World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Ethnobotanical study of plants sold in the markets of the city of DALOA to treat dysmenorrhea

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World Journal of Advanced Research and Reviews, 2024, 24(01), 1178–1185

Publication history: Received on 20 July 2024; revised on 01 October 2024; accepted on 03 October 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.24.1.2338

Abstract

The study of plants traditionally used to treat dysmenorrhoea in the city of Daloa was carried out in three markets in the town. To obtain the information, ethnobotanical surveys based on free lists were carried out with medicinal plant traders. These investigations resulted in the identification of 11 plants. Three of these plants are well known and widely used. These are *Terminalia superba* (FC = 77.78%; VU = 1.63), *Parkia biglobosa* and *Xylopia aethiopia* (FC = 66.67%; VU = 1.57). This study reveals that plants mentioned are mostly sought after for their bark and fruit. Our investigations revealed that the various plant parts are used to prepare several medicinal recipes. The most frequently mentioned preparation method is decoction. Most recipes are used as drinks.

Keywords: Dysmenorrhea; Ethnobotany; Daloa; Côte d'Ivoire

1. Introduction

Despite scientific advances in modern medicine, a large proportion of people in developing countries still rely on traditional medicine for primary health care [1]. Indeed, the use of conventional medicines is proving increasingly ineffective in the treatment of some deseases [2]. In addition, the resistance of pathogens to active substances, inaccessibility to health centers, the high cost of medicines, the manifestation of severe side effects and even toxicity in some cases favor recourse to traditional medicine [3]. The ethnobotanical approach is of great importance in this traditional medicine. It enables the identification of remedies for many illnesses and the creation of a database of medicinal plants for effective treatment of pathologies, while preserving ancestral knowledge based essentially on oral tradition [4]. Among the illnesses treated by traditional medicine is dysmenorrhea.

Previous ethnobotanical studies have paid little attention to the traditional treatment of this condition. Yet the painkillers prescribed by modern medicine (Spasfon and potassium Diclofenac) do not eliminate the disease but rather relieve the patient [5]. With this in mind, the present ethnobotanical study was initiated and carried out in a few markets in the city of Daloa in order to establish a catalog of plants used in the traditional treatment of dysmenorrhea.

What plants are used by the people of Daloa to treat traditionally this illness? It is in this context that this study was initiated. The aim of the study is to identify the plant species traditionally used to treat dysmenorrhea. To achieve this main objective, two specific objectives have been set. The first is to identify the plants used in the traditional treatment

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of dysmenorrhea. The second is to assess the importance of each plant used in the traditional treatment of dysmenorrhoea.

1.1. The town of Daloa

1.1.1. Geographical location

The study took place in three markets in the City of Daloa (Figure 1). The town of Daloa is located in central-western Côte d'Ivoire, 141 km from Yamoussoukro, the political capital, and 383 km from Abidjan, the economic capital [6]. The town is located at 6°53 north latitude and 6°27 west longitude [7]. It is bordered to the north by the departments of Vavoua and Zuénoula, to the south by the department of Issia, to the east by the department of Bouaflé and to the west by that of Zoukougbeu [8]. Capital of the Haut Sassandra department and region, it occupies 28% of the area and is the region's economic hub [7].

