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Research Paper

Traditional phytoremedies for the treatment of menstrual disorders in district Udhampur, J&K, India

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ABSTRACT

Ethnopharmacological relevance: Herbal remedies form an integral part of healing and are considered to be the oldest forms of health care known to mankind. The present study aims to document traditional phytoremedies for the treatment of menstrual disorders in Udhampur district of J&K, India.

Material and methods: The informants were interviewed directly and information was gathered about plants used in different menstrual disorders. The data was further analyzed for use-value (UV), factor informant consensus (F_{ic}) and fidelity level (Fl).

Results: In all, 62 informants were interviewed. Most of the informants (66%) were females. The patients prefer female healers over male *vaids* and *hakims*. A total of 50 plants were used to cure different menstrual disorders. Seeds were found to be of utmost medicinal importance (43.8%) followed by leaves (20.8%) and fruits (16.7%). Oral administration was observed to be the main mode (90.0%) of intake of medicine. The plants with high use-value were *Triticum aestivum* (UV=1.76), *Taraxacum officinale* (UV=1.16), *Citrus limon* (UV=0.95), *Allium cepa* (UV=0.79), *Cicer arietinum* (UV=0.77), *Trigonella foenum-graecum* (UV=0.66), *Rubia manjith* (UV=0.56), *Ocimum tenuiflorum* (UV=0.56) and *Oryza sativa* (UV=0.52). The various menstrual disorders were classified into 7 categories. The values of F_{ic} varied between 0.96 (dysmenorrhea, itching and foul smell) and 0.92 (menorrhagia). The 100% Fl value was scored by 20 plants. Leucorrhea reported the highest 5 plants with 100% Fl. Nearly 40% of the formulations had two or more plants.

Conclusion: Plants used for the treatment of different menstrual disorders were documented and analyzed for ethnogynecological problems. The study revealed some plants like *Triticum aestivum*, *Rubia manjith*, *Dalbergia sissoo*, *Raphanus sativus*, *Citrus limon*, *Allium cepa*, *Trigonella foenum-graecum*, *Elettaria cardamomum* etc. to be of great importance *vis a vis* menstrual disorders. Further pharmacological studies of these plants may provide some important drugs for the treatment of common menstrual disorders.

1. Introduction

Medicine is one of the four basic needs (*i.e.* food, clothing, shelter and medicine) of human beings fulfilled to a large extent by plants and plant products (Ghorband and Biradar, 2011). Herbal remedies form an integral part of healing and are considered to be the oldest forms of health care known to mankind on earth (Dangwal and Sharma, 2011). According to the World Health Organization (WHO) about 65–80% of the world's population in developing countries depends essentially on plants for their primary healthcare due to poverty and lack of access to modern medicine (Sharma et al., 2010) and they are also regarded as safe (Bhatia et al., 2014).

Menstruation is the most important aspect of women's reproductive cycle. In most cases, it is associated with certain disorders called menstrual disorders which adversely affect the quality of life of a large percentage of the world's female population in reproductive age. Some of the common menstrual disorders prevalent among the females of study area include: 1. Menorrhagia or hematomunia, abnormally heavy and prolonged menstrual period at regular intervals; 2. Dysmenorrhea, abnormally painful periods typically involving abdominal cramps; 3. Oligomenorrhea, irregular periods; 4. Leucorrhea, white discharge; 5. Amenorrhea, abnormal stoppage of menstruation, and 6. Hypomenorrhea, short or scanty periods (Bari, 2009; Kumar and Choyal, 2012). In addition to these disorders, itching and foul smell are the other two problems which occur during and after menstrual cycle.

India has a rich heritage of using medicinal plants in traditional medicines, as in the *Ayurveda*, *Siddha* and *Unani* systems besides

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folklore practices (Ghorband and Biradar, 2011). Few studies (Hemadri and Rao, 1983; Borthakur, 1993; Singh and Pandey, 1996; Dagar and Dagar, 1999; Sikarwar, 2002; Sarangi and Sahu, 2004; Ratnam and Venkata Raju, 2005; Gupta et al., 2006; Yadav et al., 2006; Augustine et al., 2010; Raju et al., 2011; Rawat and Kharwal, 2011; Kumar and Choyal, 2012; Kumar et al., 2012; Rajith et al., 2012; Vidyasagar and Siddalinga, 2012) have been carried out to investigate and cure gynecological problems throughout India. In J&K, Azad (2013) enumerated plants used against gynecological diseases by the Gujjar, Bakkarwal and Pahari tribes of district Rajouri.

Today, though modern civilization is at high pedestal in the field of medicine, yet these facilities have not reached to aborigines or the people living far away from towns. To overcome this problem, the local populace, inhabiting the rugged and hilly regions of district Udhampur, has acquired unique indigenous knowledge about phytoremedies through age old experience. Much of this knowledge is being passed on verbally from one generation to another and is (knowledge) dwindling rapidly because no written record of these phytoremedies is maintained by them (Bhatia et al., 2014). The present study aims to document the various traditional phytoremedies used by the midwives, *hakims* and *vaids* for curing menstrual disorders in Udhampur district.

