Ethnomedicinal Survey of Valuable Plants Used by Eskaya Traditional Healers in Bohol Island, Philippines

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ABSTRACT

Objectives. A recent review on the status of Philippine ethnobotany showed the lack of ethnobotanical studies in the Visayas group of islands. The use of medicinal plants by the Eskaya, an Indigenous ethnic group in the province of Bohol in Visayas, Philippines, has not yet been documented. This study determines the ethnomedicinal knowledge of traditional healers in selected Eskaya communities in Bohol.

Methods. Fifteen (15) Eskaya traditional healers were interviewed using a structured questionnaire, and the valuable medicinal plant species were identified through guided field walks. Informal group discussions with the community were also conducted. Moreover, the fidelity level, informant consensus factor (ICF), and use values (UV) were calculated.

Results. Our results showed that the majority of the Eskaya healers belong to an older age group (38 – 71 years old). Eighty-five medicinal plants recorded belong to 44 plant families—with Family Lamiaceae having the highest number of species represented. The leaf is the most common plant part used for healing. *Blumea balsamifera* was an essential plant with a UV of 0.8. Cardiovascular diseases have the highest ICF values of 0.6, and the most common plants used for these diseases include *Cymbopogon citratus*, *Zingiber officinale*, and *Luffa cylindrica*.

Conclusion. Our study yielded a record of native and non-native medicinal plants used by the Eskaya healers. This initial listing is also their contribution to promoting medicinal plants that are accessible and abundant in their communities.

Key Words: ethnobotany, ethnopharmacology, Eskaya, herbal medicine, Philippines, traditional medicine

INTRODUCTION

Ethnic groups are recognized for having a rich source of knowledge on herbal medicine.[1] They have used the plants available in their natural environment as herbal therapies for different diseases in their communities.[2] In the Philippines, there are 110 ethnolinguistic groups, some of which have been subjected to an ethnobotanical study. The majority of the conducted ethnobotanical studies were from the islands of Luzon and Mindanao. These published ethnobotanical studies in Luzon Island include the Kalanguya of Ifugao, the Ayta of Bataan and Pampanga, the Ivatan of Batanes, and the Ifugaos of Cordillera Mountains.[2–6] A recent review on the status of Philippine ethnobotany showed the lack of ethnobotanical studies in the Visayas group of islands, with only 3% of the published ethnobotanical studies in the literature.[7]

The Eskaya is one of the Indigenous groups in the province of Bohol in Visayas, Philippines. The first settlement of Eskaya was established in Biabas, Guindulman, and founded by Datu Mariano Sumatra Datahan in the early

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20th century. The Eskaya can be described as an agricultural community. Most days of the week are devoted to farming and communal activities; meanwhile, Sundays are reserved for Eskaya classes on their cultural heritage and language attended by younger community members.[8,9] Despite access to western medicine, people within the community, still rely on traditional herbal medicine when treating common afflictions such as cough and colds. This indigenous knowledge of the Eskaya about medicinal plants lacks documentation.

Traditional knowledge of medicinal plants and their use by Indigenous cultures is helpful for the conservation of cultural traditions and biodiversity and community health-care and drug development at present and in the future.[3] Ethnobotanical studies contribute to the preservation and utilization of biological resources; most of the world depends on traditional medicine for their primary health care needs.[10] This is not only because a significant majority still uses herbal medicine for ailments but also because these herbs often become sources of biological molecules/active ingredients for drug development. There is a possibility of losing this wealth of knowledge due to the lack of interest of the younger generation and their tendency to migrate to cities for more profitable jobs.[11]

This study addressed this concern by systematically documenting traditional healing in selected Eskaya communities through herbal medicine. Specifically, we created a record of the species of valuable medicinal plants, plant parts used for medicinal purposes, method of preparations, and modes of administration of these herbal medicines. Moreover, we also calculated for quantitative ethnobotanical indices such as fidelity level, informant consensus factor (FIC), and use values (UV).

METHODS

Study Sites

This ethnomedicinal survey was conducted in selected Eskaya communities in Brgy. Taytay, Duero; Brgy. Biabas, Guindulman; Brgy. Cantaub, Sierra Bullones; and Brgy. Lundag, Pilar in Eskaya Bohol from September to November 2019 (Figure 1). The estimated population of Eskaya was around 3000.[12] Eskaya was described as an agricultural community with houses made of wood with either galvanized iron or kugun (wild grass). The communities were members of the Iglesia Filipina Independiente.[9] Eskaya communities mainly were located in mountainous areas in the southeastern part of Bohol, are 69.2 kilometers (km) to 88.8 km from the capital city of the province. A minor health station is situated in every barangay and is usually managed by a nurse/midwife and a community health worker. However, Western medicines and essential medical laboratory examinations are accessible in the primary health centers of the towns.

Consent and Ethical Approval

This study was approved by the University of the Philippines Manila Research Ethics Board (UPM-REB 2019-109-01). Before contacting the Eskaya ethnic group, the National Commission on Indigenous Peoples (NCIP) was informed of the study and consulted regarding ethical conduct. A representative of the NCIP Bohol division accompanied the researchers during the conduct of the study. They also assisted in recruiting interview participants and the collection of plant specimens. The local tribal leaders of each of the communities studied were also consulted, and their permission to conduct the study was obtained. This included the collection of plant specimens for taxonomic identification. A free, prior, and informed consent (FPIC) was obtained from the participants.