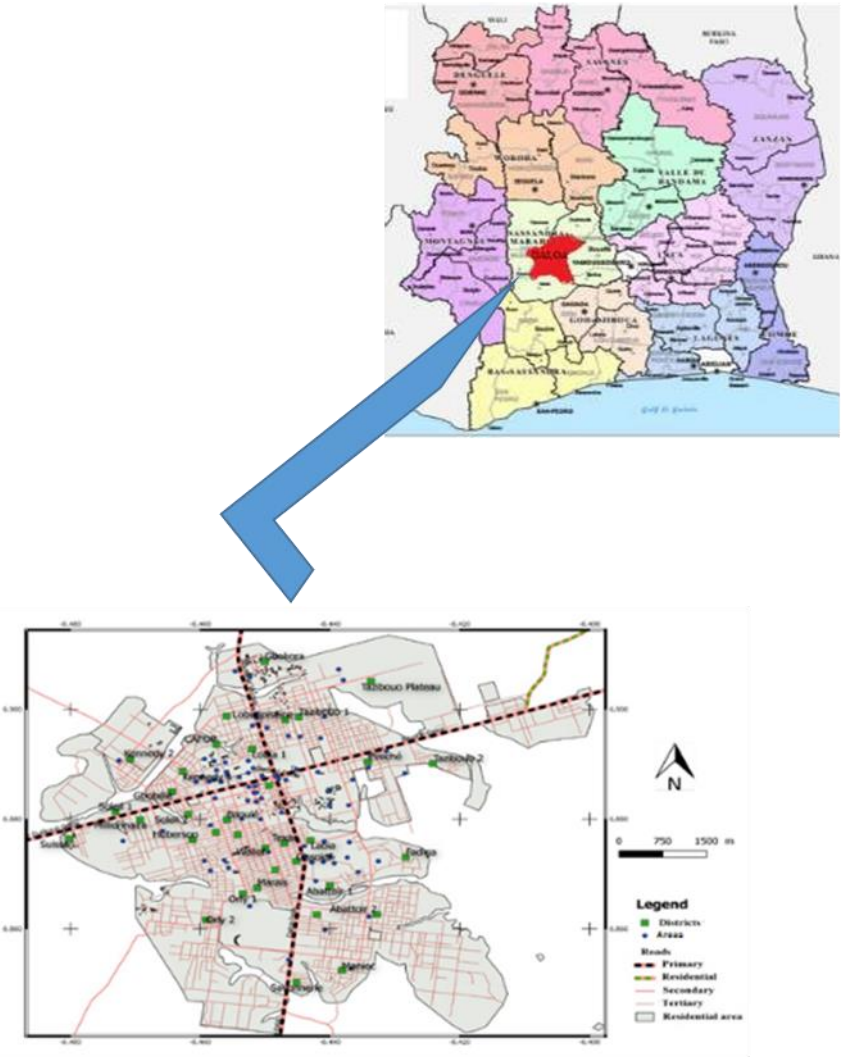

Figure 1 Localisation of the city of Daloa Kanga *et al.,* 2024 (Modified by Kouakou)

2. Material and methods

The plant material consisted of the plant species sold or recommended by the traders at the three markets selected for this study.

The technical equipment used during the study consisted of a digital camera for taking photographs; a notepad for collecting specific information; data collection sheets; a plastic bag for transporting the species and newsprint for compiling the herbariums.

Ethnobotanical investigations were carried out in various markets in the town of Daloa. To this end, female medicinal plant traders were interviewed. The list of informants was obtained through simple random sampling. This technique involves selecting a sample of defined size, linked to a variable in a finite population [8]. It ensures that the population is highly representative. To obtain the information sought, the free-list or open-list method was used. This method is well suited to ethnobotanical studies using spontaneous quotations [9]. It is based on the principle that the most significant plants used are mentioned by several informants, and therefore rank highly [10]. The collection of free lists is a quick and simple technique, which enables us to work with a large number of people [11]. It remains a first-approach tool offering interesting keys to more in-depth ethnographic surveys. The number of plants mentioned by an informant partly reflects the latter's knowledge of the field under study [1], thus making it possible to identify “experts” and assess intra-cultural variability [12].

2.1. Identification of samples

The samples collected (flowering or fruiting branches) were used to compile a herbarium. Samples were identified using the following software: Ligneux du sahel V.1.0 [13], the books of Aké-Assi [14], [15]. Family classification follows the fourth version of the Angiosperm Phylogeny Group [16] and scientific names have been updated using the APD database [17].