2. Study area and methodology

2.1. Study area

District Udhampur, located in Jammu division of J&K state and lying between 32° 34′ and 39° 30′ North latitude and 74° 16′ and 75° 38′ East longitude, has a total area of 2380 km^2. The district situated in the south-eastern part of J & K with an altitude ranging from 600 to 2900 m above mean sea level is located at a distance of 66 km from Jammu on the Jammu Srinagar national highway. The temperature varies between 1 °C (minimum) and 42 °C (maximum) and the average rainfall is 155.1 cm (Bhatia et al., 2014). Most of the rainfall takes place during July, August and September months and December to February months accompanied by snow and sleet. 25% of the area in higher reaches of the district remains snow-bound during winter. However, there are very few inhabited areas above the height of 1112 m which experience snowfall and severe cold in winter.

2.2. Data collection

A systematic and extensive ethnobotanical survey was carried out in different villages of the district during January 2012 to July 2013 for collection of information on plant species being used by females in the study area for the treatment of menstrual disorders. Information was gathered by conducting interviews and group discussions on the indigenous uses of plant species as medicine for menstrual disorders. After selecting the people, knowledge about their interests and skills in identification and utilization were obtained through informal interviews and discussion was made with the informants in their local language for their ease. Initially, they were reluctant to divulge upon the methodology of crude drug preparation but when the objectives of study were elaborated, they obliged us with the required information.

The specimens of plant species were collected from the study site and then identified from the herbaria of Department of Botany, University of Jammu, Jammu and Indian Institute of Integrative Medicine, Jammu, and with the help of various regional floras (Sharma and Kachroo, 1983; Swami and Gupta, 1998). The final list of the plants was prepared following the International Plant Names Index (http://www.ipni.org) and Tropicos (2013) for the botanical nomenclature of species.

A total of 357 villages are present in Udhampur district. A preliminary survey of the study area was conducted and on the basis of this appraisal it was found that in Udhampur district generally two–five villages had a common midwife or *hakim* or *vaid* (local medicine men). On the basis of this information, 62 informants (21 males, *hakims* or *vaids* and 41 females, all midwives) between the age group of 31 and 85 years were selected randomly and interviewed as per the questionnaire (Annexure I). Midwives are the ladies traditionally involved in female health care especially pre- and post-delivery activities. They take money and/or grains (wheat/rice/maize) whereas *hakims* or *vaids* are paid for their services. These informants are professional healers and cover 123 villages of the district that are inhabited by Hindu or Muslim populace. Usually rural womenfolk of the study area do not go in for medicaments to doctors for treatment of menstrual disorders because of shyness, hesitation, rustic life style and lack of awareness. Instead, they prefer to consult midwives and local medicine men of their own community so as to keep secrecy.

The information collected included common menstrual ailments occurring in females which are curable by plants, local name of plant species, habit, wild/cultivated, flowering time, plant-part used, ethnomedicinal use, method of crude drug preparation, drug given individually or in combination, mode of administration, and dosage. The medicinal property of each plant species was confirmed if at least five separate informants had a similar opinion. Sometimes, specimens were taken to other areas, shown to people and information collected. All the plants were not in the flowering and fruiting stage during field visits. In such cases, information was collected and the same site was visited in the flowering season. The gathered field information was systematized and analyzed to draw a clear and updated picture of the ethnomedicinal use pattern of plants of Udhampur district for treating menstrual disorders (Table 1).

2.3. Data analysis

The data collected through interview of the informants was analyzed using three different quantitative indices *viz*., use value (UV), factor informant consensus (F_{ic}) and fidelity level (Fl %). The relative importance was calculated by employing the use-value (Phillips et al., 1994), a quantitative measure for the relative importance of species known locally:

$$UV = \Sigma U/n$$

where U is the number of use-reports cited by each informant for a given species and n refers to the total number of informants. Use values are high when there are many use-reports for a plant, implying that the plant is important, and approach zero (0) when

Table 1
Characteristics of the informants.

Informants	Age group (yr.)	No. of informants	No. of literates
Female	31–40	4	2
	41–50	5	Nil
	51–60	9	Nil
	61–70	13	Nil
	71–80	4	Nil
	> 80	6	Nil
Male	31–40	2	2
	41–50	1	1
	51–60	4	3
	61–70	7	3
	71–80	5	1
	> 80	2	Nil

there are few reports related to its use. The use value, however, does not distinguish whether a plant is used for single or multiple purposes (Musa et al., 2011).

To test homogeneity of knowledge about the medicinal plants, the factor informant consensus (F_{ic}) was used (Heinrich et al., 1998). All the citations were placed into 8 problems related with menstrual cycle. The F_{ic} was calculated as:

$$F_{ic} = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

where n_{ur} refers to the number of use-reports for a particular use category and n_t refers to the number of taxa used for a particular use category by all informants. F_{ic} values are low (near 0) if plants are chosen randomly or if there is no exchange of information about their use among informants, and approach one (1) when there is a well-defined selection criterion in the community and/or if information is exchanged between informants (Gazzaneo et al., 2005; Sharma et al., 2012).

Because many plant species may be used in the same use category, it is interesting to determine the most preferred species used in treatment of particular ailment (Musa et al., 2011), which can be done with the fidelity level (Fl %) of Friedman et al. (1986):

$$\mathrm{Fl}(\%) = \frac{N_p}{N} \times 100$$

where N_p is the number of use-reports cited for a given species for a particular ailment and N is the total number of use-reports cited for any given species. High Fl value (near 100%) is obtained for plants for which almost all use reports refer to the same way of using it, whereas low Fl value is obtained for plants that are used for many different purposes (Musa et al., 2011).

3. Results

In all, 62 informants were interviewed. Sixty-six percent of the total informants were females. The female informants were midwives. They were mostly illiterate (95%). The male informants mainly *vaids* and *hakims* were having 47.6% literacy (Table 1).