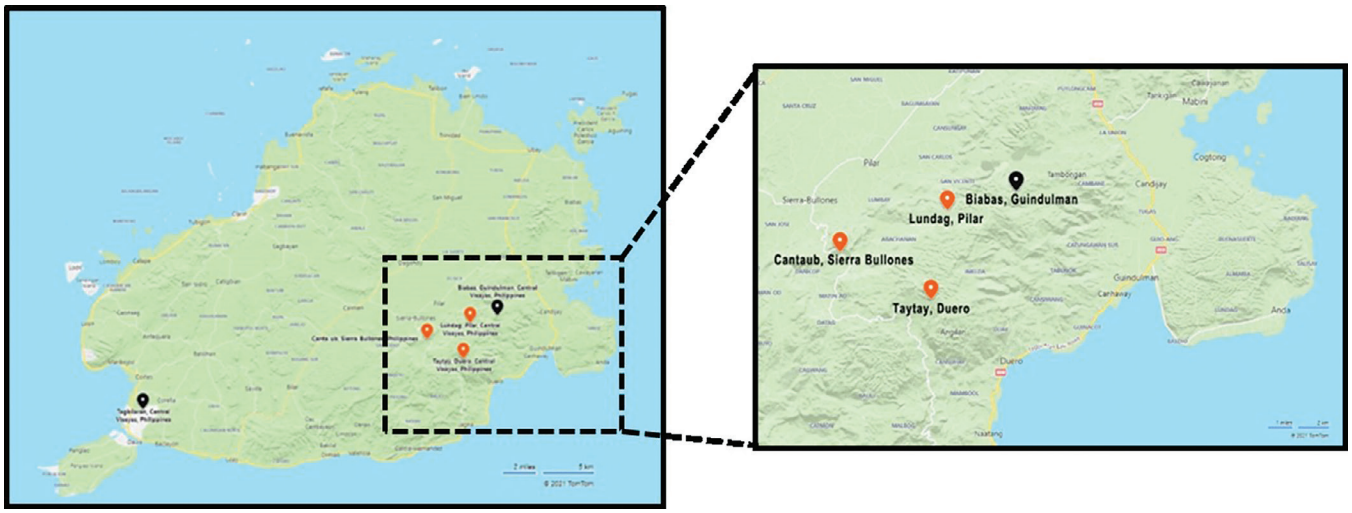

Figure 1. Map of Bohol showing the locations of the field sampling sites *(Brgy. Taytay, Duero; Brgy. Biabas, Guindulman; Brgy. Cantaub, Sierra Bullones; and Brgy. Lundag, Pilar)* relative to the capital of Bohol, Philippines: Tagbilaran City *(bottom left corner)*.

Data and Sample Collection

A questionnaire adapted from a previous ethnobotanical survey conducted in Ayta communities in Bataan was used to guide the interviewees.[2] The semi-structured interviews were conducted by the research teams composed of authors of the study and interpreters. The researchers and interpreters met before completing the survey and thoroughly discussed the component of the questionnaire. A total of 15 Eskaya traditional healers who the tribal leaders and community members recognize and are knowledgeable on medicinal plants were included to provide valuable information for the study. The interview had data on commonly used medicinal plants, their application as herbal medicine, the specific parts used, and how the herbal medicines are prepared and used.

A list of plants identified by the participants as medicinal was generated. A guided field walk within the community was conducted. The plants were identified, photographed, and collected for taxonomic identification during the activity. Informal discussions with the healers and other community members also helped us understand the innate connection of the Eskaya people to their natural environment. Voucher specimens were preserved by immersing them in denatured alcohol and were sent to the University of the Philippines Diliman Institute of Biology for identification and authentication.

Statistical Analyses

To determine the relative importance of the identified plants in the Eskaya community, the use-value (UV) was computed using the formula: UV = U/N, where U = number of citations per species, and N = total number of informants.[13] The Informant Consensus Factor (ICF), which determines the degree of agreement of the study participants for a particular plant species in treating a specific disease, was obtained using the formula: ICF = (nuc-ns)/(nuc-1), where nuc = number of use citations, and ns = number of species used.[14] Informant Consensus Factor values near to one indicate that the informants have defined the selection of plants for a particular disease or ailment. In contrast, values near 0 indicate no agreement between the informants on using a plant species on a specific disorder. To determine culturally important medicinal plant species of the community, the Fidelity Level (FL) was also obtained using the formula: FL (%) = Np/N x 100, where Np = number of informants that claim the use of a particular plant species to treat a specific disease, and N = number of informants that use the same plants as a medicine to treat any given condition.[15]

RESULTS

Fifteen traditional healers, all recognized by their communities, from four Eskaya barangays were interviewed. There were nine males (60%) and six females (40%), with a mean age of 63 years old. The youngest was 38 years old, and the oldest was 71 years old. Most healers finished only primary or secondary education; the highest educational attainment was vocational. The majority were farmers, and the practice of traditional healing was not their primary source of livelihood because they do not usually demand any form of compensation for their services.

According to the Eskaya healers, their knowledge of plants for traditional healing was obtained by observing their elders and oral traditions passed down through generations. There was no formal training established. There were no age restrictions imposed on those who wanted to practice traditional healing. Some Eskaya healers reported that they have been practicing traditional healing since their teenage years. The development of the traditional herbal medicine practice of the Eskaya may be a way for the community to address their problem regarding the accessibility of healthcare because of their geographical location. According to the Eskaya healers, they still rely on herbal medicines because of the lack of easy access to medication and primary care physicians due to the long distance they need to travel to get a health consultation at the main town's health centers. In contrast, medicinal plants are accessible, widely available in their environment, and appear to alleviate symptoms.

