International Journal of Global Science Research **ISSN: 2348-8344 (Online)**
Vol.1, Issue 1, April 2014, pp.58-65
***Available Online* at www.ijgsr.com**

Research Paper

Utilization of new research findings and pre-existing knowledge of plants of Bundelkhand region of Madhya Pradesh for the prevention and cure of diabetes

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Received: 28/04/2014
Revised: 29/04/2014
Accepted: 30/04/2014

Abstract: Life style diseases are diseases of civilization. Diabetes mellitus is the outcome of modern life style and affect our health immensely. Management of diabetes is still a major challenge. Thus there is a great demand for research on natural products with anti-diabetic properties. The Bundelkhand region of Madhya Pradesh is inhabited by various tribes and villagers. They have a good knowledge of medicinal use of their local flora. An extensive survey of the forested area of Bundelkhand region was carried out to collect information about the ethno-medicinal plants used by the herbalists of various tribal pockets. The plant species were authenticated by herbaria present in Department of Botany Dr. H.S. Gour University.In spite of the 21 plants used by the rural people of Bundelkhand region, there is a new category of three important plants recently recognized as anti-diabetic plants. These are *Allium sativum*, *Allium cepa and Aloe vera*. All these plants are very common plants hence may play a very important role in prevention and cure of the diabetes mellitus and might open a door for the formulation of important anti-diabetic medicine from our easily available cheaper source.

Keywords: Diabetes mellitus, Anti-diabetic, tribes, Bundelkhand region.

Abbreviations: Indian Diabetes Federation (IDF)

INTRODUCTION

The plants are the nature's gift and even nature's biggest chemical laboratory where a wide variety of compounds are synthesized. Exploitation of these natural resources have helped in evolving more effective drugs for some of the diseases in the pharmacological

history. Due to the close and long association with forests the tribal & villagers have acquired tremendous knowledge of plants, plant products and their uses in their daily needs and health care (Ambasta, 1986; Singh et al. 1994; Prakash 2011).
Diabetes is a chronic metabolic disorder that poses a major challenge worldwide. In the present millennium due to socio-economic and technological changes our society is facing problem of stress. Stress has long been suspected as a prime cause of metabolic disarray. Stress impairs glucose metabolism by discharging a host "counter regulatory" hormone that result decline insulin activity and elevated blood glucose level (Diabetes mellitus). Thus stress is a potential contributor to chronic hyper-glycemia in diabetes (Shrivastava and Garg, 2013).

Currently in India the number of people with diabetes is around 40.9 million and it is expected to rise to 69.9 million by 2025. [5] The IDF estimated 3.9 million deaths for the year 2010, which represented 6.8% of the global mortality (Joshi and Pathak, 2008)

Plant drugs are frequently considered to be less toxic and free from side effects than synthetic one (Valiathan, 1998) . Traditional anti-diabetic plants might provide new oral anti-diabetic compounds, which can counter the high cost and poor availability of the current medicines for many rural populations in developing countries (Pal and Jain, 1998).

The Bundelkhand region of M.P. is situated in heart of the state and has longest concentration for tribal population. Keeping in view of vastness of forest area and richness of vegetation, the present investigations were made. The present study is subjected to scientific study on use of herbal plants in cure of diabetes by villagers and tribes of Bundelkhand region of M.P. and to popularized the use of herbal medicine in urban areas also.

MATERIALS AND METHODS

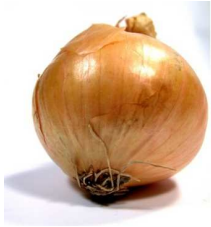
The present study has been conducted in tribal dominated pockets in Bundelkhand region of M.P. during the period of March 2012 to November 2013. The sites covered were forests of Panna, Chhatarpur, Tikamgarh, Damoh, Datia and Niwari District.

Knowledgeable persons of tribal communities and traditional herbal healers were contacted and information was collected through interviews, observations and discussions held during field survey. The discussions revealed local name of species, plant part used and formulation of herbal drugs used by them. The species were scientifically identified with their botanical names and anther index.

