

Ethnomedicinal Inquisition of *Ricinus Communis* L. in Various Districts of Haryana, India

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ABSTRACT

The intent of this study is to investigate, document and conserve folk knowledge about medicinal uses of *Ricinus communis* in different geographical regions which hitherto remained uninvestigated, in the state of Haryana, India. The objective is achieved by embarking on an extensive field survey of the area and subsequent documentation of native information pertaining to curative uses of the plant in a well-structured proforma which has later been subjected to statistical analysis so that to arrive at a logical conclusion. Explored ethno medicinal uses of the plant have been classified according to plant's part name, therapeutic uses, formulations and their route of administration along with ailments treated. *Ricinus communis* is known for its toxicity however its leaves and seeds are endowed with ethno medicinal properties. This manuscript looks into medicinal uses of *Ricinus communis* and how it is being used by traditional practitioners of rural and urban sites in studied area for treating multiple ailments. Such folkloric information about medicinal flora is needed to be preserved and subjected to systematic inquiry.

Key words: Ethnomedicinal uses, Haryana, Medicinal plants, *Ricinus communis*, rural pockets.

Introduction

India stands quite high in global biodiversity index. Among mega bio diverse countries, it ranks 9th, in terms of plant species' richness. Being an old civilization, the country has been utilizing variety of plant based formulations as an alternative system of drugless healing for centuries. Around 45000 plants species are presumed to be part of India's biodiversity and her indigenous health care system uses nearly 6500 native plant species to treat various ailments (Rewatkar, 2020). India's 6th National Report to the Convention on Biological Diversity (CBD) for sustainable development and conservation of biological diversity, emphatically talks about inclusion of Traditional Knowledge of Tribal Communities in courses on ethnobotany and medicinal

plants for Green Skill Development Program. To protect Indian traditional medicinal knowledge, more than 3.6 lakhs formulations and practices have been included into the database of TKDL (Traditional Knowledge Digital Library)- a pioneering project of CSIR (Council of Scientific and Industrial Research) and AYUSH (Ministry of Ayurveda, Yoga & Naturopathy, Unani, Sidha and Homeopathy) (Kaur *et al.*, 2015).

Morphologically, *Ricinus communis* leaves are palmitate, reddish to purplish green in color; stem is hollow, and seeds shiny in appearance. Common names of *Ricinus communis* are; arand, erand, arandi, rend and erondo etc. Taxonomically, the plant belongs to family Euphorbiaceae, genus -*Ricinus* and species *communis*. Bioactive compounds like ricin, ricinine, n-methylricinine, indole-3-acetic acid, rici-

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noleic acid, camphor etc. are present in different parts of the plant body. Many of its phytoconstituents possess antibacterial, antifungal, anti-inflammatory, antirheumatic and antiarthritic properties (Jena and Gupta, 2012; Rana *et al.*, 2012; Abdul *et al.*, 2015; Bhakta and Das, 2015; Kumar 2017).

Ricinus communis is an important folk medicinal plant; has broad spectrum medicinal uses in Ayurveda, Homeopathic, Unani, Siddha and Naturopathy domains of medicinal system. Ayurvedic literature mentions *Ricinus communis* as 'eranda' and has been prescribed to be used for treating more than 40 diseases and ailments (i.e. constipation, abdominal pain, headache, swelling, piles, inflammation, fever and cough etc.); comprising about 350 formulations made from various plant's part.

Ancient Indian medicinal literature- Charaka samhita, Shushruta samhita, Ashtangahrudaya, Sharangadhara samhita and Bhavaprakasha, refer the plant repeatedly as many as- 14, 4, 9, 13 and 21 times respectively (Krunal and Rabinarayan, 2013). Langier, Alen and Clark have introduced crude drug of *Ricinus communis* in Homeopathic medicinal domain. Homeopathy uses the plant to treat dysuria, constipation, lactation, abdominal lumps, sprain and gastro-intestinal disorders etc. (Chakarborthy *et al.*, 2014). Siddha medicinal system has described *Ricinus communis* as 'Ammanaku' and said to be used for treating arthritis, constipation, menstrual problems, premature menopause/amenorrhoea and pain (Thillaivanan *et al.*, 2013). Unani medicinal system refer the plant as 'Bedanjeer', and prescribes it to be used for treatment of facial paralysis, gout, pain, fracture etc. (Wilson *et al.*, 2007; Khanam *et al.*, 2019). The above discussion encourages us to further contemplate and investigate plant based traditional medicines, crude drugs and formulations. An ethno botanical survey was undertaken to collect, protect, document, sustain and conserve the declining indigenous medicinal information available in rural sites. The study focuses on ethno medicinal investigation of *Ricinus communis* in six districts of Haryana. To carry out this study, rural sites have been chosen intentionally as these sites are believed to be good repository of folkloric information. Lack of appropriate medical health infrastructure and poverty amongst rural populace limits their accessibility to formal health services which consequently impel them to use, preserve and propagate useful ethno medicinal information. No