Based on the ethnomedicinal survey, a total of 85 taxonomically identified plants belonging to 44 families were used by the Eskaya healers as medicinal plants (Figure 2). The complete list of plants identified in this study, along with the plant parts used, mode of preparation and administration, and diseases, can be found in Appendix Table 1. The most used plant species utilized as medicine were from Lamiaceae (Labiatae) (8 species), followed by Poaceae (Graminae) and

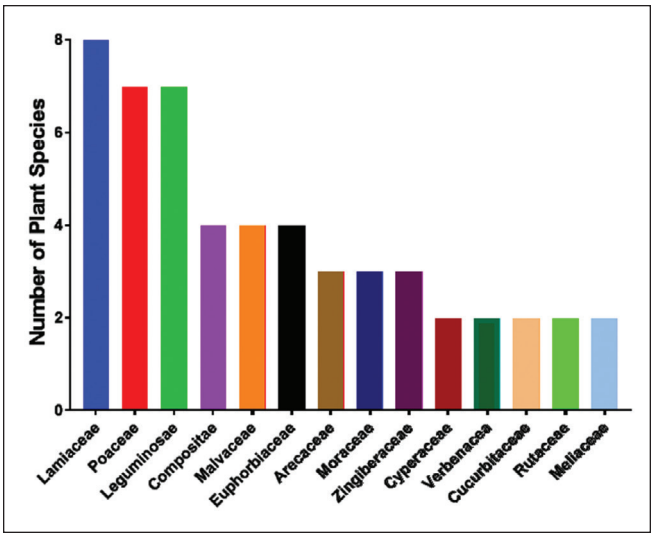

Figure 2. A total of 85 plant species under 44 plant families were identified in this ethnobotanical survey. The most common plant families used as herbal medicines by Eskaya traditional healers in Bohol, Philippines include Lamiaceae (n = 8), Poaceae (n = 7), and Leguminosae (n = 7).

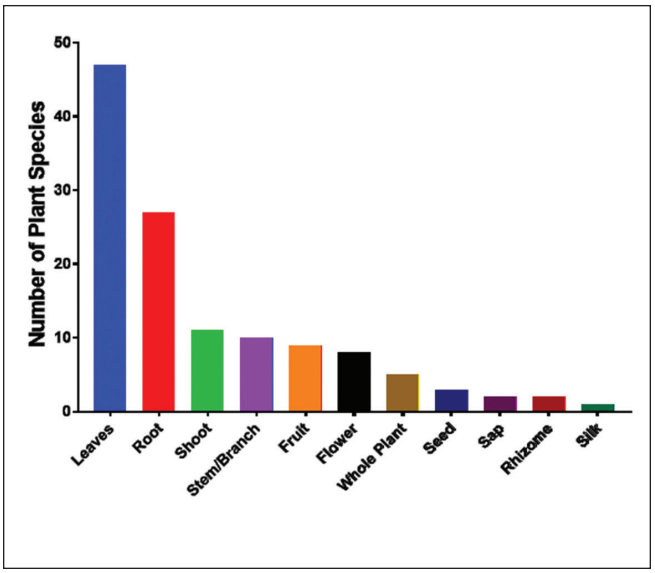

Figure 3. Different plant parts are used by Eskaya traditional healers in Bohol, Philippines.

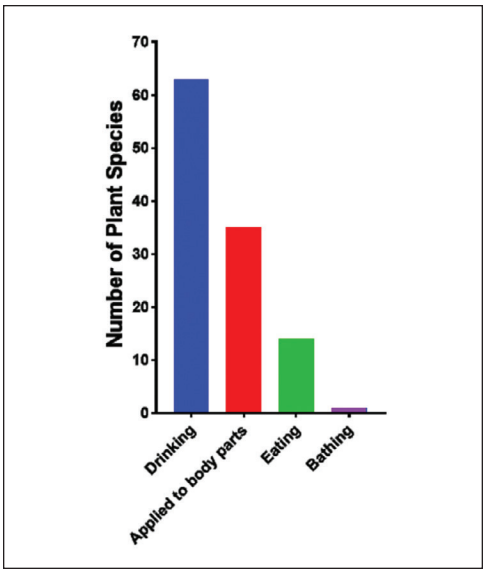

Figure 4. Different modes of administration of medicinal plants used by Eskaya traditional healers in Bohol, Philippines.

Fabaceae (Leguminosae) with seven species each, Asteraceae (Compositae), Malvaceae, and Euphorbiaceae with four species each.

The different plant organs used for traditional healing for each species are summarized in Figure 3. It was found out that the leaves were the most used part for healing (47 plants), followed by the roots (27 plants), shoots (11 plants), stem/branch (10 plants), and fruit (nine plants).

The different modes of administration of the medicinal plants are shown in Figure 4. The most common mode of administration is drinking the decoction or infusion of the medicinal plant (63 plants). The other methods of administration include topical application of the plants, usually made from heating, macerating, or mixing the plants with oil (35 plants), eating raw or cooked medicinal plant (14 plants), and using for bathing (one plant).

