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Ethnobotanical Study of Hepato-Protective / Hepato-Curative Plants Used by Ethnic Communities of South-East Rajasthan, India.

KEYWORDS: Aravalli Hills, South-East Rajasthan, Hepatoprotective/ Hepatocurative plants

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ABSTRACT *Rajasthan is a state of diversified physiography with desert, plains and range of Aravalli Hills.These mountain shelters diversified ethnic tribe with vast traditional system and proceedings. Their belief in mother nature and easier availability of the resources poke them to hold and follow the ancient medicine system. A present study was specifically carried out to document hepato-protective/curative plants used by various ethnic tribes of south-east Rajasthan , as although these people follow frequent liquor practices but the reports on hepatic disfunction and deaths trolls are comparatively low. An ethno medicinal survey of tribal belts of south-east Rajasthan reveals uses of 51 plant species in various liver aliments and among the documented plants, 21 novel plants viz. Agave americana, Amaranthus spinosus, Aristolochia bracteolate, Citrus aurantifolia,Clitoria ternatea,Cuscuta reflexa, Lawsonia inermis, Mentha spicata,Mimosa pudica, Nelumbo nucifera, Ocimum sanctum, Sonchus oleraceus and Tephrosia purpurea were reported to be hepatotropic/ hepatoprotective.*

Introduction:
South-East Rajasthan encompasses Banswara, Bhilwara, Dungarpur, Pali, Pratapgarh, Rajasamand, Sirohi and Udaipur district of Rajasthan and harbors various tribes such as Bhill, Garasia, Damor, Gameti, Kathodi, Mina, Kharadi, Mohradi, etc. Despite urbanization these local communities largely depend on their immediate vicinity for their basic needs. Their belief in mother nature can be visualized through their tradition and customs which co-relate seasons, food and basic bodily elements with do's and don'ts (Singh and Pandey, 1998). Despite availability of health care network by Government and other social health agencies most of the people are partially or totally dependent on local traditional medicinal system. In tribe's, interference of supernatural agency is particularly strong in context to health and disease, different deities or spirits are co-related to various types of aliments (Singh and Pandey, 1980). Tribals perform different type of practices for diagnosis and treatments of illness which include spiritual action, religious rituals, exorcism, herbal remedies and diet. The medical sphere of tribal is highly pluristic with emphasis on prevention, curative and promotive measures (Sebastian and Bhandari ,1984). The different healers utilize different resource/s for therapies as plants, animals or animal's products, minerals or therapeutic rituals. The tribal response to health problems reveal a multiple and simultaneous usage of home remedies and multiple therapy depending on the cultural logic based on medicine of body fluids and supernatural dimension(Kirtikar and Basu ,1984). For the prevention and management of disease various tribal healers viz-Bhopa (ritual therapeutic), Jhankar/ Jhangar (herbalist),Devala (grain diviner), Khoonth (priest),Guni (herbal practitioner) use variable methodologies(Katewa and Jain, 2006). Liquor practices among tribes are common on the occasion of various ceremonies and festivals. These practices cause several negative impacts socially as well as on health specifically on hepatic metabolism/dysfunctions.

To protect the hepatic moiety healers are aware and they have sorted plants to protect and cure the same. Some of these plants are used as food, while other are prescribed as therapeutics in the form of decoction, infusion, extract powder or paste depending upon the assigned symptoms. To get through this wisdom an effort was mode to document the ethno-hepato-protective or curative plants so that they can be explored further to meet out the drug/s requirement of modern era of alcoholic culture.

Methodology:
For documentation of ethno hepato-protective and hepato-curative plants, field surveys were carried out in different seasons, from 2010 to 2013 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 the people of different age and occupation through local transcends to avoid language ambiguity. For the authentication of plant usage cries-cross check was made, either by showing them plants or by making a tour with them to a forest array. For documentation usage, dose, mode of dose, tenure/ time interval was also enumerated. 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 & supplements/s as they directly/ passively interacts with others, in such cases a special notification were made on such check modes. Plant specimens were collected, followed by herbarium preparation as per standard method (Jain and Rao, 1977) with citation of all related information. Herbarium sheets are deposited in Department of Biotechnology, B.N. P.G. College and specimens were botanically authenticated for their genus and species name using the identification keys from Rajasthan Flora (Singh and Sheety, 1987–1993).