such exploration activity has ever been planned or exercised in the area before. The study is in line with national and global aims of conserving and disseminating useful traditional ethno medicinal knowledge.

Material and Methods

Demographical Details of Studied Sites

The study has been conducted in Haryana; a landlocked state of northern India. It borders Punjab and Himachal Pradesh to the north and Rajasthan to the west and south. The river Yamuna defines its eastern border with Uttarakhand and Uttar Pradesh. Six districts namely Hisar, Sonapat, Panipat, Karnal, Kurukshetra and Ambala of Haryana formed part of study to amass ethno medicinal data about *Ricinus communis*. Urban and rural sites amongst the given districts were surveyed in person from January to June 2020 (Table 1).

Rural sites were chosen randomly. In an attempt to gather authentic information people were talked to directly. Two thousand four hundred people volunteered for answering the questionnaire and whose photograph and signatures were obtained on a well-structured proforma. 389 informants were found to possess and shared knowledge regarding medicinal uses of *Ricinus communis*. Explanation of urban and rural models chosen for this study has been provided in Table 1.

Table 2, gives demographic details of studied sites whereas Table 3, specify Statistical Indices employed for analysis and interpretation of the data.

Results

Overall Percentage of Informants in Studied Districts for *Ricinus communis*

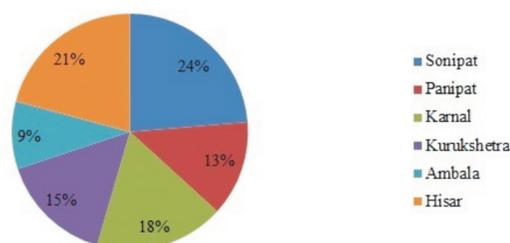


Fig. 1. Overall Percentage of Informants

Discussion

The study has been accomplished amassing huge

Table 1. Studied Sites in Urban and Rural Models of Haryana

Sr.No.	Studied districts	Urban model	Rural models
1.	Sonipat (28°59'29.58"N and 77°00'44.45"E)	Sonipat and Gohana city	Ahmadpur Majra, Chhatehra, Sikanderpur Majra, Teori
2.	Panipat(29°23'25.39"N and 76°58'59.59"E)	Panipatcity	Garh sarnai, Badauli, Babail, Atta
3.	Karnal(29°41'15.06"N and 76°69'23.22"E)	Gharaunda city	Staundi, Kaimla, Gudha, Pundri
4.	Kurukshetra(29°58'12.97"N and 76°50'05.68"E)	Kurukshetra and Thanesar city	Ramgarh alias ror, Sandhola, Sandholi, Dhantauri
5.	Ambala (30°22'38.33"N and 76°46'51.23"E)	Ambala city	Ugala, Suhata, Subga, Landha
6.	Hisar (29°08'58.62"N and 75°43'18.30"E)	Uklana mandi and Hansi city	Mohla, Bhatol jattan, Bhatol Rangran, Bhatol Khar khara

Table 2. Showing Demographic Details of Studied Sites of Haryana

Sr. No.	Name of studied districts and models		Selected attributes				
			Total	Population Male	Female	Percentage of Informants	Government health services
1.	Sonipat	Urban	278,149	148,364	129,785	7.71	Satisfactory
		Rural	10,680	5,712	4,958	15.94	Unsatisfactory
2.	Panipat	Urban	294,292	157,148	137,144	4.11	Satisfactory
		Rural	20,673	11,219	9,454	8.99	Unsatisfactory
3.	Karnal	Urban	37,816	19,919	17,897	8.48	Satisfactory
		Rural	22,560	11,753	10,627	9.25	Unsatisfactory
4.	Kurukshetra	Urban	964,655	510,976	453,679	4.88	Satisfactory
		Rural	9,229	4,869	4,360	10.54	Unsatisfactory
5.	Ambala	Urban	195,153	102,607	92,546	3.34	Satisfactory
		Rural	13,227	7,027	6,200	5.91	Unsatisfactory
6.	Hisar	Urban	13,219	6,962	6,257	6.43	Satisfactory
		Rural	14,505	7,262	6,343	14.39	Unsatisfactory

Source: Google earth pro, Google map, Census of India 2011.

