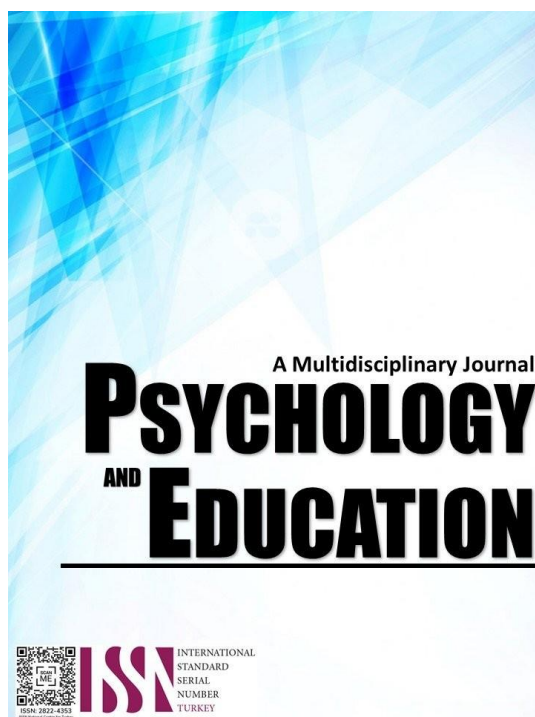


BOTANICAL SURVEY AND PHYTOCHEMICAL SCREENING OF MEDICINAL PLANTS USED BY TRADITIONAL HEALERS IN AURORA, ZAMBOANGA DEL SUR, PHILIPPINES



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Botanical Survey and Phytochemical Screening of Medicinal Plants used by Traditional Healers in Aurora, Zamboanga Del Sur, Philippines

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Abstract

The documentation of medicinal plants is an important baseline for possible extraction, isolation, characterization, and chemical modification of important active cellular chemical contents. This study aims to determine the qualitative phytochemical screening of medicinal plants used by traditional healers in Aurora, Zamboanga del Sur, Philippines. A total of 34 medicinal plants were mentioned by five traditional healers, who willingly shared their knowledge on medicinal plants. These plant species were collected and came from 23 families. The greater number of plant species was represented by families of Poaceae, Euphorbiaceae, Lamiaceae, and Asteraceae with three species each, followed by Malvaceae, Compositae, and Leguminosae with two species each, and the rest of the families were represented by only one species each. In this study, qualitative phytochemical analysis of five selected medicinal plants clearly reveals the medically active cellular phytoconstituents such as terpenoids, anthraquinones, phenols, and saponins that were present in *Stachytarpheta jamaicensis*, *Jatropha gossypifolia*, *Impatiens balsamina*, *Phyllanthus urinaria*, and *Pseudelephantopus spicatus* leaves. These medicinal plants appeared to be rich in chemical contents, widely used in traditional medicine to combat and cure various ailments. The anti-inflammatory, antibacterial, antiviral, antimalarial, antiparasitic, antianalgesic and antioxidant can be attributed to the high anthraquinones, phenols, terpenoids and saponins in the leaves of the five medicinal plants. However, the presence of phytoconstituents like terpenoids, anthraquinones, phenols and saponins should take note importantly by the traditional healers or even community in order to have a better understanding on how the plants combat and cure the specific ailments. Furthermore, the study recommends that all medicinal plants should take care of and the future researchers conduct more studies on phytochemical screening of medicinal plants for better understanding on when and how to use different medicinal plants to treat different ailments.

Keywords: *medicinal plants, qualitative phytochemical screening, active cellular chemical contents, ailments, phytoconstituents*

Introduction

Plants are well known for its importance. The plant kingdom is a treasure trove of potential medications, and there has been a growing appreciation for medicinal plants in recent years (Yadav and Agarwala, 2011). People employed herbal medicines to treat and prevent ailments before there were modern therapies (Yaniv, 2014). Suntar (2020) stated that even today, the natural occurring chemicals identified in these plants are critical to the discovery of new pharmaceutical possibilities.

The chemicals found natural in plants are known as phytochemicals. These phytochemicals are becoming popular as a result of its numerous medical applications. Phytochemicals are effective against a variety of ailments, including asthma, arthritis, and cancer, and unlike pharmaceutical chemicals, it has no negative side effects because phytochemicals heal. These can also be considered "man-friendly medications" because it treats ailments without harming humans (Sahira and Cathrine, 2015). As such, plants are known for its structural diversity and extensive range of pharmacological actions in the pharmaceutical sector.

