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Traditional plant-based remedies for gynaecological problems prevailing in Nerwa, district Shimla, Himachal Pradesh

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The purpose of this study is to understand about the traditional plant-based formulations that the Nerwa region's people utilised against gynaecological problems.This study contributes region-specific documentation, particularly from areas where such knowledge remains under-represented in the literature. Data were collected through face-to-face interviews with 72 informants, predominantly women, using random and snowball sampling methods. A total of 31 plant species belonging to 27 families were recorded for their role in managing various gynaecological issues, including menstrual cramps, menorrhagia, infertility, and postpartum care. Among these, *Zingiber officinale* exhibited the highest Use Value (UV), Relative Frequency of Citation (RFC), and Cultural Importance Index (CI), indicating its widespread recognition and use in the community. The findings highlight the continued reliance on traditional medicinal practices among rural women and emphasize the need to preserve this knowledge. Currently, there is no existing documentation in the region regarding the use of plants for treating gynaecological disorders. Therefore, the primary objective of this study is to explore and document plant species that have traditionally been used in the area to manage gynaecological ailments. By examining associated cultural practices and beliefs, the research aims to enhance our understanding of women's reproductive health. Furthermore, the documented ethnobotanical knowledge may serve as a basis for evaluating the pharmaceutical potential of these plants.

Keywords: Ethnogynecology, Pharmacological potential, Traditional healing systems, Women's health

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Globally, reproductive health problems are a major cause of death and morbidity among women[1]. It can arise from a variety of causes, including hormonal imbalances, infections, lifestyle factors, poor nutrition, lack of exercise, and exposure to environmental toxins. Additionally, genetic predispositions and inadequate healthcare access may also play significant roles in the development of reproductive health concerns[2]. These problems include maternal mortality, unsafe abortion, sexually transmitted infections, menstruation related issues, inadequate education and poor access to reproductive healthcare[3]. The field of gynecology consists of the diagnosis, treatment, and prevention of various female ailments, including pregnancy related issues, abortions, menstrual disorders, menopause, morning sickness, leucorrhea, infertility, and reproductive problems[4]. In ethnogynecology, people used herbal medicines, traditional practices, and cultural beliefs to treat women's health issues[5].

In rural areas, pregnant women prefer village midwives over gynaecologists for delivery. It could be due to distance and lack of finances therefore; it is not possible for them to go to healthcare and multispecialty centers. According to a report by the Indian Council for Medical Research task force, most women in rural India still consult traditional medicine practitioners or use home remedies to treat their gynaecological problems[6]. In conventional medicine, most medicinal plants are collected from the wild habitat. Tribal people have developed a plethora of traditional medical knowledge based on the flora surrounding them[7]. This knowledge is often passed down orally from one generation to the next through stories, rituals, and hands-on demonstrations[8]. Elders play a crucial role in educating younger members of the community about the medicinal uses of plants. This method ensures that traditional practices and valuable information are preserved and continue to benefit the community[9].

While ethnogynaecological knowledge has been documented in various parts of India, there remains a significant gap in region-specific studies, particularly in the Shimla region and its surrounding areas, where traditional gynaecological practices have not been

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systematically recorded. Therefore, present study is commenced with an aim to study the ethnogynecological plants of Nerwa region. It would provide a crucial insight into the cultural practices and beliefs regarding women's health and reproductive systems. This field of study helps medical anthropologists understands how different societies approach gynaecological issues, leading to document culturally sensitive healthcare practices. Additionally, it can reveal indigenous knowledge that might offer alternative treatments or complementary therapies for this disease.

Materials and Methods

Study area

Nerwa region lies between latitude 30.917°N and longitude 77.641°E, with an altitude ranging between 1,170 m and 3,324 m. It covers an area of 355.64 km^2, Nerwa is populated with 36,517 people, with a population density of 103/km^2 (censusindia.gov.in)[10]. The area is surrounded by Jubbal-Kotkhai towards north, Chopal and Kupvi towards west, Sirmaur towards south and Uttarakhand towards east. The study area is covered in dense forests, and the vegetation varies from subtropical to temperate type. The climate of the area is generally salubrious and reviving which varies with the attitude from Nerwa (1,170 m) to the highest point at Talra wildlife sanctuary (3,324 m). The temperature also varies with altitude and seasons, from lowest at -5-10°C during winters to 25-35°C in the summers. Maximum rainfall occurs in monsoon and the area received an average rainfall of 721.5 mm during the monsoon season of 2024 (imd.gov.in) (Fig. 1).

