
Ethnomedicinal plants used by the local folks in two selected villages of San Miguel, Surigao del Sur, Mindanao, Philippines

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Abstract The Island of Mindanao in the Philippines is blessed with abundant medicinal plants where most of its people around the archipelago are still relying on the traditional use of herbal plants as their primary health care. Despite several efforts to record and conserve other ethnomedicinal knowledge in Mindanao, many plant species are not yet fully explored, especially to other plant species that warrant practical use in the selected villages of the Province of Surigao del Sur. Thus, this paper aimed to document the ethnomedicinal plants used by the local folks of the two Villages (Tina and Libas Gua) of San Miguel, Surigao del Sur. Thirty (30) key informants ages 30 to 79 years old participated in the series of interviews using a semi-structured questionnaire. A total of 46 plant species belong to 31 families were documented. Data analysis also revealed the highest frequency distribution of plant family were *Gramineae/Poaceae* (5 species), *Fabaceae* (4 species), *Lamiaceae* and *Zingiberaceae* (3 species) and *Compositae*, *Verbenaceae*, *Liliaceae*, and *Malvaceae* with two plant species each. Gastrointestinal ailments, skin conditions, body pain, cancer and tumor/cysts, high blood, leukemia, and diabetes, respiratory illnesses, and renal diseases were among the common health problems with remedies from the documented herbal plants. The decoction of the herb plants using leaves and water was mostly the mode of preparation, wherein this usually taken internally through drinking. Conducting pharmacological examination is vital to validate the ethnomedicinal uses of the identified plants.

Keywords: Ethnomedicine, Medicinal Plants, Traditional Knowledge, Conservation, Ailments

Introduction

Medicinal plants are considered a globally valuable source of pharmaceutical drugs (Chen *et al.*, 2016). According to the World Health Organization, more than 80 % of the world's population depends on traditional medicine for the treatment of patients who have lacked access to conventional medications (Hamilton, 2004; Zarsuelo *et al.*, 2018). Due to its several benefits

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brought to the health of humanity, medicinal plant products gained global recognition in terms of public health care supports. Thus, many researchers nowadays are conducting intensive studies on medicinal plants in response to the increasing global demands of natural products. However, due to synthetic drug side effect and its expensive cost in the world market, many countries in Africa, North America, Europe, and Australia (Mahmood *et al.*, 2011; Ekor, 2014) tend to embrace the therapeutic uses of herbal plants despite the modernization of medicine and technology. Meanwhile, some parts of Asia like China, India, Bangladesh (Kala *et al.*, 2006; Lee *et al.*, 2008; Hossain *et al.*, 2016) and Southeast Asian nations like Thailand, Vietnam, and Philippines (Kurian, 2017; Boy *et al.*, 2018), the use of therapeutic plant items are still profoundly being esteemed by most of the medical experts for the treatment of serious illnesses and diseases (Astutik *et al.*, 2019). Therefore, the present study on ethnomedicinal plants is essential to the ongoing search of an effective organic and low-cost natural product.

In the Philippines, local groups in some rural areas of Mindanao are still relying on traditional herbal plants. In fact, several studies were conducted throughout the Island of Mindanao who documented the medicinal plant uses and health practices of traditional healer, residents, and indigenous people (Olowa *et al.*, 2012; Blasco *et al.*, 2014; Gruyal *et al.*, 2014; Arquion *et al.*, 2015; Olowa and Demayo, 2015; Pizon *et al.*, 2016; Odchimar *et al.*, 2017; Dapar and Demayo, 2017; Juico *et al.*, 2017; Rubio and Na ñve, 2018; Alduhisa and Demayo, 2019; Morilla and Demayo, 2019; Demetillo *et al.*, 2019). These studies recommended to conduct further ethnomedicinal studies to some places in the Island of Mindanao to document the medicinal plant uses that somehow would prevent knowledge degradation and extinction due to modernization (Pizon *et al.*, 2016). Despite several efforts to record and conserve the traditional knowledge of the local inhabitants, still few documentations were done (Gruyal *et al.*, 2014) in the selected municipalities and villages of Surigao del Sur. These documentations that were made previously in the province have a geographical limitation (Gruyal *et al.*, 2014; Blasco *et al.*, 2014). Therefore, there are still several species of medicinal plants that are not yet fully explored its medicinal uses, especially to other plant species that warrant practical application to different geographical locations (Boy *et al.*, 2018).

In the province of Surigao del Sur, San Miguel is one of the agricultural municipalities known for the home of native and Manobo residents. This place is a first-class landlocked municipality in the province characterized by tropical climate conditions and diverse vegetations facing from the eastern part of the Diwata mountain range protected area. The said municipality has vast timberlands with over a hundred hectares of government-irrigated land; thus,

leading to being the rice bowl capital of the province. Hence, this study focuses on the two villages of San Miguel, Surigao del Sur, namely: Tina and Libas Gua, that holds vast hectares of land resources to the entire municipality. However, due to the increasing forest destruction, loss of traditional knowledge, and rapid modernization (Olowa *et al.*, 2012; Pizon *et al.*, 2016; Rubio and Na ñe, 2018), it is therefore imperative to document the medicinal plants used by some local folks on the said area. The findings of this study will serve as baseline data about the existing medicinal plants and provide additional insights for conservation, pharmacological investigation, and future research for the potential development of the pharmaceutical drug.

Materials and methods

Study area

Tina and Libas Gua village are among the 18 Villages of the landlocked municipality of San Miguel, Surigao del Sur in the Island of Mindanao, Philippines. Tina is situated at latitude (8.94 N) and longitude (126.04 E) with a land area of 4 275 hectares while the Libas Gua located at latitude (8.93 N) and longitude (126.08 E) with a land area of 1 260.50 hectares (PhilAtlas, n.d). The elevation of Libas Gua estimated at 16.2 meters or 53.1 feet above mean sea level while Tina is at 39.8 meters or 130.6 feet above mean sea level. As of 2015 National Census, Tina village has a population of 3,594, while Libas Gua village has a population of 1,418 (PhilAtlas, n.d). The Village of Tina is the location of San Miguel Community Hospital and Municipal Town Hall. This village covered by the private houses, business establishments, and government irrigated lands that are surrounded by the hill ranges and Tago River banks that connect the Poblacion of San Miguel, Magroyong, Libas Gua, Siagao, Baras, Patong, and Sagbayan. Tina village is approximately three (3) kilometers away from Libas Gua and divided by the Village of Magroyong.