The medicinal plants used by the Eskaya healers and their corresponding use values were summarized in Appendix Table 1. Fidelity level (FL) was calculated for medicinal plants, which four or more informants have cited as a treatment for a certain disease (Table 1). FL indicated the percentage of informants who mentioned using a plant to treat the same disease. Two plants had an FL of 100%: *Cymbopogon citratus* (DC.) Stapf for the treatment of hypertension and *Plectranthus amboinicus* (Lour.) Spreng. for cough treatment. For the treatment of diarrhea, three species had a relatively high FL: *Persea americana* Mill. (75%), *Psidium guavaja* L. (71%), and *Annona muricata* L. (60%).

Diseases and conditions were categorized according to Indigenous uses by Heinrich, 1998 and ICF values were derived from each category (Table 2). Diseases of the cardiovascular system have the highest ICF values of 0.6, including hypertension and edema. Plants used for these conditions include *C. citratus*, *Zingiber officinale* Roscoe, *Luffa cylindrica* (L.) M. Roem., *Sechium edule* (Jacq.) Sw., and *Thysanolaenalatifolia* (Roxb. ex Hornem.) Honda. Gastrointestinal diseases have the second-highest ICF (0.54), with stomachache representing most of the conditions followed by musculoskeletal diseases (ICF = 0.5) such as body and joint pains. Culture-bound syndromes,

Table 1. Fidelity level (FL) values of some medicinal plants cited by three or more informants for being used against a given ailment

Scientific Name	Local Name	Number of informants	Therapeutic Uses	Fidelity Level (%)
Cymbopogon citratus (DC.) Stapf	Tanglad	6	Hypertension	100
Plectranthus amboinicus (Lour.) Spreng.	Kalabo	5	Cough	100
Persea americana Mill.	Abokado	4	Diarrhea	75
Psidium guavaja L.	Biabas	7	Diarrhea	71
Annona muricata L.	Karnaba	5	Diarrhea	60
Canna indica L.	Saging-Saging	7	Fever	57
Rhynchospora colorata (L.) H. Pfeiff.	Busikad Puti	9	Fever	56

Table 2. Informant consensus factors for different disease groups cited by Eskaya healers

Categories of Indigenous Uses	NUC	NS	ICF
Gastrointestinal (dyspepsia, vomiting, diarrhea, stomachache, gastrointestinal ulcer, and gallbladder disease)	42	20	0.54
Dermatological (roseola infantum, rashes, wound care, furuncle/carbuncle, skin pruritus, and hematoma)	26	15	0.44
Respiratory (cough)	29	17	0.43
Cardiovascular (hypertension and edema)	11	5	0.6
Gynecological-Obstetrics (menstrual problems, postpartum care, and labor/delivery)	25	18	0.29
Culture-bound Syndromes	28	23	0.19
Fever	34	20	0.43
Musculoskeletal (muscle pain, joint pain, and fracture)	51	26	0.5
Urological (urinary tract infection)	4	3	0.33
Animal bites	3	3	0
Otorhinolaryngological (acute tonsillopharyngitis, otitis, cold, toothache, epistaxis, mouth ulcer)	13	8	0.42
Infectious (measles, dengue, helminthiasis, chickenpox, and flu)	11	9	0.2
Endocrinological (diabetes)	5	4	0.25
Others/Unclassified (headache, hypoglycemia, anemia, corneal scar, energy drink, and teeth cleaner)	14	11	0.23

widespread in traditional healing in the Philippines, have a low ICF score of 0.19.

Aside from treating diseases, some plants were also used by Eskaya healers to promote physiological processes such as lactogen for *Carica papaya* L., an energy drink for *B. balsamifera*, and postpartum care for *Smilax* sp., *Sida spinosa* L., and *Pterocarpus indicus* Willd. The use of these plants mirrors the use of supplements in Western medicine. However, the benefits of such plants are based on the physiologic outcomes experienced by the community in contrast to western pharmaceutical drugs, where the use is based on its effects on known physiologic processes.

DISCUSSION

In this ethnobotanical study, we showed the medicinal plants used by the Eskaya traditional healers in Bohol. The Family Lamiaceae was also the most represented plant family in previous ethnobotanical surveys conducted among traditional healers in Pagadian City and Laguna, Philippines.[16,17] The most reported use for medicinal plants under Lamiaceae relieves musculoskeletal pains. Functional studies supported this ethnopharmacological use of these plants, which showed that different species under this family show analgesic and anti-inflammatory properties.[18]

The leaves were the most widely used because of their accessibility, abundance, and sustainability. The previous studies conducted among the traditional healers in the Ayta tribe of Bataan, the Manobo tribe of Agusan del Sur, and the Ivatan of Batan Island also documented the leaves as the most used plant parts in traditional medicine.[2,3,16,17,19] This is especially important when the treatment duration of a particular disease is prolonged or when repeated administrations are needed. The use of the leaves is not highly destructive to the plants because it is highly abundant and almost always available. The roots were less used than the leaves because collecting this part is more laborious and destructive.[20] Despite being more difficult to collect than leaves, roots of a wide variety of plants were being used for traditional healing. This includes small plants such as *Sida spinosa L.*, herbs such as *Desmodium triflorum (L.) DC.*, shrubs such as *Schefflera elliptica (Blume) Harms* and large trees such as *Pterocarpus indicus* Willd. We also observed that the different parts of plants could be used for the same treatment indications for each plant species. This allows for a more accessible alternative that may allow a more effortless and faster preparation and administration of the medicinal plant.