Table 3. Statistical Indices Used for Interpretation of Data

Sr.No	Statistical indices with explanation	References
1.	N -The total number of informants for studied plant.	Hoffman and Gallaher, 2007.
2.	N_i - The number of informants for particular plant part used to treat various ailments.	
3.	RMU (Reported Medicinal Uses) - The total number of medicinal uses of studied plant species.	Hoffman and Gallaher, 2007.
4.	RFC (Relative Frequency of Citation) – The ratio of number of cited reports for particular plant part and total number of informants of studied plant.	
5.	RUPP (Reported Uses of Particular Plant Part) - The total number of uses of particular plant part.	
6.	PPV (Plant Parts Value) - The ratio of total number of reported uses for particular plant part and number of reported uses for a given plant.	
7.	SU (Specific Uses) -Total number of specific uses of particular plant parts which is maximally used among the reported uses.	
8.	RSU (Reports of Specific Uses) – Total number of cited reports for specific uses of particular plant part.	
9.	IUV (Intra specific Use Value) -The ratio of number of reported specific uses to the total number of reported uses of particular plant part.	

Table 3. Continued ...

Sr.No	Statistical indices with explanation	References
10.	OUV (Overall Use Value) – Overall ranking of uses obtained by multiplication of plant part value and intra specific use value.	
11.	Average Score -The ratio of number of informants under selected criteria and total number of informants.	Kaur <i>et al.</i> , 2015.
12.	PCTK (Persons Carrying Traditional Knowledge) score percentage - The ratio of number of informants of particular ailment to total number of informants of studied plant species.	

Table 4. Reported Ethnomedicinal Uses of *Ricinus communis* L. in the study Area

Sr. No.	Plant Parts Used	Medicinal use/ Ailments treated	Crude drug/ Formulation	Mode of Application		
1.	Leaves	Allergy, Joints pain and inflammation	Mustard oil/ sesame oil coated leaves are warmed gently. Leaves boiled in sesame oil Poultice. Leaves boiled hot water. Leaves boiled hot water used to make sweet dish (halwa) of soojee (Semolina) and chopped leaves mixed dish used for eating.	Tied on affected part Massage Basking Oral uptake		
		Boils and sores	Mustard oil coated leaves are warmed gently. Poultice. Fresh leaves	Tied on affected part Topical As sole in shoes		
		To improve circulatory system	Poultice of castor leaves and <i>Cuscuta</i> .	Topical		
		Cancer/ cyst/tumor treatment at very early stage	Decoction of leaves of plants- <i>Ricinus communis</i> , <i>Carica papaya</i> , <i>Abelmoschus esculentus</i> and <i>Colocasia esculenta</i> .	Oral uptakes (250 ml)		
		Edema, Facial Paralysis, Internal Injury, Furuncle, Muscular Cramp, Menstrual Pain and Sprained Feet	Mustard/ sesame oil coated leaves are warmed gently.	Tied on affected part		
		Jaundice	Aqueous extract of crushed leaves	Oral uptake		
		Uterus and Vaginal Infection	Aqueous extract of leaves genital region	Applied in		
		To overcome sedative effect of <i>Ricinus</i> seeds uptake	Aqueous extract of leaves of mint, <i>Ricinus</i> (root can also be taken) and lemon juice	Oral uptake		
		2.	Stem	Joints pain and inflammation	Stem boiled hot water	Basking
				Cough and Malaria	Powder of dried and roasted stem mixed with honey.	Oral uptake
3.	Flowers	Pneumonia Strengthening of uterine muscle	Aqueous extract of stem Poultice of roasted flowers and honey	Applied on navel point		
4.	Seeds	Arthritis, Allergy, Itching and Inflammation	Seed oil/poultice Powder of <i>Ricinus</i> (seeds), <i>Azadirachta indica</i> (bark), <i>Euphorbia prostrate</i> (aerial part), <i>Achyranthes aspera</i> (roots),	Massage 1/8 th part of teaspoon taken twice/ day after		

Table 4. Continued ...