RESULT AND DISCUSSION
Traditional health system of ethnic pouches of south east Rajasthan generally relies on symptomatic method of diagnosis. Despite with the prevalence of health care centres by Government and other social NGOs, pathological investigations are least popular and the healers consider the symptoms to be more authentic for the treatment and curative purposes. General symptoms which are co-related to liver ailments include-yellowing of the skin and eyes, loss of appetite, swollen abdomen, abdominal pain, general fatigue, nausea and vomiting, weakness, weight loss, mental disorientation or confusion etc. Local therapist categorizes such ailments as primary or secondary and treats accordingly with preventive and curative herbs.

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Table I: Ethno-medicinal enumeration of hepato-protective and hepato-curative plants from southeast Rajasthan

S.No	Botanical Name	Family	Local Name	Locality	Herbarium Ac. no.	Part/s used	Usage
1.	*Abutilon indicum* (L.) Sweet	Malvaceae	Jhumka	Amarpura, Aala Dhani	BNC/11-12/02:S43	Leaves	5 g powder is taken orally with water twice a day for 5 days.
2.	*Acacia catechu* (L.F.) Willd.	Mimosacease	Katha		BNC/11-12/02:T45	Heart wood	Decoction of 3 - 5 g dried powder is used along with honey for 7 days.
3.	*Achyranthes aspera* Linn.	Amaranthaceae	Chirchita, Andhijhara	Katahar, Patiya	BNC/10-11/02:C4	Whole plant, Leaves	Whole plant infusion is consumed early morning for 7 to 10 days. Decoction of Leaves with *Curcuma* (tubers) is taken thrice a day for 7 days.
4.	*Aegle marmelos* (Linn.) Corr.	Rutaceae	Bel-patra	Bhootiya, Ubeshwarji	BNC/11-12/02:Z52	Fruit pulp	Fruit pulp (3g), sugar (1g) and seeds powder of black pepper (5 to7) are thoroughly mixed and swallowed for 5 days.
5.	*Aerva lanata* (L.) Juss. Ex. Schult.	Amaranthaceae	Choti-bui	Bhootiya	BNC/10-11/02:C5	Root	Root extract is taken orally.
6.	*Agave americana* Linn.	Agavaceae	Jhanjhar	Bheelon Ka Bedla	BNC/10-11/02:B3	Leaves	Leaf sap (1/4 cup) along with salt and lemon juice is degluted for 7 days.
7.	*Aloe barbadensis* Mill.	Liliaceae	Rambans	Kakad Sagwada	BNC/11-12/02:Q39	Fresh Pulp	25g of fresh pulp along with a pinch of powdered black pepper and black salt is taken empty stomach for 14 days.
8.	*Aloe vera* (L.) Burm.	Liliaceae	Gwarpata	Peepalwaas	BNC/11-12/02:Q40	Leaves	Leaf juice mixed with ginger juice is ingested before meal once a day for 7 days.
9.	*Amaranthus spinosus* Linn.	Amaranthaceae	Adak Dhatura	Jhadol	BNC/11-12/02:C6	Roots	Tribes prepare pills of root- paste and give at least two pills per dose for twice a day for 7 days.
10.	*Andrographis paniculata* Nees.	Acanthaceae	Kalmegh	Bhutia, Kurabad	BNC/10-11/02:A1	Whole plant	½ glass of decoction is taken once a day for 15 days.