The oral route is the most preferred through drinking and eating among the traditional healers. Preparations for this mode of administration include decoction, infusion, directly drinking the water such as *Cocos nucifera L.*, eating the raw fruit such as *Swietenia mahogani L.*, and cooking such as *L. cylindrica.* Topical application of the plants involves directly applying to the affected body part. Most notable is the direct application of the sap of *Euphorbia hirta L.* to a corneal scar to help its healing. Another is the bark of *Ficus benjamina L.*, which is wrapped around a fractured body part and used as a splint. There were no limitations in the frequency of administrations as the traditional healers perceived the plants as safe and natural. Decoctions or infusions of several medicinal plants include *B. balsamifera*, *Smilax* sp., *Casuarina equisetifolia* L., Vitex parviflora A Juss *Antidesma* sp., were prescribed by Eskaya healers as a replacement for water during illness.

Medicinal plants are used in Eskaya communities for adult and pediatric populations. Eskaya healers used *R. colorata, A. vulgaris*, and *Eleusine indica* (L.) Gaertn for the treatment of roseola infantum, a dermatologic disease in the pediatric population. The use of herbal medicines to treat pediatric illnesses is also reflected in other ethnic

tribes in the Philippines, like the Ati Negrito of Guimaras island.[21] In this study, certain medicinal plants are used by the Indigenous group to treat conditions specific to the pediatric populations, such as *Canarium asperum* Benth. for cough with phlegm in babies and children and *Aerva lanata* (L.) Juss. for child sleeplessness. Plants were also used for local culture-bound syndromes, such as *Pasmo* and *Panuhot*. These conditions can be considered a diagnosis but can have numerous causes and varied presentations that contribute to its low ICF score. Treatment for these ailments may depend on the predominant symptom presenting. It can have the same treatment option with illnesses that present similarly, such as the use of *Mangifera indica* L. for both dyspepsia and *pasmo* when the predominant symptom of *pasmo* is stomachache.

In this study, we found that *Cymbopogon citratus* (DC.) Stapf, locally known as Tanglad, is culturally important to the Eskaya community, and the healers agree on its use as a remedy for hypertension. This is supported by other ethnobotanical surveys in the Alangan Mangyan of Mindoro and Ati Negrito of Guimaras island, which also use *C. citratus* to lower blood pressure and is administered as a drink decoction.[21,22] Several animal studies have already shown the antihypertensive and relaxant effects of *C. citratus* in vascular smooth muscles.[23,24] *C. citratus* was shown to induce transient hypotension and bradycardia and relaxation of the superior mesenteric artery, indicating a potential clinical use of this plant for hypertension.[25] Active ingredients with possible antihypertensive effects were also seen in studies involving *Zingiber officinale* Roscoe and *Luffa cylindrica* (L.) M.Roem.[26,27]

Most of the plants reported in this ethnomedicinal survey were non-native species. The incorporation of these species in the list showed that the plant knowledge of the traditional healers is also dynamic. Palmer (2004) noted that exotic species were also recorded in Hawaii pharmacopeia.[28] Bennett and Prance (2000) explained that exotic species may have been introduced to the community with a different purpose, other than medicinal use, and may have thrived due to their versatility.[29] Exotic species would enter local pharmacopeias to fill the gaps not met by native plants and diversify the local medicinal plant repertoire.[30]

From our study, *Garcinia rubra Merr.* is the only endemic plant used by the Eskaya healers.[31] *G. rubra,* indicated for the culture-bound syndrome of *Pasmo*, was also not reported in previous ethnobotanical surveys. A previous study showed that *G. rubra* has cytotoxic activity against colorectal cancer cell lines and contains tannins and phenolic compounds.[32] This endemic species may be a potential source of bioactive compounds.

Among the plants identified, *Pterocarpus indicus* Willd. is categorized as endangered by the International Union for Conservation of Nature (IUCN).[33] *Gossypium hirsutum* L. is categorized as vulnerable, and *Swietenia mahogani* L and *G. rubra are* classified as near threatened.[34,35] Judicious use of these plants or alternative medicinal plants should be encouraged to ensure the conservation of these plant species. This is important for some species, such as *P. indicus* and *G. hirsutum,* because their roots are used for healing. The use of the roots is destructive for the plants and may cause a drastic decline in the number of these plants in their natural habitat. We also recognize the importance of vigilance among the community members in the sustainable utilization of the essential medicinal flora. While there are environmental programs to safeguard these resources, we owe our indigenous peoples the stewardship of their ancestral lands.

This current study has several limitations which need to be improved to conduct a more comprehensive survey in the future. First, only five out of eighteen Eskaya communities were included in this study.[36] Therefore, the results of this study may not fully represent the Eskaya population in Bohol, Philippines. Furthermore, some of the plants cited by traditional healers were not included in our study due to the unavailability of the specimen during our field collection. We acknowledge the importance of adequately documenting these medicinal plants as the country should tap all indigenous resources and build a health industry that relies mainly on local capital, raw materials, and entrepreneurship."[37]

CONCLUSION

To our knowledge, this is the first study on the medicinal plants used by the Eskaya traditional healers in Bohol, Philippines. Eighty-five (85) medicinal plants used by Eskaya healers in treating diseases in their communities were documented. Since the number of Eskaya healers has been declining in recent years and most are already elderly, this record will help preserve the Eskaya people's indigenous knowledge of medicinal plants. This can also be used as the basis for future studies on potential sources of biologically active compounds that may be useful in treating different diseases. Actions should also be taken to conserve and promote sustainable medicinal plants in the Eskaya communities, especially those listed as endangered and threatened species.

