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Ethnobotanical literature survey of medicinal plants in the Dominican Republic used for women's health conditions

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Abstract

This ethnobotanical literature survey is part of an on-going study in New York City investigating Dominican and Chinese healing systems and the herbal treatments used for the following women's conditions: uterine fibroids (benign tumors of uterine smooth muscle); menorrhagia (excessive uterine bleeding); endometriosis (growth of endometrial tissue outside of the uterus); and hot flashes (sudden brief sensations of heat commonly experienced during menopause). The objectives of this survey were: (1) to search literature on medicinal plants used in the Dominican Republic and identify those used for the above listed conditions and their symptoms; (2) to compare the use between herbal treatments reported in the literature with those prescribed by Dominican healers in New York City; and (3) to evaluate the extent to which healers may have changed their use of plants in order to adapt to availability in the New York City environment. A total of 87 plant species were reported in the Dominican literature for these conditions and symptoms. Nineteen species overlapped from the literature survey and the fieldwork with Dominican healers in New York City, representing 29% ($n = 65$) of the plants prescribed by healers in New York City. This study offers a model to investigate changes in plant use as people migrate to urban centers where they are surrounded by diverse cultures, healing systems, and new environments. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

Ethnobotanical studies have become increasingly valuable in the development of health care and conservation programs in different parts of the world (Balick, 1996). As herbal use becomes more prevalent in the United States, ethnobotanical investigations can provide insight into other medical systems that differ from the biomedical model and could benefit patients. Urban centers, such as New York City, provide study

sites that offer access to many diverse ethnic communities and the plants traditionally used in healing.

This ethnobotanical survey is part of an on-going study in New York City investigating Dominican and Chinese healing systems and the herbal and non-herbal treatments used for the following women's conditions: uterine fibroids (benign tumors of uterine smooth muscle); menorrhagia (excessive uterine bleeding); endometriosis (growth of endometrial tissue outside of the uterus); and hot flashes (sudden brief sensations of heat commonly experienced during menopause) (Balick et al., 2000). The objectives of this survey were: (1) to search literature on medicinal plants used in the Do-

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minican Republic and identify those used for the above listed conditions and their symptoms; (2) to compare the use between herbal treatments reported in the literature with those prescribed by Dominican healers in New York City; and (3) to evaluate the extent to which healers may have changed their use of plants in order to adapt to availability in the New York City environment.

The term healer, *curandero/a* in Spanish, is used throughout this paper to identify those individuals who collaborated on the study and were knowledgeable about plant use in their medical systems. Some of these individuals call themselves by other names for example, *espiritista* (spiritist healer), facilitator of good health, or naturalist (Balick et al., 2000).

Our study offers a model to investigate changes in plant use as people migrate to urban centers where they are surrounded by diverse cultures, healing systems, and new environments. Several studies have reported the continued use of traditional practices as people migrate to urban centers (Baca, 1978; Gordon, 1994; O'Connor, 1998). The evidence of different medical traditions, for example from the Dominican Republic and Puerto Rico, can be observed at *botánicas*, shops selling fresh and dried herbs, mixtures and tinctures, as well as ritual and religious items. These specialty shops serve as herbal pharmacies for many Latino communities (Fisch, 1968; Borello and Mathias, 1977; Delgado and Santiago, 1998).

Botánicas are a valuable link for immigrants who continue to buy and use herbs and thus aid in the preservation of herbal healing systems. In New York City, Dominican healers continue to use medicinal plants, and some remember traditional methods of collection, which consider the time of day and moon phase, although based on our study these methods are not in practice in New York City because the healers do not have gardens and therefore the plants are usually purchased at botánicas (Balick et al., 2000). Traditional uses continue to evolve as healers substitute plants due to the unavailability of familiar plants and as they learn from people of other healing traditions. Even in the Dominican Republic there are other influences from foreigners migrating to the country and Dominicans traveling and returning home with new plants and/or new uses for existing plants.

There is little information about the traditions of people living in Hispaniola (the island consisting of Haiti and the Dominican Republic) before the Europeans arrived to the New World. Writings from Father Bartolomé Las Casas, a Spanish chronicler and 'protector of the Indians' depict some of the ancient customs of the Tainos based on archaeological findings (Wilson, 1997). During the colonial period, the use of herbs was influenced by European medical concepts, as well as by the introduction of European species of

plants (Weniger et al., 1992; Cunningham, 1997). Healing systems used on the island were also influenced by African slaves who were subjected to severe work loads and unbearable living conditions and were forced to cure their own illnesses by substituting medicinal plants from the New World (Bonnely de Calventi et al., 1985; Weniger, 1991). These outside influences have certainly shaped the present day use of medicinal plants in the Dominican Republic, where the majority of the population uses herbs in rural and urban areas (Robineau, 1986). The high cost of pharmaceuticals, insufficient health supplies, limited availability of biomedical doctors, and the difficulty of reaching clinics and hospitals in rural areas of the Dominican Republic most likely contribute to the widespread continued use of herbs as medicine. Cultural and religious practices also reinforce the faith that individuals place in the curative properties of medicinal plants (Deive, 1979; LaGuerre, 1987). Medicinal plant use clearly expands beyond country borders (Baca, 1978; Gordon, 1994; O'Connor, 1998) and prevails for Dominicans living in distant urban centers including New York City (Balick et al., 2000), where herbal medicine may continue to be used for similar cultural reasons (Baca, 1978; O'Connor, 1998).

The primary focus of the present study was to evaluate the literature and fieldwork to answer questions about how cultural and geographical transplantation affects the use of herbal treatments for Dominicans living in New York City. The questions examined in this survey were: first, how many plants are reported in the Dominican literature for the specific gynecological conditions and what percentage of these plants are also used by Dominican healers in New York City? second, what is their frequency of citation? third, are these plants used in similar or different ways in the Dominican Republic and the United States? and fourth, which plants reported in the literature were not used by Dominican healers in New York City and which plants used by Dominican healers in New York were not reported in the literature?

2. Methodology

Initially this survey consisted of searching Caribbean ethnobotanical literature, which was defined as the West Indies and countries of South and Central America bordering the Caribbean Sea. In part, this was done because the project involved healers from the Dominican Republic, Puerto Rico, and Colombia. However, as the research continued, the Dominican healing system evolved to be the focus of the study and therefore the survey centered on ethnobotanical literature from the Dominican Republic. Also, the diversity of Latino healing traditions and herbal treatments vary among countries, therefore it was decided to narrow the search by

examining and drawing comparisons of the literature within the country of origin of each group of healers—in this case, the Dominican Republic.

Journal articles and both scientific and anecdotal books were surveyed for medicinal plants described for the treatment of the four women's health conditions listed and their symptoms (Table 1). Other uses included were: menstrual regulator, unspecified menstrual and female disorders, and tumors that were not specified as cancerous or benign. These uses were included because of their general description suggesting a use for menstruation disorders.