Methods

The study was conducted between May, 2024-March, 2025. Informants were interviewed through different types of interview methods including Group talks, field observations, guided field walks, and a semi-structured questionnaire following Jain and Mudgal (1999)[11]. Prior to the interviews, concise group discussions were conducted with the informants to clarify the study's objectives, and formal consent was obtained from each informant. The interviews were conducted in the local dialect, and subsequently, all recorded data were translated into English. The collected information included the local name of the plant, its life form, the particular part used, its ethnogynaecological uses, and the methods of preparation and administration.

The plant species were photographed and collected during field visits that were mostly led by the local informants. The specimens were pressed, dried, and mounted on herbarium sheets in accordance with standard techniques[12], and voucher specimens were deposited at the Herbarium of Himachal Pradesh University, Shimla. Preliminary identification of the plants was done following some regional flora such

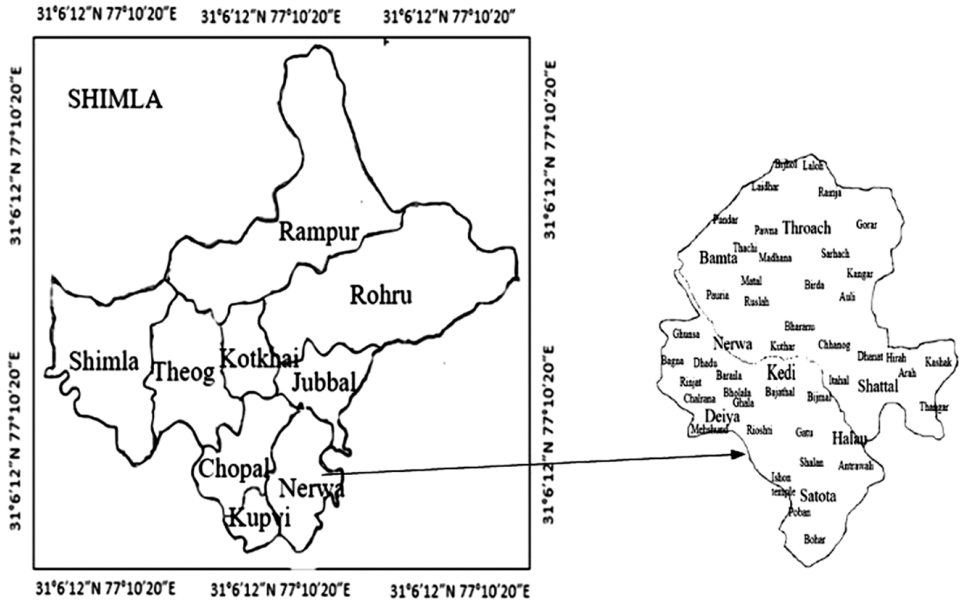

Fig. 1 — Study area maps showing, Shimla district, Himachal Pradesh, India and the Nerwa region highlighting the surveyed villages (Source: author)

as, Flora Simlensis[13], Flowers of the Himalaya[14], Flora of Himachal Pradesh[15], Medicinal and Aromatic Plants of Himachal Pradesh[16] and Flora of Kullu District Himachal Pradesh[17] and the results were also confirmed at the Herbarium of Himachal Pradesh University, Shimla. Certain online databases like http://www.worldfloraonline.org/[18] and https://powo.science.kew.org/[19] were also consulted for this purpose.

This region was selected due to the noticeable lack of previous ethnobotanical studies focused on traditional healers and their gynaecological practices. By choosing an area that remains underexplored in this context, the study aimed to uncover undocumented cultural knowledge and medicinal plant use, contributing original insights to the field of ethnogynaecology.

During the survey, a total of 72 respondents were interviewed, comprising 64 females and 8 males. Among the male participants, 3 were traditional healers, while the remaining were elderly individuals. Of the 64 female respondents, only one identified as a traditional healer; rest included housewives, elderly women and women from various age groups. Initial informant selection was conducted randomly. Subsequently, the snowball sampling method, as described by Bailey (2008)[20], was employed to identify key informants, particularly knowledgeable elders and traditional healers. The study was conducted in accordance with ethical standards, and prior informed consent was obtained from all informants before participation.

Quantitative analysis

To analyses the data, the following quantitative analysis was performed.

