharmacy and Science; 6(2015) 268-273;  
Journal home page: <https://www.irjps.in>

**INTRODUCTION:**

Diabetes mellitus is one type of chronic disease characterized by high blood glucose levels owing to absolute or relative deficiency of circulating insulin levels (Rahman *et al.*, 2015). There are an estimated 150 million people worldwide suffering from diabetes, which is almost 5 times more than the estimated number 10 years ago (Puraniket *et al.*, 2010). The treatment of diabetes with synthetic drugs is costly and chances of side effects are highly. Although new and more efficacious diabetes medications and improved medication delivery systems have been developed, the majority of diabetic patients do not achieve optimal blood glucose control, leading to poor health outcomes and needing the new alternative drugs for treatment (Baldeet *et al.*, 2015).

There is a growing interest in herbal remedies because of their effectiveness, minimal side effects in clinical experience and relatively low costs. Herbal drugs or their extracts are prescribed widely, even when their biological active compounds are unknown. Even the World Health Organization (WHO) approves the use of plant drugs for different diseases, including diabetes mellitus (Shetti&Kaliwal, 2015). Therefore, it is important to investigate the new nontoxic antidiabetic drugs. As the compounds from plants, originally applied in traditional medicine, are usually relatively nontoxic and do not produce significant side effects (Fan *et al.*, 2015).

Out of the several medicinal plants used in the treatment of diabetes, plants of *Bauhinia* genus reviewed in the present study. The following review will cover the anti-diabetic potential of plant extracts. Information regarding the plants and their anti-diabetic property was gathered by searching with different keyword combinations in databases like Science Direct, Research Gate, and Google scholar. Secondary data gathered was

analyzed and reported in present study (Kandimalla *et al.*, 2015).

***Bauhinia purpurea:***

Administration of STZ (50 mg/kg, i.p.) led to many folds elevation of fasting blood glucose levels, which was maintained over a period of 2 weeks. Two weeks of daily treatment of methanolic extract of *B. purpurea* led to a dose-dependent fall in blood sugar levels (Pahwa *et al.*, 2012).

The antidiabetic activity of *B. purpurea* stem bark extract of petroleum ether, chloroform, ethyl acetate, acetone, methanol and hydro-alcoholic extracts was evaluated using mice i.e. alloxan induced diabetes in mice by glucometer method, with 50 mg/kg dose activity was not show significant activity so higher dose with (100 mg/kg and 200 mg/kg) were selected for study it was found significant activity and in higher doses showed significant value, Amongst these extracts methanolic extract was potent antidiabetic activity (Meshram *et al.*, 2013).

***Bauhinia variegata:***

Oral administration of ethanolic, aqueous and hydro-alcoholic extract of leaves and stem bark of *Bauhinia variegata* at different doses i.e 200 and 400 mg/kg in streptozotocin (STZ) and alloxan-induced diabetic rats reduced the elevated blood glucose level by increasing glucose metabolism. Further it has been discovered that insulin-like proteins present in leaves of *Bauhinia variegata* are responsible for glucose metabolism. Moreover, treatment of ethanolic extract of *Bauhinia variegata* leaves at a dose of 300 mg/kg lowered the blood glucose level and improved lipid profile. It has been noted in an in vitro study that ethanolic extract of leaves of *Bauhinia variegata* increased the release of insulin in beta-cell line INS-1. It has been suggested that treatment of ethanolic extract

of bark at 250 mg/kg and 500 mg/kg improved blood glucose level by regenerating  $\beta$ -cells in alloxan-induced rats (Kaur *et al.*, 2014).

***Bauhinia megalandra:***

The aqueous extract of *Bauhinia megalandra* leaves inhibited the gluconeogenesis and glycogenolysis. *Bauhinia megalandra* leaf extract which are responsible for the reduction in the hepatic production of glucose and of the glucose intestinal absorption, events that are important for the reduction of the supply of glucose to the blood. As a consequence the compounds present in this plant may well be useful in the treatment of diabetic patients due to their antihyperglycaemic activity (Mujica *et al.*, 2005).