Emmenagogue and abortifacients were frequently mentioned in the literature (e.g., Cordero, 1978; Bonnelly de Calventi et al., 1985; Rodríguez Martínez, 1987), although they are not included in this survey. Emmenagogue refers to an agent that renews or stimulates menstruation and an abortifacient is defined as a substance that induces abortion (Gruenwald et al., 1998). Based on the biomedical model, emmenagogue and abortifacient may be synonymous but according to ethnobotanical studies these terms can have different uses (Conway and Slocumb, 1979). Plants reported to be used as an emmenagogue were only recorded if the use was specified as a menstrual regulator.

Data collected from the literature consisted of cultural group, common name, scientific name, uses, part of plant, preparation, and administration. The plants often had multiple uses, but for this survey only the uses listed in Table 1 and those mentioned above were

Table 1
Women's conditions and symptoms used to query Dominican ethnobotanical literature data^a

<i>Endometriosis</i>	
Abnormal uterine bleeding	Dyspareunia
Adhesion and/or anatomic distortions or obstructions	endometriomas (ovarian cysts)
Bleeding from lesions	Infertility
Chronic pelvic pain	Pain with defecation
Dysmenorrhea	Spontaneous abortion
<i>Menorrhagia</i>	
Profuse or prolonged uterine bleeding	
Causes include leiomyomas (fibroids) or abnormalities of endometrial growth	
<i>Menopausal hot flashes</i>	
Sudden, transient sensation of warmth—intense heat that spreads over body	
Flushing, perspiration, followed by chills	
Palpitations, anxiety	
<i>Uterine fibroids (leiomyomas)</i>	
Abnormal uterine bleeding (generally menorrhagia)	
Dysmenorrhea	
Infertility	
Spontaneous abortion	

^a Based on DeCherney and Pernoll, 1994.

recorded. Many of the references were in Spanish, and thus the appropriate information was translated into English. The data was entered into an ACCESS[®] database that enabled us to manage, store, and query the records. The references were stored in a reference manager. Photocopies were made of all relevant journal articles and book pages and are on file at The New York Botanical Garden (NYBG).

We undertook this literature survey to help understand the data gathered during a field study of Latino healers in New York City, as reported in Balick et al. (2000). Each patient and each healer in the initial study signed a formal consent in adherence with IRB rules and regulations. Eight healers, six women (from the Dominican Republic) and two men (one from Puerto Rico and the other from Colombia), all living in New York City, each had seen 2–10 patients with uterine fibroids, hot flashes, menorrhagia or endometriosis. In this paper we consider only the Dominican healers, six ($n = 6$) in number. There were a total of 45 patient consultations (including all eight healers), mostly for uterine fibroids. From this group, 67 plant species were identified as being used by the Latino healers, and of these, 65 were prescribed by the Dominican healers. Accordingly, for the literature survey that was focused on Dominican healing traditions, we focused on these 65 plants, which were identified through the 36 patient consultations that were with Dominican healers. These consultations consisted of 30 healer/patient visits for uterine fibroids, three with hot flashes, two with menorrhagia and one endometriosis patient (although no plants were prescribed for this latter patient condition). We were able to record much information about plants and their uses, as well as additional information about diagnosis and treatment of disease, which will appear in a future paper. The present paper compares some of the data collected from the fieldwork in New York City with that found in our survey of the literature.

3. Results and discussion

3.1. Ethnobotany in the Dominican Republic

Thirty literature sources were reviewed and included in the survey. Most ethnobotanical accounts have been written by Dominicans. Based on a review of these 30 sources, it was found that one of the most comprehensive inventories of medicinal plants utilized in the Dominican Republic comes from the TRAMIL program (TRAditional Medicine in the Islands) which publishes ethnobotanical and ethnopharmacological research about plants utilized in the West Indies and Central America (Robineau and Soejarto, 1996). The non-governmental organization Enda-Caribe (Environment and Development in the Third World—the Caribbean re-

gion), coordinates the TRAMIL program which originated in Hispanola in 1982 and has expanded to Costa Rica, Dominica, Guatemala, and many other countries (Weniger, 1991; Robineau and Soejarto, 1996). The aim of this program is to evaluate the use of local plants to provide safety and efficacy information for people who cannot afford Western prescription alternatives, and to encourage the preservation of cultural traditions (Weniger, 1991; Robineau and Soejarto, 1996). The TRAMIL program publishes a series of books which are used as popular herb manuals because they include safety and toxicity information supported by pharmacological studies (Weniger and Robineau, 1988a,b; Robineau, 1991, 1995).

Other Dominican references include Liogier (1974) who published a comprehensive list of common names, botanical descriptions, and some uses of plants from the island of Hispanola. Hernández Colón (1976/77) published an ethnomedical study about the useful plants of Pedernales, a province bordering Haiti. Robineau (1986) compared medicinal plants used in the urban area of Santo Domingo with the rural area of Zambrana. Several folkloric accounts of medicinal plant use have also been written (Mañon Rossi, 1983; Lebron Saviñon, 1987; Liriano María, 1988; Pimentel Arias, 1989; Rodríguez, 1994). Two Dominican anthropological references that included plant uses were also reviewed (Deive, 1979; Avila Suero, 1988). An agronomy engineer, Rodríguez Martínez has compiled several books on useful medicinal plants (Rodríguez Martínez, 1987, 1990, 1991a,b, 1992, 1999). Other works have been written by Dominican biomedical physicians with an interest in herbal remedies (Cordero, 1978; Estévez and Báez, 1998). Work by Bonnelly de Calventi et al. (1985) consists of popular plants used as medicine, including their principle chemicals, toxic compounds, and some pharmacological actions. Polanco (1991) published a popular medicinal manual that discusses medicinal plant collection, preparation of remedies, as well as reflexology and 'auriculoterapia' (using pressure points in the ears to heal pain in other parts of the body).

The majority of these references are published and circulated in the Dominican Republic, therefore they are difficult to find outside of the country. However, The NYBG library has extensive holdings in herbal medicine that provided many of the Dominican references.

Apart from these works there are other comprehensive references that include ethnobotanical accounts from Central America, the West Indies, and South America (Ayensu, 1981; Morton, 1981; Honychurch, 1986; Liogier, 1990; Gupta, 1995; Seaforth, 1998). For the present survey, these sources were included because it was clear that the use information was specific to the Dominican Republic.

3.2. Literature survey

Eighty-seven species were reported in the Dominican literature (Table 3) for the treatment of conditions and symptoms listed in Table 1. As would be expected based on family size and abundance in the Dominican Republic, the three most common plant families reported were Asteraceae, Lamiaceae, and Rutaceae. Two plants reported in the literature surveyed were identified to genus, *Leonotis* sp. (Lamiaceae) and *Zingiber* sp. (Zingiberaceae). *Leonotis* sp. was included in the total number of species recorded in the survey because it is the only plant mentioned in that genus. *Zingiber* sp. was not included in the tally because this genus included another plant identified to species.