Statement of Authorship

All authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising and approved the final version submitted.

Author Disclosure

All authors declared no conflicts of interest.

Funding Source

This study was funded by the University of the Philippines Manila National Institutes of Health Faculty Grant (Project Code: NIH 2017-008) to JSIL.

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Medicinal Plants Used by Eskaya Traditional Healers

APPENDIX

Appendix Table 1. Plant parts used, mode of preparation and administration, diseases treated, and use-value of medicinal plants used by Eskaya healers in Bohol, Philippines

Family	Scientific Name	Local Name	U	UV	Plant Part Used	Administration	Diseases Treated
Asteraceae (Compositae)	*Blumea balsamifera* (L.) DC.	Halibon	12	0.8	L, Fl, R, Sh	Drink decoction; Heat over fire then apply directly to an affected body part; Apply extract directly	Cough, MSK pain, fever, headache, acute tonsillopharyngitis, UTI, flu, energy drink, and pasmo
Asteraceae (Compositae)	*Artemisia vulgaris* L.	Hilba	9	0.6	AL, Fl, L, Sh	Apply directly to an affected body part; drink decoction	Fever, roseola infantum, cough, and rashes
Cyperaceae	*Rhynchospora colorata* (L.) H.Pfeiff.	Busikad Puti	9	0.6	F, L, R, Sh, W	Apply extract directly to an affected body part; Drink decoction	MSK pain, kabuhi, dyspepsia, vomiting, diarrhea, himugnaw, fever, rashes, roseola infantum, otitis
Poaceae	*Eleusine indica* (L.) Gaertn.	Padpad	7	0.46	L, R, Sh, St	Heat over fire crushed leaves then apply directly on affected body part; Drink decoction	MSK pain, panuhot, roseola infantum, fever, cough, cold, and headache
Cannaceae	*Canna indica* L.	Saging-Saging	7	0.46	AL, L, Sh	Drink decoction	Fever, cough, fever from tooth eruption
Bixaceae	*Bixa orellana* L.	Aswetes / Sawitis	7	0.46	L	Apply directly on the affected area; Drink decoction	Stomachache, MSK pain, irregular menstruation, and dysmenorrhea
Myrtaceae	*Psidium guavaja* L.	Biabas	7	0.46	AL, Br, L	Drink decoction, Chewed then eaten	Diarrhea, stomachache, panuhot, teeth cleaner, wounds, epistaxis, furuncle, and skin pruritus
Smilacaceae	Smilax sp.	Banag	6	0.4	AL, Fl, R	Drink decoction	MSK pain, himughat, postpartum care, and fever
Malvaceae	*Sida spinosa* L.	Busikad kahoy	6	0.4	Fl, L, R	Drink decoction	Fever, postpartum care, cough, colds, headache, and roseola infantum
Rutaceae	*Citrus maxima* (Burm.) Merr.	Boongon	6	0.4	AL, L	Drink decoction; Apply directly on an affected body part	Panuhot, MSK pain, stomachache, himugnaw, and lotong
Poaceae	*Cymbopogon citratus* (DC.) Stapf	Tanglad	6	0.4	R, St	Drink decoction	Hypertension, stomachache, and diarrhea
Leguminosae	*Pterocarpus indicus* Willd.	Bahay / Naga	6	0.4	R, Sa	Apply extract directly to an affected body part; Drink decoction	MSK pain, himughat, postpartum care, and mouth ulcer
Euphorbiaceae	*Jatropha curcas* L.	Kasla	6	0.4	AL, L, Fl, St	Drink decoction, Apply directly on an affected body part	Stomachache, MSK pain, fever, roseola infantum, and kabuhi
Annonaceae	*Annona muricata* L.	Karnaba	5	0.33	AL, L	Heat over fire then apply directly to an affected body part; Drink decoction	Diarrhea, UTI, MSK pain, and stomachache
Leguminosae	*Vigna radiata* (L.) R.Wilczek	Monggos	5	0.33	Be, Fl, L	Drink decoction	Fever, measles, and roseola infantum