11.	*Aristolochia bracteolata* Lam.	Aristolochiaceae	Hukka-bel, Kalipaqd	Jagat	BNC/11-12/02:E9	Roots	In morning 10g of root powder is taken orally for 15 days.
12.	*Asparagus racemosus* Wild.	Liliaceae	Satawari	Nya gaon	BNC/10-11/02:Q41	Roots	Root powder with boiled milk and one spoonful of honey is consumed during winters.
13.	*Balanites aegyptiaca* (L.) Del.	Balanitaceae	Hingota, Hingor	Hwala, Naei	BNC/11-12/02:G12	Seeds	Kernel powder is taken with sugar (sour supplements are prohibited).
14.	*Barleria prionitis* Linn.	Acanthaceae	Bajaradanti	Bhutia, Kurabad	BNC/10-11/02:A2	Whole plant	Kathodias make a powder of shade dried plant and ingest orally with cow-milk.
15.	*Bauhinia variegate* Linn.	Fabaceae	Kachnar	Lakadwaas	BNC/11-12/02:N26	Leaves	About one cup of decoction of leaves is used twice a day.
16.	*Boerhaavia diffusa* Linn.	Nyctaginaceae	Santhi, Punarnava	Badi undri	BNC/11-12/02:X50	Roots	Root powder is taken with milk for 7 days.
17.	*Cassia fistula* Linn.	Caesalpiniaceae	Carmalo, Amaltas	Keware-ki-nal, Hwala	BNC/10-11/02:H14	Seed	1 or 2 boiled seeds are grinded with Curcuma and taken orally.
18.	*Citrullus colocynthis* (L.) Schrad.	Cucurbitaceae	Indrayan, Gartumba	Kurabad	BNC/11-12/02:K18	Roots	The powder of dry roots is taken orally with water by the Bhils.
19.	*Citrus aurantifolia* (Christ.) Swingle	Rutaceae	Nimboo	Ramgiri	BNC/11-12/02:Z53	Fruits	As a diuretic sugary sap is consumed thrice a day.
20.	*Clitoria ternatea* Linn.	Fabaceae	Gokarni	Sisarma	BNC/12-13/02:N27	Leaves	Leaf extract is taken orally.
21.	*Commelina benghalensis* Linn.	Commelinaceae	Kallni, Bukana	Boreshwar mahadev	BNC/11-12/02:I16	Whole plant	Root decoction is taken twice a day, till the disappearance of yellowing of skin.
22.	*Corchorus depressus* (L.) Stocks.	Tiliaceae	Chamkas, Baphuli	Nakoda	BNC/11-12/02:AD59	Fresh leaves	Leaf decoction is taken orally for 5 day by the tribes.
23.	*Curcuma longa* Linn.	Zingiberaceae	Haldi	Kalyanpur, Katewari	BNC/11-12/02:AE60	Rhizome	Powder is taken with milk thrice a day for 5 days.
24.	*Cuscuta reflexa* Linn.	Convolvulaceae	Amar-bel	Bada bhanuja	BNC/12-13/02:J17	Stem	Decoction is taken orally by Kathodi tribes (it was denied by maximum healers.)
25.	*Dioscorea bulbifera* Linn.	Dioscoreceae	Jatashankar, Raalar	Kherwara	BNC/11-12/02:L20	Tubers	Decoction of tubers is taken once a day for 7 days.
26.	*Eclipta alba* (L.) Hassk.	Asteraceae	Bhangra	Madri	BNC/11-12/02:F10	Whole plant	Infusion is taken orally for 7 days during pale vomits.
27.	*Emblica officinalis* Gaerth.	Euphorbiaceae	Anwla	Lakhawali	BNC/10-11/02:M21	Fruit	Powder is taken with sugar for 5 days.
28.	*Euphorbia neriifolia* Linn.	Euphorbiaceae	Danda-thor	Bichhiwara	BNC/11-12/02:M22	Roots	One pinch of powder is taken orally with lukewarm water for prescribed days depending on severity.