***Bauhinia forficata:***

Aqueous extract of *Bauhinia forficata* reduced glucose levels and contributed to weight recovery in treated animals. A significant reduction of glucose levels was observed in animals of group I treated with the aqueous extract of *Bauhinia forficata* (Curcio *et al.*, 2012).

***Bauhinia monandra* Kurz:**

Hypoglycemic activity of aqueous extracts from *Bauhinia monandra* Kurz leaves (10% w/v) was evaluated in normoglycemic mice. Aqueous extract was administered by oral route to male mice in a concentration of 10% (w/v). The extract have shown hypoglycemic activity (Menezes *et al.*, 2007).

***Bauhinia divaricate:***

In laboratory experiment *Bauhinia divaricata* revealed hypoglycemic (antidiabetic) effect. A study was performed using healthy rabbits with intragastric administration of water, tolbutamide or decoction of the tested plant before the induction of

hyperglycaemia by subcutaneous injection of 50 % dextrose solution (4 ml/kg) at 0 and 60 min. Tolbutamide and *Bauhinia divaricata* significantly decreased hyperglycaemia compared with control (Majekodunmi & Igwilo, 2014).

***Bauhinia candicans* Benth.**

The hypoglycemic activity of a 20% dried leaf infusion of *Bauhinia candicans* Benth. was evaluated in alloxan and streptozotocin induced hyperglycemic rats. In normal rats the different infusions did not modify significantly the glycaemia in the period studied, but in diabetic rats different results were observed, depending on the diabetogenic drug used. *B. candicans* infusions elicited remarkable hypoglycemic effects in both experimental models. *B. candicans* presented a greater decrease of glycaemia in alloxan diabetic rats (39%) (Lemuset *et al.*, 1999).

***Bauhinia vahlii* :**

The ethanolic and chloroform extract of *Bauhinia vahlii* at a dose level 353 mg/kg, showed significant reduction in blood sugar level from 2 to 24 h in progressive manner comparable to standard glibenclamide (Narayan *et al.*, 2012).

***Bauhinia Tomentosa* Linn.**

The ethanolic extract of the roots of *Bauhinia tomentosa* Linn. (Family – Fabaceae) were tested for antidiabetic activity by glucose tolerance test in normal rats and alloxan induced diabetic rat. Extract was administered daily for 14 days at doses of 250 and 500 mg/kg. i.p. 5 days after alloxan injection (120mg/kg). Both of doses extract showed significant antidiabetic activity and was compared with glibenclamide (10 mg/kg). Extract with 250 mg and 500mg showed 27.6% and 40.3% decrease in blood glucose level while glibenclamide showed

44.7% decrease in blood glucose level (Kaur *et al.*, 2011).

***Bauhinia kalbreyeri*:**

*Bauhinia kalbreyeri* ("cow hof"), is a tropical plant included in the family Fabaceae. In this work, an ethanolic was obtained. From this extract two bioassays were carried out in order to determine the hypoglycemic action of plant. The diabetes was induced in normoglycemic mice by means of aloxane administration in dose of 75 mg/Kg. The diabetic animals were assigned to different groups to be subjected to treatment with the extract (1.000 mg/Kg), the vehicle (control), the tolbutamide (pattern, per os) and the insulin (via subcutaneous). *Bauhinia kalbreyeri* as antidiabetic, and being consequence of the abundant presence of phenolic-like compounds detected (Murillo *et al.*, 2006).

***Bauhinia rufescens*:**

Methanolic leaf extracts of *Bauhinia rufescens* on alloxan-induced diabetic rats shows hypoglycemic activity. The oral administration of 200, 300, and 400mg/kg b.w. of extract (once a day, for four weeks) significantly lowered blood glucose levels in all treated diabetic rats. Chronic oral administration of extract at doses 200, 300 and 400mg/kg b.w. may be a safe alternative antihyperglycaemic and beneficial effect of improving blood glucose level (Aguhet *et al.*, 2013).

**DISCUSSION:**

Currently, many countries face large increases in the number of people suffering from diabetes. The World Health Organization estimated that about 30 million people suffered from diabetes in 1985 and the number increased to more than 171 million in 2000. It is estimated that the number will increase to over 366 million by 2030 and that large increases will occur in developing countries,

especially in people aged between 45 and 64 years (Mukesh&Namita, 2013). Treatment with oral hypoglycemic drugs ends with numerous side effects and huge monetary expenditure. Fortunately the potency of herbal drugs is significant and they have negligible side effects. There is increasing demand by patients to use the natural products with antidiabetic activity (Romila *et al.*, 2010).