An overlap of 19 species (Table 2) was found between the literature and the fieldwork data, which represents 29% of the total plants ($n = 65$) prescribed by Dominican healers in New York City. Of those 19 species, two identified to genus (*Agave* sp., Agavaceae, and *Citrus* sp., Rutaceae) from the fieldwork were included in the total, because the literature contained several species listed for those genera: two *Agave* species, *A. americana* and *A. fourcroydes* (Cordero, 1978; Rodríguez Martínez, 1987); and three *Citrus* species, *C. aurantium*, *C. limon*, and *C. sinensis* (Deive, 1979; Rodríguez Martínez, 1991b; Estévez and Báez, 1998).

3.3. Similarities in use

The majority (95%, $n = 19$) of the species that overlapped from our fieldwork and the literature were used for similar conditions and symptoms. The term 'uterine fibroid' was not specifically reported in the literature, but symptoms related to this condition, such as excessive menses, dysmenorrhea (painful menstruation) or presence of tumors were reported. Excessive menses overlaps as a symptom for uterine fibroids and menorrhagia. Tumors were included as a symptom because fibroids are defined as benign tumors of uterine smooth muscle. In some cases species were used for similar conditions but the plant parts differed (Table 3).

Based on information collected during the fieldwork, leaf and root of *Agave* sp. are prescribed by several healers for uterine fibroids. The healers said that this plant was able to relieve pain, treat infection, and remove fibroids. One healer mentioned that the root cures the fibroid. Uterine fibroids may cause dysmenorrhea and abnormal bleeding. Two species of *Agave* are reported in the literature with similar uses, *A. americana* is used for dysmenorrhea, (Cordero, 1978) and *A. fourcroydes* is used to regulate menses (Rodríguez Martínez, 1987).

Aloe vera (Asphodelaceae) is prescribed by healers (in the fieldwork) for uterine fibroids to remove the fibroids and cleanse the body. According to Rodríguez

Table 2

Plants reported by Dominican healers in New York City and reported in Dominican literature to treat hot flashes, menorrhagia, and uterine fibroids^a

Species (Family) (Voucher number)	Vernacular name	Condition ^b
<i>Agave</i> sp. (Agavaceae) (AO 12, 14, 47, 48, 49, 57, 62)	Magüey de bestia	uf
<i>Aloe vera</i> (L.) Burm.f. (Asphodelaceae) (AO 77)	Sábila	uf
<i>Ambrosia peruviana</i> Willd. (Asteraceae) (AO 24)	Artemisa, altamisa	uf
<i>Ananas comosus</i> (L.) Merr. (Bromeliaceae) (AO 102)	Guarpo, pineapple	hf, uf
<i>Beta vulgaris</i> L. (Chenopodiaceae) (AO 95)	Beet, remolacha	m, uf
<i>Chenopodium ambrosioides</i> L. (Chenopodiaceae) (AO 3, 23, 27)	Apasote, epazote	uf
<i>Citrus</i> sp. (Rutaceae) (AO 79, 99, 116)	Orange, limón	hf, uf
<i>Daucus carota</i> L. (Apiaceae) (AO 97)	Carrot	uf
<i>Kalanchoe gastonis-bonnierei</i> Raym.-Hamet et H.Perrier (Crassulaceae) (AO 45)	Mala madre	uf
<i>Momordica charantia</i> L. (Cucurbitaceae) (AO 54)	Cundeamor	uf
<i>Opuntia ficus-indica</i> (L.) Mill. (Cactaceae) (AO 40, 46)	Tuna, alquitira	m, uf
<i>Petiveria alliacea</i> L. (Phytolaccaceae) (AO 1, 10, 11, 15, 53, 89, 90)	Anamú	m, uf
<i>Petroselinum crispum</i> (Mill.) Nyman ex A.W.Hill (Apiaceae) (AO 92)	Parsley	uf
<i>Plantago major</i> L. (Plantaginaceae) (AO 8, 25)	Llantén, yantén	m, uf
<i>Rosmarinus officinalis</i> L. (Lamiaceae) (AO 19, 86)	Romero	uf
<i>Ruta chalepensis</i> L. (Rutaceae) (AO 17, 21, 37)	Ruda	m, uf
<i>Saccharum officinarum</i> L. (Poaceae) (AO 42)	Molasses, miel de pulga	m, uf
<i>Zea mays</i> L. (Poaceae) (AO 94, 108)	Barba de maíz	uf
<i>Zingiber officinale</i> Roscoe (Zingiberaceae) (AO 58)	Ginger, jengibre	hf, uf

^a Balick et al., 2000.

^b hf = hot flashes, m = menorrhagia, uf = uterine fibroids.

Martínez (1987) it is used to regulate menses. The regulation of menses suggests the treatment of abnormal bleeding, a symptom of uterine fibroids. More information from this reference is needed to accurately compare the uses. According to Bonnelly de Calventi et al. (1985), *A. vera* is used as an abortifacient.

In the literature, *Ambrosia peruviana* (Asteraceae) leaves were prescribed as a relaxing tea for uterine fibroids. Seven to eight leaves are boiled and drunk as a tea. Both the leaves (Mañon Rossi, 1983; Rodríguez

Martínez, 1990, 1991a) and roots (Mañon Rossi, 1983) of *A. peruviana* are used similarly for nervousness and menstrual deficiencies.

Although *Ananas comosus* (Bromeliaceae) was reported used in both the fieldwork and the literature, different parts of the plant are used for a similar condition. Pimentel Arias (1989) reported that the flowers are used to regulate menstruation, especially menorrhagia, while Estévez and Báez (1998) reported the leaves as a treatment for abundant menses. Although our fieldwork reported the use of the fruit for uterine fibroids, menorrhagia was a primary symptom. Information from our fieldwork stated that the peel of pineapple fruit is fermented in water for 1–2 weeks and then sipped throughout the day for hot flashes.

Beta vulgaris (Chenopodiaceae) mixed with *Saccharum officinarum* (Poaceae) was frequently reported by healers in New York City for the treatment of uterine fibroids and by one healer for the treatment of menorrhagia (Balick et al., 2000). Uses reported in the literature are similar to our fieldwork, for example treatment of menstrual disorders (Rodríguez Martínez, 1999) and tumors (Estévez and Báez, 1998; Rodríguez Martínez, 1999). Estévez and Báez (1998) discuss several benign tumor cases varying from ovarian to pulmonary, in which the tumor size decreased after consuming a mixture of *B. vulgaris* with molasses, the sugar extracted from *S. officinarum* for 39 days. Estévez and Báez (1998) also mention that these cases were publicized for a period of time on national television in the Dominican Republic, suggesting a possible influence for the healers' use of beets and molasses.

According to the literature, the leaves and flowers of *Chenopodium ambrosioides* (Chenopodiaceae) are used for dysmenorrhea and menses regulation and disorders (Rodríguez Martínez, 1987, 1999; Polanco, 1991). A decoction is typically prepared with the leaves and sometimes the flowers and taken orally. In New York City, the leaves and flowers of *C. ambrosioides* are used as a poultice to help 'dissolve' fibroids and to treat uterine hemorrhaging.

