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Study of ethno hypoglycemic food plants used by tribal's of Southern Rajasthan (India)

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Abstract

Functional food regulates different maladies either by regulating their pathway or controlling the source / origin. They also balance between healthy nutritional stuffs and toxicants of body. Among life style mediated disease, diabetes mellitus ruins life because of sedentary routines. Certain foodstuffs regulate glycemic loads but either out bursting low sugar loads or by de-routing glucose indices. Survey to ethnic pouches of South East Rajasthan reveals usage of 32 food plants for DM II management. Among documented 32 food plants 15.6% plants are cooked and consumed as rice while 18.75% are used as for the preparation of bread. The study also reveals that in study area only few fruits are consumed as means of foods. Some examples include *Psidium guajava*, *Feronia limonia*, *Syzygium heyneanum*, *Syzygium cumini*, *Pithecellobium dulce* and *Aegle marmelos*. In study area neither decoction or infusion or ash has been documented.

Keywords: Hypoglycemic plants, diabetes mellitus II, South east Rajasthan, *Alloteropsis cimicina*, *Panicum miliaceum*, *Panicum sumatrense*, *Paspalidium flavidum*, *Setaria glauca* and *Setaria italica*

Introduction

Diabetes mellitus is a complicated metabolic disorder that has greatly troubled the human health and quality of life. According to recent estimates of WHO there were 171 million people in the world with diabetes in the year 2000, it has reached to 347 million people worldwide having diabetes during 2013. This is projected to increase to 552 million by 2030, with more than 80 percent of deaths occurring in developing countries. The recent survey projects diabetes deaths will double by 2030. The International Diabetes Federation predicts that at least one in 10 adults could have diabetes by 2030. The no. is changing surprisingly as per the 2006 report of WHO on diabetes they reported the projected value were 366 million people by 2030.

The term diabetes mellitus describes a metabolic disorder of multiple aetiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. Several pathogenetic processes are involved in the development of diabetes. These include processes which destroy the beta cells of the pancreas with consequent insulin deficiency, and others that result in resistance to insulin action. Drugs used to treat diabetes are known as anti-diabetic drugs and it treats diabetes mellitus by lowering glucose levels in the blood. There are different classes of anti-diabetic drugs, and their selection depends on the nature of the diabetes, age and pathological conditions of patient.

There are many alternative therapies have been employed for treatment since time unmemorable. Among variable therapies homeopathic, Unani and Ayurveda were popular in Indian context. But India is a country of ethnic localities and sub localities, local healing systems were found to be more appropriate and feasible as these were phyto – dependent which cost least as compare to other processed once and was easily available.

The tribal population in India is quite considerable, i.e. 53 million, forming 8% of country's total population. Over 550 ethnic groups are found in different geographical habitats. Rajasthan is a state of cultural diversity. Rajasthan has about 70.97 lac tribal population (fifth rank in India) forming 12.5% of state's total population. It encompasses various tribes like Bhil, Meena, Bishnoi, Kathodia, Garasia, Banjara, Gadia-Lohar, Jogi, Bori, Sansi, Saharia, Sahadad, Kanjar, Damor, Tetariya, Kalbeliya, Banjara in different localities from Dessert to Aravallies. Among these twelve tribes five are demographically important viz. Bhil, Damor, Garasia, Meena and Saharia. The Dang region comprising of Karauli, Sawai Madhopur, and Dholpur districts is rich in forests as well as in tribal and traditional communities. Shekhawati region of Rajasthan specially the hilly tracts of Lohargal, Mansadevi, Khetri, Babai, Sakambari, Singhana and Harshnath areas are endowed with rich vegetation and the local

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people nicely learnt to use the area's vegetation resources including health care. These people successfully treat many difficult diseases by using plant based medicines. Tribals like Bhil, Garasia, Meena, Damor, Kalbelia, Kathodia resides in southern part of Rajasthan including Chittorgarh, Udaipur, Banswara, Rajsamand, Bhilwara and Dungarpur districts. These people and their medicine men and women have valuable information about medicinal properties and usage of plants in their areas of Rajasthan. We will evaluate some hypoglycemic plants from South-East Rajasthan. In present study an attempt was made to document the hypoglycemic plants and to evaluate their use value so that they can be subjected for further screening to be formulated as low risk safe herbal drug.