Use value

A plant's importance can be determined by its use value, which can be calculated using following formula[21].

$$UV = \sum \frac{ui}{N}$$

Where, UV = Use value of individual species, ui = the number of uses cited by each informant for a given species, and N = Total number of informants. A high use value indicates there are many use reports, while a low value indicates fewer use reports[21].

Relative Frequency of Citation (RFC)

It is calculated by dividing the number of informants, who mentioned the species as useful, by the total number of informants who participated in the survey (N) [22]

$$\mathrm{RFCs} = \frac{\mathrm{FCs}}{N} = \frac{\sum_{\mathrm{i=i1}}^{\mathrm{iN}} \mathrm{URi}}{N}$$

In the same way, it can also be calculated as the summation of the UR of all the informants interviewed for the species, regardless of its use category divided by total number of informants.

Cultural Importance Index (CI)

The cultural index measures the diversity of plant uses and the degree of recognition of sources of information for each use category. It will be calculated as follows[23].

$$\mathrm{CIs} = \sum_{i=u1}^{uNC} \sum_{i=i1}^{iN} \frac{URui}{N}$$

NC represents the total no. of use categories and N represents the total no. of informants. In general, the CI ranges from 0 to the number of all utilization categories. A higher CI represents that a species has multiple uses as well as higher degree of recognition.

Statistical tools

Statistical analysis of the data was conducted using Microsoft Excel and IBM SPSS Statistics (version 31). Descriptive statistics, including frequencies and percentages, were used to summarize the demographic details of the respondents. To examine whether there were significant differences in knowledge scores across various educational groups, a one-way Analysis of Variance (ANOVA) was performed, Tukey's Honest Significant Difference (HSD) post-hoc test was applied to determine which specific groups differed from each other. Additionally, a Chi-square test of independence was used to evaluate the association between categorical variables such as gender and knowledge level. The observed and expected frequencies were compared to calculate the Chi-square statistic and assess the significance of the relationship. A significance level of 0.05 was used throughout the analysis to determine statistical significance.

Results

The ethnogynaecological uses, plant parts utilized, their life form, mode of administration, UR, UV, RFC, CI of medicinal plants documented in the study area are summarized in Table 1.

Table 1 — No. of plant species along with their UV, CFC and CI utilized for gynaecological problems in Nerwa region

Sr. no.	Botanical Name	Local name (Pahadi)	Family	Part used	Life form	Ailment treated	Preparation	Use report	UV	RFC	CI
1.	*Achyranthes aspera* L.	Puthkanda	Amaranthaceae	Leaves	Herb	Contraceptive	Leaves and root extract (2-3 spoons) is taken (twice a day) as a contraceptive.	9	0.125	0.208	0.125
2.	*Acorus calamus* L.	Shalbow	Acoraceae	Rhizome	Herb	Irregular menstruation	A spoonful of rhizome powder is consumed with milk and honey for five days to cure irregular menstruation.	16	0.222	0.277	0.222
3.	*Adiantum vensutum* D. Don	Doomtili	Pteridaceae	Leaves	Fern	Leucorrhea	Paste of fresh leaves is taken for leucorrhea.	8	0.111	0.138	0.111
4.	*Aesculus indica* (Wall. ex Cambess.) Hook.	Khanor	Sapindaceae	Roots	Tree	Menorrhagia, leucorrhea	Root powder is taken for heavy menstruation and leucorrhea.	12	0.166	0.277	0.152
5.	*Allium cepa* L.	Pyaaz	Amaryllidaceae	Bulb	Herb	Irregular menstruation	The bulb extract is heated and 2-3 tablespoon taken for irregular menstruation.	7	0.097	0.138	0.097
6.	*Asparagus adscendens* Roxb.	Shatvari, shatvaar	Asparagaceae	Roots	Shrub	Leucorrhea, infertility	Root powder is taken every day with milk for leucorrhea. It also helps in increasing fertility and in treating various female reproductive issues.	21	0.291	0.416	0.347
7.	*Berberis aristata* DC	Koshamal, Kashmal	Berberidaceae	Bark, flowers	Shrub	Uterus infection, UTI	Decoction of its root and stem bark is taken orally with lukewarm water after delivery to clear uterus. The decoction of its flower is taken for Urinary tract infection.	12	0.166	0.208	0.25
8.	*Bergenia ciliata* (Haw.) Sternb.	Daklambu	Saxifragaceae	Roots	Herb	UTI, menorrhagia	Decoction made with dried powder of roots is taken orally for UTI. One tablespoon of dried powder is added to 200 ml of water and is taken for heavy menstruation.	25	0.347	0.388	0.405
9.	*Cannabis sativa* L.	Bhaang	Cannabaceae	Leaves	Herb	Menstrual cramps.	Dried leaves (1-2 g) decoction is taken for menstrual cramps. Fresh leaves paste is also applied on abdomen for menstrual cramps.	18	0.25	0.416	0.333

… *Contd.*

Table 1 — No. of plant species along with their UV, CFC and CI utilized for gynaecological problems in Nerwa region (Contd.)