A total of 50 species of flowering plants belonging to 33 families and 48 genera were observed to be used for the treatment of menstrual disorders in the study area (Table 2). 42 species (84%) were dicots and 8 species (16%) were monocots. The most dominant habit was herb (62%) followed by trees (28%) and shrubs (10%). Majority of the taxa were purely cultivated (46%), whereas 32% of the plants were wild, 18% existed in both wild and cultivated forms and 4% purchased.

Medicinal value was observed to be confined to one or more plant parts. In terms of percentage usage of plant parts, seeds were observed to be of utmost medicinal importance (43.8%) followed by leaves (20.8%), fruits (16.7%), flower (8.3%), stem (4.2%), root (3.0%), and others (3.3%). Oral administration was the main mode (90.0%) of intake of medicine followed by external administration (8.0%) and oral/external mode (2.0%). Majority of the plants were effective in the treatment of Leucorrhea (30.9%), followed by dysmenorrhea (17.6%), oligomenorrhea (14.7%), menorrhagia (13.2%), amenorrhea (10.3%), itching (7.4%), and hypomenorrhea and foul smell (2.9%, each).

Use-value (UV) of different species shows that *Triticum aestivum* (UV=1.76), *Taraxacum officinale* (UV=1.16), *Citrus limon* (UV=0.95), *Allium cepa* (UV=0.79), *Cicer arietinum* (UV=0.77), *Trigonella foenum-graecum* (UV=0.66), *Rubia manjith* (UV=0.56) and *Oryza sativa* (UV=0.52) were the most important ethno-gynecological plants. Some other traditionally important plants, but having low use-value, were *Lepidium sativum, Musa paradisiaca, Phyllanthus emblica, Raphanus sativus* and *Azadirachta indica* (Table 2).

The menstrual disorders were grouped into 7 categories and factor informant consensus (F_{ic}) was calculated to access the degree of shared knowledge amongst the informants for these categories (Table 3). The values of F_{ic} varied between 0.96 (dysmenorrhea and itching and foul smell) and 0.92 (menorrhagia). Nineteen species were used to cure Leucorrhea. The category had total 345 citations. Other important menstrual disorder categories were dysmenorrhea (12 species and 265 citations), oligomenorrhea (12 species and 192 citations) and menorrhagia (11 species and 128 citations). Hypomenorrhea was the least common category of the study site with just 31 citations and 3 species used to cure the disorder.

Fidelity level values of species for each menstrual disorder are given in Table 4. These values reveal that for curing amenorrhea, the locals mainly used *Citrus limon* (Fl=100%), *Trigonella foenum-graecum* (Fl=100%) and *Chenopodium album* (Fl=72.2%). *Taraxacum officinale*, *Mentha arvensis*, *Zingiber officinale* and *Ricinus communis* were the species having high fidelity level used to cure dysmenorrhea whereas *Dalbergia sissoo*, *Rubia manjith* and *Mangifera indica* for menorrhagia. For Leucorrhea, the species with highest fidelity level were *Triticum aestivum*, *Cicer arietinum*, *Oryza sativa*, *Momordica charantia* and *Cuminum cyminum*. The informants reported that for treating oligomenorrhea, they mainly used *Allium cepa*, *Sesamum indicum*, *Butea monosperma*, *Rosa indica* and *Beta vulgaris*, all having 100% fidelity level.

4. Discussion

A total of 62 informants were interviewed. Sixty-six percent of the total informants were females. The patients generally prefer them over *vaids* or *hakims* due to shyness and social bindings, especially among Muslims. The female informants were mostly illiterate (95%), a very concerning fact which may lead to the erosion of the vital knowledge they possess. Moreover, the females engaged in midwifery do not want their children to take up the same profession because of low earnings and their poor social status in the society. In addition to this, due to increasing literacy and awareness in the society, the local populace is now consulting gynecologists for menstrual and other female disorders.

In the present study, secondary amenorrhea was studied. Secondary amenorrhea occurs when periods that were previously regular become absent for at least three cycles (Dangal, 2005). Species with high fidelity level like *Citrus limon* and *Trigonella foenum-graecum* were reported to be the best plants for treating amenorrhea. According to Ososki et al. (2002) menstrual disorders generally result due of liver malfunctioning and *Citrus* sp. works to disinfect and treat the liver. The bioflavonoids present in *Citrus limon* strengthen the inner lining of blood vessels, especially veins and capillaries, and help counter varicose veins, arteriosclerosis, circulatory disorders and infections of liver, stomach and intestines (Khare, 2007). Estevez and Baez (1998) found *Citrus limon* to be effective for abundant menses. Yassin (2012) also reported *Trigonella foenum-graecum* to be effective in the management of amenorrhea. Natarajan and Dhananjayan (2007) in their study provided evidence that *Trigonella foenum-graecum* contains phytoestrogens. Phytoestrogens are natural plant chemicals that mimic female hormone estrogens and can in turn increase the building up of uterine endometrium and increase its thickness. Consequently, it can increase the menstrual flow. *Trigonella foenum-graecum* is the most common herb used for the management of menstrual disorders in Egypt (El–Gilany et al., 2005; Yassin, 2012). Antihistaminic effect of *Trigonella foenum-graecum* can also relieve premenstrual tension and its spasmolytic effect may relieve premenstrual gastrointestinal spasms (Nutritional Supplement Education Center, 2009).

