Compendium and Phytochemicals of Selected Plants used for Dysmenorrhea Treatment in Ibadan Metropolis, Nigeria

By Ige A, Oluborode J.A & Kilasho A,R

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Keywords: therapy, medicinal plants, phytochemicals, and dysmenorrheal.

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Compendium and Phytochemicals of Selected Plants used for Dysmenorrhea Treatment in Ibadan Metropolis, Nigeria

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Abstract- A gynecological condition unique to women is dysmenorrhea. Dysmenorrhea makes women uncomfortable and lowers their quality of life. Non-steroidal anti-inflammatory medication (NSAID) use is nevertheless discouraged due to its negative side effects. Despite its frequency, dysmenorrhea gets little attention. As a result, there is a lack of knowledge about traditional medical treatments for dysmenorrhea. The study's main goal was to catalog the plants and phytochemicals found in the Ibadan metropolis in Nigeria that can be used to treat dysmenorrhea. Three (3) Local Government Areas (LGAs) within the city of Ibadan were purposefully chosen using a three-stage random selection technique, based on the presence of herb markets (Ibadan North, Ibadan South East, and Ibadan North East). In each LGA, three (3) important markets were chosen. The distribution of 90 structured questionnaires to herb vendors was done at random. Each market's socioeconomic data as well as documentation of medicinal plants were gathered. Chromatographic methods were used to identify the phytochemicals present in five herbs that should be prioritized. To evaluate the collected data, descriptive statistics were employed 42 herbs which were documented include: *Bidens bipinnata*, *Aristolochia repens*, *Gongronema latifolium*, and *Oxytropis abyssinica*, which were also the most often referenced herbs. Bark, leaf, root, seed, and flower bud were among the plant parts tested for efficacy. 96.7 percent of respondents used the maceration method, 2.2 percent used the squeezing method, and 1.1 percent boiled the herbs. All the botanicals contained steroids, cardiac glycosides, and terpenoids. All herbs, with the exception of *Gongronema latifolium* and *Bidens bipinnata*, contained phenol. All herbs, with the exception of *Bidens bipinnata*, contained saponins.

The analysis of the plants' roots and barks revealed that they contained phytochemicals that have anti-inflammatory properties and might be utilized to treat dysmenorrhea. The comments from the respondents demonstrated the efficacy of herbal treatments for dysmenorrhea.

Keywords: therapy, medicinal plants, phytochemicals, and dysmenorrheal.

1. Introduction

An unpleasant menstruation or uterine cramps, the most frequent gynecology ailment affecting women of reproductive age is dysmenorrhea (Coco, 1999). It is brought on by the overproduction of uterine prostaglandins, especially F2 prostaglandins, which cause the myometrium to contract excessively and the arteries to constrict (Dutta, 2014). A study done in a school of nursing in Spain revealed that other monthly symptoms of painful menstruation, like nausea, vomiting, diarrhea, dizziness, exhaustion, headaches, depression, and an inability to concentrate, are widespread among women, leading students to miss courses (Ana et al, 2020).

Dysmenorrhea comes in two main forms: primary and secondary (Proctor and Farquhar, 2006). Around the time of menarche (6 to 24 months into adolescence), primary dysmenorrhea typically develops (Dawood, 2006). Usually beginning just before or at the commencement of menstruation, a distinct and foreseeable time pattern can be observed in primary dysmenorrheic pain (Harel, 2008). The pain, which can be felt in the back and thighs, often lasts 8 to 72 hours and may be worse on the first or second day of menstruation (Hofmeyr, 1996; Proctor et al., 2002; Ruoff and Lema, 2003). Inflammatory illness of the pelvis, endometriosis, adenomyosis, fibroids (myomas), and secondary dysmenorrhea are all potential causes of discomfort. Secondary dysmenorrhea may occur at any time after menarche, usually two years after the start of the period, and may be accompanied by additional gynecological symptoms such as menorrhagia and inter menstrual hemorrhage depending on the underlying circumstances. In addition, secondary dysmenorrheic pain may manifest at any time during the menstrual cycle, may be chronic or diffuse and may not necessarily be accompanied with menstruation. (Hofmeyr, 1996; Proctor and Farquhar, 2006). The most frequent cause of secondary dysmenorrhea in teenagers is endometriosis, which is defined as the presence of endometrial tissue outside of the uterus (Janssen et al., 2013).

Herbs are renowned for their culinary and therapeutic uses (Oliver, 1960). Because the economics of plant use were passed down orally or without any written records from one generation to the next, they are extensively used throughout the world and there is a growing quantity of studies showing their usefulness in treating a wide range of maladies (Ekor, 2013) (Oliver, 1960). According to Sharaibi et al. (2017), several medicinal herbs, including *Cuminum cyminum*, *Angelica sinensis*, *Cimicifuga racemosa*, *Coriandrum sativum*, *Coriandrum sativum*,
*Foeniculum vulgare* and *Vitex agnus-castus*, have been shown to be useful in the treatment of various gynecological problems.