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S.No	Botanical Name	Family	Local Name	Locality	Herbarium Ac. no.	Part/s used	Usage
29.	*Glycyrrhiza glabra* Linn.	Fabaceae	Mulethi	Badganw	BNC/11-12/02:N31	Roots	Powder (one spoonful) is taken orally with milk for 3 days.
30.	*Gossypium herbaceum* Linn.	Malvaceae	Kapas	Nai	BNC/11-12/02:S44	Leaves	One spoonful of leaf juice is taken with honey twice a day.
31.	*Indigofera cordifolia* Heyne ex.Roth.	Fabaceae	Kakad	Patiya	BNC/12-13/02:N28	Whole plant	Decoction is consumed once a day for a week.
32.	*Indigofera linifolia* (L.F.) Retz.	Fabaceae	Khuaro, Jaljamni	Aravalli hills (Gorilla Point)	BNC/11-12/02:N29	Whole Plant	The fresh juice is taken orally with sugar (during usage sour foods are prohibited).
33.	*Indigofera tinctoria* Linn.	Fabaceae	Nai	Patiya, Gudli	BNC/11-12/02:N30	Roots	Root powder is taken orally by Mina tribes.
34.	*Lawsonia inermis* Linn.	Lythraceae	Mahendi	Bamanvada	BNC/11-12/02:R42	Leaves	In fatigue conditions spoonful of leaf juice is consumed daily.
35.	*Leucas aspera* (Will.) Link.	Lamiaceae	Goma, Piyari	Kurabad, Butala	BNC/11-12/02:P35	Whole aerial part	Powder is taken orally with luke-warm water for 5 days.
36.	*Luffa acutangula* (L.) Roxb.	Cucurbitaceae	Jangli taroiei	Jagat	BNC/11-12/02:K19	Seeds	Seeds are soaked overnight and about 10 drops of this water is taken orally.
37.	*Mentha spicata* Linn.	Lamiaceae	Podina	Baleecha	BNC/11-12/02:P36	Leaves	½ spoonful leaf juice is ingested before meals.
38.	*Mimosa pudica* Linn.	Mimosacease	Lajwanti	Bhalon ka gurha	BNC/11-12/02:T46	Roots	Decoction is prepared from 3 to 4 g of root powder and is consumed with honey.
39.	*Moringa oleifera* Lam.	Moringaceae	Sainjna	Depara	BNC/11-12/02:V48	Fruits, Leaves	Leaf decoction is taken orally and fried pods are used as vegetable.
40.	*Nelumbo nucifera* Gaerth	Nelumbonaceae	Kamal- kakri	Gautameshwar	BNC/11-12/02:W49	Stem	Stem extract is taken orally.
41.	*Ocimum sanctum* Linn.	Lamiaceae	Kali Tulshi	Naei	BNC/11-12/02:P37	Leaves	One spoonful of juice is taken twice a day for 10 days.
42.	*Phoenix dectylifera Linn.*	Euphorbiaceae	Khajoor	Sukher	BNC/11-12/02:M23	Fruits	Powder is taken orally with milk for 10 days.
43.	*Phyllanthus amara* Schum. & Thonn.	Euphorbiaceae	Bhui-anwla	Kurabad	BNC/10-11/02:M24	Whole plant	One cup of decoction is taken orally twice day for 7 days.
44.	*Physalis Minima* Linn.	Solanaceae	Cherpotan, Rusberry	Sisarma	BNC/11-12/02:AC56	Fruit	Fruit powder is taken orally and fresh fruits are used as a vegetable.
45.	*Portulaca oleracea* Linn.	Portulacaceae	Lunkia, Kungan	Kumbhalgar, Banswari	BNC/11-12/02:Y51	Leaves, Seeds	Fresh leaves are eaten as salad and their juice and seeds are used to make poly- herbal drinks.
46.	*Ricinus communis* Linn.	Euphorbiaceae	Arandi	Ramwas	BNC/11-13/02:M25	Leaves	Leaf extract with ½ cup of raw cow milk are taken for three day.
47.	*Solanum nigrum* Linn.	Solanaceae	Cirmoi, Makoo	Jagat, Badi-Undri,	BNC/11-12/02:AC57	Whole plant	It is consumed as an important ingredient of mixed vegetable to protect liver.
48.	*Sonchus oleraceus* Linn.	Asteraceae	Aakadiyo, Ankhali	Baleecha, Girva	BNC/10-11/02:F11	Leaves	Juice of fresh plant is taken orally in the morning.
49.	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Sharpunka, Dhamaso	Bhootiya, Som	BNC/11-12/02:N32	Roots and Stem	Root and stem extract is prescribed along with *Phyllanthus.*
50.	*Tinospora cordifolia* (Willd) Miers	Menispermaceae	Neem giloy	Bhootiya, Katahar	BNC/11-12/02:U47	Leaves and Stem	Decoction is prescribed in routine for daily liquor consumer/s.
51.	*Wrightia tinctoria* (Roxb.) R.Br.	Apocynaceae	Khirni	Kurabad, Jhadol	BNC/10-11/02:D8	Leaves	Juice of tender leaves is taken orally for 7 days and specifically in patient suffering with prolonged fever and liver compliant.