In the field study, *Citrus* sp. (Rutaceae) was prescribed by healers for hot flashes and uterine fibroids. One healer prescribed the fruit as a cleanser and to rid infection, and the leaves as a tea to relieve hot flashes and to calm nervousness. Deive (1979) reports the use of a tea made from the leaves of *C. aurantium* for night sweats. This species is also used as an emmenagogue (Weniger and Robineau, 1988b; Robineau, 1991). Rodríguez Martínez (1991b) reported the leaves of another species, *C. sinensis* to calm nervousness. *C. limon* is also used for abundant menses (Estévez and Báez, 1998). One of the healers believes that the first organ affected by fibroids is the liver, therefore, *Citrus* sp. works to disinfect and treat the liver.

Carrot juice (*Daucus carota*, Apiaceae) was prescribed by healers as a treatment for uterine fibroids because it

Table 3
Medicinal plants used in the Dominican Republic for women's health conditions

Scientific name	Traditional use	Plant part and preparation	Literature source
Agavaceae			
<i>Agave americana</i> L.	Treat dysmenorrhea	Root crushed, fermented, infused, sugar added; to make it stronger <i>brusca</i> root is added; one spoonful 1–4 × a day	Cordero, 1978
<i>Agave fourcroydes</i> Lem.	Regulate menses	Not specified	Rodríguez Martínez, 1987
<i>Polianthes tuberosa</i> L.	Treat sweats	Flowers, tea, taken orally	Deive, 1979
Algae			
<i>Fucus vesiculosus</i> L.	Treat uterus, ovaries	Not specified	Rodríguez Martínez, 1999
Alliaceae			
<i>Allium cepa</i> L.	Treat infertility	Onion bulb, juiced, mixed with one tablespoon of olive oil and one tablespoon of lemon, taken orally 2 × a day until cleared	Estévez and Báez, 1998
<i>Allium sativum</i> L.	Raise the uterus	Peels, decoction, taken orally	Estévez and Báez, 1998
Amaranthaceae			
<i>Amaranthus hypochondriacus</i> L.	Treat abundant menses	Plant, powdered (1 ounce in 1/2 liter water), infusion, administration not specified	Rodríguez Martínez, 1999
Anacardiaceae			
<i>Mangifera indica</i> L.	Treat uterine hemorrhaging	Branches, extract juice, administration not specified	Rodríguez Martínez, 1999
Annonaceae			
<i>Annona muricata</i> L.	Treat nervousness	Leaves, tea, taken orally	Rodríguez Martínez, 1987, 1991b
Apiaceae			
<i>Angelica archangelica</i> L.	Treat spasmodic action in painful menses	Not specified	Rodríguez Martínez, 1999
<i>Centella asiatica</i> (L.) Urb.	Used in menopause	Not specified	Rodríguez Martínez, 1999
<i>Daucus carota</i> L.	Regulate menses	Roots, leaves, juiced, taken orally; infusion, cook leaves in water, taken orally	Rodríguez Martínez, 1990
	Treat tumors	Root, juice mixed with beets and molasses, taken orally every day	Rodríguez Martínez, 1999
<i>Petroselinum crispum</i> (Mill.) Nyman ex A.W.Hill	Treat sweats	Not specified	Rodríguez Martínez, 1999
	Regulate menses	Fresh roots, one teaspoon of roots in one cup of water, taken orally	Rodríguez Martínez, 1990
	Treat infertility	Whole plant, tea, taken orally one cup 3 × a day	Estévez and Báez, 1998
Apocynaceae			
<i>Vinca minor</i> L.	Treat tumors	Leaves, preparation and administration not specified	Rodríguez Martínez, 1999
Araliaceae			
<i>Panax ginseng</i> C.A.Mey.	Used to alleviate nervousness, stimulate hormones	Not specified	Rodríguez Martínez, 1991a
Arecaceae			
<i>Serenoa serrulata</i> (Michx.) G. Nicholson	Treat infertility	Fruit, preparation and administration not specified	Rodríguez Martínez, 1999
Asphodelaceae			
<i>Aloe vera</i> (L.) Burm.f.	Regulate menses	Leaves, powdered, small doses taken orally	Rodríguez Martínez, 1987
Asteraceae			
<i>Ambrosia peruviana</i> Willd.	Regulate menses, treat nervousness	Root, leaves, infusion with hot milk, taken orally	Mañon Rossi, 1983
	Treat menstrual deficiencies, nervousness	Leaf, chopped (1/2 tablespoon per cup of water), tea, taken orally 2–3 × a day without sugar	Rodríguez Martínez, 1990, 1991a
<i>Artemisia absinthium</i> L.	Treat dysmenorrhea, irregular menstruation, womb problems	Leaves, roots, infusion (one teaspoon in one cup of water), taken orally 2–3 × a day	Rodríguez Martínez, 1990, 1999
<i>Calendula officinalis</i> L.	Regulate menses	Flower, infusion, taken orally	Rodríguez Martínez, 1999
<i>Centaurea benedicta</i> (L.) L.	Treat tumors	Dried plant, decoction, applied externally	Mañon Rossi, 1983

Table 3 (Continued)