Materials and Methods

For documentation of hypoglycemic plants, field surveys were carried out in different seasons, from 2014-2018 in various tribal pockets. The pockets were selected randomly and were emphasized to cover nearly all ethnic groups. For the documentation, field interviews were made from different practitioners - Bhopa (ritual therapeutic), Jhankar / Jhangar (herbalist), Devala (grain diviner), Khoonth (priest) and Guni (herbal practitioner) through local transcends to avoid language ambiguity. For the authentication of plant usage crisscross check was made, either by showing them plants or by making a tour with them to a forest array. According to CBD guidelines prior informant consent (PIC) was obtained and inscribed for usage, dose, mode of dose, tenure/ time interval etc. In case of poly-herbal preparation ratio of respective drug/s and mode of usage was specifically noted. As some of the herbs prevents usage of other food/s and supplements/s as they directly or passively interacts with others, in such cases special notes were made for check modes. Plant specimens were collected and were followed by herbarium preparation with citation of all related information. Plants were identified up to species level through flora of

region and prior work. Herbarium sheets were deposited in Department of Biotechnology, B.N. P.G. College, Udaipur (Raj.) for further reference.

Results and Discussion

Ethno-traditional medicinal system of south-east Rajasthan functions on three arrays viz.-

- Regulation of ailment through nutritional supplement.
- Prohibitory supplements to delay the consequence of ailments and
- Use of local herbs/resources to cure and regulate the ailment.

Inventoried ethno-medicinal data reveals use of 15.6% of plants viz. *Coix lacryma-jobi*, *Echinochloa colonum*, *Echinochloa crusgalli*, *Eleusine coracana* and *Paspalum scrobiculatum* are eaten in the form of rice. Among 18.75% of them are used as flour to make bread such are *Alloteropsis cimicina*, *Panicum miliaceum*, *Panicum sumatrense*, *Paspalidium flavidum*, *Setaria glauca* and *Setaria italica*. 37.5% plants viz. *Aloe barbadensis*, *Mukia maderaspatana*, *Trichosanthes anguina*, *Trigonella corniculata*, *Trigonella foenum graecum*, *Capparis deciduas*, *Psidium guajava*, *Cyamopsis tetragonoloba*, *Acacia Senegal*, *Cordia mixa*, *Cucumis callous* and *Prosopis cineraria* are eaten in the form of cooked vegetables as pure or in combination as mix vegetable. *Bauhinia variegata* is added to the wheat flour for making carb stuffs. *Coix lacryma-jobi* is also used to make porridge in which jaggary is used as a sweetener. *Feronia limonia* is either eaten raw or used in the preparation of chutney. Fruits of *Pithecellobium dulce*, *Psidium guajava*, *Syzygium heyneanum* and *Syzygium cumini* are consumed raw, while *Syzygium heyneanum* and *Syzygium cumini* fruits are also used to make vinegar. *Cinnamomum verum*, *Illicium verum* and *Myristica fragrans* are chiefly used as spices and flavouring agents (Table 1).

Table 1: Enumeration of ethno hypoglycemic food plants used by tribal's of Southern Rajasthan