2.2. Data processing

Data processing involved two indices. These are the level of knowledge of uses and the intensity of plant use. The level of knowledge is expressed by the frequency of citation of each plant species [2]. This citation frequency is the number of times a plant is cited by an interlocutor. It is an index based on the consensual use of plants, which makes it possible to estimate the credibility of the information received [18]. The frequency with which a species is cited (FC) is calculated using following formula [19]:

$$FC = \frac{N}{n} \times 100$$

Where:

n: is the number of respondents citing the plant; N is the total number of respondents interviewed during the survey in a given area.

The species are then divided into the following classes [20]:

- 50% to 100%: species considered well known ;
- 25% to 50%: species said to be moderately well known;
- 0% to 25%: little-known species

2.3. Plant use intensity

The intensity of use of a plant species by populations is apprehended through the ethnobotanical use value [21]. The interest of use value is that this index makes it possible to significantly determine which plant is most widely used. It is a subjective allocation method that involves assigning scores to distinguish, for example, acuity of use, conservation efforts and other notions related to the survey community's perception of the plant. This value is represented by the average use score of plant i within the use category. It is calculated by the following formula [22]:

$$\text{UV (i)} = \frac{\sum_{n}^{i} sj}{N}$$

UV (i) is the ethnobotanical use value of species i; Sj is the use score assigned by respondent j; N is the number of respondents for a given use category.

The assessment grid used in this study by the informants is :

- 2 = highly used species ;
- 1 = low-use species.

In this study, species are divided into three groups:

- a species is said to be heavily used when its intensity of use is between 1.5 and 2
- a species is said to be moderately used when its intensity of use is between 1.3 and 1.5 ;
- a species is said to be lightly used when its intensity of use is between 1 and 1.3.

3. Results

3.1. Plants used in the traditional treatment of dysmenorrhoea

Our investigations revealed that 11 plants are used in traditional treatment of dysmenorrhoea in the town of Daloa (Table 1). These plants belong to 11 genera grouped into nine botanical families. The Fabaceae family is the most represented, with three species. All the other eight families have one species each.

Table 1 Frequency of quotation and ethnobotanical use values of various species used to treat dysmenorrhea

Plants	Families	Frequency of quotation	Ethnobotanical use values
Acacia nilotica	Fabaceae	33,33	1,13
Astonia boonei	Apocynaceae	22,22	1,37
Erythrina senegalensis	Fabaceae	11,11	1,23
Lannea barteri	Anacardiaceae	22,22	1,43
Newbouldia laevis	Bigniniaceae	44,44	1,27
Parkia biglobosa	Fabaceae	66,67	1,57
Syzygium aromaticum	Myrtaceae	33,33	1,17
Terminalia superba	Combretaceae	77,78	1,63
Thonningias sanguinnea	Balanophoraceae	11,11	1,07
Xylopia aethiopia	Annonaceae	66,67	1,57
Zingiber officinalis	Zingiberaceae	22,22	1,10

3.2. Level of knowledge of plants

The level of knowledge of plants used in the traditional treatment of dysmenorrhoea varies (Table 1). From our investigations, the best known in the markets of the city of Daloa are: *Terminalia superba* (77.78%), *Parkia biglobosa* and *Xylopia aethiopia*, each with a citation frequency of 66.67%. At the other end of the scale, two other plants are very poorly cited. These are : *Erythrina senegalensis* and *Thonningias sanguinnea* with 11.11% each.

3.3. Intensity of plant use

The intensity of use of plants sought in the traditional treatment of dysmenorrhoea ranges from 1.10 to 1.63 (Table 1). Three plants are the most sought-after by women. These are *Terminalia superba* (UV = 1.63), *Parkia biglobosa* and *Xylopia aethiopia* (UV = 1.57). In addition to these widely-used plants, other plants are used to a lesser extent for the traditional treatment of dysmenorrhea. These include *Thonningias sanguinnea* (UV = 1.06), *Acacia nilotica* (UV = 1.13) and *Zingiber officinalis* (UV = 1.1).