Present study file's Abutilon indicum, Acacia catechu, Achyranthes aspera, Aegle marmelos, Agave americana, Aloe barbadensis, Aloe vera, Amaranthus spinosus, Andrographis paniculata, Aristolochia bracteolate, Asparagus racemosus, Bauhinia variegate, Boerhaavia diffusa, Cassia fistula, Citrus aurantifolia, Clitoria ternatea, Commelina benghalensis, Corchorus depressus, Curcuma longa, Cuscuta reflexa, Dioscorea bulbifera, Eclipta alba, Emblica officinalis, Glycyrrhiza glabra, Gossypium herbaceum, Indigofera cordifolia, Indigofera linifolia, Indigofera tinctoria, Lawsonia inermis, Leucas aspera, Luffa acutangula, Mentha spicata, Mimosa pudica, Moringa oleifera, Nelumbo nucifera, Phoenix dectylifera, Phyllanthus

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amara, Ricinus communis, Tephrosia purpurea and Wrightia tinctoria as hepatocurative while Aerva lanata , Asparagus racemosus, Balanites aegyptiaca, Barleria prionitis, Citrullus colocynthis, Clitoria ternatea, Commelina benghalensis, Euphorbia neriifolia, Ocimum sanctum, Physalis Minima, Portulaca oleracea, Solanum nigrum, Sonchus oleraceus and Tinospora cordifolia are used as hepatoprotective(Table 1).

Achyranthes aspera, Aegle marmelos, Agave americana, Aloe barbadensis , Aloe vera, Cassia fistula and Tephrosia purpurea are habituated in polyherbal preparation among which curcuma is commonly deployed. Some of the preparations involve ingredients which alter glycemic loads such additives include honey, sugar and other saccaride rich foods. Such preparations are not recommended to patients suffering from diabetes mellitus and alternative/s or along with compensatory additives they are advised. Plants enlisted under such cases include- Acacia catechu, Aegle marmelos, Asparagus racemosus, Balanites aegyptiaca, Citrus aurantifolia, Emblica officinalis, Gossypium herbaceum , Indigofera linifolia and Mimosa pudica. Sour preparation/supplements were interdicted with Balanites aegyptiaca and Indigofera linifolia.

Citrullus colocynthis, Cuscuta reflexa and Indigofera tinctoria are utilized only by a specified tribe viz. bhil, kathodia and mina respectively. Usage of these plants was not depicted in other ethnic groups and Cuscuta was denied by maximum healers except Khoonth (priest) of kathodia tribe. Unfortunately, no relevant mode of usage or dose of Aerva lanata, Indigofera tinctoria and Nelumbo nucifera was affirmed from any tribe. Review of prior studies (Katewa et al., 2004; Jain et al. 2004; Meena and Yadav, 2010) to the subject area reveals exploration of 21 novel plants with respect to the mode of usage or for their novel documentation. This novelistic inventory includes Agave americana, Amaranthus spinosus, Aristolochia bracteolate, Citrus aurantifolia,Clitoria ternatea,Cuscuta reflexa, Lawsonia inermis, Mentha spicata,Mimosa pudica, Nelumbo nucifera, Ocimum sanctum, Sonchus oleraceus and Tephrosia purpurea.

CONCLUSION

A number of liver function tests (LFTs) are available to test the proper function of the liver and to affirm the malady only on the basis symptoms can not be justified as the symptoms assigned to liver functions can be an outcome of another ailments or disease/s also. However, the fruitful practices over prolonged periods lead to belief in utilization of these herbs as drug/s or part thereof (Joshi, 1995; Katewa and Arora, 1997). As per recommendations of WHO, indigenous system of medicine should be promoted with alliance to modern drugs. For the formulation of new drug, these plants should be subjected to pharmacological studies with clinical trials so that inherent system of therapy can be aligned with modern health care therapies. Such approach can led to (1) preservance of indigenous drug system (2) safer drugs with probable low side effects (3) conservation of local biodiversity (4) boosting of local farmers economy and (5) easy availability of drugs to local inhabitants. Apart from these fruitful notions it will assist for the better life span to patients suffering from liver deregulatory compliances.

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