Sr. no.	Botanical Name	Local name (Pahadi)	Family	Part used	Life form	Ailment treated	Preparation	Use report	UV	RFC	CI
10.	*Capsella bursa-pastoris* (L.) Medik.	Khandwa	Brassicaceae	Fruits, leaves	Herb	Menstrual cramps, UTI	Fruits are chewed for menstrual cramps and leaves decoction is taken for UTI.	12	0.166	0.208	0.166
11.	*Catharanthus roseus* (L.) G. Don	Phooldu	Apocynaceae	Leaves	Herb	Menorrhagia	Decoction of dried leaves is taken for menorrhagia.	14	0.194	0.208	0.194
12.	*Chenopodium album* L.	Bathah	Amaranthaceae	Leaves	Herb	Menorrhagia, low lactation	Dried leaves powder is taken along with milk to reduce heavy menstrual flow. Fresh leaves are eaten as vegetable by nursing mother to enhance lactation.	28	0.388	0.402	0.405
13.	*Coriandrum sativum* L.	Dhoniyo	Apiaceae	Seeds	Herb	Leucorrhea	Dried seeds are ground and mixed with mustard oil and applied for leucorrhea.	19	0.263	0.277	0.263
14.	*Cuscuta reflexa* Roxb.	Kanewari	Convolvulaceae	Leaves	Climber	Contraceptive	Leaves decoction is taken as a contraceptive for unwanted pregnancy.	5	0.069	0.097	0.069
15.	*Emblica officinalis* Gaertn.	Aanvla	Phyllanthaceae	Fruits	Tree	Leucorrhea	The fruit juice is taken for vaginal discharge and burning sensation in vagina during urination.	14	0.194	0.236	0.194
16.	*Erigeron bellidioides* (Buch.-Ham. ex D. Don) Benth. ex C.B. Clarke	Phooldu	Asteraceae	Entire plant	Herb	UTI	Plant extract is taken orally to treat Urinary tract infection (UTI).	7	0.097	0.138	0.097
17.	*Foeniculum vulgare* Mill.	Sonf	Apiaceae	Seeds	Herb	Menstrual cramps	The decoction made with its seeds and jaggery powder is taken for menstrual cramps.	25	0.347	0.361	0.347
18.	*Geranium wallichianum* D. Don	Kugti	Geraniaceae	Leaves, roots	Herb	Gonorrhea, leucorrhea	Dried leaves and root powder is taken with honey and lukewarm water for gonorrhea and leucorrhea.	17	0.236	0.277	0.375
19.	*Isodon rugosus* (Wall. Ex Benth.) Codd	Chichdi	Lamiaceae	Leaves	Herb	Menstrual cramps, leucorrhea	Leaves decoction is taken for menstrual cramps and leucorrhea.	19	0.263	0.277	0.347
20.	*Juglans regia* L.	Okhad	Juglandaceae	Seeds	Tree	Infertility, irregular periods	The seeds are eaten daily to enhance fertility and for irregular periods.	19	0.263	0.305	0.277

… *Contd.*

Table 1 — No. of plant species along with their UV, CFC and CI utilized for gynaecological problems in Nerwa region (Contd.)