Additionally, a recent study by Sharma et al. (2020) stated that the scientific process of examining, extracting, experimenting, and identifying various classes of phytoconstituents present in various bases for drug discovery is known as phytochemical screening. The active components from this screening can then be used for further investigation and research.

Medicinal plants, according to the World Health Organization (WHO), are the best source of a wide range of medications. Traditional medicines, which contain substances derived from medicinal plants, are used by almost 80% of people in developed countries.

Such plants, however, need to be examined in order to have a greater understanding of their qualities, safety, and efficiency (Arunkumar and Muthuselvam, 2009). In addition, the WHO estimates that roughly 2% of the world's population is currently incapacitated as a result of cuts and injuries (Dapar et al. 2020). Farnsworth (1994), as cited by Dapar et al. (2020), said that the World Health Organization also recorded that around 60% of the world's population relies on herbal medicine.

According to Alduhisa and Demayo (2019), herbal medicines are still commonly utilized to prevent and treat ailments in the Philippines, particularly in rural Mindanao. Earlier this year, a survey conducted in Aurora, a rural municipality in western Mindanao, revealed that folk medicine is widely used (Pucot and Demayo, 2021b). As such, when residents have health issues, traditional healers are frequently contacted and frequently prescribe herbs, either singly or in polyherbal compositions.

In Cebuano culture, a traditional healer is known as a "mananambal" (Del Fierro and Nolasco, 2013). A "mananambal" was a local medical practitioner who uses traditional healing techniques to treat patients who are in pain or have been enduring various illnesses

for a long time that have been brought on by supernatural forces.

The researchers conducted this study mainly to conduct qualitative phytochemical screening to determine the active cellular chemical contents of selected medicinal plants used by traditional healers in Aurora, Zamboanga del Sur. Further, to provide beneficial information about different medicinal plants as the best remedy to treat various ailments.

Research Objectives

The main objective was to conduct qualitative phytochemical screening, and to determine the active cellular chemical contents of selected medicinal plants used by traditional healers. Specifically, it also aims to:

1. Survey, collect, and identify different medicinal plants used by traditional healers in Aurora, Zamboanga del Sur;
2. compare the most and least commonly used medicinal plants by traditional healers in Aurora, Zamboanga del Sur; and
3. identify certain illnesses treated with medicinal plants used by traditional healers in Aurora, Zamboanga del Sur.

Methodology

Research Design

The researchers applied a survey research design in which gathered information of the five traditional healers and determined the best way to answer the questions to attain accurate data about medicinal plants used by traditional healers. However, the collection of data of medicinal plants were done through semi-structured checklists type and open-ended oral interviews for those traditional healers who could not read or write. Thus, all participants who volunteered for the study were also assured that taking part or withdrawing would not affect the informants in any way, and its privacy and anonymity were always maintained, as reflected on the interview consent form. A purposive sampling method was used in this study. This technique was used to rely on the researchers' judgment to choose the members who would be part of the study.

Source

This study was carried out in Aurora, Zamboanga Del Sur, particularly in 5 Barangays, namely, (1) Campo 2, (2) Gubaan, (3) Inasagan, (4) Lapaz, and (5) Lintugop (Figure 1). The three assessments sampling was conducted in the month of November, 2022. Aurora, Zamboanga del Sur, is within Region IX in the Zamboanga Peninsula, and a 2nd class municipality in the province of Zamboanga del Sur, Philippines. Aurora, Zamboanga Del Sur—a rural municipality in western Mindanao, Philippines—has a total land area of 18,095 hectares, which is 2.46% of Zamboanga del Sur Province's land area of 735,769 hectares (Mondido, 2020). However, the researchers conducted this study in Aurora, Zamboanga del Sur since the municipality's vegetation is dominated by perennial trees and vine crops, followed by grazing pastures or grassland. Thus, due to its high elevation, the municipality has a cooler climate, ranging from 22 to 35 degrees celsius.