Sr. No.	Plant Parts Used	Medicinal use/ Ailments treated	Crude drug/ Formulation	Mode of Application
4.	Roots	Allergy, Dandruff, Edema, Internal Injury and Menstrual Pain Constipation, Gastrointestinal disorders, Kidney stone and Urine blockage problem Contraceptive purpose Leucorrhoea Typhoid Anti-arthritis effect Constipation Diabetes Gastrointestinal disorders and Pneumonia	<i>Foeniculum vulgare</i> (seeds) and sugar. * Equal quantity of all parts is used while making formulation. Powder of roasted seeds, melted butter and cane sugar.	Taking meal. ½ teaspoon with hot Milk twice a day.
			Seeds of <i>Trigonella foenum-graecum</i> (250 grams), <i>Centratherum anthelminticum</i> (50 gm), <i>Trichospermum ammi</i> (100 gm) are boiled in castor oil, sieved, filled in bottle. Kept it in cool place. <i>Alium sativum</i> cloves and <i>Trichospermum ammi</i> seeds are boiled in 100 ml of castor oil. Kept in bottle after sieving at cool place. Mixture of oils of castor, sesame, ajwain, laung and mustard. <i>Ricinus</i> seeds and <i>Thevetia pevuriana</i> flowers boiled mustard oil. Seed oil	Massage and topical application
			½ teaspoon oil mixed in 250 ml hot milk.	Oral uptake
			One Seed *(only once for one year delay in pregnancy) Poultice of one seed mixed in one cup of hot milk. Roasted seeds powder.	Swallowing (Not chewing). Oral uptake.
			<i>Ricinus</i> roots and <i>Nux vomica</i> seeds powder are boiled in sesame oil. Roots boiled hot water. Poultice of root powder and mustard oil.	Massage Basking Massage
			Decoction of Roots. Decoction of crushed roots. Decoction of roots of <i>Ricinus communis</i> , <i>Withania somnifera</i> , <i>Pargularia daemia</i> and <i>Datura stromantium</i> are prepared using water	Oral uptake Oral uptake 5 ml of decoction (in 100 ml water) taken orally after meal

Table 5. Conclusive Trends of Ethnomedicinal Knowledge in Rural Pockets of Studied Districts

Sr.No.	Name of districts	Trends of ethnomedicinal knowledge in rural pockets
1.	Sonipat	Ahmadpur Majra > Chhatehra > Sikanderpur Majra > Teori
2.	Panipat	Atta > Badauli > Babail > Garhsarnai
3.	Karnal	Gudha > Staundi > Kaimla > Pundri
4.	Kurukshetra	Ramgarh alias ror > Sandhola > Dhantauri > Sandholi
5.	Ambala	Suhata > Ugala = Subga > Landha
6.	Hisar	Bhatol Rangran > Bhatol Khar khara > Mohla > Bhatol jattan

ethno medicinal information about *Ricinus communis* in northern and western parts of Haryana which may help in management and treatment of certain ailments. Community interaction with local inhibitors remained an integral part of the study. Initial reconnaissance and group discussion across all districts have led us to believe that informants from Sonipat and Hisar possessed more traditional information in contrast to other districts as shown in Fig. 1.

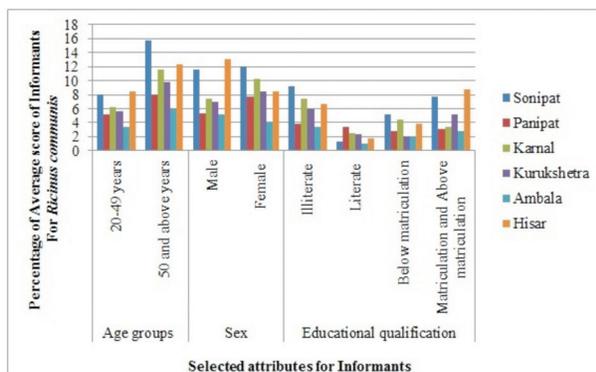


Fig. 2. Showing Average Score of Informants

It was noticed that information regarding medicinal usage of *Ricinus communis* and other native plants was mostly confined to elders, illiterate and females in all surveyed Districts except Kurukshetra and Hisar where male informants were found to have greater ethno medicinal knowledge as reflected in Fig. 2. A total of 30 ailments have been found to be treated with *Ricinus communis* in the studied area as reported in Table 4. It was also found that fresh leaves and seeds of the plant have high frequency of use in all crude drugs formulations (Figure 3 and 4).