Sr. no.	Botanical Name	Local name (Pahadi)	Family	Part used	Life form	Ailment treated	Preparation	Use report	UV	RFC	CI
21.	*Mesua ferrea* L.	Naagkesar	Calophyllaceae	Fruits, seeds	Tree	Infertility, UTI	Powder formed of its flower and seeds of *Foeniculum vulgare* (Sounf) are taken orally with lukewarm water after a delivery to clear uterus. The decoction of its flower is taken for Urinary tract infection. Seeds powder is taken for infertility.	12	0.166	0.208	0.25
22.	*Ocimum basilicum* L.	Tulsi	Lamiaceae	Leaves	Herb	Infertility, irregular periods	Tea prepared with its leaves is taken for irregular periods and infertility.	20	0.277	0.305	0.277
23.	*Oxalis corniculata* L.	Kantaari	Oxalidaceae	Leaves	Herb	Morning sickness	Leaves are chewed to prevent excessive morning sickness during pregnancy.	11	0.152	0.166	0.152
24.	*Punica granatum* L.	Daadu	Lythraceae	Fruits	Tree	Infertility	The juice of its fruit is taken every day during menstruation and pregnancy. The fruits are also taken to cure infertility.	19	0.263	0.347	0.319
25.	*Putranjiva roxburghii* Wall.	Putrajiva	Putranjivaceae	Seeds	Tree	Infertility	Powder prepared with its seeds and fruits/ seeds of *Mesua ferrea*, seeds of *Quercus infectoria*, roots of *Asparagus adscendens and Withania somnifera* is taken every morning (empty stomach) along with milk for infertility.	5	0.069	0.069	0.069
26.	*Quercus infectoria* Oliv.	Majuphal	Fagaceae	Seeds	Shrub	Infertility	Seeds powder is taken for infertility.	6	0.083	0.083	0,083
27.	*Rubus niveus* Thunb.	Kalanchheyo	Rosaceae	Roots	Shrub	Menorrhagia	The root powder is taken with milk for excessive bleeding during menstruation.	8	0.111	0.138	0.111
28.	*Thymus linearis* Benth.	Jangli ajwain	Lamiaceae	Seeds	Shrub	Menstrual cramps	Decoction of seeds is made with jaggery and taken to treat menstrual cramps.	25	0.347	0.416	0.347
29.	*Tripidium bengalense* (Retz.) H. Scholz	Munji	Poaceae	Roots	Herb	Contraceptive	Dried root decoction is taken as a contraceptive.	21	0.291	0.347	0.291

… *Contd.*

Table 1 — No. of plant species along with their UV, CFC and CI utilized for gynaecological problems in Nerwa region (Contd.)

Sr. no.	Botanical Name	Local name (Pahadi)	Family	Part used	Life form	Ailment treated	Preparation	Use report	UV	RFC	CI
30.	*Withania somnifera* (L.) Dunal	Ashwagandha	Solanaceae	Roots	Shrub	Infertility	The dry root powder is taken along with milk for infertility.	27	0.375	0.416	0.375
31.	*Zingiber officinale* Roscoe	Adrak	Zingiberaceae	Rhizome	Herb	Menstrual cramps, nausea, vomiting	A tea prepared from its rhizome is traditionally consumed to relieve menstrual cramps. Rhizome decoction is used to manage menorrhagia, alleviate menopausal symptoms, support postpartum recovery, and reduce nausea and vomiting during pregnancy.	30	0.416	0.444	0.472

Statistical analysis results regarding plant knowledge

A total of 72 informants participated in the study. Descriptive analysis revealed that the majority were female (88.9%), while male informants constituted 11.1% of the sample. Regarding age, all participants provided valid data. The 40-60 years age group represented the largest proportion (48.6%), followed by the 60-80 years group (27.8%), and the 20-40 years group (22.2%). A small proportion of informants (1.4%) were over 80 years of age. A one-way ANOVA was conducted to examine the effect of education level on knowledge scores among informants. The results revealed a statistically significant difference in knowledge scores across different educational categories, $F(4, 67) = 3.738$, $p = 0.008$, indicating that education level significantly influenced on knowledge acquisition.

Post hoc comparisons using the Tukey HSD test further identified where these differences lay. Notably, informants with no formal schooling had significantly higher knowledge scores compared to those with university-level education (Mean Difference = 6.646, $p = .003$). Similar significant differences were observed between the "No Schooling" group and other formal education levels, such as primary and secondary. The effect size, as measured by Eta-squared ($\eta^2 = 0.182$), indicates a moderate practical significance, with approximately 18.2% of the variance in knowledge scores explained by education level.

A Chi-Square test revealed a statistically significant association between gender and knowledge level ($x^2 = 11.311$, $df = 5$, $p = 0.046$.

Diversity of the plant composition

The study documented the use of 31 plant species for the treatment of gynaecological ailments, belonging to 27 different botanical families. The most dominant family was Lamiaceae, represented by three species, followed by Amaranthaceae and Apiaceae, each with two species. The remaining families, including Acoraceae, Amaryllidaceae, Apocynaceae, Asteraceae, Asparagaceae, Brassicaceae, Berberidaceae, Cannabaceae, Calophyllaceae, Convolvulaceae, Fagaceae, Geraniaceae, Juglandaceae, Lythraceae, Oxalidaceae, Phyllanthaceae, Poaceae, Pteridaceae, Putranjivaceae, Rosaceae, Saxifragaceae, Solanaceae, Sapindaceae, and Zingiberaceae, were each represented by a single species (Fig. 2).