Moreover, Libas Gua is the boundary village between the adjacent municipality of San Miguel and Tago. This village is approximately 24 km away from the City of Tandag, the capital of Surigao del Sur. The residential land of this village is bounded by the hill ranges, hectares of rice field, and Tago river banks that separate from the Village of Layog, Tago, Surigao del Sur. The two villages (Tina and Libas Gua) are among the abundance of agricultural land resources in the municipality of San Miguel as the producer of large-scale farm products such as rice, corn, abaca, soybeans, banana, coconut, and vegetable products, respectively. Thus, most of the local folks on the said areas were farmers who depend mostly on their source of income on farming. Besides, these two villages can be reached by any vehicles, as they also located

along the national high way before reaching the Village of Poblacion, San Miguel, Surigao del Sur.

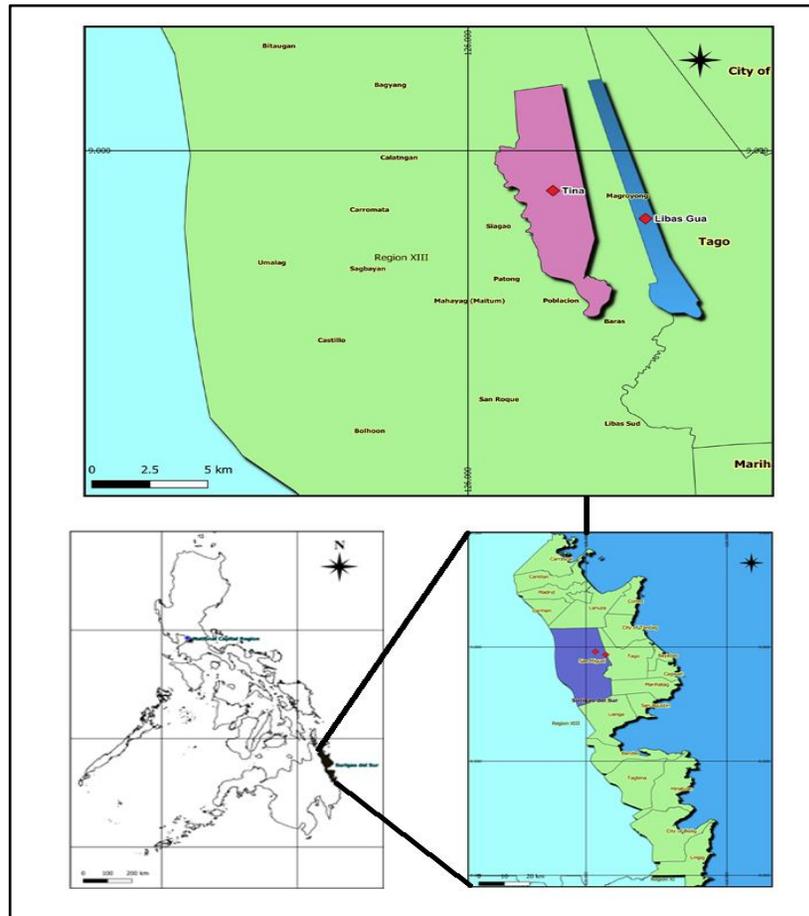


Figure 1. The Location map of Tina and Libas Gua village, San Miguel, Surigao del Sur, Mindanao, Philippines

Ethnomedicinal Data Collection

In this study, prior informed permission was made through their Village Captain and some local administrators before the investigation conducted. In these two chosen villages, 30 people interviewed, six (6) respondents were male, twenty-four (24) were females, ranging the age from 30 to 79 years old. From 30 households, one member was taken as a representative respondent regardless of age and position in the family (father, mother, or children) as long

as they were able to answer the questions. They interviewed through semi-structured questionnaires. The information gathered includes demographic profiles like age, gender, and the village where they belong and occupation. Their knowledge of ethnomedicinal plants and their uses also were recorded. Interviews were conducted through informal conversations to allow for continuous replies and minimize feeling pressured (Olowa *et al.*, 2012; Gruyal *et al.*, 2014). A series of interviews and field observations made from December 2019 to January 2020. The data obtained from each plant comprised the local name, plant part used and its preparation and mode of administration, and the ailment/diseases treated, in which the standard taxonomical procedures employed in gathering plant specimens, which were pressed, dried, and identified. Photographs of the plant specimens taken during the survey and plant identification were done by referring to the various literature and databases (Stuartxchange, n.d; Philippine Medicinal Plants, n.d; Arquion *et al.*, 2015).

Results

Based on the interviews conducted among the 30 respondents in Tina and Libas Gua village of San Miguel, Surigao del Sur, a total of 46 plant species belong to 31 families were documented. Each plant collected from the field determined in terms of its family, scientific name, local name, plant part used, forms of preparation and mode of application, and disease/ailment to be treated (Table 1). Of the 31 families, *Gramineae/Poaceae* (5 species), *Fabaceae* (4 species), *Lamiaceae* and *Zingiberaceae*, (3 species) were the most frequent number of plant species. These are followed by the *Compositae*, *Verbenaceae*, *Liliaceae*, and *Malvaceae* with two (2) plant species each, and the rest of the remaining families had one species. Family *Gramineae/Poaceae* was the highest and most abundant representative plant species that had occupied a diversity of medicinal plants. These plant families were frequently present in the household surroundings as ornamental plants, inferring that these plants were the most part utilized for medicinal purposes.

As shown in Table 2, the recorded variety of ailments and diseases believed to have treated using medicinal plants. Based on the conversations with the respondents, medicinal plants have an innate power to cure a variety of illnesses and diseases which depend on the kind of plant species. These include gastrointestinal ailments (n=17), cold sore, measles, wound, and skin infection/diseases (n=15), fatigue, fever, headache, infant torticollis and body pain (n=10), high blood, leukemia and diabetes (n=10), cancer and tumor/cysts (n=10), respiratory illnesses (n=9), and renal diseases (n=8).

Table 1. Lists of ethnomedicinal plants used by the local folks in Libas Gua and Tina Village of San Miguel, Surigao del Sur, Philippines

Family	Scientific name/Plant Species	Local name	Plant Part used	Forms of Preparation and Mode of Application	Disease/Ailment to be treated
<i>Acanthaceae</i>	<i>Andrographis paniculata</i> (Burm. f.) Nees	Serpentina	Leaves	Decoction of leaves and then drink	Treats high blood, diabetes, and stomachache
<i>Amaryllidaceae</i>	<i>Allium ampeloprasum</i> L.	Sibuling	Leaves	Preheat the leaves, then rub thoroughly around the affected part of the body	Treats infant torticollis
<i>Annonaceae</i>	<i>Annona muricata</i> L.	Guyabano	Leaves	Decoction of leaves and then drink	Treats cancer
<i>Apiaceae</i>	<i>Angelica keiskei</i> (Miq.) Koidz	Ashitaba	Leaves	Soak in the water and then drink	For kidney infection and tumor
<i>Boraginaceae</i>	<i>Cordia dichotoma</i> Forst. f.	Anonang	Stem	Scrape the stem and pound to get the extract before drinking	For cough
<i>Casuarinaceae</i>	<i>Casuarina equisetifolia</i> L.	Maribuhok	Roots	Infusion of roots and then drink its extract juice during the ailment occur	Prevents bleeding and treats overfatigue
<i>Compositae</i>	<i>Artemisia vulgaris</i> L.	Hilbas	Leaves	Preheat the leaves and then rub to the affected part of the body	Treats flatulence
	<i>Blumea balsamifera</i> L.	Sagbong	Leaves	Decoction of leaves and then drink	Treats cough, kidney stone, and urinary tract infection
			Roots	Boil with three glasses of water until one glass of extract juice would remain	Treats ulcer and urinary tract infection
<i>Costaceae</i>	<i>Chamaecostus cuspidatus</i> (Nees. & Martin) C.D Specht & D.W. Stev.	Insulin Plant	Leaves	Wash the leaves thoroughly before eating its fresh leaves	For diabetes

Table 1. (Con.)