Menispermaceae	*Tinosporacrispa* (L.) Hook. f. & Thomson	Panjawan	5	0.33	St	Apply directly on an affected body part	Joint pain, diabetes, stomachache, and toothache
Moraceae	*Ficus septica* Burm.f.	Lagnob	5	0.33	AL, Br, L, S	Heat extract over fire then apply directly on affected body part; Drink decoction	Facilitate labor and delivery, snake bite, diarrhea, flu, headache, toothache, and himugnaw
Musaceae	*Musa acuminata* × *M. balbisiana* (AAB Group) 'Silk'	Saging	5	0.33	AL, L, R, Sh	Apply directly on affected body part; drink decoction	Postpartum bleeding, cough, fever, dysmenorrhea, MSK pain, and hypoglycemia
Lamiaceae	*Plectranthus amboinicus* (Lour.) Spreng.	Kalabo	5	0.33	L	Drink extract, Drink decoction	Cough
Zingiberaceae	*Zingiber officinale* Roscoe	Luya	4	0.27	Rh	Heat over fire crushed rhizome then apply directly to an affected body part; Chewed then eaten	Cough, panuhot, MSK pain, joint pain, hypertension, and diabetes
Lauraceae	*Persea americana* Mill.	Abokado	4	0.27	AL, Ba, L, Se	Drink decoction	Diarrhea and hinugnaw
Apiaceae	*Centella asiatica* (L.) Urb.	Jahung-Jahung	4	0.27	L, R	Drink decoction	Roseola infantum, fever, and cough
Caricaceae	*Carica papaya* L.	Kapayas	4	0.27	Fl, Fr, L	Drink decoction; Drink extract; Eat	Dengue, acute tonsillopharyngitis, lactogen, fever, and dog bite
Casuarinaceae	*Casuarina equisetifolia* L.	Maribuhok	4	0.27	R	Drink decoction	Postpartum care and MSK pain
Leguminosae	*Desmodium triflorum* (L.) DC.	Konsingsing	4	0.27	AL, R, W	Drink decoction	Roseola infantum, cough, postpartum care, and fever
Moringaceae	*Moringa oleifera* Lam.	Kamunggay	4	0.27	L	Apply crushed leaves directly to an affected body part, Drink extract,	Wounds, gallbladder disease, GI Ulcer, placental separation, and wound bleeding
Boraginaceae	*Cordia dichotoma* G.Forst.	Anunang	3	0.2	L	Apply boiled leaves directly on an affected body part	MSK pain
Moraceae	*Ficus benjamina* L.	Dakit	3	0.2	Ba, R	Apply extract directly on affected body part; Drink decoction, Wrap around affected extremity	Fractured bone and joint pain
Euphorbiaceae	*Euphorbia hirta* L.	Tawa-Tawa	3	0.2	R, Sa, W	Drink decoction, Apply directly on an affected body part	Fever, dengue, and corneal scar
Lamiaceae	*Mentha arvensis* L.	Hambubuena (Yerba Buena)	3	0.2	AL,	Apply crushed or boiled leaves directly on the affected body part; Drink decoction	Headache, joint pain, dyspepsia, and pasmo
Amaryllidaceae	*Allium chinense* G.Don.	Ganda	3	0.2	L	Apply crushed leaves directly on an affected body part	Cough, colds, and headache
Cyperaceae	*Scleria ciliaris* Nees	Daat	3	0.2	Sh, Se	Drink decoction	Fever from tooth eruption, cough, and furuncle/carbuncle
Verbenaceae	*Calicarpa* sp.	Awoy Pilit	2	0.13	AL, L	Apply extract directly on affected body part; Drink decoction	Stomachache and diarrhea
Acanthaceae	*Justicia* sp.	Lupo	2	0.13	L	Apply boiled leaves on an affected body part	MSK pain and fractured bone
Rubiaceae	*Coffea arabica* L.	Kape	2	0.13	AL, L	Drink decoction	Panuhot and dyspepsia
Araliaceae	*Schefflera elliptica* (Blume) Harms	Tagima	2	0.13	R	Apply extract directly on affected body part	Pregnant women, pakunastun-og, and MSK pain
Myrtaceae	*Syzygium samarangense (Blume)* Merr. & L.M.Perry	Tambis	2	0.13	AL, L	Apply directly on an affected body part	MSK pain and stomachache
Arecacea	*Cocos nucifera* L.	Lubi	2	0.13	Drupe	Drink coconut water; Roast the endosperm and let sit for 3 days before eating	UTI