Scientific name	Traditional use	Plant part and preparation	Literature source
<i>Cichorium intybus</i> L.	Treat sweats	Not specified	Rodríguez Martínez, 1999
	Treat menopausal symptoms, hot flashes, nervousness	Leaves, tea, taken orally 3 × a day	Estévez and Báez, 1998
<i>Lactuca sativa</i> L.	Treat painful menses	Leaves, infusion, tea, taken orally	Pimentel Arias, 1989; Estévez and Báez, 1998
<i>Matricaria chamomilla</i> L.	Treat uterine colic	Leaf, preparation and administration not specified	Bonnely de Calventi et al., 1985
	Treat nervousness, dysmenorrhea	Flowers, oil administration not specified	Rodríguez Martínez, 1990, 1999
	Regulate menses, treat menstrual disorders	Flowers, decoction, used as a wash	Estévez and Báez, 1998
	Treat tumors	Tea, preparation and administration not specified	Estévez and Báez, 1998
Berberidaceae			
<i>Berberis vulgaris</i> L.	Treat dysmenorrhea	Not specified	Rodríguez Martínez, 1999
Bignoniaceae			
<i>Crescentia cujete</i> L.	Regulate menses	Flower, preparation and administration not specified	Bonnely de Calventi et al., 1985
Boraginaceae			
<i>Borago officinalis</i> L.	Stimulate ovaries	Seeds, leaves, flowers, preparation and administration not specified	Rodríguez Martínez, 1999
Brassicaceae			
<i>Lepidium virginicum</i> L.	Treat tumors	Seeds, powdered, grated onto food as a condiment	Mañon Rossi, 1983
Bromeliaceae			
<i>Ananas comosus</i> (L.) Merr.	Regulate menses	Flowers, preparation and administration not specified	Pimentel Arias, 1989
	Treat abundant menses	Leaves, tea, taken orally	Estévez and Báez, 1998
Cactaceae			
<i>Cactus grandiflorus</i> L.	Treat painful menses	Not specified	Rodríguez Martínez, 1999
<i>Opuntia ficus-indica</i> (L.) Mill.	Stop menses	Stems, peeled, boiled in sea water, administration not specified	Honychurch, 1986
Chenopodiaceae			
<i>Beta vulgaris</i> L.	Treat tumors	Root, grated, infusion (two tablespoons in cup of boiling water), cover, steam 20 min, remove top, cool, add molasses (from sugarcane), taken orally 3 × a day for 39 days	Estévez and Báez, 1998
	Treat menstrual disorders, tumors	Root, juiced, taken with molasses, orally	Rodríguez Martínez, 1999
<i>Chenopodium ambrosioides</i> L.	Regulate menses	Leaves, flowers, tea, taken orally	Rodríguez Martínez, 1987
	Treat dysmenorrhea	Not specified	Rodríguez Martínez, 1999
	Treat menstrual disorders	Leaves, infusion, one spoonful in one cup of water, one cup taken orally 2 × a day for 2 days	Polanco, 1991
Crassulaceae			
<i>Kalanchoe gastonis-bonnieri</i> Raym.-Hamet et H.Perrier	Treat uro-genital problems	Leaves, decoction, taken orally or as a bath/wash	Weniger and Robineau, 1988b; Robineau, 1991, 1995
Cucurbitaceae			
<i>Cucumis melo</i> L.	Treat uterine tumors	Fruit, taken orally	Estévez and Báez, 1998
<i>Momordica charantia</i> L.	Treat uterine problems	Not specified	Cordero, 1978
	Regulate menses	Leaves, tea, taken orally	Rodríguez Martínez, 1999
<i>Sechium edule</i> (Jacq.) Sw.	Regulate menses	Not specified	Rodríguez Martínez, 1987
Dioscoreaceae			
<i>Dioscorea villosa</i> L.	Treat menstrual pain, threatened abortion	Roots/rhizomes, preparation and administration not specified	Rodríguez Martínez, 1999
Euphorbiaceae			
<i>Jatropha gossypifolia</i> L.	Regulate menses	Plant, preparation and administration not specified	Bonnely de Calventi et al., 1985
<i>Ricinus communis</i> L.	Treat tumors	Oil, poultice, applied externally	Lebron Saviñon, 1987
Fabaceae			
<i>Acacia macracantha</i> Humb. et Bonpl. ex Willd.	Treat abundant menses	Fruit, tea, taken orally	Estévez and Báez, 1998; Rodríguez Martínez, 1999
<i>Centrosema virginianum</i> (L.) Benth.	Treat dysmenorrhea	Root, decoction (one handful in one bottle of boiling water), taken orally	Cordero, 1978

Table 3 (Continued)

Scientific name	Traditional use	Plant part and preparation	Literature source
<i>Tamarindus indica</i> L. Fagaceae	Treat abundant menses	Root, decoction, taken orally	Estévez and Báez, 1998
<i>Quercus ilex</i> L. Hypericaceae	Treat abundant menses	Bark (immature), $\frac{3}{4}$ ounce in one liter of water, taken orally	Rodríguez Martínez, 1999
<i>Hypericum perforatum</i> L. Lamiaceae	Used in menopause	Not specified	Rodríguez Martínez, 1999
<i>Lavandula officinalis</i> Chaix et Kitt.	Promote menstruation	Leaves, flowers, chopped (one tablespoon in one cup of boiling water), cover, left for 10 min, taken orally one cup 3 × a day	Polanco, 1991
<i>Leonotis</i> sp.	Treat menstrual disorders	Stems, leaves, preparation and administration not specified	Rodríguez Martínez, 1999
<i>Majorana hortensis</i> Moench	Treat tumors	Part not specified, poultice, placed over tumor externally	Lebron Saviñon, 1987
<i>Ocimum basilicum</i> L.	Treat painful menses	Leaves, tea, taken orally, one cup as needed	Estévez and Báez, 1998
	Raise uterus	Whole plant, decoction, taken orally	Estévez and Báez, 1998
<i>Rosmarinus officinalis</i> L.	Regulate menses	Flower, leaves (1/2 teaspoon in a cup), tea, taken orally 2–3 × a day	Rodríguez Martínez, 1987, 1990, 1999
<i>Salvia officinalis</i> L. Lauraceae	Treat dysmenorrhea	Leaves, dried in shade, infusion, taken orally	Mañon Rossi, 1983
<i>Cinnamomum zeylanicum</i> Breyn.	Treat abundant menses	Oil, preparation and administration not specified	Rodríguez Martínez, 1991a, 1999
<i>Laurus nobilis</i> L.	Treat tumors	Leaves, tea, administration not specified	Rodríguez Martínez, 1999
<i>Persea americana</i> Mill.	Regulate menses	New shoot, preparation and administration not specified	Bonnely de Calventi et al., 1985
	Regulate menses	Leaves, flowers, new shoots, tea, taken orally	Rodríguez Martínez, 1987, 1991b
	Treat tumors	Seeds, mash with honey, apply like cataplasm	Cordero, 1978; Lebron Saviñon, 1987
	Treat painful menses	Leaves, tea, taken orally	Estévez and Báez, 1998
Malpighiaceae <i>Bunchosia glandulosa</i> (Cav.) DC.	Treat dysmenorrhea	Leaves, juiced, in alcohol, taken orally	Cordero, 1978
<i>Malpighia punicifolia</i> L.	Treat womb problems	Fruit, preparation and administration not specified	Bonnely de Calventi et al., 1985
	Regulate menses	Not specified	Rodríguez Martínez, 1987
Malvaceae <i>Gossypium barbadense</i> L.	Treat uterine hemorrhaging	Bark, roots, tea, taken orally	Lebron Saviñon, 1987
	Regulate menses	Root, cut, used in tea, taken orally	Rodríguez Martínez, 1987, 1999
Nyctaginaceae <i>Boerhavia scandens</i> L. Passifloraceae	Regulate menses	Not specified	Rodríguez Martínez, 1999
<i>Passiflora edulis</i> Sims	Treat dysmenorrhea	Leaves, preparation and administration not specified	Estévez and Báez, 1998
<i>Passiflora foetida</i> L.	Treat dysmenorrhea	Leaves, fruit, preparation and administration not specified	Cordero, 1978
Pedaliaceae <i>Sesamum orientale</i> L.	Regulate menses	Seeds, tea, taken orally	Rodríguez Martínez, 1987, 1991a, 1999
Phytolaccaceae <i>Petiveria alliacea</i> L.	Treat cramps, womb inflammation, nervousness	Root, infusion, taken orally	Mañon Rossi, 1983
	Treat tumors	Not specified	Rodríguez Martínez, 1999
Plantaginaceae <i>Plantago major</i> L.	Treat dysmenorrhea, hot flashes	Part not specified, tea, taken orally	Mañon Rossi, 1983
	Treat abundant menses	Leaves, infusion, tea, taken orally	Estévez and Báez, 1998
	Treat hot flashes	Leaves and inflorescence, in sun and at night for 9 days, tea, taken orally in small cups in morning and evening	Estévez and Báez, 1998

Table 3 (Continued)