In spite of the plants suggested by tribal &rural people, literature related to latest scientific investigations were also searched for the herbal treatment of diabetes. The information recorded in the present investigation is presented below:-

New Research Findings

1. *Allium cepa* Linn.
   Family: - Liliaceae
   Hindi: - Pyaj
   English: - Onion
   Part Used: - Bulb



2. *Allium sativum*
   Family: - Liliaceae

Hindi: - Lahsun
English: - Garlic
Part Used: - Cloves

3. *Aloe vera* Mill.
Family: - Aloaceae
Hindi: - Gwarpatha,
Ghee Kunwar
Part Used: - Leaf

The above mentioned three plants were never ever reported by any tribal community of studied area as a cure for the treatment of diabetes.

Traditionally Used Plants by Villagers & Tribes of Bundelkhand Region

1. *Aacia nilotica* Linn.
Synamous:- *Acacia arabica*
Family: - Mimosaceae
Local Name: - Babul
English: - Indian gum Arabic tree
Part Used: - Gum of *A.nilotica*
Dosage: - Gum of *A.nilotica* 5gm withwater. 2-3 times a day.

2. *Aegal marmelos* (Linn.) Corr.
Family: - Rutaceae
Local Name: - Bel, Beel
English: - Bael tree
Part Used: - Fruit pulp of plant 4gm *Piper*
Dosage: - Fruit pulp of plant 4gm *Piper nigrum* 2-3times with water.

3. *Aerva lanata* (L) juss ex Schult
Family: - Amaranthaceae
Local Name: - Gorakhaganja
English: - N.A.
Part Used: - Whole Plant
Dosage: - Chewing the plant once in a day.

4. *Anoogeissus latifoloia* (Roxb) Wall ex Bedd.
Family: - Combretaceae
Hindi: - Dhava
English: - Axle wood tree
Part Used: - Bark
Dosage: - 5gm bark decoction once a day early morning.

5. *Azadirachta indica* A.Juss

Family: - Meliaceae
Hindi: - Neem
English: - Neem tree
Part Used: - Bark
Dosage: - 2-4gm once in a day decoction of 10-20gm

6. *Bauhinia variegate* Linn.
   Family: - Caesalpiniaceae
   Local Name: - kachar
   English: - Mountain aboni
   Part Used: - Root & Bark
   Dosage: - decoction of 10-20gm once in a day

7. *Butea monosperma* (Lam)Taub
   Family: - Papilionaceae
   Local Name: - Dhak, Palash, Teshu, Chhewla
   Part Used: - Seeds (3-6 gm), Bark (10-20gm) & Gum (1-3gm) .

8. *Caesalpinia bonducella* (L.) Roxb.
   Family: - Caesalpiniaceae
   Local Name: - Kantaki, Karanj
   English: - Fevernut
   Part Used: - Seed Abstract

9. *Cassia fistula*
   Family: - Caesalpiniaceae
   Local Name: - Amaltas
   English: - Indian labornum
   Part Used: - Bark decoction

10. *Cassia oxidentalis* Linn.
    Family: - Caesalpiniaceae
    Local Name: - Kasondi
    English: - Megro Coffee
    Part Used: - Root decoction

11. *Catharanthus rosea* (L.) G. Don.
    Family: - Apocynaceae
    LocalName:-Sadabahar, Sadasuhagan
    English: - Madagaskar periwinkle
    Part Used: - Sauce of leaves and flowers of the plant at morning and bed time.

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12. *Coccinia grandis* (Linn.) Voigt
    Family: - Cucurbitaceae
    Local Name: - Kundaru
    English: - Ivy gourd
    Part Used: - Juice of whole plant 10ml. With "Vasantakusumkara rosa"100mg,
    2 times a day with honey, Fruits are also used.

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13. *Ficus benghalensis* Linn.
    Family: - Moraceae
    Hindi: - Bargad, Vat
    English: - Banyan tree
    Part Used: - Bark or small leaves powder of the plant 5gm with water, 2-3 times
    a day of decoction of bark.