Hence, treatment with herbal drugs has an effect on protecting  $\beta$ -cells and smoothing out fluctuation in glucose levels. In general, there is very little biological knowledge on the specific modes of action in the treatment of diabetes, but most of the plants have been found to contain substances like glycosides, alkaloids, terpenoids, flavonoids etc. that are frequently implicated as having antidiabetic effects. The research for alternate remedies (from the plant kingdom) for diabetes mellitus will continue all over the world as the disease poses many challenges not only to the physician but also to the researcher (Malviya *et al.*, 2010). The species of genus *Bauhinia* (Fabaceae) are the potential natural source to cure a global problem, Diabetes.

**CONCLUSION:**

In this paper 10 antidiabetic plants are discussed which are mainly used in the treatment of diabetes mellitus. The most commonly studied species are *Bauhinia purpurea*, *Bauhinia variegata*, *Bauhinia megalandra*, *Bauhinia forficata*, *Bauhinia monandra*, *Bauhinia divaricate*, *Bauhinia candicans*, *Bauhinia vahlii*, *Bauhinia Tomentosa*, *Bauhinia kalbreyeri* and *Bauhinia rufescens*. Many new bioactive drugs isolated from effects showed antidiabetic activity equal and sometimes even more potent than known oral anti-diabetic agents such as daonil, tolbutamide and chlorpropamide. However, many other active agents obtained from plants have not been well characterized. More

investigations must be carried out to evaluate the mechanism of action of medicinal plants with

antidiabetic effect. The toxic effect of these plants should also be elucidated.

#### REFERENCES:

1. Rahman MA, Sarker J, Akter S, Mamun AA, Azad MAK, Mohiuddin M, Akter S, Sarwar MS (2015) Comparative evaluation of antidiabetic activity of crude methanolic extract of leaves, fruits, roots and aerial parts of *Cocciniagrandsis*. J Plant Sci2(6): 19-23.
2. Puranik N, Kammar KF, Dev S (2010) Antidiabetic activity of *Tinospora cordifolia* (Willd.) in streptozotocin diabetic rats; does it act like sulfonylureas. Turk J Med Sci 40 (2): 265-270.
3. Fan Y, He O, Luo A, Wang M, Luo A (2015) Characterization and Antihyperglycemic Activity of a Polysaccharide from *Dioscorea opposita* Thunb Roots. Int J Mol Sci 16: 6391-6401.
4. Shetti, Kaliwal BB (2015) Hypoglycemic activity of ethanolic leaf extract of *Phyllanthus amarus* in alloxan induced diabetic mice. Eur J Exp Biol 5(1):26-29.
5. Balde ES, Balde NM, Traore MS, Diallo MA, Camara IV, Diallo MST, Balde MA, Camara A, Balde MA (2015) Efficacy and safety of *Englerina lecardii* (Engl.) Balle in the treatment of type 2 diabetes. Journal of Plant Sciences 2015; 3(1-2): 24-27.
6. Raghuram Kandimalla, Sanjeeb Kalita, Bhaswati Choudhury, Jibon Kotoky. A review on anti-diabetic potential of genus *solanum* (Solanaceae). Journal of Drug Delivery & Therapeutics. 2015; 5(1):24-27.
7. Jagdeep Kaur, Harsimran Singh1, Dilrajroop Kaur1, MU Khan. Pharmacological Potential of *Bauhinia Variegata*: A Comprehensive Review. World Journal of Pharmacy and Pharmaceutical Sciences. Vol 3, Issue 12, 2014. 447-459.
8. S. Pahwa, R. Mazumder and S. Bhattacharya. Antidiabetic Activity of Methanolic Extract of Bark of *Bauhinia Purpurea*. International journal of pharmaceutical sciences and Research. 2012; Vol. 3(5): 1444-1447.
9. Mr. S.S. Meshram, Dr. P.R. Itankar, Dr. A.T. Patil. To Study Antidiabetic Activity of Stem Bark of *Bauhinia purpurea* Linn. Journal of Pharmacognosy and Phytochemistry. Vol. 2 No. 1 2013; 171-175.
10. Freddy Gonzalez-Mujica, Norma Motta, Omar Estrada, Elsa Perdomo, Jeannette Méndez and Masahisa Hasegawa. Inhibition of Hepatic Neoglucogenesis and Glucose-6-Phosphatase by Quercetin 3-O- $\alpha$ -(2"-galloyl) rhamnoside Isolated from *Bauhinia megalandra* Leaves. Phytotherapy Research, 19, 624-627 (2005).
11. Sergio Augusto Fudaba Curcio, Luciana Francine Bocchi Stefan, Bruno Azevedo Randi, Marco Antonio Dias, Rodrigo Eduardo da Silva and Eduardo José Caldeira. Hypoglycemic effects of an aqueous extract of *Bauhinia forficata* on