Scientific name	Traditional use	Plant part and preparation	Literature source
Poaceae			
<i>Saccharum officinarum</i> L.	Treat tumors	Leaves with beet juice adds sweetness, tea, taken orally	Estévez and Báez, 1998
<i>Vetiveria zizanioides</i> (L.) Nash	Regulate menses	Not specified	Rodríguez Martínez, 1987
<i>Zea mays</i> L.	Regulate menses	Not specified	Rodríguez Martínez, 1987
Polygonaceae			
<i>Polygonum hydropiper</i> L.	Treat abundant menses	Not specified	Rodríguez Martínez, 1999
Ranunculaceae			
<i>Anemone pulsatilla</i> L.	Treat menstrual cramps	Not specified	Rodríguez Martínez, 1999
Rubiaceae			
<i>Coffea arabica</i>	Regulate menses	Seeds, made into coffee, taken orally	Rodríguez Martínez, 1987, 1991a
<i>Hamelia axillaris</i> Sw.	Treat dysmenorrhea	Leaves, infusion with avocado leaf and <i>cizaña</i> leaf, taken orally	Mañon Rossi, 1983
Rutaceae			
<i>Citrus aurantium</i> L.	Treat sweats	Leaves, tea, taken orally	Deive, 1979
<i>Citrus limon</i> (L.) Burm.f.	Treat abundant menses	Two fruits, juiced, taken orally 1 × a day	Estévez and Báez, 1998
<i>Citrus sinensis</i> Osbeck	Treat nervousness	Leaves, tea, taken orally	Rodríguez Martínez, 1991b
<i>Ruta chalepensis</i> L.	Treat menorrhagia	Tea, preparation and administration not specified	Mañon Rossi, 1983
	Regulate menses, treat aches from nervousness, cramps	Leaves, infusion (one tablespoon in one liter of water), one cup taken orally 3 × a day	Polanco, 1991
<i>Ruta graveolens</i> L.	Regulate menses, used in menopause (heart palpitations)	Not specified	Rodríguez Martínez, 1999
Sapindaceae			
<i>Paullinia cupana</i> Kunth	Treat dysmenorrhea	Not specified	Lebron Saviñon, 1987
Solanaceae			
<i>Capsicum annuum</i> L.	Treat painful menses	Leaves, tea, taken orally	Estévez and Báez, 1998
<i>Lycopersicon esculentum</i> Mill.	Regulate menses	Not specified	Rodríguez Martínez, 1987
Sterculiaceae			
<i>Waltheria americana</i> L.	Treat tumors	Part not specified, poultice, place over tumor externally	Lebron Saviñon, 1987
Turneraceae			
<i>Turnera diffusa</i> Willd. ex Schult.	Treat female disorders	Not specified	Rodríguez Martínez, 1999
Urticaceae			
<i>Urtica dioica</i> L.	Treat menstrual flow, menopause	Aerial parts of young leaves, preparation and administration not specified	Rodríguez Martínez, 1999
Verbenaceae			
<i>Citharexylum fruticosum</i> L.	Treat dysmenorrhea	Bark, crushed, one handful in bottle of boiling water, infusion, left over hot ashes then removed and sweetened, taken orally in cups throughout the day	Cordero, 1978
	Treat menstrual irregularities	Leaf, tea, taken orally	Mañon Rossi, 1983
<i>Lantana camara</i> L.	Treat female disorders	Not specified	Rodríguez Martínez, 1999
<i>Lippia micromera</i> Schauer	Regulate menses	Fresh plant leaves (2–3 g in one cup water), taken orally 3 days before menstruation	Rodríguez Martínez, 1987, 1990
	Treat dysmenorrhea, womb problems	Not specified	Rodríguez Martínez, 1999
<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	Treat tumors	Not specified	Gupta, 1995
Viscaceae			
<i>Viscum album</i> L.	Treat tumors	Not specified	Rodríguez Martínez, 1999
Zingiberaceae			
<i>Zingiber officinale</i> Roscoe	Regulate menses	Rhizome, hot tea (1 ounce in two cups of water), one cup taken orally before meals	Rodríguez Martínez, 1990, 1991a, 1999
<i>Zingiber</i> sp.	Regulate menses	Rhizome, hot tea, taken orally	Rodríguez Martínez, 1987

is believed to strengthen and clean the uterus by bringing in vitamins and removing impurities. According to Rodríguez Martínez (1990, 1999), the juice from the roots and leaves of *D. carota* are used for tumors and cancer, as well as to regulate and stimulate menses. He also reports the addition of beets and molasses to the carrot juice as a daily oral remedy for the conditions mentioned above.

Momordica charantia (Cucurbitaceae) is an important plant for women's problems and was reported in 11 of the Dominican references, although not for the same conditions as the present study. In New York City, the root was prescribed by a woman healer for uterine fibroids, because it is believed to detach the fibroid. She also mentioned that it cures infections and infertility. The primary uses in the literature are as an emmenagogue, to regulate menses, and to treat uterine problems. As an emmenagogue, the roots and leaves are boiled and consumed as a sweetened liquid (Cordero, 1978), or a decoction of the leaves is taken orally (Robineau, 1986). Other references report the parts of the plant used, although they do not include information on preparation and administration—for example Deive (1979) and Lebron Saviñon (1987) mentioned the use of the fruit, while Hernández Colón (1976/77) and Bonnelly de Calventi et al. (1985) mentioned the use of both the leaves and fruit.

Petiveria alliacea (Phytolaccaceae) is also frequently reported in the Dominican literature and by Dominican healers for use to treat women's conditions. It is commonly used as an emmenagogue but many references do not include plant part or preparation (Hernández Colón, 1976/77; Deive, 1979; Bonnelly de Calventi et al., 1985; Lebron Saviñon, 1987). The authors may have chosen not to include this information, because emmenagogues may be used as abortifacients, or, perhaps, this information is only shared by select individuals, therefore it is not commonly known. The root is used to prepare an infusion to treat 'cramps, womb inflammation, nervousness, hysteria, and muscle contractions' (Mañon Rossi, 1983). Rodríguez Martínez (1999) reports the use of *P. alliacea* for tumors. From our New York City fieldwork, both the roots and the leaves were prescribed by healers for menorrhagia and uterine fibroids. One healer mentioned that *P. alliacea* works to detach the fibroid without heavy bleeding. Another healer mentioned that it is a 'powerful' plant and should be used with caution.

Plantago major (Plantaginaceae) was prescribed by Dominican healers for both menorrhagia and uterine fibroids. For fibroids it is used as part of a tea mixture, and for menorrhagia it is used alone to make a tea. The healers mentioned that it cleans the uterine cavity, reduces heavy bleeding, and removes fibroids. These uses are similar to those reported by Estévez and Báez (1998), who write that the leaves are placed in the sun

and left outside at night for 9 days, and then they are combined with the inflorescence in a tea, which is taken orally in small cups in the morning and evening for hot flashes, while the leaves alone are used in a tea for abundant menses. Mañon Rossi (1983) reports the use of *P. major* tea for hot flashes, as well as for dysmenorrhea.