Dysmenorrhea was mainly treated by *Mentha arvensis*, *Ricinus communis*, *Taraxacum officinale* and *Zingiber officinale*. Mall (2012) also reported that *Mentha arvensis* cures amenorrhea and dysmenorrhea.

Table 2
Ethnogynecological plants used in Udhampur district for the treatment of menstrual disorders.

Name of the plant	Family	Local name	Life-form	Part used	Oral/ External	Source	Traditional method of treatment (no. of citations)	Disorder cured	UV
Aesculus indica Colebr. ex Wall.	Hippocastanaceae	*Goon*	Tree	Fruit	Oral	W	Decoction of fruit along with jaggery is taken orally twice a day till abdominal cramps subside. Intake of cold water is avoided (4).	Dysmenorrhea	0.06
Allium cepa L.	Liliaceae	*Pyaaz, ganda*	Herb	Bulb	Oral	C	Half teaspoon of bulb extract is taken orally with honey early morning on an empty stomach for two weeks (49).	Oligomenorrhea	0.79
Amaranthus viridis L.	Amaranthaceae	*Chelari*	Herb	Leaves, Seeds	Oral	W	Leaves are cooked and eaten as vegetable. Seeds either fried in clarified butter or in the form of decoction made in milk are administered to curb pain (4).	Dysmenorrhea	0.06
Asparagus adscendens Roxb.	Liliaceae	*Sahns pound, Satavar*	Shrub	Root	Oral	W	Seeds of *Robinia pseudoacacia* are mixed with dried and powdered root of *Asparagus adscendens* in the form of *churan* (powder) and taken with milk for 21 days (4).	Leucorrhea	0.06
Azadirachta indica A. Juss.	Meliaceae	*Nimm*	Tree	Leaves	External	C/W	1. Leaves of *Azadirachta indica* and fruits of *Elettaria cardamomum* are boiled in water. The decoction is used to wash vagina to cure itching (17), and also foul smell after periods (11).	Itching and Foul smell	0.45
							2. Decoction of newly sprouted leaves is sieved and one cup is administered daily for 5 days after the onset of periods (14).	Oligomenorrhea	0.23
Beta vulgaris L.	Chenopodiaceae	*Chukandar*	Herb	Tuberous root	Oral	C	Mixed juice of *Daucus carota* and *Beta vulgaris* cures menstrual irregularities (11).	Oligomenorrhea	0.18
Butea monosperma (Lam.) Taub.	Fabaceae	*Palah*	Tree	Flowers	Oral	W	Flowers of *Butea monosperma* and *Rosa indica* taken with water or cow's milk cure irregular periods (12).	Oligomenorrhea	0.19
Chenopodium album L.	Chenopodiaceae	*Kunah, Bathu*	Herb	Seeds	Oral	C/W	1. Two spoons of seeds are boiled in water till volume is reduced to one half. Filtrate is taken to cure blocked menstrual cycle (13).	Amenorrhea	0.21
							2. Two spoons of seeds are boiled in water till volume is reduced to one half. Filtrate is taken to cure irregular periods (5).	Oligomenorrhea	0.08
Cicer arietinum L.	Fabaceae	*Chole, Chana*	Herb	Seeds	Oral	C	1. Roasted and powdered seeds along with sugar and one spoon of clarified butter are taken with a cup of milk (27).	Leucorrhea	0.77
							2. Two teaspoons of deep fried and finely ground seeds are taken orally with lukewarm milk for two weeks (21).		
Citrus limon (L.) Burm. f.	Rutaceae	*Nimbu*	Tree	Fruit	Oral	C	One teaspoon of juice is taken twice a day till menstruation starts (32).	Amenorrhea	0.52
Coriandrum sativum L.	Apiaceae	*Tania, dhania, beeoon*	Herb	Seeds	Oral	C	20 g seeds are boiled in 200 ml of water. When volume is reduced to 50 ml, filter it. Filtrate is taken to control heavy blood loss during periods (1).	Menorrhagia	0.02
Cuminum cyminum L.	Apiaceae	*Jira*	Herb	Seeds	Oral	C	Roasted seeds are taken with sugar in case of Leucorrhea (12).	Leucorrhea	0.19
Curcuma longa L.	Zingiberaceae	*Haldi*	Herb	Rhizome	External	C	Paste of rhizome is applied inside vagina to cure itching sensation (19).	Itching	0.31
Dalbergia sissoo Roxb.	Fabaceae	*Tali*	Tree	Leaves	Oral	W	One cup of fresh leaf decoction is administered orally for one month (27).	Menorrhagia	0.44
Daucus carota L.	Apiaceae	*Gaajar*	Herb	Seeds	Oral	C	1. Mixed juice of *Daucus carota* and *Beta vulgaris* cures menustral irregularities (11).	Menorrhagia	0.18
							2. Two spoons of seeds and one spoon jaggery are boiled in water and taken as tea twice a day to cure blocked periods and also relives pain during periods (8).	Dysmenorrhea	0.13
							3. Seeds are ground with jaggery and made into small tablets of 2 g each. One tablet is taken with water twice a day for 10 days (8).	Oligomenorrhea	0.13
							4. 4 g seeds of *Raphanus sativus*, *Foeniculum vulgare*, *Trigonella foenum- graceum*, *Daucus carota* each are taken with water in case of blocked period (3).	Amenorrhea	0.05
Elettaria cardamomum Maton	Zingiberaceae	*Niki laachi*	Herb	Fruits (dried)	External	P	Leaves of *Azadirachta indica* and fruits of *Elettaria cardamomum* are boiled in water. The decoction is used to wash vagina to cure itching (17) and also foul smell after periods (11).	Itching and Foul smell	0.45
Ficus benghalensis L.	Moraceae	*Borh*	Tree	Prop root	Oral	W	Dried and powdered prop roots of *Ficus benghalensis* are mixed with *mishri*. 6 g of this preparation is taken with milk for 21 days (2).	Leucorrhea	0.03
Ficus religiosa L.	Moraceae	*Pipal, barh*	Tree	Fruit/seed	Oral	W	Ripened fruit crushed and mixed with jaggery is taken with cow's milk (2).	Leucorrhea	0.03
Foeniculum vulgare Mill.	Apiaceae	*Saunf*	Herb	Seeds	Oral	C/W	4 g seeds of *Raphanus sativus*, *Foeniculum vulgare*, *Trigonella foenum- graceum*, *Daucus carota* each are taken with water in case of blocked period (3).	Amenorrhea	0.05