12. the salivary glands of diabetic mice. Pak. J. Pharm. Sci., Vol.25, No.3, July 2012, pp.493-499.
13. Fábio de Sousa Menezes, Andréa BarretoMattosMinto, HallinySiqueiraRuela , Ricardo Machado Kuster , Helen Sheridan, Neil Frankish. Hypoglycemic activity of two Brazilian *Bauhinia* species: *Bauhinia forficata* L. and *Bauhinia monandra*Kurz. Brazilian Journal of Pharmacognosy 17(1): 08-13, Jan./Mar. 2007.
14. S. O. Majekodunmi and C. I. Igwilo. Current status of some tropical plants with anti-diabetic potential – a Review. Journal of Pharmacy and Biological Sciences. Volume 9, Issue 2 Ver. V (Mar-Apr. 2014), PP 41-53.
15. Lemus I, García R, Delvillar E, Knop G. Hypoglycaemic activity of four plants used in Chilean popular medicine. Phytother Res. 1999 Mar;13(2):91-4.
16. Das Surya Narayan, PatroVaranashiJagannath, DindaSubas Chandra. Evaluation of Anti-Inflammatory, Anti-diabetic activityof Indian *Bauhinia vahlii* (stembark). Asian Pacific Journal of Tropical Biomedicine (2012)S1382-S1387.
17. AjitKiran Kaur, S. K. Jain, A. Gupta, Shiv K. Gupta, M. Bansal and P. K. Sharma. Antidiabetic activity of *Bauhinia Tomentosa* Linn. Roots extract in alloxan induced diabetic rats. Der Pharmacia Lettre, 2011, 3(2): 456-459.
18. Elizabeth Murillo, Margarita Maria Tique, Luis Fernando Ospina, Oscar Lombo. Preliminary Evaluation Of Hypoglycemic Activity In Diabetic Mice And In Vitro Antioxidant Activity Of *Bauhinia Kalbreyeri* Harms Extracts. Rev. Col. Cienc. Quím. Farm. 2006; Vol. 35 (1), 64-80.
19. BI. Aguh, IH. Nock, IS. Ndams, A. Agunu and CA. Ukwubile. Hypoglycaemic Activity and Nephro-Protective Effect of *Bauhinia rufescens* in Alloxan-Induced Diabetic Rats. International Journal of Advances in Pharmacy, Biology and Chemistry. Vol. 2(1), Jan-Mar, 2013; 249-255.
20. RawatMukesh and ParmarNamita. Medicinal Plants with Antidiabetic Potential - A Review. American-Eurasian J. Agric. & Environ. Sci., 13 (1): 81-94, 2013.
21. Neeleshmalviya, sanjayjain and sapnamalviya. Antidiabetic potential of medicinal plants. ActaPoloniaePharmaceutica ñ Drug Research, Vol. 67 No. 2 pp. 113ñ118, 2010.
22. Romila Y, P. B. Mazumder and M. Dutta Choudhury. A Review on Antidiabetic Plants used by the People of Manipur Charactirized by Hypoglycemic Activity. Assam University Journal of Science & Technology. Vol. 6 Number I 167-175, 2010.

Conflict of Interest Reported: Nil;

Source of Funding: None Reported