S.No	Botanical name; Family (Local name)	Plant part/s used	Form of usage; Application
1	<i>Alloteropsis cimicina</i> (L.) Stapf.; Poaceae (Basanti ghash)	Grains	Flour used for making bread
2	<i>Aloe barbadensis</i> Mill.; Liliaceae (Gwarpatha)	Leaves & Inflorescence	Cooked as a vegetable
3	<i>Bauhinia variegata</i> L.; Caesalpiniaceae (Kachnar)	Fruits	Powder is added to wheat flour
4	<i>Coix lacryma-jobi</i> L. ; Poaceae (Garelo)	Grains	Boiled and consumed as rice. Seeds along with <i>Zea mays</i> / <i>Triticum</i> are used for making porridge.
5	<i>Echinochloa colonum</i> (L.) Link. ; Poaceae (Sama)	Grains	Boiled and consumed as rice
6	<i>Echinochloa crusgalli</i> (L.) P.Beauv.; Poaceae (Sama)	Grains	Boiled and consumed as rice
7	<i>Eleusine coracana</i> (L.) Gaertn. ; Poaceae (Garelo)	Grains	Boiled and consumed as rice
8	<i>Feronia limonia</i> (L.) Swingle; Rutaceae (Kotambadi)	Ripe fruits	Consumed raw and also used for the preparation of chutney.
9	<i>Mukia maderaspatana</i> (L.) Cogn.; Cucurbitaceae (Sirvi)	Leaves	Used as a vegetable
10	<i>Panicum miliaceum</i> L. ; Poaceae (Samlai)	Grains	Flour used for making bread
11	<i>Panicum sumatrense</i> Roth. ex Roem. & Schult.; Poaceae (Samlai)	Grains	Flour used for making bread
12	<i>Paspalidium flavidum</i> (Retz.) A.Camus ; Poaceae (Samlai)	Grains	Flour used for making bread
13	<i>Paspalum scrobiculatum</i> L. ; Poaceae (Kodra)	Grains	Boiled and consumed as rice
14	<i>Setaria glauca</i> (L.) P.Beauv. ; Poaceae (Kukarva)	Grains	Flour used for making bread
15	<i>Setaria italica</i> (L.) P.Beauv. ; Poaceae (Kangini)	Grains	Flour used for making bread
16	<i>Syzygium heyneanum</i> (L.) P.Beauv.; Myrtaceae (Jungle jamun)	Fruits	Eaten raw or used as a vinegar
17	<i>Syzygium cumini</i> (L.) P.Beauv.; Myrtaceae (Jamun)	Fruits	Eaten raw or used as a vinegar
18	<i>Trichosanthes anguina</i> L.; Cucurbitaceae (Chachinda)	Fruits	Consumed as a vegetable
19	<i>Trigonella corniculata</i> L.; Fabaceae (Dandi Methi)	Whole plant	Consumed as a vegetable

20	<i>Trigonella foenum graecum</i> (L.); Fabaceae (Methi)	Whole plant	Consumed as a vegetable
21	<i>Capparis decidua</i> (Forssk.) Edgew; Capparaceae (Kair)	Fruits	Cooked as a vegetable
22	<i>Psidium guajava</i> L.; Myrtaceae (Guava)	Fruits	Eaten raw or Cooked as a vegetable
23	<i>Cyamopsis tetragonoloba</i> (L.) Taub; Fabaceae (Guar)	Pods and beans	Cooked as a vegetable
24	<i>Pithecellobium dulce</i> (Roxb.) Benth.; Fabaceae (Madras thorn, Jungle Jalebi)	Fruits	Eaten raw
25	<i>Aegle marmelos</i> L.; Rutaceae (Bael, Bili)	Fruits	Fruit juice is taken
26	<i>Cinnamomum verum</i> L.; Lauraceae (Cinnmon)	Leaves and inner bark	Used as spices and flavouring agent
27	<i>Illicium verum</i> Hook.; Illiciaceae Myristicaceae (Javitri)	Aril of Fruit	Used as spices and flavouring agent
28	<i>Myristica fragrans</i> Houtt; Myristicaceae (Jaiphal)	Fruits	Used as spices and flavouring agent
29	<i>Prosopis cineraria</i> (L) Druce; Fabaceae (Sangri, Khejri, Shami)	Pods	Cooked as a vegetable
30	<i>Cucumis callosu. Rott. Cong;</i> (kachri)	Fruits	Cooked as a vegetable
31	<i>Cordia mixa</i> Roxd. (Lasoda)	Fruits	Cooked as a vegetable
32	<i>Acacia senegal</i> (L) Willd.; (Kumat)	Seeds	Cooked as a vegetable

Conclusion

In the present study 32 plants were enumerated for their anti hyperglycemic potential. Akin to prior studies use of some plants was confined to specific tribe. Plants are consumed as raw fruits or as cooked vegetables, breads, porridge, rice and some of them as spices and flavouring agents. As raw fruits are seasonal and not available afterward there for the grains of *Coix lacryma-jobi*, *Echinochloa colonum*, *Echinochloa crusgalli*, *Eleusine coracana*, *Paspalum scrobiculatum*, *Alloteropsis cimicina*, *Panicum miliaceum*, *Panicum sumatrense*, *Paspalidium flavidum*, *Setaria glauca*, *Setaria italica*, *Bauhinia variegata*, *Coix lacryma-jobi* are recommended to store throughout the year and can be used to manage DMII. *Cinnamomum verum*, *Illicium verum* and *Myristica fragrans* are chiefly used as spices and flavouring agents they could also play an important role in the management of DMII as they can be added on daily bases in vegetables, pulses etc.

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