Medicinal Plants Used by Eskaya Traditional Healers

Appendix Table 1. Plant parts used, mode of preparation and administration, diseases treated, and use-value of medicinal plants used by Eskaya healers in Bohol, Philippines *(continued)*

Family	Scientific Name	Local Name	U	UV	Plant Part Used	Administration	Diseases Treated
Cucurbitaceae	*Luffa cylindrica* (L.) M.Roem.	Sikwa (Patola)	2	0.13	Fr	Eat cooked fruit, Drink extract	Hypertension
Leguminosae	*Mimosa pudica* L.	Hibi-Hibi	2	0.13	W	Apply extract directly to affected body part	Toothache and tocolytic
Euphorbiaceae	*Antidesma* sp.	Anislag	2	0.13	R	Drink decoction	MSK pain
Lamiaceae	*Vitex parviflora* A Juss.	Tugas	2	0.13	R	Drink decoction	MSK pain
Lamiaceae	*Hyptis capitata* Jacq.	Butsaw	2	0.13	AL, L	Drink decoction; Apply directly on affected body part	Diarrhea, MSK pain, and panuhot
Anacardiaceae	*Mangifera indica* L.	Mangga	2	0.13	L	Drink decoction	Pasmo and dyspepsia
Meliaceae	Melia azedarach L.	Abihid	2	0.13	L	Drink decoction	Pasmo and roseola infantum
Lamiaceae	*Vitex negundo* L.	Lagundi	2	0.13	L	Drink decoction	Cough
Poaceae	*Oryza sativa* L.	Bugas	2	0.13	Se	Drink decoction	Pasmo and dyspepsia
Meliaceae	*Swietenia mahogani* L.	Mahogany	2	0.13	Fr	Chewed then eaten	Stomachache and diarrhea
Euphorbiaceae	*Melanolepis multiglandulosa* (Reinw. ex Blume) Rchb. & Zoll.	Awom	2	0.13	L	Heat over fire then apply directly on affected body part; Drink decoction	Himugnaw and pain reliever for pregnant
Poaceae	*Thysanolaenalatifolia* (Roxb. ex Hornem.) Honda	Bojon	1	0.07	S	Apply extract directly to affected body part	Beri-beri and edema
Leguminosae	*Flemingia strobilifera* (L.) W.T.Aiton	Gaan-gaan	1	0.07	R	Drink decoction	Heavy menstrual bleeding
Melastomataceae	*Alstronia cumingiana* S. Vidal	Laglag	1	0.07	L, St	Heat over fire then apply directly to the affected area	Abortifacient
Urticaceae	*Dendrocnidemeyeniana* (Walp.) Chew	Lingatong	1	0.07	R	Drink decoction	Diabetes
Lamiaceae	*Hyptissuaveolens* (L.) Poit.	Mala-mala	1	0.07	L	Drink decoction	Diarrhea
Lythraceae	*Lagerstroemiaspeciosa* (L.) Pers.	Banaba	1	0.07	L	Drink decoction	Cough
Arecacea	*Areca catechu* L.	Bunga	1	0.07	Fr, Sh	Drink decoction	Helminthiasis
Lamiaceae	*Gmelina arborea* Roxb.	Gemelina	1	0.07		Apply directly on affected body part	Joint pain
Zingiberaceae	*Curcuma longa* L.	Duwaw / Luyang	1	0.07	Rh	Apply crushed rhizome on affected body part	Joint pain and hematoma
Leguminosae	*Sennaalata* (L.) Roxb.	Sawuting	1	0.07	L	Apply directly on affected body part	Helminthiasis
Lamiaceae	*Ocimumtenuiflorum* L.	Bante	1	0.07	L, St	Boil in vinegar and apply directly on affected body part	Joint pain
Poaceae	*Zea mays* L.	Mais	1	0.07	Silk	Drink decoction	Dysmenorrhea
Lygodiaceae	*Lygodiumflexuosum* (L.) Sw.	Pasan (Ratan)	1	0.07	R	Drink decoction	Himughat
Moraceae	*Castilla elastica* Cerv.	Halimukon	1	0.07	L	Use decoction for bathing	Panagang sa lisang; Panglihi
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Ganas (Kamote)	1	0.07	L	Drink decoction	Anemia and pasmo
Bignoniaceae	*Mansoaalliacea* (Lam.) A.H.Gentry	Ahos (Bawang)	1	0.07	Bulb	Chewed then eaten	Snake bite
Arecacea	*Calamus* sp.	Uway	1	0.07	R	Drink decoction	Postpartum care
Poaceae	*Chrysopogon aciculatus* (Retz.) Trin.	Morsiko	1	0.07	L	Apply directly on affected body part	Headache
Cucurbitaceae	*Sechium edule* (Jacq.) Sw.	Sayote	1	0.07	Fr	Eat cooked fruit	Hypertension
Compositae/ Asteraceae	*Chromolaena odorata (L.)* R.M.King & H.Rob.	Hagonoy	1	0.07	Fl, R	Drink decoction	Cough
Poaceae	*Setaria italica* (L.) P.Beauv.	Dawa	1	0.07	Fr	Drink decoction	Measles
Araceae	*Alocasia macrorrhizos* (L.) G.Don	Badyang	1	0.07	R	Drink decoction	Diabetes
Onagraceae	*Ludwigiapeploides* (Kunth) P.H.Raven	Kokog-banog	1	0.07	Fl, L	Drink extract	Diarrhea and cough
Sapotaceae	*Chrysophyllum cainito* L.	Kaymito	1	0.07	AL, L	Drink decoction	Himugnaw
Malvaceae	*Ceiba pentandra* (L.) Gaertn.	Duldol	1	0.07	R	Drink decoction	Fever
Malvaceae	*Gossypium hirsutum* L.	Gapas-gapas	1	0.07	R	Drink decoction	Fever
Clusiaceae	*Garcinia rubra* Merr.	Batuan	1	0.07	L	Drink decoction	Pasmo
Commelinaceae	*Tradescantia spathacea* Sw.	Bangka-bangkaan	1	0.07	L	Drink decoction	Cough and fever
Leguminosae	*Gliricidia sepium* (Jacq.) Walp.	Madre de cacao	1	0.07	Br	Apply extract directly on affected body part	Wound
Malvaceae	*Sida acuta* Burm.f.	Escoba	1	0.07	R	Drink decoction	Postpartum care
Solanaceae	*Capsicumannuum* L	Sili	1	0.07	L	Drink decoction	Postpartum care
Zingiberaceae	*Alpinia* sp.	Tagbak	1	0.07	Sh	Drink decoction	Fever from tooth eruption
Compositae/ Asteraceae	*Bidens pilosa* L.	Tuay-tuay	1	0.07		Drink decoction	Fever
Flagellariaceae	*Flagellaria indica* L.	Huwag	1	0.07	Sh	Drink decoction	Chickenpox
Rutaceae	*Citrus* sp.	Lemonsito	1	0.07	Fr	Apply extract directly on affected body part	Wound care
Verbenaceae	*Stachytarpheta jamaicensis* (L.) Vahl	Elepante	1	0.07	R	Drink decoction	Postpartum care

Abbreviations: L – apical leaf, Ba – bark, Br – branch, Fl – flower, Fr – fruit, L – leaves, R – root, Sa – sap, Se – seed, Sh – shoot, St – stem, W – whole plant