Table 2 (*continued*)

Name of the plant	Family	Local name	Life-form	Part used	Oral/ External	Source	Traditional method of treatment (no. of citations)	Disorder cured	UV
Gossypium hirsutum L.	Malvaceae	*Kapas*	Shrub	Flower	Oral	C	One teaspoon of flower ash is taken with water early morning on an empty stomach for 10 days (2).	Menorrhagia	0.03
Juglans regia L.	Juglandaceae	*Kharot, akhroat*	Tree	Fruit rind	Oral	C	Decoction of fruit rind along with seeds of *Raphanus sativus* and jaggery is taken orally till menstruation starts (3).	Amenorrhea	0.05
Lepidium sativum L.	Brassicaceae	*Halian*	Herb	Seeds	Oral	C/W	1. Decoction of seeds prepared in milk is taken along with sugar. Seeds are taken as such with cold water (16).	Oligomenorrhea	0.26
							2. Decoction of seeds prepared in milk is taken along with sugar. Seeds are taken as such with cold water (11).	Amenorrhea	0.18
							3. Decoction of seeds prepared in milk is taken along with sugar. Seeds are taken as such with cold water (7).	Menorrhagia	0.11
Mangifera indica L.	Anacardiaceae	*Amb*	Tree	Seed	Oral	C/W	Two teaspoons of dried and finely powdered fruit rind of *Punica granatum* and *Mangifera indica* seed along with a pinch of black salt are taken orally with lukewarm milk empty stomach for one week (6).	Menorrhagia	0.27
Mentha arvensis L.	Lamiaceae	*Pootna, Pudina*	Herb	Leaves	Oral	C/W	Dried and powdered leaves are finely ground with fruits of *Phyllanthus emblica* and rhizome of *Zingiber officinale* and are made into tablets. 2-3 tablets are taken with water (27).	Dysmenorrhea	0.44
Momordica charantia L.	Cucurbitaceae	*Karela*	Climber	Seeds	Oral	C	Dried and powdered seeds are made into tablets with jaggery. Two tablets are consumed early morning on an empty stomach for one month (31).	Leucorrhea	0.50
Musa paradisiaca L.	Musaceae	*Kela*	Herb	Leaves, fruit	Oral	C	1(i). Fruits are shade dried and then powdered. 3 g of powder mixed with 25 g green banana and jaggery is taken twice a day along with cow's milk in case of Leucorrhea (10).	Leucorrhea	0.31
							1(ii). Ripened banana and fruits (without seeds) of *Phyllanthus emblica* are taken with honey to cure Leucorrhea (5).		
							1(iii). Young leaves are ground and decoction is prepared in milk. One cup is taken empty stomach for one month (4).		
							2. Banana taken with ghee twice a day for 15 days cures Leucorrhea and blood loss (9).	Menorrhagia	0.15
Nyctanthes arbor-tristis L.	Oleaceae	*Haar-shringaar*	Tree	Leaves	Oral	W	Newly sprouted leaves are ground along with *Piper nigrum* seeds and made into tablets of 2 g each. One tablet is administered twice a day for two weeks (1).	Menorrhagia	0.02
Ocimum tenuiflorum L.	Lamiaceae	*Tulsi*	Herb	Leaves, Seeds	Oral	C/W	1. 10 g of seeds is boiled in water and filtrate is taken orally for any menustral cycle disturbance (22). Decoction of leaves is taken orally for 1–3 days. Decoction of seeds is taken orally for one week (13).	Oligomenorrhea	0.56
							2. Decoction of leaves is taken orally for 3 days (4). Decoction of seeds is taken orally for one week (2).	Amenorrhea	0.10
Oryza sativa L.	Poaceae	*Dhan, munji*	Herb	Seeds	Oral	C	Water left after washing rice is taken with mishri to cure leucorrhea (32).	Leucorrhea	0.52
Phyllanthus emblica L.	Phyllanthaceae	*Amla*	Tree	Fruit/seed	Oral	C/W	1. 10 g fruit juice mixed with *mishri* (sucrose) is taken twice a day to cure vaginal itching and pain (6).	Itching	0.10
							2(i). Seeds crushed to powdered form is taken along with honey and *mishri* to cure Leucorrhea (9).	Leucorrhea	0.35
							2(ii). Fruits (seed removed) are taken with banana and honey to cure Leucorrhea (5).		
							2(iii). One teaspoon of fruit juice along with few drops of honey is consumed twice a day for one month (8).		
							3. Dried and powdered leaves of *Mentha arvensis* are finely ground with fruits of *Phyllanthus emblica* and rhizome of *Zingiber officinale* and made into tablets. 2–3 tablets are taken with water (27).	Dysmenorrhea	0.44
Piper nigrum L.	Piperaceae	*Kale maarch*	Herb	Seeds	Oral	P	1. Powered seeds of *Piper nigrum* are crushed along with leaves of *Punica granatum* and mixed with water. Filtrate is taken twice a day to cure Leucorrhea (26).	Leucorrhea	0.42
							2. Newly sprouted leaves of *Nyctanthes arbor-tristis* are ground along with *Piper nigrum* seeds and made into tablets of 2 g each. One tablet is administered twice a day for two weeks (1).	Menorrhagia	0.02
							3. Eight spoons of *Sesamum indicum* seeds and ten powered seeds of *Piper nigrum* and jaggery are boiled in water till volume is reduced to one half. It is taken twice a day for 15 days before the due date of periods (11).	Oligomenorrhea	0.18
							4. Two teaspoons of *Sesamum indicum* seeds are boiled along with *Piper nigrum* seeds and jaggery and taken orally twice a day for five days before the onset of periods (8).	Hypomenorrhea	0.13
Punica granatum L.	Punicaceae	*Darooni*	Tree	Leaves/ dried fruit rind	Oral	W	1(i). One spoon of dried and powderd fruit rind is taken with cold water twice a day to cure heavy blood loss during periods (11).	Menorrhagia	0.27
							1(ii). Two teaspoons of dried and finely powdered fruit rind and *Mangifera indica* seed along with a pinch of black salt are taken orally with lukewarm milk empty stomach for one week (6).		
							2. Powered seeds of *Piper nigrum* are crushed along with leaves of *Punica granatum* and mixed with water. Filtrate is taken twice a day to cure Leucorrhea (26).	Leucorrhea	0.42
Raphanus sativus L.	Brassicaceae	*Mooli*	Herb	Seeds, Tuberous roots	Oral	C	1(i) One teaspoon of dried seeds is taken with water twice a day for 2–3 days (11).	Dysmenorrhea	0.44
							1(ii) Powered seeds are taken thrice a day in case of severe pain during periods (16).		
							2. One teaspoon of dried seeds is taken with water twice a day for 2–3 days (15).	Hypomenorrhea	0.24
							3. Powered seeds taken thrice a day taken in case of irregular periods (8).	Oligomenorrhea	0.13
								Amenorrhea	0.10

