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Quantitative Estimation of Some Essential Minerals of *Gymnema sylvestre* as a Potential Herb in Counteracting Complications of Diabetes

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Abstract: *People who are suffering from diabetes mellitus are at increased risk of developing a number of complications and glucose intolerance due to deficiency of certain minerals like Mg, Zn, Cr, Mn . Gymnema sylvestre is one such anti-hyperglycemic medicinal plant which is now popularized owing to lesser side effects and low cost compare to conventional drugs. The mineral contents of Gymnema sylvestre leaf was measured by means of Inductively Coupled Plasma-Optical Emission Spectroscopy following AOAC method 985.01. The results of this study showed that the leaf contains a higher amount of minerals like Ca, Fe, Mg, Mn, Cu, Zn, Ni, Se, Mo, Cr which are 1580 mg, 19.26mg, 604.8mg, 74.1mg, 13.22 mg, 24.02 mg, 2.36 mg, 0.12mg, 0.230mg, 0.071mg respectively per 100gm leaf . Both from laboratory study and review it may be concluded that high mineral content of Gymnema sylvestre may be proved to be beneficial in controlling diabetes related complications like trace minerals deficiency and glucose intolerance.*

Keywords: *Anti-hyperglycemic, Diabetes mellitus, Gymnema sylvestre, Trace-minerals*

1. INTRODUCTION

The term 'diabetes mellitus' describe a metabolic disorder of multiple aetiology and complications [1].There is accumulating evidence that the metabolism of several trace elements like Zn,Mg,Mn,Cu etc are altered in diabetes mellitus [2,3]. The cause of trace mineral deficiency in diabetic individual is multifactorial. An altered metabolism, a poor glycaemic control, urinary loss may be some contributory factors. On the other hand these decreased levels of trace elements(Zn,Mg,Mn,Cu) cause disturbances in glucose transport across cell membrane lead to insufficient formation and secretion of insulin by pancreas [1,3]. Untreated diabetes leads to serious complications or even premature death. The treatment of diabetes mellitus is based on insulin and/or oral hypoglycemic drugs[4] .Oral hypoglycaemic drugs available in the market though improve insulin secretion but unable to check the mineral loss in Diabetes and have many side effects[2,4].Condition demand mineral supplementation that is expensive for poor patient. Therefore, there is considerable interest in the field of medicinal plants due to their natural origin and less side effects .One of these medicinal plants is *Gymnema sylvestre* (Gurmar), which means sugar killer [4].

1.1. Plant Details

Scientific name - *Gymnema sylvestre*

Geographical distribution- widely distributed in India, Malaysia, Srilanka, Australia, Indonesia, Japan, Vietnam, tropical Africa and the south western region of the People's Republic of China. In India it is native to the tropical forests of central and southern India.

Active constituents – Gymnemic acid .Gymneotrogenin, gymnemagenin .

Therapeautic indication - A scrutiny of literature revealed some notable pharmacological activities of the plant such as antidiabetic, antiobesity, hypolipidaemic, antimicrobial, free radical scavenging and anti-inflammatory [5,6].

Table1. *Taxonomy of Gymnema sylvestre*

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Gentianales
Family	Asclepiadaceae
Genus	*Gymnema*
Species	*sylvestre*

Fig1. *Fresh leaves of Gymnema sylvestre*

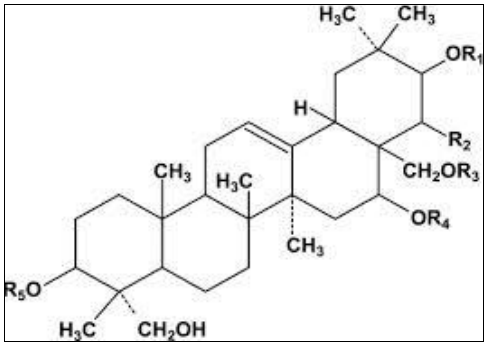

Fig2. *Basic molecular structure of gymnemic acid*

1.2. Patent and Dosage

These days Gymnema based products, dietary supplements and health foods are available in the Asian, American and European markets for the management of diabetes and obesity. Many patents are also filed mainly in the fields of product formulation and analysis of constituents .In market, *Gymnema*. *sylvestre* is available in the form of crude plant, powder, extract paste and solid in standardized form. The plant material is also available in many dosage like form capsule or tablets in combination with other herbal plants, teas, chewing gums etc.The gymnemic acids content of the daily-recommended dose differs from 38 to 251 mg.