Family	Scientific name/Plant Species	Local name	Plant Part used	Forms of Preparation and Mode of Application	Disease/Ailment to be treated
<i>Crassulaceae</i>	<i>Bryophyllum pinnatum</i> (Lam.) Oken	Anghelica	Leaves	Pound the leaves to soften and then apply it to the affected part of the body	Swelling toothache
<i>Cyperaceae</i>	<i>Eleusine polydactyla</i>	Busikad	Stem and Leaves	Soaking in water during night time and then drink the water in the morning time	Treats measles, baby's teething discomfort, and fever
<i>Euphorbiaceae</i>	<i>Phyllanthus niruri</i> L.	Kanding-Kanding	Leaves	Preheat the leaves and then pound and rub it to the affected part of the body	Treats flatulence
<i>Fabaceae</i>	<i>Caesalpinia sappan</i> L.	Sibukaw	Stem	Scrape the stem and pound to get the extracted juice	Treats leukemia, cancer, and fatigue
	<i>Indigofera tinctora</i> L.	Tagum	Leaves	Use it as a pillow around the affected part of the body	Treats infant torticollis
	<i>Cassia alata</i> L.	Sunting	Leaves	Pound to soften and rub it directly to the affected skin	Treats <i>Tinea versicolor</i> or skin-fungal infection
	<i>Mimosa pudica</i> L.	Hibi-Hibi	Roots	Crush the roots and then pound and apply directly to the affected part	For wound treatment
<i>Gramineae/ Poaceae</i>	<i>Imperata cylindrica</i> (L.) Raeush	Tigbaw	Shoot	Wash and soak in water and then drink Pound to soften and extract the juice before drinking	For kidney infection For blood vomiting
	<i>Eleusine indica</i> (L.) Gaertn.	Bila-bila/Paragis	Whole plant	Boil with water and then drink it during the ailment occur	Treats flatulence, urinary tract infections, and cancer

Table 1. (Con.)

Family	Scientific name/Plant Species	Local name	Plant Part used	Forms of Preparation and Mode of Application	Disease/Ailment to be treated
	<i>Cymbopogon citratus</i> (DC.) Stapf	Tangad	Roots	Boil with water and then drink three times a day	Lower hypertension
	<i>Zea mays</i> L.	Mais	Young hair	Decoction of hair and then drink three times a day to stimulate urination	For kidney trouble
	<i>Oryza sativa</i> L.	Rice	Fruit	Hot bath using rainwater with burnt rice	For ulcer treatment
<i>Guttiferae</i>	<i>Garcinia mangostana</i>	Mangosteen	Leaves Stem Roots	Decoction of leaves, stem, and roots and drink	Treats cancer
<i>Iridaceae</i>	<i>Jatropha curcas</i> L.	Tada-Tada	Leaves Stem	Put the leaves to the affected part of the body Scrape the stem and then preheat, pound, and rub to the affected part of the body	Treats tetanus, wounds, flatulence, and blood vomiting
<i>Lamiaceae</i>	<i>Plectranthus scutellarioides</i> (L.) R. Br.	Mayana	Leaves	Preheat the leaves and pound before applying to the affected part of the body Boil with water and drink Pound the leaves to get the extract and apply it to the affected part of the body	Treats cold sores For cough Treats wound
	<i>Ocimum basilicum</i> L.	Malinaw	Leaves	Rub the leaves around the affected part of the body	Treats cold sores
	<i>Coleus aromaticus</i> Benth	Kalabo	Leaves	Decoction of leaves and then add with Calamansi fruit extract before drinking	For cough

Table 1. (Con.)

Family	Scientific name/Plant Species	Local name	Plant Part used	Forms of Preparation and Mode of Application	Disease/Ailment to be treated
				Infusion of leaves and use it for a hot-bath	Treats fever
				Boil with water and drink it as a tea	Treat cysts and cancer
<i>Lauraceae</i>	<i>Persea americana</i> Mill.	Avocado	Leaves	Decoction of leaves and then drink	For LBM
<i>Liliaceae</i>	<i>Allium odorum</i> L.	Ganda	Leaves	Roast partly and rub on the affected part of the body	Treats stomachache and flatulence
	<i>Allium cepa</i> L.	Sibuyas	Leaves	Preheat the leaves and then soak to the coconut milk before wiping it to the mother's nipple.	For mother's lactating
<i>Malvaceae</i>	<i>Theobroma cacao</i> L.	Kakaw	Fruit	Scrape the peeling of the fruit and apply around to the affected body part	Treats the swelling wound/tumor
	<i>Gossypium sp.</i>	Gapas + Buli	Roots + Thorns	Infusion of roots and thorns and then mix it with liquor before drinking	For overfatigue
<i>Menispermaceae</i>	<i>Tinospora rumphii</i> Boerl	Panyawan	Stem	Cut the stem, then dried it under the heat of the sun before soaking to the coconut oil to become an ointment.	Treats flatulence, body pain, headache
				Cut the stem and soak to the drinking water for few minutes and then drink	Treats diabetes

Table 1. (Con.)