Menstrual pain is commonly experienced by teenage girls and is therefore thought to be a normal part of the development that all women go through. As a result, it is frequently misdiagnosed and undertreated. Dysmenorrhea has masses of effects on females in several aspects of their lives, from their life’s quality to its effect on their day to day activities and a lot of discomfort periods.

There are increasing suggestions for the use of herbs to eradicate the risk rather than the side-effect-laden non-steroidal anti-inflammatory medicines (NSAIDS). Therefore, the main objective of the study was to document the plants that can be used in the treatment of dysmenorrhea in Ibadan metropolis and their phytochemicals constituents present in the plants.

## II. Materials and Methods

**Study location:** The study was carried out in Ibadan, the state capital of Oyo in southwest Nigeria. Latitude 7°22'39.22"N and longitude 3°54'21.28"E are its precise coordinates. The elevation of Ibadan city is 225 meters. In Ibadan, there are predominant tropical wet and dry weather, with a lengthy wet season and usually constant temperatures all year long. March through October is considered the rainy months, with august seeing some of the least amount of rain.

The rainy season is split into two distinct wet seasons as a result of this gap. Between November and February, Ibadan suffers the dry season, which is known as the harmattan in West Africa. Ibadan experiences 1,230 mm of rainfall on average during the course of 123 days. The two highest rainfall months are June and September. The mean lowest temperature is 21.42°C while the mean daily temperature is 26.46°C and the relative humidity 74.55%.

**Figure 1:** Map of Ibadan Metropolis showing the study area

*Method of data collection:* Three (3) Local Government Areas in the Ibadan Metropolis were purposefully chosen for the purpose of compiling a compendium of plants for the treatment of dysmenorrhea: Ibadan North, Ibadan North East, and Ibadan South East. Three (3) major markets were also identified in each Local Government Area. The respondents (local herb merchants) were surveyed using questionnaires to gather pertinent information about their understanding of menstruation pain therapy. In order to gather information about the respondents’ demographics, the local names of the plants used to treat menstrual pain, the plant parts used, whether other materials are added, the method of preparation, and other pertinent details pertaining to the study, the questionnaires for the herb sellers contained thirty-four (34) items.

*Method of data analysis:* The data generated from the questionnaires were collected, data analysis adopted was descriptive analysis using IBM SPSS software. Frequency of citation was also determined to help choose species with highest frequencies for further analysis.
Frequency of Citation (FC) = \left( \frac{N_p}{N} \right) \times 100

Where,
N_p = number of times a species was mentioned
N = total number of participants

a) Extraction of plant material
The chosen plants' barks were bought dry from Bode Market in Ibadan and powdered using a milling machine. The plant powder was placed in individual test tubes, each of which received distilled water after which the plant powder was thoroughly mixed and allowed to soak. The solution was filtered after 48 hours using filter paper, and extracts were then taken out and used for further phytochemical investigation.

b) Botanical Chemical Screening

400 cc of each of the organic solvents were used to soak 200g of the powdered sample for 24 hours. Ethyl acetate, methanol, and acetic acid were different types of organic solvents employed. Whatman qualitative filter paper was then used to filter the resulting combination (Sigma-Aldrich, Germany). The colorimetric tests used as reported by (Alghasham et al., 2017; Sasidharan et al., 2011) are listed below.

Test for Saponins: the plant extracts were put to a test tube containing 5mm of distilled water, vigorously shaken, and then tested for saponins. For a positive test, a stable persistent effervescence was detected.

Test for Terpenoids: 1ml of concentrated H₂SO₄ solution was mixed with 1 ml of chloroform and 2.5 ml of each plant extract to test for terpenoids. Terpenoids were identified at the contact as a reddish-brown color development.

Test for Phenols/Polyphenols: 1 ml methanol was added to 1 ml of 10 % lead acetate solution to conduct a flavonoid test. For a positive test, the emergence of a yellow colored precipitate extract was noted.

Flavonoids: 1 ml methanol was added to 1 ml of 10 % lead acetate solution to conduct a flavonoid test. For a positive test, the emergence of a yellow colored precipitate extract was noted.

Phenols/Polyphenols: a 10% ethanolic ferric chloride solution was mixed with 0.5 cc of methanol extract. For a positive test, the development of blue green to dark blue color was seen.

Steroids: in a test tube, 1 ml of the ethanolic extract and 1 ml of sulfuric acid were added. Steroids were present because of the development of the red-colored solution.