							4(i). 4 g seeds of *Raphanus sativus*, *Foeniculum vulgare*, *Trigonella foenum-graecum*, *Daucus carota* each are taken with water in case of blocked periods (3). 4(ii) Decoction of fruit rind of *Juglans regia* along with seeds of *Raphanus sativus* and jaggery is taken orally till menstruation starts (3).		
Ricinus communis L.	Euphorbiaceae	*Areni, Arind*	Shrub	Leaves, twigs	External	W	Leaves heated in clarified butter are tied on hypogastria and back for pain relief. Twigs are heated in fire and oil thus obtained is messaged on hypogastria (8).	Dysmenorrhea	0.13
Robinia pseudoacacia L.	Fabaceae	*Kikkar*	Tree	Seeds	Oral	W	Seeds of *Robinia pseudoacacia* are mixed with dried and powdered root of *Asparagus adscendens* in the form of *churan* and taken with milk for 21 days (4).	Leucorrhea	0.06
Rosa indica L.	Rosaceae	*Gulaab*	Shrub	Flowers	Oral	C/W	Flowers of *Butea monosperma* and *Rosa indica* taken with water or cow's milk cure irregular periods (12)	Oligomenorrhea	0.19
Rubia manjith Roxb. ex Flem.	Rubiaceae	*Bara macheet*	Herb	Root	Oral	W	One teaspoon of dried and finely powdered root is taken thrice a day with lukewarm milk (35).	Menorrhagia	0.56
Sesamum indicum L.	Pedaliaceae	*Til*	Herb	seed	Oral/ External	C	1. Eight spoons of its seeds and ten powdered seeds of *Piper nigrum* and jaggery are boiled in water till volume is reduced to one half. This decoction is taken twice a day for 15 days before the due date of periods (11).	Oligomenorrhea	0.18
							2. Two teaspoons of seeds are boiled along with *Piper nigrum* seeds and jaggery and taken orally twice a day for five days before the onset of periods (8).	Hypomenorrhea	0.13
							3. Oil extracted from seeds is messaged on hypogastria and back to relieve pain (23).	Dysmenorrhea	0.37
Syzygium cumini (L.) Skeels	Myrtaceae	*Tallay, jaamnoo*	Tree	Bark	Oral	W	Bark is boiled in water and decoction is taken to cure leucoorrhea (2).	Leucorrhea	0.03
Taraxacum officinale Wigg	Asteraceae	*Bathur, Phul dudhli*	Herb	Leaves	Oral	W	Leaves either consumed as vegetable or in the form of curry relieve abdominal spasms (72).	Dysmenorrhea	1.16
Trachyspermum ammi Sprague	Apiaceae	*Ajwain*	Herb	Seeds	Oral	C	1. 25 g seeds are soaked in water overnight. Next day, they are powered and taken with water (23).	Leucorrhea	0.37
							2. One teaspoon of seeds is chewed with tea (12).	Dysmenorrhea	0.19
Trapa natans Roxb.	Lythraceae	*Singhara*	Herb	Fruit/seed	Oral	C/P	Chapati made from its flour taken daily in the morning cures leucorrhea(3).	Leucorrhea	0.05
Trigonella foenum-graecum L.	Fabaceae	*Methreya, methi*	Herb	Seeds	Oral	C	1(i). Seeds of *Raphnus sativus*, *Foeniculum vulgare*, *Trigonella foenum-graceum*, *Daucus carota* each 4 g taken with water in case of blocked period (24). 1(ii). Decoction of seeds is prepared and one cup is taken daily before breakfast for 5 days (17).	Amenorrhea	0.66
Triticum aestivum L.	Poaceae	*Kanak*	Herb	Seeds	Oral	C	Seeds are soaked in water for five days and water is changed every day. Then seeds are ground and the resulting sediment is sun-dried and is called *Talkhira*. It is cut into small pieces and one piece is taken with a glass of water early morning empty stomach for one month (49) or fried in ghee and sugar and finally milk is added (31).	Leucorrhea	1.29
Vitex negundo L.	Verbenaceae	*Bana*	Shrub	Leaves	Oral	W	Decoction of leaves is prepared and mixed with warm milk in equal quantity. Sugar is added. One cup is administered once a day till pain subsides (2).	Dysmenorrhea	0.03
Withania somnifera (L.) Dunal	Solanaceae	*Asgandh*	Herb	Stem	Oral	C/W	One teaspoon of dried and finely ground twigs is taken orally with water empty stomach in morning for two weeks (4).	Leucorrhea	0.06
Woodfordia fruticosa (L.) Kurz	Lythraceae	*Dhaeen*	Shrub	Flower	Oral	W	Dried and powdered flowers are mixed with few drops of honey and made into small tablets. Two tablets are consumed in the morning empty stomach for two weeks (3).	Leucorrhea	0.05
Zingiber officinale Roscoe	Zingiberaceae	*Adrak*	Herb	Rhizome	Oral	C	Dried rhizome and jaggery are taken in the form of tea to cure pain during periods (15). Decoction of dried rhizome is prepared with jaggery and two teaspoons are administered twice a day till abdominal cramps subside (9). Dried and powdered leaves of *Mentha arvensis* are finely ground with fruits of *Phyllanthus emblica* and rhizome of *Zingiber officinale* and then made into tablets. 2–3 tablets are taken with water (27).	Dysmenorrhea	0.82
Ziziphus mauritiana Lamk.	Rhamnaceae	*Ber*	Tree	Fruits	Oral	W	Fruits are shade dried and then powdered. 3 g powder mixed with 25 g green banana and jaggery is taken twice a day along with cow's milk in case of Leucorrhea (2).	Leucorrhea	0.03