Family	Scientific name/Plant Species	Local name	Plant Part used	Forms of Preparation and Mode of Application	Disease/Ailment to be treated
<i>Moraceae</i>	<i>Ficus pseudopalma</i> Blanco	Lubi-Lubi	Leaves	Boil with water and then drink	Treats kidney failure
<i>Moringaceae</i>	<i>Moringa oleifera</i> Lam.	Malunggay	Leaves	Crush the Malunggay leaves and apply it to the open wound.	For wound treatment
<i>Musaceae</i>	<i>Musa sp.</i>	Saging	Stem/ Sprouted shoots	Cut the Banana stem, then get the sap from the newly sprouted shoots	For mother's conceived
<i>Myrtaceae</i>	<i>Psidium guajava</i> L.	Bayabas	Leaves	Decoction of leaves and then drink it	Treats urinary tract infection, flatulence, cancer, LBM, and high blood
<i>Piperaceae</i>	<i>Peperomia pellucida</i> (L.) Kunth	Sinaw-sinaw	Stem and Leaves	Decoction of stem and leaves and then drink Pound to soften and apply to the affected part	Treats urinary tract infection Skin burns
<i>Rubiaceae</i>	<i>Nuclea orientalis</i> L.	Kabak	Shoots	Put the shoots to the affected part of the body	Treats swelling wound and tumor
<i>Sapotaceae</i>	<i>Chrysophyllum cainito</i> L.	Kaymito	Leaves	Decoction of leaves and then drink	For LBM
<i>Sterculiaceae</i>	<i>Kleinhovia hospita</i> L.	Bitan-ag	Stem	Cut the stem, peel off the skin, scrape and then pound and drink the extracted juice	For cough and fever
<i>Urticaceae</i>	<i>Laportea meyeniana</i> Warb.	Sagay	Roots	Boil with water and drink one glass three times a day	Treats high blood and diabetes
<i>Verbenaceae</i>	<i>Gmelina elliptica</i> Sm.	Gmelina	Leaves	Apply directly to the affected part of the body	Treats flatulence
	<i>Vitex negundo</i> L.	Lagundi	Leaves	Boil with water and then drink	For cough

Table 1. (Con.)

Family	Scientific name/Plant Species	Local name	Plant Part used	Forms of Preparation and Mode of Application	Disease/Ailment to be treated
<i>Zingiberaceae</i>	<i>Zingiber officinale</i> Roscoe	Luya	Rhizome	Decoction of rhizome and then drink	For cough, sore throat, beriberi, flatulence, and hypertension
	<i>Kaempferia galanga</i> L.	Kesoy	Leaves	Preheat the leaves, then pound to get the desired extract before drinking	Soften the cough
	<i>Curcuma longa</i> L.	Turmeric	Leaves Rhizome	Infusion of leaves or Rhizome and then drink	Treats body impairment

Table 2. Ailments/diseases treated by medicinal plants

Ailments/diseases	F	%
Beriberi	1	1.16
Bleeding	1	1.16
Body impairment	1	1.16
Cancer and Tumor/Cysts	10	11.63
Cold sore, Measle, Wound, and Skin infection/diseases	15	17.44
Fatigue, Fever, Headache, Infant Torticollis, and Body pain	10	11.63
Gastrointestinal ailments	17	19.77
High blood, Leukemia, and Diabetes	10	11.63
Lactating and Pregnancy Condition	2	2.33
Renal diseases	8	9.30
Sore throat and Cough	9	10.47
Toothache and Baby's Teething	2	2.33
Total	86	100

Results show that some medicinal plants have multiple remedies in treating ailments. For example, *Psidium guajava* used to treat urinary tract infection, 'panuhot' or flatulence, cancer, loose of bowel movement, and high blood. The leaves of this plant were extracted through decoction or boiling with water before it would be taken orally through drinking. *Jatropha curcas* used to treat tetanus, wounds, and flatulence wherein these leaves were applied directly to the affected external part of the body. Conversely, scraping of *Jatropha curcas* stem and extracting the juice of *Imperata cylindrica* was the treatment for blood vomiting under gastrointestinal ailments. Moreover, the decoction of leaves from *Persea americana* and *Chrysophyllum cainito* and partly roasting

of *Allium odorum* are included in the lists of remedies for gastrointestinal ailments such as loose bowel movement, 'panuhot' or flatulence, and stomachache respectively.

Some plants also were used for the treatment of cold sore, measles, wound, and skin-related infection/diseases. For instance, preheating and pounding the leaves of *Plectranthus scutellarioides* and by rubbing the leaves of *Ocimum basilicum* can help cure cold sores. However, plant species for treating the wound, measles and skin related diseases mentioned during the interview were *Theobroma cacao*, *Jatropha curcas*, *Nuclea orientalis*, *Mimosa pudica*, *Moringa oleifera* and *Peperomia pellucida*. Results also show that the most frequent responses for renal disease treatment were *Blumea balsamifera*, *Angelica keiskei*, *Imperata cylindrica*, *Peperomia pellucida*, *Eleusine indica* and young hair of *Zea mays*. Other plants like *Zingiber officinale*, *Kleinhovia hospita*, *Coleus aromaticus*, *Kaempferia galanga* and *Vitex negundo* were among the plant species used by the respondents for the treatment of respiratory illnesses such as sore throat and cough. Some of these plants like *Vitex negundo*, *Blumea balsamifera* and *Peperomia pellucida* were among the recommended medicinal plants of the Department of Health to be used in the Philippine healthcare, wherein some of them were already commercialized and distributed its natural products throughout the island of the country. This shows that the majority of the said ailments/diseases are the common health problems experienced by the selected local folks in San Miguel, Surigao del Sur.

Other common health problems with remedies clearly stated in Table 1. These involved the fever (e.i. *Kleinhovia hospita*, *Eleusine polydactyla*, *Coleus aromaticus*), fatigue (e.i. *Gossypium* sp. and *Caesalpinia sappan*), infant torticollis (e.i. *Allium ampeloprasum* and *Indigofera tinctora*), headache and body pain (e.i. *Tinospora rumphii*). Whereas few serious illnesses with suggested medicinal plants were recorded such as high blood/hypertension (e.i. *Laportea meyeniana*, *Cymbopogon citratus*, *Zingiber officinale*, and *Andrographis paniculata*), leukemia (e.i. *Caesalpinia sappan*), diabetes (e.i. *Tinospora rumphii*, *Andrographis paniculata*), *Chamaecostus cuspidatus* and *Laportea meyeniana*), cancer (e.i. *Psidium guajava*, *Garcinia mangostana*, *Annona muricata*, *Caesalpinia sappan*, and *Eleusine indica*) and tumor/cysts (e.i. *Angelica keiskei*, *Coleus aromaticus*, *Theobroma cacao* and *Nuclea orientalis*).

Due to the limited access to modern medicine, many people resort to the most abundant form of medicinal plants who thought to have healing property. Result of the analysis in Table 1 shows that herbs (43%) with 20 plant species got the highest percentage of medicinal plants followed by the tress (35%) with 16, shrubs (13%) with 6, grass (7%) with 3, and vine (2%) with 1. These

underscore that herbs are the most commonly used medicinal plants and most available for treating ailments and diseases.