Instrument

An opportunistic sampling supported by a semi-constructed ethno medicinal survey was utilized for plant collection. In this study, plant specimens were collected and photographed during supervise field walks with the help of traditional healers as key informants for easier identification and classification. In which the researchers take notes on the plants' families, common names, and local names that would be recorded. The taxonomic identification of five selected plants were verified at the University Museum of Central Mindanao University. In addition, the collected medicinal plants were undergoing the wet pressing method of preservation of specimen as voucher specimens for verification of the samples. Further, the wet method pressed maximum of three medicinal plants that were collected with its designated parts (leaves, stem, and whole plants). Thus, all scientific names and family classifications were verified for identification of medicinal plants using The Plant List (2013), World Flora Online (2019), the International Plant Names Index (2019), Tropicos (2019), and Co's Digital Flora as references.

Procedure

Preparation Techniques for Phytochemical Screening

After plant collection, plants were cleaned properly. Cleaning was done by hand in order to get better results. The cleaning process may involve the following steps: cleaning, washing, peeling, or stripping leaves from stems (Sahira and Cathrine, 2015). Thus, in preparing plant specimens, the drying and powdering of plants were applied. The main purpose of drying was to remove the water content from plants so that the plants could be stored. Plants were dried immediately through the natural process of sun drying as soon as the plants were collected, or this might lead to spoilage of plant materials. Dried plant parts were grounded into a fine powder using an electric blender, the powder was kept in small plastic bags with paper labeling. The grinded leaves material of 200 g weighed using an electronic balance. The plant ethanolic extract of 1:2 ratios in which 200 g of each powdered plant sample was added to 400 mL of ethanol. The powder extracts obtained were then subjected to phytochemical screening in Research Center, Central Mindanao University–Bukidnon to detect the chemical constituents present in each extract.

Phytochemical Screening

Some standard methods for phytochemical screening were utilized in this study. The qualitative phytochemical screening was utilized to determine the active cellular chemical contents of selected medicinal plants used by traditional healers in Aurora, Zamboanga del Sur. The standard procedures for phytochemical screening described by Guevarra (2005) were adopted to screen the ethanolic extracts of the leaves of *Impatiens balsamina*, *Jatropha gossypifolia*, *Phyllanthus urinaria*, *Pseudelephantopus spicatus*, and *Stachytarpheta jamaicensis* to determine the chemical contents of each plants. All the laboratory activities were performed in the Central Mindanao University as a service center. The different active cellular chemical contents of each plant parts extract were determined utilizing the following procedures.

Test for Anthraquinones

To an equivalent of 1g of *Impatiens balsamina*, *Jatropha gossypifolia*, *Phyllanthus urinaria*, *Pseudelephantopus spicatus*, and *Stachytarpheta jamaicensis* leaves were extracted separately and evaporates to incipient dryness over a steam bath. Then, added 10 mL 0.5 M potassium hydroxide and 1 ml of 5% (H₂O₂) and stirred. Also heated the resulting mixture over a steam bath for 10 minutes. Filter and discard the residue. Acidify the filtrate with glacial acetic acid. And then the aqueous filtrate was extracted twice with 5ml portions of benzene. Combining the benzene extracts divide the combined benzene extracts into 2 portions, reserving one portion as the control basify the other portion with ammonia and shake (Guevara, 2005).

Test for Terpenoids

Two (2) mL of *Impatiens balsamina*, *Jatropha gossypifolia*, *Phyllanthus urinaria*, *Pseudelephantopus spicatus*, and *Stachytarpheta jamaicensis* leaves extracts were added to 2 ml of acetic anhydride and concentration of H₂SO₄. The concentrated sulfuric acid used in the laboratory is 92% H₂SO₄ by mass (Guevara, 2005). In which, the formation of blue, green rings indicate the presence of terpenoids.

Test for Phenolic compounds

To diluted the extract with 100 ml of distilled water and then 2 ml of the ethanolic extract. Took an equivalent of 2g *Impatiens balsamina*, *Jatropha gossypifolia*, *Phyllanthus urinaria*, *Pseudelephantopus spicatus*, and *Stachytarpheta jamaicensis* leaves extracts separately and added 2 drops of 3% FeCl₃. In which, the formation of green or blue color was indicated the presence of phenolic (Guevara, 2005).

Test for Saponins

An equivalent of 2g of *Impatiens balsamina*, *Jatropha gossypifolia*, *Phyllanthus urinaria*, *Pseudelephantopus spicatus*, and *Stachytarpheta jamaicensis* leaves were extracted separately and loaded to a capillary tube by immersing the tube to a height of 10 mm in the plant extract. (Note: A capillary tube was a tube with a calibrated inside diameter and length used to control the flow of refrigerant). Likewise, load another capillary with distilled water. Then, lift the capillary tubes and keep both in a vertical position to allow the liquid inside to flow freely. After sometime, compare the height of the liquids in the two tubes. If the level of the plant extract in the capillary tube was half or less than the in the other tube containing water, then the presence of saponins may be inferred (Guevara, 2005).