Table 3
Factor informant consensus (F_{ic}) for different menstrual disorders.

Category	No. of species	No. of citations	F_{ic}
Amenorrhea	9	118	0.93
Dysmenorrhea	12	265	0.96
Hypomenorrhea	3	31	0.93
Itching and foul smell	4	71	0.96
Leucorrhea	19	345	0.95
Menorrhagia	11	128	0.92
Oligomenorrhea	12	192	0.94

Table 4
Fidelity level (Fl) of the plants used to cure different menstrual disorders.

Category	Name of the plant	No. of citations	Fl (%)
Amenorrhea	*Trigonella foenum-graecum* L.	41	100
	Citrus limon (L.) Burm. f.	32	100
	Chenopodium album L.	13	72.2
Dysmenorrhea	*Taraxacum officinale* Wigg	72	100
	Zingiber officinale Roscoe	51	100
	Mentha arvensis L.	27	100
	Ricinus communis L.	8	100
Hypomenorrhea	*Raphanus sativus* L.	15	26.8
	Sesamum indicum L.	8	19.0
	Piper nigrum L.	8	17.4
Itching and foul smell	*Curcuma longa* L.	19	100
	Elettaria cardamomum Maton	28	100
	Azadirachta indica A. Juss.	28	66.7
Leucorrhea	*Triticum aestivum* L.	80	100
	Cicer arietinum L.	48	100
	Oryza sativa L.	32	100
	Momordica charantia L.	31	100
	Cuminum cyminum L.	12	100
	Musa paradisiaca L.	19	67.9
	Trachyspermum ammi Sprague	23	65.7
	Punica granatum L.	26	60.5
	Piper nigrum L.	26	56.5
Menorrhagia	*Rubia manjith* Roxb. ex Flem.	35	100
	Dalbergia sissoo Roxb.	27	100
	Mangifera indica L.	17	100
Oligomenorrhea	*Allium cepa* L.	49	100
	Butea monosperma (Lam.) Taub.	12	100
	Rosa indica L.	12	100
	Beta vulgaris L.	11	100
	Ocimum tenuiflorum L.	35	85.4

The essential oils menthol and menthone present in *Mentha arvensis* have antibacterial, antifungal and antispasmodic properties (Khare, 2007). The antispasmodic activity exhibited by the essential oils help in relieving dysmenorrheal pain. Leaves of *Ricinus communis* are also used as pain killer in Sindh, Pakistan (Rahman et al., 2013). *Taraxacum officinale* extract has shown to exhibit analgesic and anti-inflammatory effect in mice (Tita et al., 1993). Galanolactone is a serotonin receptor antagonist, present in *Zingiber officinale*, which may have partly anti-emetic effect (Huang et al., 1991; Mustafa et al., 1993) and also explains the antispasmodic effects on visceral and vascular smooth muscle (Braun and Cohen, 2007). *Zingiber officinale* also has sedative, anti-inflammatory, antipyretic, analgesic, hypotensive and hepatoprotective properties due to the presence of gingerol and shogaol (Khare, 2007).