Moreover, an analysis in Table 1 showed that leaves (52.73%, n=29) are the highest percentage used parts of the plants in treating various ailments and diseases followed by the stem (16.36%, n=9) and roots (12.73%, n=7). Other parts of the plants include shoots (5.45%, n=3), rhizome (3.64%, n=2), fruit (3.64%, n=2), thorns (1.82%, n=1), whole plant (1.82%, n=1) and young hair (1.82%, n=1) which were applied by the local folks in the treatment of various ailments and diseases. However, a different mode of preparation of medicinal plants was shared by the respondents during the interview and discussion. According to them, it varies on what specific ailments/diseases it may apply. In this study, the decoction was the most prevalent mode of preparations of medicinal plants. The prevalent mode of plant preparations involved internal application as a mode of administering the medications, in which the majority were taken orally for the treatment. These showed that most of the ailments attributed to the internal organs such as gastrointestinal problems, renal diseases, high blood, leukemia and diabetes (Table 2). Some of the preparations were preheating, direct, poultice, chew, and sap gathering, which used to treat topically (externally) to the affected part of the body. These medications sustained until the symptoms will no longer persist.

Discussion

As the time goes rapid changing, modern medicine and healthcare necessities are going to be expensive. Hence, patients with limited access on conventional medicines rely mostly on the herbal medicines which plays a vital role to the rural areas for the remedy of their various ailments and diseases (Olowa *et al.*, 2012). This study revealed that Family *Gramineae/Poaceae* obtained the highest citation of the family of medicinal plants, which shows similar result in an ethnomedicinal survey conducted at Aurora and Northern part of Surigao del Sur, Philippines (Gruyal *et al.*, 2014; Balberona *et al.*, 2018). A quantitative phytochemical analysis of *Gramineae/Poaceae* plant family revealed to have a high composition of alkaloids, flavonoids, phenols, saponins, and tannins, respectively (Babu and Savithamma, 2013). In this study, the plants under the *Gramineae/Poaceae* family includes *Imperata cylindrica*, *Eleusine indica*, *Cymbopogon citratus*, *Zea mays*, and *Oryza sativa*. These considered to have antibacterial, anti-mycotic, anthelmintic, antioxidant, and scavenging activity (Al-Zubairi *et al.*, 2011; Shah *et al.*, 2011; Gruyal, 2014; Burlando and Cornara, 2014; Manvitha and Bidya, 2014; Morah and Otuk, 2015; Rouf Shah *et al.*, 2016; Lalthampuii and Lalchhandama, 2018). In

some parts of the Philippines (Olowa *et al.*, 2012; Olowa and Demayo, 2015; Baleta *et al.*, 2016; Balberona *et al.*, 2018), these plant species usually were used for renal diseases and hypertension which could have associated to their secondary metabolites.

Another recorded list of plant family is *Fabaceae*. Tantengco *et al.* (2018) reported that this family was the most representative family of plants in the Ayta communities in Dinalupihan, Bataan, Philippines. Also, in a survey conducted in the selected indigenous people of Pampanga and Aurora revealed that Family *Fabaceae* has the highest frequency distribution (Obico and Rragio, 2014; Balberona *et al.*, 2018). These findings confirmed that it showed similarities concerning the present results of the investigation. Among these plant species involved is *Cassia alata*. This plant found to have similar applications for the treatment of ringworm and other fungal infections (Zarsuelo *et al.*, 2018). A phytochemical study of the selected plants belong to the family of *Fabaceae* has revealed to have alkaloids, flavonoids, phenols, saponin, steroids and tannins (Gnanaraja *et al.*, 2014). It also confirmed that several species of *Fabaceae* family have pharmacological activities. It involved analgesic, anti-inflammatory, antiulcer, anticancer, antidiabetic, anti-inflammatory, antirheumatic, antimicrobial, and cytotoxic (Gnanaraja *et al.*, 2014; Ahmad *et al.*, 2016). Thus, the therapeutic properties of the plant extract like *Caesalpinia sappan*, *Mimosa pudica*, and *Indigofera tinctora* has high antioxidant, antimicrobial, anti-fungal and anti-inflammatory activities (Motamarri *et al.*, 2012; Johnson *et al.*, 2014; Nirmal *et al.*, 2015; Gruyal, 2015).

Another plant family with notable medicinal value was *Lamiaceae* and *Zingiberaceae*. Medicinal plants belonging to family *Lamiaceae* possessed aromatic essential oil, tannins, saponins, and organic acids (Raja, 2012). In this study, *Plectranthus scutellarioides*, *Ocimum basilicum* and *Coleus aromaticus* were among the medicinal plants belong to family *Lamiaceae*. Some of these medicinal plants reportedly applied for the treatment of skin infection (Levita *et al.*, 2016) and cough (Pizon *et al.*, 2016; Alduhisa and Demayo, 2019). However, family *Zingiberaceae* has known to have therapeutic properties such as antioxidants, antiviral, antimicrobial, and anti-inflammation activities (Kaliyadasa and Samarasinghe, 2019). Several plant species belong to this family include *Zingiber officinale*, *Kaempferia galangal*, and *Curcuma longa*. These plant species traditionally used as an analgesic, antioxidant, antimicrobial, anti-inflammatory, and respiratory disorders (Ahmed *et al.*, 2011; Krup *et al.*, 2013; Gruyal, 2018; Shetu *et al.*, 2018) which attributed to their bioactive compounds that constitute the entire parts of the plants. These mentioned plant species under their specific family have broad applications for

the treatment of various ailments/diseases. These could be due to the different phytochemical constituents present in the variety of medicinal plants (Khalid *et al.*, 2018). Thus, resulting in the plant extensive range of pharmacological activities.

In this study, most of the plants recorded for treating common health problems were previously reported in Mindanao (Arquion *et al.*, 2015; Alduhisa and Demayo, 2019; Pucot *et al.*, 2019), Visayas (Tantiado, 2012; Del Fierro and Nolasco, 2013; Ong and Kim, 2014) and Luzon (Balangcud and Balangcud, 2015; Ducusin, 2017), which found to have different medicinal uses for the treatment of certain illnesses and diseases. However, relative to other studies conducted in the Philippines, some medicinal plants utilized by the Higaonon Tribe and Muslim Maranaos in Iligan City had shown similarity when it comes to the medicinal uses in San Miguel, Surigao del Sur. Since based on the plant species recorded in this paper showed few differences in the treatment of common health problems. For example, the *Jatropha curcas* in Higaonon Tribe is traditionally used for the relief of rheumatism and arthritis (Olowa *et al.*, 2012) while this utilized as a treatment for toothache among Muslim Maranaos (Olowa and Demayo, 2015). Also, plants like *Eleusine indica* usually used for treatment for renal diseases, which are traditionally used among Muslim Maranaos as a remedy to eliminate poison (venom) of snakebite (Olowa and Demayo, 2015).

Moreover, in some provinces in the Philippines (e.i. Agusan del Sur and Surigao del Sur), *Kaempferia galanga* was utilized as a treatment for cough (Arquion *et al.*, 2015). However, it is being used among traditional healers in North Cotabato to abate bleeding wounds (Rubio and Na ñve, 2018) and remedy for dog bite and snake bite wound for some indigenous peoples in Santol, La Union (Ducusin, 2017). The difference in the medicinal uses of herbal plants could be due to the geographical location of the local dwellers, their ways of living, and their experiences towards ailments and diseases (Gruyal *et al.*, 2014). These plant healing properties also showed to be a potential candidate to be investigated to validate its safety and efficacy based on the therapeutic uses claimed by the local people. Even though despite the different applications of the selected medicinal plants in the Philippines, there was still limited literature recorded relative to the ethnomedicinal uses of some plants like *Angelica keiskei* and *Nuclea orientalis*. Therefore, more studies shall focus on documenting other therapeutic plants over the Philippine archipelago.