Alkaloids: Two tests were performed to identify the presence of alkaloids.

Mayer's Test: Under this test, 2 ml of the extract and 0.2 ml of dilute hydrochloride acid was put in a test tube. Then, 1 ml of Mayer's reagent was added. A yellowish buff precipitate is indicated of the presence of alkaloids.

Dragendorff's Test: in the case of this test, 2 ml of the extract and 0.2 ml of dilute hydrochloride acid was put in a test tube. Then, 1 ml of danengroff reagent was added. Observation of an orange-brown precipitate indicated the presence of alkaloids.

III. Results and Discussions

a) Social and demographic data of respondents

The most responders (42.2 percent of all respondents) are from Ibadan South East, next Ibadan North (33.3% of all respondents), and finally Ibadan North East (24.4 percent of the total respondents). Because it featured the most well-known herb markets, including Bode, Oje, and Beere, Ibadan South East had the biggest population. Only 18.9 percent of respondents were men, making up the majority of respondents (81.1%). Because the work requires less physical strength than other types of work, there are more women than men who do it.

Most respondents had primary education (77.8%) while thirteen percent had secondary school education and those with tertiary education were 8.9%. Most respondents were married while least (1.0%) were single, this is because the business is a veritable source of income for married person that need to cater for their own family. The age range of 20-30, 31-40 and 41-50 years old had 14.4%, 81.1% and 4.4% of the respondents respectively.

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b) Knowledge on treatment of menstrual pain

Most of the respondents indicated that the use of herbs for the treatment of menstrual pain is very effective (97.8%) while other respondents indicated that herbs is only effective (2.2%). Moreover, most of the respondents indicated that they add other supplements during the preparation of the herbs (96.7%) while other
respondents indicated that they do not add any other supplements during the preparation of the herbs (3.3%). The addition of other supplements for the preparation of herbs is believed to enhance efficiency of the herbs rather than being used alone without supplements.

Furthermore, most of the respondents (96.7%) indicated that the maceration of the plants was the method used for preparation, while others indicated squeezing (2.2%) and boiling (1.1%), the use of maceration in the preparation of herbs is the most effective because maceration prevents evaporation of the active ingredients in the leaves compare to other herb preparation methods.

Most of the respondents (98.9%) indicated that refrigeration was used in the preservation of the herbs and others (1.1%) indicated the boiling of the herbs as a means of preservation.

c) Relative Frequency of Citation of the Medicinal Plants used in the Traditional Treatment of Menstrual Pain

More than forty (40) medicinal plants which were used for the treatment of menstrual pain were recorded from the respondents which are presented in the appendix and the five which had the highest frequency were chosen for further study for the phytochemical constituents. This relative frequency of citation was calculated using the formula:

\[ \text{RFC} = \left( \frac{N_p}{N} \right) \times 100 \]

Where,
\[ N_p = \text{number of times a species was mentioned} \]
\[ N = \text{total number of participants} \]

d) Medicinal plants used for the treatment of Menstrual Pain and other information acquired

Most of the respondents (48.9%) indicated that the availability of the plant materials used were the same, while others indicated that the availability was decreasing (36.7%) and increasing (14.4%). Most of the respondents (93.3%) got their knowledge from their ancestors, while the rest of them got their knowledge from training (3.3%) and from both ancestors and training (3.3%).

Furthermore, most of the respondents (36.7%) had over 30 years of experience, followed by those with over 40 years of experience (35.6%), then those with over 60 years of experience (8.9%), then those with over 50 years of experience (7.8%), followed by those with over 20 years of experience (6.7%), then those with over 35 years of experience (3.3%) and the least of them with over 15 years of experience (1.1%). Most of the respondents (97.8%) has an association while others (2.2%) had no association. Moreover, majority (97.8%) of the respondents were registered herb sellers, while others (2.2%) were not registered. On the respondents’ knowledge on conservation, most (57.8%) did not have the knowledge of the conservation of indigenous knowledge, while others (42.2%) had knowledge on it.

e) Detailed responses for ways of conserving indigenous knowledge and plant diversity

Most of the respondents (57.8%) had no knowledge on the conservation of indigenous knowledge, followed by some of them (13.3%) who kept records, then some who taught persons and kept records (6.7%) and some others who taught their offspring. The rest of the respondents, trained people (6.7%) and documented and taught persons (4.4%).

f) Detailed responses for ways of conserving indigenous knowledge and plant diversity