Data Analysis

The collected data of medicinal plant species that were used by traditional healers in Aurora, Zamboanga del Sur were analyzed using simple descriptive statistics and expressed in the form of graphs and tables. Such as Relative Frequency and Percentage Distribution, and Use-value (UV) Index. The data was analyzed by the following statistical measures:

Relative Frequency and Percentage Distribution. This was used as a statistical tool in getting frequency distribution of a sources of the plant, plant part used, mode of preparation and route of administration and ailments treated of medicinal plants.

Use-value (UV) Index. This statistical tool was calculated as: $Uvc = UI/N$ where U is the sum of the total number of use citations by all informants for a given species, divided by the total number of informants (N). This was used to determine the most and least commonly used medicinal plants that were used by traditional healers in Aurora, Zamboanga del Sur (Andrade & Adolfo, 2011).

Table 1. Use-value (UV) Index Scale

Relative Values	Use-value (UV) Index
Most used	1.00 and above
Least used	0.99 and below

Ethical Considerations

In the gathering of data, an approved letter was acquired from the Local Government Unit, in which a proper letter that served as prior informed consent was submitted to the Municipal Mayor of Aurora before the conduct of the study. This was to get permission for the researcher’s entry and be able to conduct research and collect medicinal plants used by traditional healers in Aurora, Zamboanga del

Sur. However, in gathering of data of the respondents the interview consent form was administered.

Results and Discussion

Sociodemographic profile of the respondents

A total of five (n=5) traditional healers from Aurora, Zamboanga del Sur, were interviewed about the herbal and other folk medicinal practices with full consent. Of these respondents, there were more males (3) than females (2). Based on these results, it can be argued that the majority of traditional healers in Aurora were male. However, it was also revealed by other closely similar ethnobotanical studies conducted throughout the nation that women were more knowledgeable about therapeutic herbs (Abe and Ohtani 2013; Balinado and Chan 2017; Tantengco et al. 2018). On the other hand, based on the occupation of informants, majority were farmers (3), while the other two (2) were healers (“manambalay”). In terms of educational attainment, two (2) of the respondents were never been in school, while other two (2) were in elementary school level, and one (1) was in high school level. Hence, some studies found out that higher educational attainment has linked a lower understanding of folk medicine (Morilla et al. 2014).

Additionally, the majority of four (4) key informants were Cebuano, and the other one was Subanen. The three (3) traditional healers were aged 67-70 years old, while the two (2) were 56-58 years old. Thus, all of the informants were married. Additionally, one informant got only three (3) children while other two (2) blessed with 6 to 8 children, and other two also got 10 to 11 children. Regardless of being traditional healers, the informant’s annual income was not affected by being a traditional healer as per interviewed by the researchers. Hence, the informant’s annual income was coming from own sideline and occupation as farmers. The traditional healers in Campo 2, Gubaan, Inasagan, and La Paz got an income of 50,000 annually, while the healer in Lintugop got an annual income of 30,000. Further, the four (4) traditional healers were have been tenant of land for years, while only one was owned the land where many medicinal plants came from. In terms of number of years as an herbalist, majority of four (4) respondents have been traditional healers for 5-8 years, while only one has been practiced folk medicine for almost 20 years.

Medicinal plants found in Five Barangays of Aurora, Zamboanga del Sur

Table 2 will show the list of medicinal plants used by traditional healers in Aurora, Zamboanga del Sur, to treat different ailments or diseases. A total of 34 medicinal plant species were collected and came from 23 families. These medicinal plants were all recorded in the Philippine Medicinal Plants. However, among the collected 34 medicinal plants, three of it including *Peperomia pellucida*, *Psidium guajava*, and *Vitex negundo* were recorded in the Ten Scientifically Approved Medicinal Plants by the Department of Health in the Philippines.