3.4. Plant parts used

Four plant parts are sought by Daloa populations for traditional treatment of dysmenorrhoea (Figure 2). Of these, bark, flowers and fruits (36.34%) are the most sought-after. These are followed by leaves. In this study, rhizomes were the least used part (9.09%).

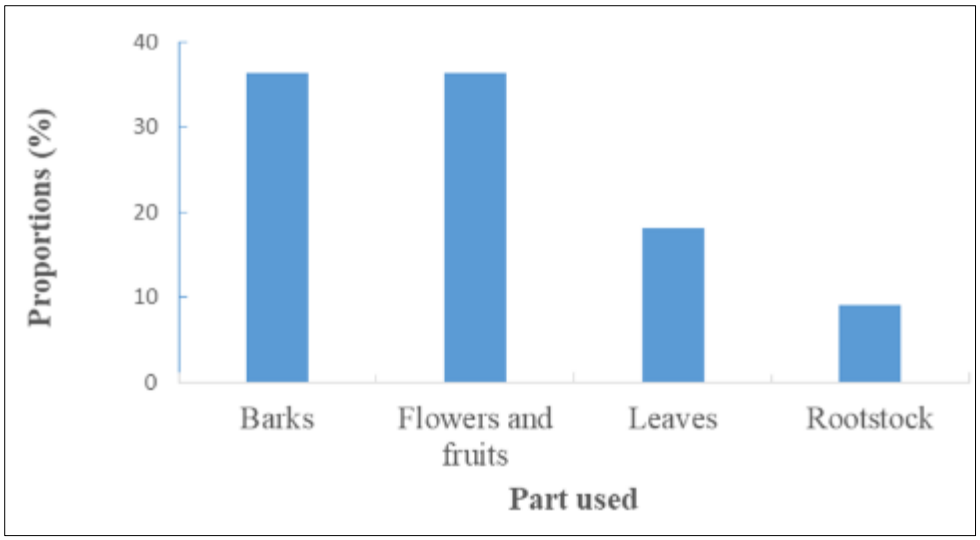

Figure 2 Histogram of plant parts traditionally used to treat dysmenorrhea

3.5. Recipe preparation methods

Three methods of preparation were mentioned by the people interviewed. Decoction is the most frequently used method. Grinding, on the other hand, is the least used (Figure 3).

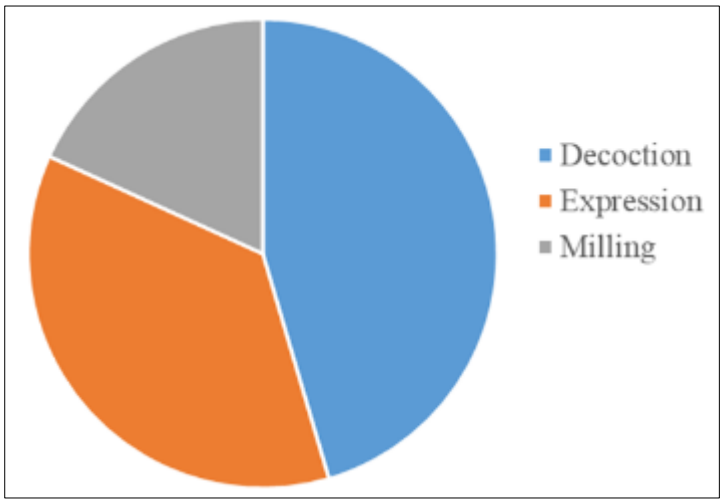

Figure 3 Spectrum of plant preparation methods

3.6. Recipe administration channels

The recipes traditionally prepared by local people are administered by three routes (Figure 4). Bathing and drinking are the most common (35.71%). In contrast to these routes, the study reveals that enema is the route least used to administer recipes (28.57%).