In terms of plant habit, herbs were the most commonly used, with 17 species, followed by shrubs (6 species), trees (6 species), climbers (1 species), and ferns (1 species) (Fig. 3). Leaves (31%) were the majorly used plant part followed by roots (20%), seeds (20%), fruits (11%), rhizome (6%), bark, flower, entire plant (3% each), and bulb (3%) (Fig. 4).

The most commonly treated issues were menstruation-related problems, including irregular periods, menorrhagia, and menstrual cramps. In addition to these, conditions such as leucorrhea,

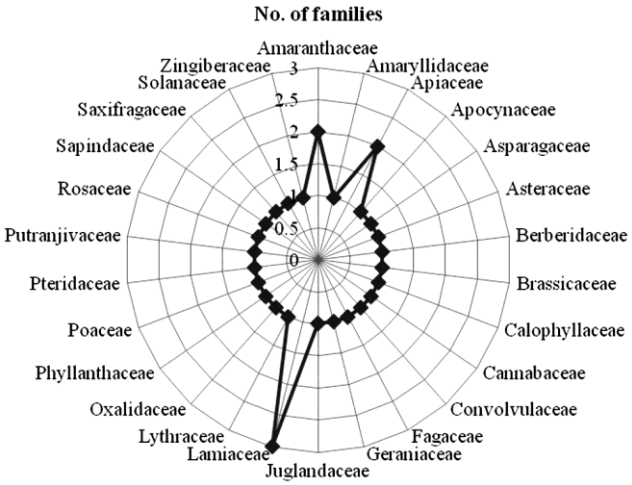

Fig. 2 — Figure representing number of plant species under each taxonomic family

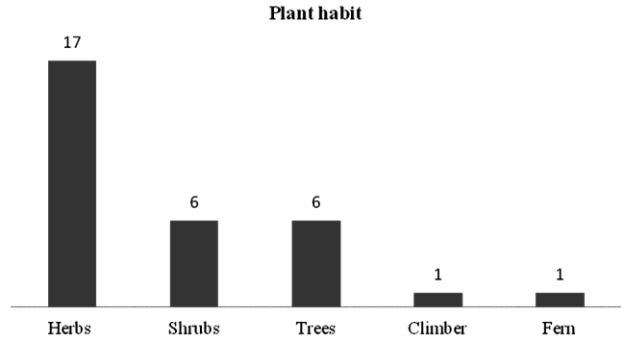

Fig. 3 — A chart showing number of species under each plant habit

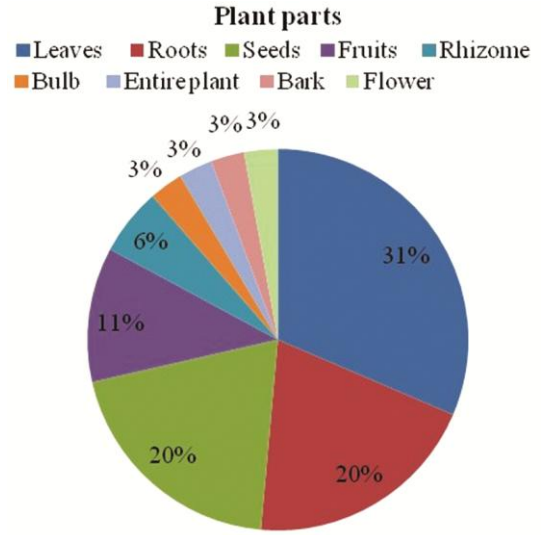

Fig. 4 — A pie chart showing different plant parts utilized to treat various gynecological problems

infertility, gonorrhea, and unwanted pregnancy were also frequently reported.

***Use value* (*UV*)**

The highly valuable gynaecological plants based on their use value (UV) were *Zingiber officinale* (0.416), *Chenopodium album* (0.388), *Withania somnifera* (0.375), *Bergenia ciliata* (0.347), *Thymus linearis* (0.347), *Foeniculum vulgare* (0.347), *Tripidium bengalense* (0.291), *Ocimum tenuiflorum* (0.277), *Punica granatum* (0.263), *Coriandrum sativum* (0.263), *Isodon rugosus* (0.263), *Geranium wallichianum* (0.236) and *Acorus calamus* (0.222).