Table 2. List of documented medicinal plants used by traditional healers in Aurora, Zamboanga del Sur

Family	Local name	Scientific name	Plant's location	Ailments treated	PP	Preparation	Route of application
Acanthaceae	Mandalusa	<i>Justicia gendarussa</i> Burm.f.	Cultivated	Fever, headache, inflammation, eczema	L	Extraction	Topical
Apiaceae	Gotu kola	<i>Centella asiatica</i> (L.) Urb.	Cultivated	Wound healing, stomach ulcers, mental fatigue, epilepsy, diarrhea, fever, asthma	L	Extraction	Topical
Asteraceae	Tulay-tulay or tuway-tuway	<i>Bidens pilosa</i> L.	w/in the vicinity	Relapse, headache, body pain, fever, migraine	R	Decoction	Oral
	Gabon	<i>Blumea balsamifera</i> (L.) Dc.	Cultivated	Cough, chills, common cold, fever	L	Decoction	Oral
	Hagonoy	<i>Chromolaena odorata</i> L.	w/in the vicinity	Diarrhea, dysmenorrhea, stomach acidity	R	Extraction	Topical
Balsaminaceae	Kamantigue	<i>Impatiens balsamina</i> L.	Cultivated	Diarrhea, stomachache, cough, fever	L	Decoction	Oral
Boraginaceae	Elephanteng Puti	<i>Heliotropium indicum</i> L.	w/in the vicinity	Relapse, headache, fatigue, fever, body pain	R	Decoction	Oral
Compositae	Dila-dila sa Iro	<i>Pseudelephantopus spicatus</i> (B Juss. ex Aubl)	w/in the vicinity	Stomachache, diarrhea, stomach acidity, dysmenorrhea	L	Decoction	Oral
	Hilbas	<i>Artemisia vulgaris</i> L.	Cultivated	Relapse, headache, body pain, fever, diarrhea	L	Decoction	Oral
Cyperaceae	Busikad	<i>Kyllinga nemoralis</i> (J.R. Frost)	w/in the vicinity	Fever, headache, relapse, body pain	S	Infusion	Oral
Euphorbiaceae	Mangagaw or tawa-tawa	<i>Euphorbia hirta</i> L.	w/in the vicinity	Fever, dengue fever	W	Infusion	Oral
	Tuba-tuba tapol	<i>Jatropha gossypifolia</i> L.	Cultivated	Diarrhea, swollen breasts, stomachache, eczema, purgative, itchiness, fevers, wound	L	Decoction	Oral

	Tuba-tuba	Jatropha curcas L.	w/in the vicinity	healing, animal bites Nausea, swelling, muscle pain, animal bites, sprains, toothache	B	Decoction	Topical
Fabaceae	Makahiya or kipi-kihi	Mimosa pudica L.	w/in the vicinity	Headache, fever, fatigue, migraine, relapse	R	Decoction	Oral
Lamiaceae	Lagundi	Vitex negundo L.	Cultivated	Cough, fever, chills	L	Decoction	Oral
	Kalabo	Coleus amboinicus Lour.	Cultivated	Cough, chills, fever, relieve pain, itching, aching muscles, indigestion	L	Decoction	Oral
	Mayana itum	Plectranthus scutellarioides (L.) R. Br.	Cultivated	Dermatitis, skin diseases, toothaches, itchiness, ringworm	L	Extraction	Topical
Leguminosae	Mani-mani	Senna tora (L.) Roxb.	w/in the vicinity	Stomach acidity, nausea, gastrointestinal problem	L	Decoction	Oral
Family	Local name	Scientific name	Plant's location	Ailments treated	PP	Preparation	Route of application
	Monggos	Vigna radiata (L.) R. Wilczek	Cultivated	Fatigue, relapse, headache, body pain, fever	F	Infusion	Oral
Lythraceae	Banaba	Lagerstroemia speciosa (L.) Pers.	Forest	Leukemia, diabetes, fever, kidney inflammation, urinary dysfunction	B	Decoction	Oral
Malvaceae	Scoba nga mayawis	Sida acuta Burm. f	Cultivated	Relapse, headache, body pain, fever	L	Decoction	Oral
	Panigbin	Corchorus cordifolius Salisb.	Cultivated	Stomachache	L	Extraction	Topical
Moraceae	Lagnob	Ficus septica Burm. f	Forest	Nausea, stomach acidity, headache, fever	L	Decoction	Oral
Family	Local name	Scientific name	Plant's location	Ailments treated	PP	Preparation	Route of application
Myrtaceae	Bayabas	Psidium guajava L.	Cultivated	Diarrhea, stomachache, nausea, stomach acidity	L	Decoction	Oral
Phyllanthaceae	Likod-likod	Phyllanthus urinaria L	w/in the vicinity	Sores, swelling, itchiness	L	Extraction	Topical
Piperaceae	Sinaw-sinaw	Peperomia pellucida (L.) Kunth	w/in the vicinity	Kidney stones, kidney infection, arthritis, cough, constipation, edema, dysuria	L	Decoction	Oral
Poaceae	Bila-bila	Eleusine indica (L.) Gaertn.	w/in the vicinity	Relapse, headache, fever, body pain, migraine, fatigue	S	Infusion	Oral
Family	Local name	Scientific name	Plant's location	Ailments treated	PP	Preparation	Route of application
	Amorsiko	Chrysopogon aciculatus (Retz.) Trin	w/in the vicinity	Hypertension, diarrhea, liver pain, poison antidote	W	Decoction	Oral
	Kugon	Imperata cylindrica (L.) Raeusch.	w/in the vicinity	Skin infection, diabetes, wound healing, arthritis, blood purifier, diuretic, ringworm, intestinal infections	W	Decoction	Oral
Sapotaceae	Caymito	Chrysophyllum cainito L.	Forest	Nausea, stomach acidity, stomachache	L	Decoction	Oral
Family	Local name	Scientific name	Plant's location	Ailments treated	PP	Preparation	Route of application
Simaroubaceae	Macassar kernels	Brucea javanica L.	w/in the vicinity	Diarrhea, stomachache	Se	Decoction	Oral
Solanaceae	Katyubong	Datura metel L.	Cultivated	Stomachache, body pain, arthritis, rheumatism, headache,	L	Extraction	Topical