Curcuma longa is the species mostly used to cure vaginal itching. It contains curcumin (Goel et al., 2008) which displays a wide array of properties such as antifungal, antiviral, anti-inflammatory, antioxidant, and anticancer activities (Pari and Eckel, 2008). Other important plants used for curing vaginal itching were *Phyllanthus emblica*, *Elettaria cardamomum* and *Azadirachta indica*. Vaginal itching generally occurs due to some infection or inflammation, and all these species used to cure vaginal itching have anti-inflammatory action (Kritikar and Basu, 1999; Pandey, 2002; Khare, 2007; Dang et al., 2011). In addition to this, *Elettaria cardamomum* is antibacterial, antiseptic and fungicide (Gruenwald et al., 2000) and antispasmodic (Williamson and Evans, 1988) and *Azadirachta indica* is antiseptic, refrigerant and appetizer (Kritikar and Basu, 1999).

Leucorrhea denotes a thick whitish or yellowish vaginal discharge. It occurs either due to inflammation/congestion of vaginal mucosa or estrogen stimulation (Kumar and Choyal, 2012). Plants like *Triticum aestivum*, *Cicer arietinum* and *Oryza sativa* used by the informants to treat Leucorrhea are good source of nutrition which improve the immunity of body and help in recovering from hormonal imbalance. *Talkhira*, a special preparation from *Triticum aestivum*, is considered to be highly nutritious. It is also available in the local markets. In addition to nutritive value, *Oryza sativa* (Kritikar and Basu, 1999), *Momordica charantia* (Panthong et al., 1986; Raman and Lau, 1996), *Piper nigrum* (Panda and Kar, 2003) and *Cuminum cyminum* (Duke, 1983) have anti-inflammatory properties.

In district Udhampur, rural women administer fresh leaf decoction of *Dalbergia sissoo* against menorrhagia. According to Rawat and Kharwal (2011), in Balh valley of district Mandi, Himachal Pradesh, its leaves are chewed with sugar to check Leucorrhea and menorrhagia. Rural population of Haryana uses paste of tender leaves of *Dalbergia sissoo* made in milk for curing Leucorrhea (Yadav et al., 2006). Gujjar, Bakkarwal and Pahari tribes of district Rajouri use the bark decoction of *Dalbergia sissoo* for curing Leucorrhea (Azad, 2013). Lal and Singh (2012) also reported that the leaf extract of *Dalbergia sissoo* cures menorrhagia, dysmenorrhea and Leucorrhea. According to Sidana et al. (2012), the leaf extract of this species was found to have analgesic and anti-inflammatory properties and this may validate its traditional use in the study site.

Allium cepa, reported to be having antibacterial, antiviral, antiparasitic, antifungal, antihypertensive, hypoglycemic, antithrombotic, antihyperlipidemic, anti-inflammatory and antioxidant activities (Parmar and Rawat, 2012), was used to treat oligomenorrhea in the present study. Juice of *Daucus carota* and *Beta vulgaris* is also used to cure oligomenorrhea. While juice of *Beta vulgaris* has anti-inflammatory and anti-cancerous properties (Hartwell, 1982; Kritikar and Basu, 1999), *Daucus carota* juice is believed to strengthen and clean the uterus by bringing in vitamins and removing impurities (Ososki et al., 2002).

In all, 73 formulations were used by the informants for treating different menstrual disorders. Out of these, 40% formulations involved more than one plant. The use of multiple therapies in traditional medicine based on combining plants has shown to increase the efficacy of the herbal medicine. According to Bhat et al. (2012) the combination of different plants increases the activity of medicine and 'ill effect' of any plant (if present) will be 'neutralized' by the other.

The values of factor informant consensus were towards the higher side. This shows that the informants share ethnogynecological knowledge amongst themselves. Sharma et al. (2012) also reported the sharing of information amongst the informants in Kathua district of J&K, for the ethnoveterinary treatments. The conversation and discussion between the traditional healers is a good sign for the conservation of the precious knowledge regarding ethnomedicinal plants. By sharing, they assure the dispersal of this understanding and also increase the possibility of its documentation for the betterment of the future generations.

5. Conclusion

The present study site has a rich diversity of medicinal plant knowledge among the midwives and medicine men for the treatment

of menstrual disorders. In total 50 plants were reported by the 62 informants. The quantitative analysis of the data using UV and Fl highlighted the most important plants used to cure various menstrual ailments. These plants need further pharmacological analysis so that new drugs can be formulated. The high values of F_{ic} also show a high degree of sharing of ethnogynecological knowledge amongst the informants. By sharing, they assure the dispersal of this understanding and also increase the possibility of its documentation for the betterment of the future generations.

Annexure I

PROFORMA FOR ETHNOBOTANICAL SURVEY

Form No. ……

Name: …….. Parentage:……

Age: …… Gender: Male/Female ……..…… Edu. Qualification: …...……

Address: ……...

……

S. No.	Menstrual disorder cured	Local Name of the plant	Plant part used	w/c/p	Fl. colour & fl. season	Methodology	Any other information

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