***Relative Frequency of Citation* (*RFC*)**

Most frequently cited plants for gynaecological problems were *Zingiber officinale* (0.444), *Asparagus adscendens* (0.416), *Withania somnifera* (0.416), *Cannabis sativa* (0.416), *Bergenia ciliata* (0.386), *Foeniculum vulgare* (0.361), *Punica granatum* (0.347), *Tripidium bengalense* (0.347), *Juglans regia* (0.305), *Ocimum tenuiflorum* (0.305), *Acorus calamus* (0.277), *Aesculus indica* (0.277), *Coriandrum sativum* (0.277), *Geranium wallichianum* (0.277) and *Isodon rugosus* (0.277).

***Cultural Importance Index* (*CI*)**

The most important plants according to their CI are *Zingiber officinale* (0.472), *Bergenia ciliata* (0.405), *Chenopodium album* (0.405), *Withania somnifera* (0.375), *Geranium wallichianum* (0.375), *Foeniculum vulgare* (0.347), *Isodon rugosus* (0.347), *Thymus linearis* (0.347), *Cannabis sativa* (0.333), *Punica granatum* (0.319), *Tripidium bengalense* (0.291), *Juglans regia* (0.277), and *Coriandrum sativum* (0.263).

Discussion

To ensure the relevance and depth of the data, the majority of respondents interviewed during the study were women, as they have direct experience and understanding of gynaecological health issues. Focusing on female informants allowed the study to capture personal narratives and insights that are often under-represented, thereby contributing to a more comprehensive understanding of the subject. During the interviews, many female respondents were hesitant to discuss gynaecological issues, likely due to cultural modesty and the sensitive nature of the topic. In contrast, all the traditional healers interviewed-both male and female, shared information openly and without hesitation.

Lamiaceae has been reported as the most commonly used family for gynaecological disorders in this region. This dominance may be attributed

to the family's well-known anti-inflammatory, antispasmodic, and antimicrobial properties, which help relieve menstrual cramps, regulate menstrual cycles, and treat infections such as bacterial vaginosis and yeast infections[24].

The predominance of herbs suggests their greater availability and accessibility in the study area, which was also observed during field visits. Scientific literature supports this observation, indicating that herbs often contain bioactive compounds capable of regulating hormonal balance and alleviating various menstrual symptoms[25]. Owing to their natural therapeutic properties and ease of use, herbs are frequently preferred in traditional healthcare systems for managing gynaecological disorders[26]. However, contrasting patterns have been observed in some regions, where shrubs and trees were reported to be more commonly used in ethnomedicinal practices[27]. These regional variations in plant habit preference may be attributed to differences in ecological availability, cultural practices, healer-specific knowledge, and community-level traditions.

Leaves were mostly used plant part likely due to their abundance and presence of certain compounds such as flavonoids and tannins that possess anti-inflammatory and antioxidant properties which help to support reproductive health[28]. A significant amount of roots and seeds are also used that has also been reported in some previous studies[29]. The reason for it can be the presence of a long shelf life as compared to other parts and since they are storage organs for the plant therefore contain various compounds that might help in hormonal regulation and improving reproductive health[30]. Usage of a specific part shows that it has a greater potential to treat the problem when compared to other parts[29].

Menstrual disorders were the primary health concerns treated in the study area. During conversations with elderly women in the area, it was noted that they had experienced fewer menstrual complications in their youth, and severe menstrual issues appeared to be less common in earlier generations. In contrast, such problems are now increasingly observed among younger women. This shift may be attributed to changes in lifestyle, particularly higher stress levels, poor dietary habits, and environmental factors that can contribute to hormonal imbalances[31].

The elevated Use Value (UV), Relative Frequency of Citation (RFC), and Cultural Importance Index (CI) observed for *Zingiber officinale* and the other highly ranked species can be attributed to their well-established therapeutic efficacy and broad ecological distribution within the study area. Their widespread availability likely enhances accessibility and familiarity among local communities, thereby increasing their frequency of use in traditional remedies[32].

