EFFECT OF *Bidaria khandalense*, *Gymnema sylvestre* AND *Wattakaka volubilis* ON DIABETE IN DIABETIC MICES

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Summary

The pesent study explores the anti-diabetic potential of *Bidaria khandalense*, *Gymnema sylvestre* and *Wattakaka volubilis* in diabetic Balb/c mices.
Qualitative test of gymnemic acid from the stem and leaf of *B. khandalense*, *G. sylvestre* and *W. volubilis* were carried out. Diabetic Balb/c mice were treated with the alcoholic extracts of *B. Khandalense*, *G. sylvestre* and *W. volubilis*. Blood glucose level in diabetic Balb/c mices were estimated.
The leaf and stem of all the studied plant gave positive test for gymnemic acid. Results of hypoglycemic potential indicated that, out of these only *W. volubilis* did not showed hypoglycemic activity like that of *G. sylvestre*. The highest reduction in blood glucose after 24 h was found in *G. sylvestre* followed by *B. kandalense.*
These results suggested that *B. kandalense* can be used as an anti-diabetic.

Key Words: Anti-diabetic; *Bidaria*; *Gymnema; Wattakaka*

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Introduction

The tribe Marsdenieae of the sub-family Asclepiadoideae and family Asclepiadaceae contains a number of medicinally important genera like *Gymnema*, *Bidaria* and *Wattakaka*. Traditionally, some medicinal member belongs to the tribe Marsdenieae has been used in treatment of diabetes. Diabetes is a consequence of abnormalities in the blood levels of insulin, the hormone that converts blood sugar into energy. Adult-onset diabetes is caused by the body's inability to adequately process of insulin. Today it is known as Type II diabetes, non-insulin-dependent diabetes mellitus (NIDDM) and stable diabetes. Type I diabetes or juvenile diabetes results from an insulin shortage. Type I diabetes is also called insulin-dependent diabetes mellitus (IDDM). Thousands of years ago, Type II diabetes was treated with *Gymnema*. In India, *Gymnema* has been used by both Type I and Type II diabetics, but it is used mainly to treat Type II diabetics. In ancient Indian texts, *Gymnema* is referred to as *Gurmar,* which means, "*sugar killer*" in Sanskrit. The leaves of *Gymnema sylvestre* (Retz.) R.Br. are used in the preparation of herbal medicine. *G. sylvestre* leaves contain gymnemic acids, which are known to suppress transport of glucose from the intestine into the blood stream (1,2,8,11,12). *G. sylvestre* that can interact with receptors on the tongue to decrease the sensation of sweetness in many foods. Therefore, it is useful in lowering blood sugar, lowering blood cholesterol levels, balancing insulin levels and also for promoting weight loss. It is reported in the literature that *Bidaria khandalense* (Sant.) Jagtap and Singh has same medicinal properties like that of *G. sylvestre*. However, no literature is available on its chemical constituents and anti-diabetic potential of this plant. *Wattakaka volubilis* (L. F.) Stap. is useful in cold and eye disease. It contains dregein alkaloids (5). Leaves are used as an application to boils and abscesses. However, the plant *W. volubilis* has not been studied for its effect on diabetes. Thus, we selected *B. khandalense*, *G. sylvestre* and *W. volubilis* of the tribe Marsdenieae to evaluate for its anti-diabetic action in diabetic Balb/c mices and compare result of *B. khandalense* and *W. volubilis* with anti-diabetic potential of *G. sylvestre*.