<table>
<thead>
<tr>
<th>Question</th>
<th>Items</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed</td>
<td>Documentation and teaching</td>
<td>4</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td>Keeping records</td>
<td>12</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>52</td>
<td>57.8</td>
</tr>
<tr>
<td></td>
<td>Teaching</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>Teaching and recording</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>Teaching offspring</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>Teaching offspring</td>
<td>4</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td>Training</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

g) Phytochemical Screening of the Selected Medicinal Plants

Five prioritized, carefully chosen therapeutic plants were the subject of a phytochemicals investigation, which revealed their phytochemical contents i.e., saponin, tannin, flavonoid, alkaloid, cardiac glycosides, phlobatumin, steroids, terpenoids, anthraquinones and phenols are either present or absent in these plants and the results are summarized. In this study it was investigated that most of the aforementioned phytochemicals are present in the five selected plants. Saponins are glycosides of both tritepenes and sterols that typically include five sugar units as well as gluconic units. More than 70 families of...
higher plants have been documented to contain saponins. They work by preventing the body’s reabsorption of cholesterol to lower it. Insecticides, emulsifiers and foamy extinguishers are other products where they are used. (Narayanasamy and Ragavan, 2012). The data shows that saponin is absent in *Bidens bipinnata* and *Gongronema latifolium* but present in the rest of the plants.

Tannins are polyphenolic compounds that are naturally present in almost all plants, including their leaves, bark and stems. Their abundance in nature has influenced their historical use in a variety of ways (Fraga-Corral et al., 2020). Herbs that contain tannins are used to tighten tissues (varicose veins), dry up excessive watery discharges (diarrhea), protect damaged tissue (skin), aid in stopping bleeding (heavy menstrual flow) and control infection. In addition to acting as anti-inflammatory, anti-microbial and keratolytic agents, they also function to inhibit enzymes such as 5-lipoxygenase & hyaluronidase, (Lufuluabo et al., 2018). In the results shown in Figure 4, tannins were only present in *Gongronema latifolium* and the *Oxytenanthera* species but were absent in the rest of the plants.

Alkaloids are well known nitrogen-containing natural bioactive compounds. From this study, two types of tests were carried out to evaluate the presence of alkaloids in the samples under study which were; Dragendoff’s test and Meyer’s test. Alkaloids are shown to be present in *Gongronema latifolium* and *Oxytenanthera* species but absent in *Aristolochia repens* and *Bidens bipinnata*, from the data presented.

Terpenoids were found to be present in all of the samples except *Gongronema latifolium*. Terpenoids signifies anti-inflammatory, antiviral, antihyperglycemic and anticancer activities. Steroids were found to be present in all of the samples except *Gongronema latifolium*.

According to the table presenting the results, cardiac glycosides were present in all the plant samples tested except one of the *Oxytenanthera* species (Paranfunfun).

Although many essential oils are terpenes and some phenolic compounds, phenols undoubtedly make up the biggest group of plant secondary metabolites. They range in size from simple structures containing an aromatic ring complicated ones, like lignin (Aldred, 2008). It was present in all plant samples except *Bidens bipinnata*.

As a result of its anti-inflammatory analgesic and anti-oxidant qualities, phlobatannin has been noted for its ability to speed up the healing of wounds (Wadood et al., 2013). It is observed that phlobotannin is present in *Gongronema latifolium* and *Oxytenanthera* species but absent in *Aristolochia repens* and *Bidens bipinnata*.

In addition to their function as flavoring agents, flavonoids are also expressed in plants in response to microbial infection, which suggests that they have anti-microbial properties. (Awotedu et al., 2019). In addition, flavonoids have been linked to anti-oxidant activity in both healthy and pathological conditions. Flavonoid was found to be present in *Bidens bipinnata* and an *Oxytenanthera* species (Paran funfun) and not present in other plants.

**h) Phytochemical qualitative analysis of the five prioritized plants**

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th><em>Bidens bipinnata</em></th>
<th><em>Aristolochia repens</em></th>
<th><em>Gongronema latifolium</em></th>
<th><em>Oxytenanthera abyssinica</em></th>
<th><em>Oxytenanthera abyssinica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Saponins</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steroids</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Phlobatannins</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Phenol</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Alkaloid</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Where; + Implies the presence of the phytochemicals

**IV. Conclusion**

This study provides clear insight on the medicinal plants used in curing dysmenorrhea in three selected local governments in Ibadan and a qualitative analysis was done on five prioritized plants. The presence of phytochemicals in the root and barks of the plants analyzed shows that, they can be used for the treatment of dysmenorrhea. The responses the respondents gave as given in the results, also showed the effectiveness of herbal remedies for the treatment of dysmenorrhea.

**V. Recommendation**

This study sturdily recommends that further work to isolate, identify, characterize, and standardize the bioactive elements in charge for the medicinal properties
of future promising medicinal plants be looked into and studies to regulate satisfying dosages, adverse reactions and effects. This would not only help the country develop, but it will also encourage the use of locally made herbal treatments and the exportation of our abundant herbal medicines.

**References**