During the fieldwork, parsley leaves (*Petroselinum crispum*, Apiaceae) were prescribed for uterine fibroids because it was claimed that they remove impurities from the body. A cup of tea made with the entire plant that is reported in the literature is consumed three times a day for infertility and to provoke menstruation (Estévez and Báez, 1998). According to Rodríguez Martínez (1990, 1999), the plant is used for the relief of sweats and one teaspoon of fresh parsley root in one cup of water is taken orally for irregular menstruation.

The leaves of *Rosmarinus officinalis* (Lamiaceae) were prescribed by a healer in New York City for uterine fibroids and menopausal symptoms. In the literature, although the leaf and flower parts are not specifically reported to be used for uterine fibroids, they are used as an emmenagogue for delayed menses and to regulate a women's monthly flow (Rodríguez Martínez, 1987, 1990, 1999).

Ruta chalepensis (Rutaceae) has historically been used for many ailments. It is known to cause dermatitis and promote abortion. It is prescribed by Dominican healers for menorrhagia and uterine fibroids, because they claim that it heals and cleans the womb and brings in vitamins. One healer mentioned a treatment to aid infertility, two leaves of *R. chalepensis* are chopped and sprinkled over eggs. The literature reports the use of two species of *Ruta*, *R. graveolens* and *R. chalepensis*. *R. graveolens* is reported to regulate menses, to relieve menopause, and to be used as an abortifacient (Rodríguez Martínez, 1999). *R. chalepensis* was more frequently reported as used for menorrhagia (Mañon Rossi, 1983), aches from nervousness, cramps, and to regulate menses (Polanco, 1991). Other uses reported were as an emmenagogue (Cordero, 1978; Mañon Rossi, 1983; Bonnelly de Calventi et al., 1985; Lebron Saviñon, 1987), as an abortifacient (Cordero, 1978; Mañon Rossi, 1983), for amenorrhea, and for uterine infections (Cordero, 1978). In the literature the plant parts mentioned were the leaves and the stalks (Cordero, 1978; Polanco, 1991).

According to Rodríguez Martínez (1987), *Zea mays* (Poaceae) is used to stimulate and regulate menstruation. Based on our field study *Z. mays* silk was used for fibroids. One of the healers mentioned that it worked with the other plants to reduce cramps caused by fibroids.

Another plant with similar uses is *Zingiber officinale* (Zingiberaceae). In the literature, it is reportedly used to regulate menses (Rodríguez Martínez, 1990, 1991a,

1999), while in our fieldwork the plant is reportedly used to treat uterine fibroids and hot flashes. One healer prepares it into a tea and uses it as a multi-purpose body cleanser. It has also been reported in the literature to stimulate menses (Rodríguez Martínez, 1987).

3.4. Differences in use

In New York City the leaves of *Kalanchoe gastonis-bonnieri* (Crassulaceae) were prescribed by several healers in mixtures to cleanse the uterus and to treat uterine fibroids. There was agreement between the healers that the action of the plant was to dry and to destroy the fibroid. In the literature the leaves are used in an oral decoction or in a bath for uro-genital problems and vaginal infections (Weniger and Robineau, 1988b; Robineau, 1991, 1995).

3.5. Mixtures versus individual plants

Avila Suero (1988), Liriano María (1988), and Rodríguez Martínez (1992, 1999) reported the use of mixtures of plants for women's conditions. Because only common names are mentioned these mixtures are noted but no comparisons can be made. Rodríguez Martínez reported (1992, 1999) that mixtures of plants are used for female disorders, genito-urinary disorders, hormonal balance, infertility, menopause, menstruation, strengthening the uterus, and tumors.

Avila Suero's (1988) mixtures were based on individual cases of women who had consulted a local healer in the small community of Barreras in the Dominican Republic. Each mixture contained three or more plants. Rodríguez (1994) reported plant mixtures for use by pregnant women, therefore, these plants were not included in the study.

Based on our fieldwork in New York City, mixtures can vary from two to 20 plants. All the healers used mixtures and four of the six healers also used individual plants. With a greater sample size of healers, the use of single plants versus mixtures could be evaluated, in order to determine if there is an explanation for this choice. Preferences for the use of a single plant against a formula containing multiple plants may be based on healer's preference or be specific to a selected condition.

3.6. Important medicinal plants from the literature

There are four plants reported in three or more literature sources that were not mentioned during the fieldwork with Dominican healers in New York City. These plants are worth noting: *Gossypium barbadense* (Malvaceae), *Lippia micromera* (Verbenaceae), *Matricaria chamomilla* (Asteraceae), and *Persea americana* (Lauraceae).

The bark and the roots of *Gossypium barbadense* are prepared into a tea and used to treat uterine hemorrhaging (Lebron Saviñon, 1987), while a piece of the root is used in a tea to regulate menses (Rodríguez Martínez, 1987, 1999). The seeds are used as a galactogen and to treat diarrhea (Lebron Saviñon, 1987; Rodríguez Martínez, 1987, 1999).

The fresh leaves of *Lippia micromera* are prepared as a decoction and taken 3 days before menstruation to regulate menses (Rodríguez Martínez, 1987, 1990). Another reference suggests that the tea not be given to women during menstruation, as this is believed to increase blood flow (Estévez and Báez, 1998). According to Rodríguez Martínez (1999), *L. micromera* is used to treat dysmenorrhea and womb problems.

Matricaria chamomilla or chamomile is considered a 'women's plant' in the Dominican Republic (Estévez and Báez, 1998) and is used for a variety of different conditions. Uterine colic is treated with the leaf (Bonnely de Calventi et al., 1985); the oil and the flowers are effective in treating nervousness and dysmenorrhea (Rodríguez Martínez, 1990, 1999). A decoction is prepared with the flowers and used externally as a wash for regulating menses and other menstrual disorders and internally as a tea for the treatment of tumors (Estévez and Báez, 1998). In New York City, another species of chamomile, *Chamaemelum nobile* (L.) All. (Asteraceae), was reported by healers to be used to treat uterine fibroids and menorrhagia (Balick et al., 2000).

Persea americana and *Momordica charantia* were two frequently reported plants in the Dominican literature surveyed for women's health problems. While *M. charantia* was used in New York City, *P. americana* was not reported to be used by the healers we interviewed (Balick et al., 2000). *P. americana* is reported in the literature for amenorrhea, dysmenorrhea, stimulating and regulating menses, as an abortifacient, for tumors, and for diarrhea. The leaves, flowers, new shoots, or fruit are prepared in a decoction and taken orally to stimulate and regulate menses (Deive, 1979; Bonnely de Calventi et al., 1985; Robineau, 1986; Rodríguez Martínez, 1987, 1991a; Estévez and Báez, 1998). The leaves are used for amenorrhea in a decoction with salt and taken orally and the fruit is used as an abortifacient prepared in the same way (Weniger and Robineau, 1988a,b; Robineau, 1991, 1995). Leaves, flowers, and new shoots are also used in an infusion or decoction as an abortifacient (Lebron Saviñon, 1987; Rodríguez Martínez, 1987, 1991a). New shoots or growth, as well as flowers and leaves are used to regulate menstruation (Bonnely de Calventi et al., 1985; Rodríguez Martínez, 1987, 1991a). The seeds have been used to treat diarrhea (Cordero, 1978), as well as tumors. For tumors, a poultice is made with grated seeds and honey and applied externally (Cordero, 1978; Lebron Saviñon, 1987). Based on

Browner's work (1985) in Oaxaca, Mexico, *P. americana* is classified as a plant for uterine expulsion and retention and is used for menorrhagia because it is claimed to stop bleeding and cleanses the uterus.