Verbenaceae	Kandikandilaa	Stachytarpheta	w/in the	infection			
	n	jamaicensis L.	vicinity	Fever, asthma, liver	L	Decoction	Oral
Zingiberaceae	Luy-a	Zingiber officinale	Cultivated	problem, wound healing			
		Roscoe		Swelling, nausea,	Rz.	Decoction	Oral
				muscle pain, cough			

Note: PP: Plant-parts used; B: bark; F: fruit; L: leaves; R: roots; Rz: rhizome; Se: seeds; S: stem; W: whole plant

Most of the medicinal plant species that are used in this study were mainly gathered from the vicinity (49%), some were cultivated (42%), and others were from forests (9%). Based on interviews with the traditional healer in Gubaan, most of the medicinal plants grow randomly within the vicinity and backyard. The informants usually do not cut down the growing plants in surroundings because these plants constitute a source of medicinal plants that can be used to treat common diseases in communities. Since most of the traditional healers were located in high elevation mountain or near the forest, the informants have an abundance of medicinal plants in surroundings. However, some of these medicinal plants were also cultivated in which the traditional healers were hands on in planting various medicinal plants.

In addition, the majority of the collected medicinal plant parts were leaves (67%), followed by roots (13%), whole plants (10%), both stems and bark (7%), and lastly, rhizomes, fruits, and seeds (3%) of the total number of collected plant parts. As stated by Fiscal (2017), the leaves were the plant portion that was most frequently used to make medicines. Where the chemical makeup was present, plant leaves were more plentiful and simpler to use.

Moreover, the roots, fruits, seeds, and stem are also utilized. Similar results on the widespread use of plant leaves were also documented by certain pertinent ethnobotanical surveys (Abaquita and Buot, 2013; Olowa, et al., 2012). According to Molyneux, et. al, (2007) stated that in order to protect leaves against rivals, predators, or infections, it had evolved to create chemical compounds. Leaves were the primary and most important source of energy for plants. Alkaloids, flavonoids, terpenoids, and phenols were examples of secondary metabolites that were present in most plant parts and have been studied for its therapeutic characteristics and potential as drugs or medicines (Wink, 2015).

Furthermore, most routes of application of collected medicinal plants were administered orally (i.e., via drinking), which accumulates (77%), and topically (23%). Plants that were prepared through decoction and infusion were usually taken internally.

However, according to Ghorani-Azam et al. (2018), as cited by Pucot and Demayo (2021), it is advisable that local consumers exercise caution when administering herbal products orally because the prolonged oral consumption of some herbal medicines was frequently associated with toxicity and poisoning. Since the majority of diseases affected the internal organs, such as diarrhea, stomach acidity, gastrointestinal disorders, respiratory illnesses, and diabetes, around 77% of the drugs were taken orally. These treatments have been used up until the signs of a particular illness or ailment have disappeared. The other part of the medication was typically made as a poultice and applied topically or directly to the body portion that was affected.