In this study, the use of herbs for medication found to have the highest percentage. These showed similar results in the previously reported studies in Surigao del Sur (Blasco *et al.*, 2014; Gruyal *et al.*, 2014). Aside from these, leaves also reported to have the highest percentage used parts of the plants.

Several ethnobotanical studies revealed that leaves were the most accessible and available parts of the plants (Olowa *et al.*, 2012; Blasco *et al.*, 2014; Tindowen *et al.*, 2017; Rubio and Na ěve, 2018; Morilla and Demayo, 2019). It means that leaves were very abundant compared to other plant parts.

Research suggests that if leaves were taken away from the plants, this would bring less harm to the survival and conservation of medicinal plants. Leaves are among the most vital plant parts since leaves are the sites for photosynthesis. These play a role in the production of energy and secondary metabolites such as alkaloids, tannins, coumarins, flavonoids, essential oils, and inulins, which are bioactive compounds that determine its role behind the therapeutic properties of every herbal plant (Okoewale and Omefezi, 2001; Kumar and Chaturvedi, 2011). These plant's chemical constituents act as a defense mechanism against the invading insects, pests, and pathogens that fortify plants from getting damaged (Molyneux *et al.*, 2007). Moreover, active compounds derived from the plant leaves served as the basis for plants' preparation in high dosage before the utilization of herbal products (Okoewale and Omefezi, 2001). Also, the use of roots reported of having harm to the plant's survival and diversity (Mesfin *et al.*, 2013). In a discussion during the interview with the key informants, roots were emphasized as a vital part of plants' subsistence. Since this part is responsible for sipping water and essential nutrients from the soil to sustain the plant's growth and development, this indicates that the local folks in the two selected villages of San Miguel have concerned about herbal plant's survival and sustainability especially those plants with high medicinal value.

Moreover, the mode of preparation of the said plant parts involved mostly with decoction. In decoction preparation, fresh plants were boiled for a very long period until it reaches the boiling point; thus, chemical constituents released. This finding confirmed the previous studies in the Philippines (Olowa *et al.*, 2012; Blasco *et al.*, 2014; Juico *et al.*, 2017; Morilla and Demayo, 2019). Another mode of preparation is an infusion, wherein the collected fresh plant parts are usually submerged to the hot or warm water to serve as a tea for oral medication. The respondents also mentioned pounding as another method of preparation. These done by grinding the plant material to get the desired amount of extract for the remedy of an ailment (Gruyal *et al.*, 2014). In most cases, plant preparation involved only the use of one plant species. According to Mahwasane *et al.* (2013), the choice of the plant species could be anchored on the health practices passed by the ancestors from generation to generation. Although our generation today is progressively becoming into advance when it comes to medicine, it is undeniable that the ethnomedicinal value of plants in the future will gradually diminish due to bandwagon on the modern method of

treating illnesses and diseases. This further implies that documenting medicinal plants play a significant role in preserving the ethnomedicinal knowledge of the ancestors from knowledge degradation and extinction. Since 80 % of the world's population depends on the medicinal uses of herbal plants, therefore it is argued to design strategic plans for conservation of the ethnomedicinal plants leading to policy formulation for the sake of future generation.

In conclusion, the present study provides additional literature on the existing medicinal plants used in the Province of Surigao del Sur, Philippines. Based on the findings of the study, it showed that most of the medicinal plants recorded have multiple medicinal uses. Some plants listed in this study also disclosed similarities and different ethnomedicinal applications to the previously conducted studies in the Philippines. Therefore, the present findings will serve as baseline data for the future researchers who wish to conduct pharmacological studies on the identified medicinal plants. Moreover, this would lead to future development of pharmaceutical drug to address the ongoing search of an effective organic and low-cost natural product. Since the present study is limited only to the two villages (Tina and Libas Gua) of San Miguel, Surigao del Sur, therefore, more studies shall concentrate on the other plant species that warrant practical use to other villages and municipalities of Surigao del Sur. This research will also serve as a reference to the policymakers to craft policy that would protect and conserve the medicinal plants and ethnomedicinal knowledge from degradation and extinction.

References

- Ahmad, F., Anwar, F. and Hira, S. (2016). Review on Medicinal Importance of Fabaceae Family. *Pharmacology Online*, 3:151-156. <http://pharmacologyonline.silae.it>
- Ahmed, K., Shaheen, G. and Asif, H. M. (2011). *Zingiber officinale* Roscoe (pharmacological activity). *Journal of Medicinal Plants Research*, 5:344-348.
- Alduhisa, G. U. and Demayo, C. G. (2019). Ethnomedicinal Plants Used by the Subanen Tribe in two villages in Ozamis City, Mindanao, Philippines, *Pharmacophore*, 10:28-42.
- Al-Zubairi, A. S., Abdul, A. B., Abdelwahab, S. I., Peng, C. Y., Mohan, S. and Elhassan, M. M. (2011). *Eleusine indica* possesses Antioxidant, Antibacterial and Cytotoxic Properties, Evidence-Base Complementary and Alternative Medicine, 2011.
- Arquion, R. D., Galanida, C. C., Villamor, B. and Aguilar, H. T. (2015). Ethnobotanical study of indigenous plants used by local people of Agusan del Sur, Philippines. *Asia Pacific Higher Education Research Journal*, 2:1-11.
- Astutik, S., Pretzsch, J. and Kimengsi, J. N. (2019). Asian Medicinal Plants' Production and Utilization Potentials: A Review. *Sustainability*, 11:5483. DOI:10.3390/su11195483.
- Babu, R. H. and Savithramma, N. (2013). Phytochemical screening of underutilized species of Poaceae. *JPR: BioMedRx: An International Journal*, 1:947-951.
- Balangcud, T. D. and Balangcud, K. D. (2015). Ethnomedicinal Plants in Bayabas, Sablan, Benguet Province, Luzon, Philippines. *Electronic Journal of Biology*, 11:63-73.
- Balberona, A. N., Noveno, J. J., Angeles, M. G. B., Santos, R. I., Cachin, E. J. D. J. and Cruz, K. G. J. (2018). Ethnomedicinal plants utilized by the ilongot-egongot community of Bayanihan, Maria Aurora, Aurora, Philippines. *International Journal of Agricultural Technology*, 14:145-159.