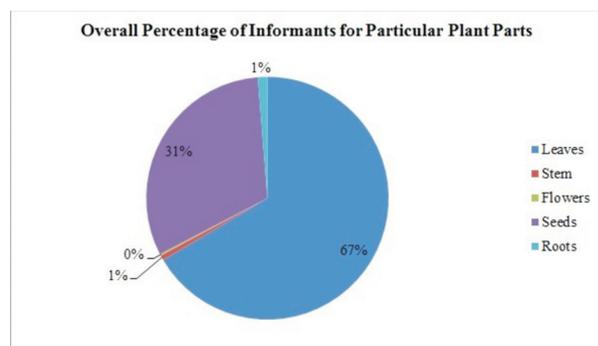


Fig. 3. Overall Percentage of Informants for Particular Plant Parts

Statistical Analysis and investigation of the data had been summarized in Table 3. Ethnomedicinal uses of the plant had been organized and given in Table 4. Traditional practitioners amongst respondents were quite hesitant to share such knowledge about the plant products as having valuable healing potential. Herbal formulations are still being used and survive among rural population of studied sites. Trends of ethno medicinal knowledge in explored districts are shown in Table 5.

Conclusion

The data obtained from present study reflects upon many facts and drive us to conclude that traditional practitioners of herbal formulations plays an important role in conservation of local ethno medicinal flora and primary health care of rural populace. Data gathered from the study could assist pharmacologists in development of anti-inflammatory and anti arthritic herbal drugs from *Ricinus communis*.

Across the surveyed sites, narrow variations is seen in the ways as to how different ailments are being treated using *Ricinus communis*. Review of concerned literature and the data gathered from the present field studies has revealed that *the* plant has vast medicinal properties and is being frequently used to treat ailments such as arthritis, constipation, edema, pain, muscular cramps, menstrual Irregularities, boils and sores etc. however data analysis of the present study finds arthritis, constipation, boils and sores more commonly treated ailments. Accumulated data also throws light on the fact that rural pockets are repository of valuable ethno medicinal data comprising herbal formulations of native plant which are being lost with time. Hence it would be necessary to preserve and document this huge ethno medicinal information before it being vanished forever from the sites. The collected data clearly suggests medicinal use of standardized formulations made from *Ricinus communis*. However dosage, safety and efficacy of these formulations is required to be verified by extensive clinical trials which would lead to further scientific validation and rationale of existing ethno botanical knowledge.

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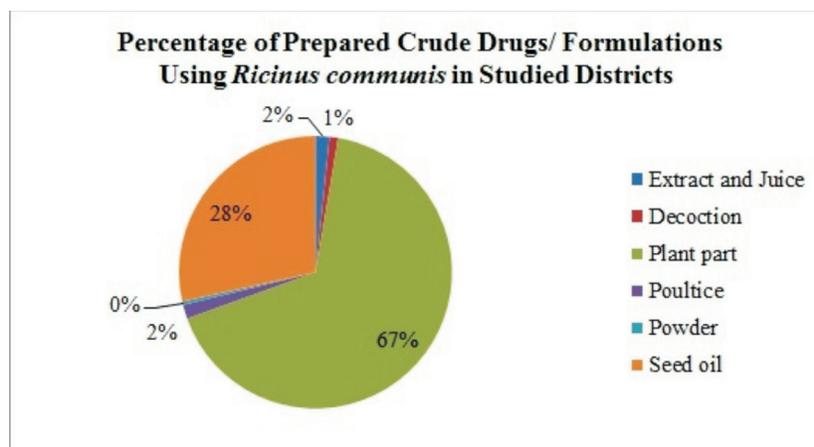


Fig. 4. Percentage of Prepared Formulations

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