Adult dose: In liquid form (extract), 25 to 75 ml per week is recommended. Best results of this medicine will come after 6 to 12 months of continuous use. It is also prescribed in tablet form, in this case 8 to 12 g per day of leaf equivalent is recommended [5,7].

Consumption of *Gymnema sylvestre* has a number of health benefits and is used in the treatment of many diseases including Diabetes. The clinical research suggests that the homeostasis of trace elements can be disrupted by Diabetes mellitus. Deficiency of certain trace minerals like Mg, Zn and Cr has been shown to predispose of a person to glucose intolerance and aggravate the diabetic complications.[8]. All the supplements & patents of Gymnema available in market show their positive health benefits & ability to control glucose on the basis of active constituents [9].Less importance was given on its mineral content in counteracting complications of mineral loss in Diabetes Mellitus.

Therefore the objective of the present study is to estimate the mineral content of Gymnema sylvestre leaves. As a potential medicinal herb in counteracting diabetic complications.

2. METHODS

2.1. Collection of Sample

Gymnema sylvestre leaves were collected from The Agri Horticultural Society of India, Kolkata in the month of July.

2.2. Preparation of Sample

The dried leaves were selected as the test portion for the quantitative estimation of the minerals.

2.3. Preparation of Working Solution

The working solution was prepared for measuring the following minerals Fe, Ca, Mg,Mn, Zn, Cr, Cu, Se,Mo,Ni using AOAC method.[10] . The instrument used for mineral estimation was ICP (OES), model ICAP6800, serial number ICP 20073108, calibrated with NIST certified multi-standards.

3. RESULT AND DISCUSSION

Table2. *Mineral content of Gymnema sylvestre leaf*

Sr. No.	Parameters	Mineral constituents mg/100g
1.	Calcium	1580
2.	Iron	19.26
3.	Magnesium	604.8
4.	Manganese	74.1
5.	Copper	13.22
6.	Zinc	24.02
7.	Nickel	2.36
8.	Selenium	0.12
9.	Molybdenum	0.230
10.	Chromium	0.071

Deficiency of chromium, magnesium, selenium, vanadium and zinc impaired insulin release, insulin resistance and glucose intolerance in experimental animals and humans with Diabetes Mellitus .On the other hand diabetes Mellitus increases Zinc, chromium, magnesium excretion at higher than normal rates, through urine [2].For solving this problem one could increase the dietary intake of the mineral or utilize supplemental sources of these minerals. Doctor suggest multivitamin mineral tablets for preventing urinary loss of mineral in diabetes but poverty and lack of purchasing power have been identified as two major factors responsible for deprivation. Gymnema sylvestre may be used as a supplementary food source because- it is easily available, cheap, does not require special care for farming and has both medicinal properties to cure diabetes along with high mineral content to prevent diabetic complications .So, it should be promoted as a cheap source of trace minerals in a poor country like India to cure diabetes & improve the scenario of long standing complication of mineral deficiency.

4. CONCLUSION

From the study we can conclude that Gymnema leaves are rich sources of minerals like Calcium, Iron, Magnesium, Manganese and Zinc. Previous studies revealed that commercial supplement of Gymnema is beneficial in lowering blood glucose level. Results shows that some mineral like Magnesium, Manganese, Copper present in good amount so that we can use it as a supplement for those minerals which are very helpful in preventing diabetic complications. Though edible & patent are available but being unfamiliar it is neglected.

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