14. *Gymnema sylvestre* B. Br.
    Family: - Asclepidaceae
    Local Name: - Gudmar
    English: - Australian cow plant
    Part Used: - Leaves powder 2gm with honey 10gm or milk, 2 times a day

15. *Momordica charentia* Linn.
    Family: - Cucurbitaceae
    Local Name: - Karela
    Part Used: - Juice of unripe fruit 1.5ml daily.

16. *Musa paradisica* Linn.
    Family: - Musaceae
    Local Name: - Kela
    English: - Banana
    Part Used: - Flower powder of plant 20gm, 2 times a day.

17. *Phyllanthus emblica* Linn.
    Family: - Euphorbiaceae
    Local Name: - Amala
    English: - Emblic, Indian Goosberry
    Part Used: - Fruit

18. *Pongamia pinnata* Pierre
    Family: - Papilionaceae
    Local Name: - Karanji
    English: - Pongam oil tree
    Part Used: - Cold infusion of Flower 10gm, 2 times daily.

19. *Syzygium cumini* (L.) Skeel
    Family: - Myrtaceae
    Local Name: - Jamun
    English: - Jamul tree
    Part Used: - Vinegar of plant 5-10ml, 2 times a day with water.

20. *Temarindus indica* Linn.
    Family: - Caesalpiniaceae
    Local Name: - Imali
    English: - Tamarind tree
    Part Used: - Seed

21. *Terminalia chebula* Retz.
    Family: - Combretaceae
    Local Name: - Harad, Harre
    English: - Chebulic, Myrobalan
    Part Used: - Mixture of powder of ripe fruits with leaves and seeds of *Syzygium cumini* ,*Gymnema sylvestre* & juice of fruit of *Momordica charentia* by seven times and make tablet of 19. Take 01 tablet two times in a day.

22. *Triticum aestivum* Linn.
    Family: - Poaceae
    Local Name: - Grahun
    English: - Wheat
    Part Used: - use of flower of wheat, barley and green gram in ratio 10:4:1 for making chapatti.

RESULTS AND DISCUSSION

A wide and diverse range of plants have been reported by the tribes of Bundelkhand region (M.P.) to prevent and treat diabetes (Bhutya, 2011). Several phytochemicals, including alkaloids, flavonoids, glycosides, glyco-lipid, polysaccharides, peptidoglycans, steroids, carbohydrate, terpenoides, amino acids, dietary fibres and inorganic ions affect various metabolic cascades, which directly or indirectly affect the level of glucose in human body (Grover et al., 2001)These have produced potent hypo-glycemic, anti-hyperglycaemic and glucose suppressive activities (Saxena et al., 2006).

A few traditional Indian anti-diabetic plants and their beneficial effects have been utilized by the tribal and villager of Bundelkhand region (M.P.) [Fig. from 01 to 22]. Three new plants which are experimentally proved to be effective hypo-glycemic in modern researches are *Allium cepa, Allium sativum* and *Aloe vera.*

The mechanism by which *A. cepa* and *A. sativum* might work is through the inhibiton of dipeptidyl peptidase for which has emerged as a new class of anti-diabetic agent that increase insulin secretion and reduce glycogen secretion (Mathew and Augusts, 1975; Sheelor and Augusts, 1992). *Aloe vera* contains polysaccharides which increase the insulin level and show hypo-glycemic properties (Tanaka et al., 2006). Hence it is clear that the medicinal plants have potential effectiveness against diabetes and the phyto-chemicals play a major role in the management of diabetes. Available data on anti-diabetic response of their herbs suggest that there are many active ingredients present in different parts of these herbs, which in turn act through different pathways and have a role in many diseases apart from diabetes. It requires biological testing of plants extracts, isolation of bioactive components as well as toxicological, pharmacological and ultimately, clinical studies.

ACKNOWLEDGEMENT

The author is thankful to the University Grant Commission for financial assistance provided under Minor Research Project.

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