These plants were not prescribed by Dominican healers in New York City, although they are frequently mentioned in the Dominican literature. Possibly, the use of these plants has been substituted by other plants that treat these conditions more effectively. Living in New York City creates difficulty for healers to encounter the plants they need, so that at times they need to improvise with their surroundings and plant availability. For example, a Dominican healer mentioned that she prefers to use roots in her treatments, but in New York City they are not always sold at local botánicas (Balick et al., 2000). Some plants may not be available in the city, therefore healers must rely on other plants that they can purchase or collect. This may suggest the reasons why plants such as *Persea americana* and *Lippia micromera* were not prescribed by Dominican healers in our field study. Another explanation may lie in the study design, because in this study we included only a small sample size of healers ($n = 6$) as compared to the large literature sample ($n = 30$); this would result in a smaller percentage of overlap between the two data sets. Additional interviews are ongoing to enlarge the sample size of healers.

3.7. Important medicinal plants from the fieldwork

The four most frequently prescribed plants (prescribed 12 or more times) based on the fieldwork were all reported in the literature. These plants are *Agave* sp., *Beta vulgaris*, *Saccharum officinarum*, and *Kalanchoe gastonis-bonnieri* (Balick et al., 2000). Several other plants were reported during the fieldwork but not in the literature. They deserve mention because they were prescribed 9 or more times by healers in the study sample. Those species are *Doyerea emetocathartica* Grosourdy (Cucurbitaceae), *Argemone* sp. (Papaveraceae), *Spermacoce verticillata* L. (Rubiaceae), and *Ruellia tuberosa* L. (Acanthaceae). One of the healers used the tuber of *D. emetocathartica* in a mixture with several plants for uterine fibroids. It is part of the Flora of Hispaniola (Liogier, 1986) and has been reported by Liogier (1974) but with different uses.

There is also a pattern of utilization whereby plants are recommended for one condition based on our fieldwork, and other condition(s) in the literature. For example, the roots of *Spermacoce verticillata* are used by healers for uterine fibroids in New York City (Balick et al., 2000). In the literature the roots, leaves and stalks are reported for different uses including diuretic, emmenagogue, and for urinary tract infections. The root is considered the strongest part of the plant (Cordero, 1978). *Ruellia tuberosa* was reported in the

literature to be used as an abortifacient (Bonnely de Calventi et al., 1985), while in New York City it was reported to be used for uterine fibroids (Balick et al., 2000).

Although this was not the focus of the study, it was noted that many of the species frequently reported in the fieldwork were often cited in the literature although for different uses. Those species that were not frequently used by healers in the fieldwork, such as *Panax pseudoginseng* Wall. (Araliaceae) or *Uncaria tomentosa* (Willd. ex Roem. et Schult.) DC (Rubiaceae), reported in Balick et al. (2000), may be new species added to the New York Dominican pharmacopoeia based on healers' contact with the medicinal plants of other cultures.

3.8. Challenges of using ethnobotanical literature

Given the multidisciplinary nature of ethnobotanical literature, references can range in discipline from pharmacological studies to botanical studies. For example an anthropological study may include detailed information about the people, their kinship patterns, and their cultural knowledge, but less information on the plants used in their traditional medical system. On the other hand, an ethnobotanical study conducted from a botanical standpoint may provide considerable information about plant use, scientific names, and ecological habitats but have insufficient data about the community or cultural traditions surrounding the use of those plants. In this survey of herbal treatments, sources came from various disciplines and were both scientific and anecdotal, therefore voucher information, methodologies, and references were not consistently included in each study.

The methodology for deriving the data published in many of these sources is not explicit, therefore we are making the assumption that references published in the Dominican Republic about plant use are based on in-country use. However, we cannot confirm that these reported uses are common in Dominican society or if these uses are gathered from other sources. For example, Rodríguez Martínez (1999) included both exotic plants, such as Dong quai (*Angelica sinensis* (Oliv.) Diels, Apiaceae) and native plants in his book. Although the book includes over 50 references, the use information is not referenced individually for each plant. Therefore it is difficult to determine if these are plants that were in use at that time or if the plants were suggested for use by Rodríguez Martínez, based on his reading of other sources or based on his observations in the Dominican Republic. Moreover, sources that describe traditional use of herbs in the Dominican Republic may not reflect current modern use.

In a number of the references, common names are given without scientific names (Avila Suero, 1988; Liriano María, 1988; Rodríguez, 1994). Common names can differ widely within a country and even within a

single community. Based on our fieldwork (Balick et al., 2000), common names can vary from shop to shop, within a few blocks range! Another challenge in evaluating ethnobotanical data is the inconsistent use of voucher specimen documentations. Vouchers allow for the positive identification of a plant species and are the basis for reproducing studies. Many sources from the survey did not include voucher numbers; however, we made the assumption that the scientific name was valid. The information from these references is still valuable in giving us a general picture of the species of plants used in the Dominican Republic.

4. Conclusions

The data from this survey suggests some complex relationships between medicinal plant use and migrating people. Twenty-nine percent ($n = 65$) of the plants reported in our field study in New York were also reported in the literature, some with similar uses and a few with differing uses. Of the total plants (87) reported in the literature for the conditions and symptoms mentioned in Table 1, 22% of those were also reported in the field study. This suggests that Dominican healers in New York City continue to use plants commonly known from their country of origin but in more limited ways. In addition, these data demonstrate the wide variety of plants used to treat these types of women's health conditions.

The other 71% of plants used by Dominican healers in New York City may be plants known in the Dominican Republic but with different uses or undocumented uses, or new plants that have been acquired as the healers come into contact with other ethnic communities or based on availability in botánicas. Undocumented uses may be explained by gender differences and taboos, such as conditions related to the menstrual cycle. Gender differences of the researchers may have caused communication barriers between researchers and women depending on cultural structures. Also, taboos, for example related to the menstrual cycle, may have further resulted in limited data about plants used for women's problems. These examples may help explain why the majority of the plants from the fieldwork were not reported in the literature with similar uses.

In conclusion, a more comprehensive investigation is required to adequately evaluate the change of plant use for women's conditions in the Dominican Republic. It should be noted that many medicinal uses of Dominican plants have yet to be subjected to clinical testing. Some studies have been conducted on the chemicals thought to be the active principles of these plants, which will be the focus of a future paper. Additional investigations on ethnobotanical uses of women's plants will strive to elucidate specific uses, preparation,

administration, and historical origins. In conducting future studies, economic and cultural reasons will be examined to understand the prevailing use of medicinal plants in both urban centers and rural communities to better tailor health care delivery to those groups.

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