- Baleta, F. N., Donato, J. G. and Bolaños, J. M. (2016). Awareness, utilization and diversity of medicinal plants at Palanan, Isabela, Philippines. *Journal of Medicinal Plants Studies*, 4:265-269.
- Blasco, F. A., De Guzman, G. Q. and Alejandro, G. J. D. (2014). A Survey of Ethnomedicinal Plants in Surigao Del Sur Mountain Range, Philippines. *International Journal of Pure and Applied Bioscience*, 2:166-172
- Boy, H. I. A., Rutilla, A. J. H., Santos, K. A., Ty, A. M. T., Yu, A. I., Mahboob, T., Tangpoong, J. and Nissapatorn, V. (2018). Recommended Medicinal Plants as Source of Natural Products: A Review. *Digital Chinese Medicine*, 1:131-142. [https://doi.org/10.1016/S2589-3777\(19\)30018-7](https://doi.org/10.1016/S2589-3777(19)30018-7).
- Burlando, B. and Cornara, L. (2014). Therapeutic properties of rice constituents and derivatives (*Oryza sativa* L.): A review update. *Trends in food science and technology*, 40:82-98.
- Chen, S. L., Yu, H., Luo, H. M., Wu, O., Li, C. F. and Steinmetz, A. (2016). Conservation and sustainable use of medicinal plants: problems, progress, and prospects. *Chinese Medicine*, 11:1-10. DOI 10.1186/s13020-016-0108-7.
- Dapar, M. L. and Demayo, C. G. (2017). Folk Medical Uses of Lunas Amara Blanco by the Manobo People, Traditional Healers, and Residents of Agusan del Sur, Philippines. *Science International*, 29:823-6.
- Del Fierro, R. and Nolasco, F. (2013). An exploration of the ethnomedicinal practices among traditional healers in Southwest Cebu, Philippines. *ARNP Journal of Science and Technology* 3:1182-1188.
- Demetillo, M. T., Betco, G. L. and Goloran, A. B. (2019). Assessment of native medicinal plants in the selected mining area of claver Surigao Del Norte, Philippines. *Journal of Medicinal Plants Studies*, 7:171-174.
- Ducusin, M. B. (2017). Ethnomedicinal Knowledge of Plants among the Indigenous Peoples of Santol, La Union, Philippines. *Electronic Journal of Biology*, 13:360-382.
- Ekor, M. (2014). The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Front Pharmacol*, 4:177. DOI: 10.3389/fphar.2013.00177.
- Gnanaraja, R., Prakash, V. and Peter, S. (2014). Qualitative and quantitative phytochemicals analysis of selected Fabaceae medicinal plants from the Allahabad region. *The Pharma Innovation Journal*, 3:53-56.
- Gruyal, G. A., del Roasario, R. and Palmes, N. D. (2014). Ethnomedicinal Plants Used by Residents in Northern Surigao del Sur, Philippines. *Natural Products Chemistry and Research*, 2:2-6. DOI: 10.4172/2329-6836.1000140.
- Gruyal, G. A. (2014). Total Phenols and Free Radical Scavenging Capacity of Five Selected Herbs in Cantilan, Surigao del Sur. *SDSSU Multidisciplinary Research Journal*, 2:82-86.
- Gruyal, G. A. (2015). Selected Ethnomedicinal Plants of Northern Surigao del Sur: Their Antioxidant Activities in Terms of Total Phenolics, ABTS Radical Cation Decolorization Power, and Ferric Reducing Ability. *International Journal of Biological, Biomolecules, Agricultural, Food, and Biotechnological Engineering*, 9:876-880.
- Gruyal, G. A. (2018). Phytochemical and Antimicrobial Evaluations of Some Medicinal Plants in Surigao del Sur, Philippines. *Science International (Lahore)*, 30:529-533.
- Hamilton, A. C. (2004). Medicinal plants, conservation, and livelihoods. *Biodiversity Conservation*, 13:1477-517.
- Hossain, M., Urbi, Z., Evamoni, F. and Zohora, F. (2016). Secondary research on medicinal plants mentioned in the Holy Qur'an. *Journal of Medicinal Plants Research*, 15:81-97.
- Johnson, K., Narasimba, G. and Krishnan, C. (2014). *Mimosa pudica* Linn- a shyness princess: a review of its plant movement active constituents, uses, and pharmacological activity. *International Journal of Pharmaceutical Sciences and Research*, 5:5104.
- Juico, M. C. W., Cortuna, G. E., Evangelista, S. H. M., Gatal, R. R. D., Licuanan, C. I. K. S. and Tapia, F. J. C. (2017). Ethnobotanical Practices of Tagabawa Tribe on Selected Medicinal Plants at Barangay Jose Rizal, Sta. Cruz, Davao del Sur, Philippines. *Journal of Complementary and Alternative Medical Research*, 4:1-12.
- Kala, C. P., Dhyani, P. P. and Sajwan, B. S. (2006). Developing the medicinal plants' sector in northern India: Challenges and opportunities. *Journal of Ethnobiology and Ethnomedicine*, 2:32.