Although *Mesua ferrea*, *Putranjiva roxburghii*, and *Quercus infectoria* are not native to the study region, their inclusion in the ethnomedicinal inventory is justified based on their reported use by informants who obtain these species through herbal markets or from relatives residing in regions where these plants are cultivated. These species are mostly brought in dried form and are combined with locally available species in traditional formulations which is used to treat infertility. Their presence in local ethnomedicine highlights the dynamic nature of traditional knowledge, which adapts over time through cultural exchange, trade networks, and expanding access to non-native flora[33]. It also reflects changing ethnobotanical trends influenced by availability, perceived efficacy, and modernization[34]. A study by Rai *et al.* (2019) found that these three species contain phytoestrogens, which may help women with polycystic ovarian diseases (PCOD) or low estrogen levels, thereby supporting reproductive health and increasing the chances of conception[35].

A comparison of the present findings with previous ethnobotanical studies reveals that several plant species used for gynaecological disorders in the study area are also employed for similar purposes in other regions, while other shows contrast to the previous findings. For example, *Achyranthes aspera* has been traditionally used to induce abortion and relieve labor pain[36], whereas in the present study, it was noted for its contraceptive properties. In the Pashtun regions of Pakistan, *Allium cepa* is commonly used to manage menstrual disorders[37], a use that aligns with observations in the current research. Similarly, *Cannabis sativa* has previously been reported for the treatment of gonorrhea[38], in this study, it is traditionally applied in paste form to relieve uterine pain. In the present study, *Capsella bursa-pastoris* is reported for the treatment of menstrual cramps and urinary tract infections (UTIs) whereas in previous clinical and ethnobotanical studies it is documented to be used in managing heavy menstrual bleeding and postpartum hemorrhage[39]. *Oxalis corniculata* has been used in other regions to alleviate labor pain[40],

while in the present context, it was found helpful in addressing morning sickness during pregnancy. *Punica granatum*, documented by Britto and Mahesh (2007)[41] for treating amenorrhea, was reported in this study for its role in improving fertility. This variation in reported uses suggests that the species possesses diverse gynaecological applications that may vary across cultures and regions. Although, some species like *Zingiber officinale*, *Withania somnifera* and *Foeniculum vulgare* are widely known and extensively documented in ethnomedicinal literature; their inclusion in the present study is justified by the unique cultural contexts and preparation methods observed in the Nerwa region. For instance, *Zingiber officinale* is used locally as a warm decoction to relieve menstrual cramps, to manage menorrhagia, alleviate menopausal symptoms, support postpartum recovery, to reduce nausea and vomiting during pregnancy and similar to its use in various parts of the world where it serves both menstrual and postpartum functions[42]. *Withania somnifera*, often administered in root powder form to enhance reproductive vitality, a practice paralleled across different countries for treating infertility and restoring strength after childbirth[43]. *Foeniculum vulgare* is commonly used in Nerwa to ease menstrual pain, reflecting similar uses in Iran, where it also supports lactation and menopausal health[44]. The similarity in uses across different geographic areas may be attributed to the wide distribution of these species and their well-established medicinal potential. Furthermore, the presence of bioactive compounds with consistent pharmacological effects may explain their effectiveness in treating gynaecological issues across diverse cultural settings[45].

Conclusion

Based on the present study, it can be concluded that rural communities continue to rely on traditional medicinal systems for the treatment of gynaecological problems. These plant-based remedies are often viewed as natural and holistic approaches to health, reflecting a strong connection between human well-being and nature. The majority of informants interviewed were women, most of who were middle-aged (40-60 years) and had received education only up to the primary or matriculation level. Many of them expressed hesitation or modesty when discussing gynaecological issues, likely due to cultural sensitivities surrounding the topic. While these findings reaffirm the significance of ethnomedicinal practices in rural healthcare, their relevance extends far beyond documentation. The unique preparation methods and cultural interpretations observed in this region offer valuable leads for pharmacological exploration, particularly in identifying bioactive compounds relevant to women's health. Furthermore, this knowledge can inform community-based conservation strategies, ensuring that both plant biodiversity and associated indigenous wisdom are preserved. Integrating such traditional practices into broader healthcare frameworks through validation, awareness, and respectful collaboration, could contribute to more holistic and accessible reproductive healthcare, especially in underserved areas.

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Conflict of Interest

The authors confirm no conflict of interest.

Author Contributions

Priya carried out field surveys and data recording and prepared the manuscript. SR read, edited and approved the final manuscript.

Ethics Statement

In order to conduct the research on traditional knowledge, a number of ethical and legal guidelines were followed. Participants were required to sign the Prior Informed Consent Form.

Data Availability

The data used to support the findings of this study is included in the article.

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