Materials and Methods

a) Material : Streptozotocin and Dimethy sulfoxide (DMSO) were obtained from Sigma chemicals and Accu-chek blood glucose analyzer was a product of Roche.
Fresh plant material was collected from various places of Maharashtra such as Khandala, Mulshi, Dapoli, Amboli and Khambataki Ghat. Efforts were made to collect the plant in flowering and fruiting conditions for the correct botanical

identification. The plant material was brought to the laboratory and identified with the help of flora of Maharashtra State (10), Fasicals of flora of India (7) and Flora of British India (6).

b) Animals: The Experimental Animal Facility at the National Centre for Cell Science, India provided all the animals. Male Balb/c mice 6-8 weeks old were made diabetic by intraperitoneal injection of streptozotocin (180 mg/kg body weight) freshly dissolved in chilled sodium citrate buffer (pH 4.5). Mice showing blood glucose above 200 mg/dL were taken for further experiments. They were kept under 12h in light and 12h in dark conditions at 25°C and fed them with ad libitum during the experiment (4).

c) Phytochemical screening: In the present investigation qualitative test of gymnemic acid from the stem and leaf of *B. khandalense*, *G. sylvestre* and *W. volubilis* were carried out (9).

c - 1) Qualitative test of Gymnemic acid:

Procedure: Sample Preparation: Take 1 gm of stem or leaf powder of plant samples of each studied material and mixed in 5 ml methanol (Conc. 200mm or 200µg/µl), Sonicate the mixture, filter the extract and filtrate was used for application.

Stationary Phase: Percolate Silica Gel TLC Plate (20x10cm Merc No. 5554).

Mobile Phase : N butanol : Methanol : Water.

3 : 1 : 1

Developing distance : 80mm.

Tan Saturation : 10 min.

Scanning Wavelength : 580 nm.

Spraying reagent : raniline sulphuric acid.

Rf : 0.61.

Standard gymnemic acid :1µg/µl = 5µl i.e 1%

d) Test for hypoglycemic potential: Diabetic Balb/c mice were randomly divided into 6 groups (each having 5 animals) to examine the glucose-lowering property of various plant extracts viz. *Bidaria Khandalense* (**1**), *Gymnema sylvestre* (**2**), and

Wattakaha vulubilis (**3**). All extracts were administered orally at a dose of 50 mg/kg body weight. An effect of vehicle administration DMSO (**4**) was also determined by acute oral gavage. Blood was collected from tail vein immediately prior to and 24h after administration of the extracts for blood glucose analysis by Accu-chek blood glucose analyzer from Roche (3).

Results

Phytochemical screening: Results on High Performance Thin Layer chromatography (HPTLC) indicated that the leaf and stem of all the studied plant gave positive test for gymnemic acid.

Hypoglycemic study: Results indicated that *W. vulubilis* did not show hypoglycemic activity like that of *G. sylvestre* and *B. kandalense*. The highest reduction in blood glucose after 24 h was found in *G. sylvestre* followed by *B. kandalense* (Table No.1). These results suggested that *B. kandalense* can be used as an anti-diabetic. The hypoglycemic activity is first time reported in *B. khandalense* and this can be used as a substitute an anti-diabetic to *G. sylvestre.* Thus, the results of this investigation will be helpful alternative sources of medicine in Ayurvedic, Homeopathic, Unani, Allopathic systems of medicine and Pharmaceutical industries.

Table No. 1: Screening Of Plant Extracts For Their Hypoglycemic Potential

Plant	**Blood glucose at 0 h**		**Blood glucose at 24 h**		**% change at 24h**
Extract	**Mean**	**S. E.**	**Mean**	**S. E.**	**w.r.t. 0h**
Name of the Plant & vehicle administration					
(1) *Bidaria khandalense*	379.2500	31.1886	340.7500	19.690	-10.1500
(2) *Gymnema sylvestre*	354.5000	34.0991	140.7500	33.2976	-60.3000
(3) *Wattakaka volubilis*	463.7500	70.1824	517.0000	62.9524	11.4800
(4) DMSO	287.0000	39.5095	344.6667	54.7002	20.0900

% change = $\frac{\text{(final level – initial level)}}{\text{initial level}} \times 100$

Values represent mean ± SE

Conclusion

These results suggested that *B. kandalense* can be used as an anti-diabetic. The hypoglycemic activity is first time reported in *B. khandalense* and this can be used as a substitute an anti-diabetic to *G. sylvestre*. Thus, the results of this investigation will be helpful alternative sources of medicine in Ayurvedic, Homeopathic, Unani, Allopathic systems of medicine and Pharmaceutical industries.

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