- Kaliyadasa, E. and Samarasinghe, B. A. (2019). A review on golden species of Zingiberaceae family around the world: Genus *Curcuma*. *African Journal of Agricultural Research*, 14:519-531.
- Khalid, S., Adil Shahzad, N. B., Muhammad, A. and Anwar, P. (2018). Phytochemical Screening and Analysis of Selected Medicinal Plants in Gujrat. *Journal of Phytochemistry and Biochemistry*, 2:108.
- Kumar, G. P. and Chaturvedi, A. (2011). Ethnobotanical Observations of Euphorbiaceae Species from Vidarbha Region, Maharashtra, India. *International Journal of Phytopharmacology*, 2:37-42.
- Kurian, J. C. (2017). Ethno-medicinal Plants of India, Thailand, and Vietnam. *Journal of Biodiversity* 3:61-75. <https://doi.org/10.1080/09766901.2012.11884737>.
- Krup, V., Prakash, L. H. and Harini, A. (2013). Pharmacological activities of turmeric (*Curcuma longa* Linn): A review. *Journal of Homeopathy & Ayurvedic Medicine*, 2:2167-1206.
- Lalthampuii, P. B. and Lalchandama, K. (2018). *Imperata cylindrica*: a noxious weed of pharmacological potentials. In *Mizoram Science Congress 2018 (MSC 2018)*. Atlantic, Press.
- Lee, S., Xiao, C. and Pei, S. (2008). Ethnobotanical survey of medicinal plants at periodic markets of Honghe Prefecture in Yunnan Province, SW China. *Journal of Ethnopharmacology*, 117:362-377.
- Levita, J., Sumiwi, S. A., Prativi, J. I., Ilham, E., Sidiq, S. P. and Moektiwardoyo, M. (2016). Pharmacological activities of *Plectranthus scutellarioides* (L.) R. Br. Leaves extract on cyclooxygenase and xanthine oxidase enzymes. *Journal of Medicinal Plants Research*, 10:261-269.
- Mahmood, A., Malik, R. N., Shinwari, Z. K. and Mahmood, A. (2011). Ethnobotanical survey of plants from Neelam, Azad Jammu & Kashmir, Pakistan. *Pakistan Journal of Botany*, 43:105-110.
- Mahwasane, S. T., Middleton, L. and Boaduo, N. (2013). An ethnobotanical survey of indigenous knowledge on medicinal plants. *South African Journal of Botany*, 88:69-75.
- Manvitha, K. and Bidya, B. (2014). Review on Pharmacological activity of *Cymbopogon Citratus*, 7:7.
- Mesfin, K., Tekle, G. and Tesfay, T. (2013). Ethnobotanical Study of Traditional Medicinal Plants Used by Indigenous People of Gemad District, Northern Ethiopia. *Journal of Medicinal Plants Studies*, 1:32-37.
- Molyneux, R. J., Lee, S. T., Gardner, D. R., Panter, K. E. and James, L. F. (2007). Phytochemicals: the good, the bad, and the ugly? *Phytochemistry*, 68:2973-85.
- Morah, F. N. I. and Otuk, M. E. (2015). Antimicrobial and Anthelmintic Activity of *Eleusine Indica*. *Acta Scientiae et Intellectus*, 1:28-32.
- Morilla, L. G. and Demayo, C. G. (2019). Medicinal Plants used by Traditional Practitioners in Two Selected Villages of Ramon Magsaysay, Zamboanga Del Sur. *Pharmacophore*, 10:84-92.
- Motamarri, S. N., Karthikeyan, M., Rajasekar, S. and Gopal, V. (2012). *Indigofera tinctora* Linn- A Phytopharmacological review. *International Journal of Research in Pharmaceutical and Biomedical Sciences*, 3:164-169.
- Nirmal, N. P., Rajput, M. S., Prasad, R. G. and Ahmad, M. (2015). Brazilian from *Caesalpinia sappan* heartwood and its pharmacological activities A review. *Asian Pacific Journal of Tropical Medicine*, 8:421-430.
- Obico, J. J. A. and Rragio, E. M. (2014). A survey of plants used as repellents against hematophagous insects by the Ayta people of Porac, Pampanga province, Philippines. *Philippine Science Letters*, 7:179-86.
- Odchimar, N. M. O., Nuñez, O. M., Uy, M. M. and Senarath, W. T. P. S. K. (2017). Ethnobotany of medicinal plants used by the Talaandig Tribe in Brgy. Lilingayon, Valencia City, Bukidnon, Philippines. *Asian Journal of Biological and Life Sciences*, 6:358-364.
- Okoewale, E. E. and Omezezi, J. U. (2001). Some herbal preparations among the people of Isoko Clan of Delta State, Nigeria. *Journal of Applied Sciences*, 4:2350- 2371.

- Olowa, L. F., Torres, M. A. J., Aranico, E. C. and Demayo, CG. (2012). Medicinal Plants Used by the Higaonon Tribe of Rogongon, Iligan City, Mindanao, Philippines. *Advances in Environmental Biology*, 6:1442-1449.
- Olowa, L. and Demayo, C. G. (2015). Ethnobotanical Uses of Medicinal Plants among the Muslim Maranaos in Iligan City, Mindanao, Philippines. *Advances in Environmental Biology*, 9:204-215.
- Ong, H. G. and Kim, Y. D. (2014). Quantitative ethnobotanical study of medicinal plants used by Ati Negrito indigenous group in Guimaras Island, Philippines. *Journal of ethnopharmacology*, 157:228-242.
- PhilAtlas. (n.d). San Miguel, Province of Surigao del Sur <https://www.philatlas.com/mindanao/caraga/surigao-del-sur/san-miguel.html> Philippine Medicinal Plants. (n.d). <https://medicinalplantsdatabase.com/>.
- Pizon, J. R. L., Nuñez, O. M., Uy, M. M. and Senarath, W. T. P. S. K. (2016). Ethnobotany of Medicinal Plants Used by the Subanen Tribe of Lapuyan, Zamboanga del Sur. *Bulletin of Environment, Pharmacology, and Life Sciences*, 5:53-67.
- Pucot, J. R., Manting, M. M. E. and Demayo, C. G. (2019). Ethnobotanical Plants used by selected Indigenous Peoples of Mindanao, The Philippines as Cancer Therapeutics. *Pharmacophore*, 10:61-69.
- Raja, R. R. (2012). Medicinally Potential Plants of Labiatae (Lamiaceae) Family: An Overview. *Research Journal of Medicinal Plants*, 6:203-213. DOI 10.3923/rjmp.2012.203.213.
- Rouf Shah, T., Prasad, K. and Kumar, P. (2016). Maize- A Potential source of human nutrition and health: A review. *Cogent Food & Agriculture*, 2:1166995.
- Rubio, M. M. and Navé, M. A. K. (2018). Ethnomedicinal plants used by traditional healers in North Cotabato, Mindanao, Philippines. *Journal of Biodiversity and Environmental Sciences*, 13:74-82
- Shah, G., Shri, R., Panchal, V., Sharma, N., Singh, B. and Mann, A. S. (2011). Scientific basis for the therapeutic use of *Cymbopogon citratus*, staff (Lemongrass). *Journal of Advanced Pharmaceutical Technology and Research*, 2:3.
- Shetu, H. J., Trisha, K. T., Sikta, S. A., Anwar, R., Rashed, S. S. B. and Dash, P. R. (2018). Pharmacological importance of *Kaempferia galanga* (Zingiberaceae): A mini-review. *International Journal of Research in Pharmaceutical Sciences*, 3:32-9.
- Stuartxchange. (n.d). Lists of Philippine Herbal Medicinal Plants. <http://stuartxchange.com/CompleteList.html>
- Tantengco, O. A. G., Condes, M. L. C., Estadilla, H. H. T. and Ragrajio, E. M. (2018). Ethnobotanical Survey of Medicinal Plants used by Ayta Communities in Dinalupihan, Bataan, Philippines. *Pharmacognosy Journal*, 10:859-870.
- Tantiado, R. G. (2012). Survey of Ethnopharmacology of Medicinal Plants in Iloilo, Philippines. *International Journal of Bio-Science and Bio-Technology*, 4:11-26.
- Tindowen, D. J. C., Bangi, J. C. and Mendezabal, M. J. N. (2017). Ethnopharmacology of medicinal plants in a rural community in Northern Philippines. *Journal of Biodiversity and Environmental Sciences*, 11:296-303.
- Zarsuelo, M. M., Zordilla, Z. D. and Anacio, D. B. (2018). Review of Regulatory Policies on and Benefits of Herbal Medicine in the Philippines. *ACTA MEDICA PHILIPPINA*, 52:473-479.

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