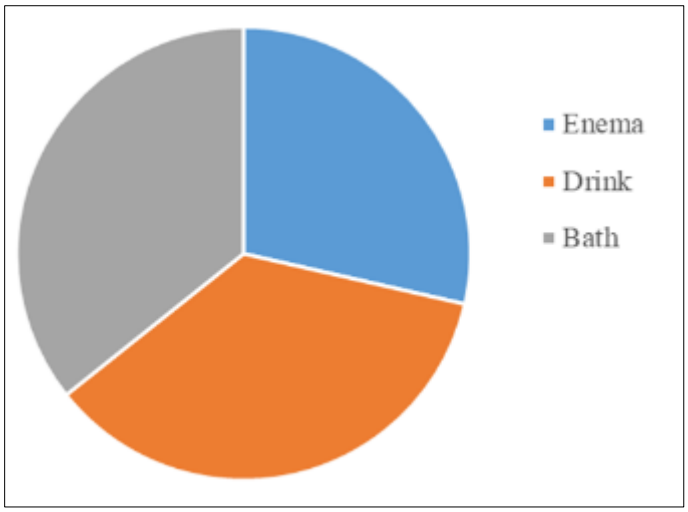

Figure 4 Spectrum of revenue delivery channels

4. Discussion

Our investigations revealed that eleven plants are traditionally used to treat dysmenorrhoea. There are two main reasons for this low number of plants. Firstly, people suffering from this pathology feel ashamed to expose the ailment. This observation was also made [23]. According to this author, modesty or cultural reasons may prevent some women from seeking medical advice. Secondly, the plants used could be effective in treating this condition.

Of the 11 plants, only three are the most widely mentioned and used. These three plants are the best known. This result could be explained by a lack of interest in the traditional treatment of dysmenorrhoea. It should be noted that, the virtues of plants are ancestral knowledge that is passed down from generation to generation [24]. Finally, traditional knowledge varies from one person to another. In addition, it should be stressed that the importance attached to the use of species is given by individuals who implicitly take into account a personal appreciation; which often refers to their preference.

Four plant parts are traditionally sought to treat dysmenorrhoea. This variability in the parts used for dysmenorrhea suggests a diverse availability of biochemicals with curative properties beneficial to the affected organs [25]. However, bark and flowers/fruits are the most widely used. This reliance on these parts could be justified by the fact that they give greater satisfaction than the other parts used. Moreover, according to [26], the high use of bark could be explained by the availability of these organs at all times of the year. The parts of plants used in traditional medicine depend on the pathology being treated, the plants used, customs, etc.

Decoction is the method most frequently used in the preparation of medicinal recipes by those questioned. This high use of decoctions is no coincidence. Indeed, people are looking for the simplest, easiest and most effective way to treat their ailments. Similar observations have been mentioned by several authors [27]. This strong use of decoction is also explained by the fact that it allows the collection of the most active principles and attenuates or cancels out the toxic effect of certain recipes [28]. This method offers several routes of administration: drinking, bathing and enema.

Various routes are used to administer traditional recipes. Of these, the oral route is the most popular. There is a major reason why the oral route is so frequently used to administer medicines. Indeed, in the treatment of bacterial, fungal and/or parasitic infections, etc. localized in deep organs, the transit of drugs through the digestive tract facilitates their assimilation and action [29]

5. Conclusion

This study shows that traditional herbal medicine is still used by the people of Daloa to treat many illnesses, including dysmenorrhea. Ethnobotanical study of plants sold in Daloa markets to treat dysmenorrhea enabled us to identify 9 female vendors and 11 plant species. These plants fall into 9 botanical families, with Fabaceae family being the most represented. Bark, flowers and fruit are the most commonly used parts. Decoction is the most widely used galenic form. From these investigations, we note that bathing and drinking are the most widely adopted routes of administration. The

results of this study highlight the diversity of plant species used, as well as the methods of preparation and administration of herbal remedies, and the effectiveness of the plants listed in the management of menstrual disorders in women. This ethnobotanical study once again demonstrated the key role played by medicinal plants in the health of local populations.

In this context, these ethnobotanical studies deserve to be carried out on a regional scale. Secondly, toxicology studies to assess the risks of using certain plant-based recipes.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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