Use Value (UV) Index of most and least commonly used medicinal plants of traditional healers in Aurora, Zamboanga del Sur

Based on how a certain uses of medicinal plants were cited by traditional healers; the use value of the plants was calculated to measure its significance. Table 3 will show the most and least commonly used medicinal plants of traditional healers in the locals of Aurora. There were four most commonly used medicinal plants, means got the highest used citations of informants per species including: (1) *Artemisia vulgaris* L. (“hilbas”) got the highest value of 5.2, (2) *Coleus amboinicus* L. (“kalabo”) also got the highest value of 4, while (3) *Mimosa pudica* L. (“makahiya”) has also got 3.4 use value index, and (4) *Peperomia pellucida* L. (“sinaw-sinaw”) got the use value of 3.2. It was found that *Artemisia vulgaris* L. based on the data collected, these medicinal plants were commonly used to treat ailments such as fever, relapse, cough, headache, infection, etc. Further, *Coleus amboinicus* L. was also recorded to have a potential treat to various illnesses including cough, chills, fever, itchiness, aching muscles, and even indigestion. While *Mimosa pudica* L. was used to treat headache, fever, fatigue, migraine, and relapse. Hence, one of the highest used citations such as *Peperomia pellucida* L. was already medically approved by the Department of Health. This plant was used to cure those people who have urinary tract infection, kidney infections, and many others. On the other hand, there were also medicinal plants collected that were belonging to least commonly used by the traditional healers. It means got the lowest calculated use value index about its medicinal uses. Nevertheless, there were seven species least commonly used by traditional healers including: (1) *Corchorus cordifolius* Salisb. (“panigbin”) which got the lowest use value of 0.2, it’s because this plant only found in barangay Gubaan due to its unavailability to other barangays. Same with (2) *Brucea javanica* L. (“macassar kernels”) also got the lowest use value of 0.4, while (3) *Phyllanthus urinaria* L. (“likod-likod”) has lowest use value of 0.6, it means that the traditional healers only cited three uses of this plants such as it could treat to sores, swelling, and itchiness according to the traditional healer. However, the (4) *Stachytarpheta jamaicensis* L. (“kandikandilaan”), (5) *Impatiens balsamina* L. (“kamantigue”), (6) *Euphorbia hirta* L. (“mangagaw” or “tawa-tawa”), (7) *Sida acuta* Burm.f. (“scoba nga mayawis”) got the lowest use value of 0.8, this probably because these medicinal plants were only available in specific barangays that were conducted in this study.

However, these plants were said to be least commonly used because only few use citations cited by the traditional healers (see table 3). Interestingly, some least commonly used medicinal plants including, *Impatiens balsamina* L. (“kamantigue”), *Jatropha gossypifolia* L. (“tuba-tuba tapol”), *Phyllanthus urinaria* L. (“likod-likod”), *Pseudelephantopus spicatus* L. (“dila-dila sa iro”), *Stachytarpheta*

jamaicensis L. (“kandikandilaan”) were then subjected to phytochemical screening to determine the active chemical contents of each plant. Unfortunately, only five species were subjected to phytochemical study because there were no other species' parts readily available.

Table 3. Use-value (UV) index of medicinal plants used by traditional healers in Aurora, Zamboanga del Sur

Local name	English name	Family name	Scientific name	Number of use citations by informants (UI)	Total number of informants (N)	UV index
Amorsiko	Golden awn or love grass	Poaceae	Chrysopogon aciculatus (Retz.) Trin	10	5	2
Banaba	Queen's crape-myrtle	Lythraceae	Lagerstroemia speciosa (L.) Pers	9	5	1.8
Bayabas	Guava	Myrtaceae	Psidium guajava L.	13	5	2.6
Bila-bila	Crowfoot grass	Poaceae	Eleusine indica (L.) Gaertn.	14	5	2.8
Busikad	Shortleaf flatsedge	Cyperaceae	Kyllinga nemoralis (J.R. Frost)	13	5	2.6
Caymito	Star apple	Sapotaceae	Chrysophyllum cainito L.	6	5	1.2
Dila-dila sa iro	False elecampane	Compositae	Pseudelephantopus spicatus (B Juss. ex Aubl)	9	5	1.8
Elepanteng puti	Mangrove apple	Boraginaceae	Heliotropium indicum L.	14	5	2.8
Gabon	Sambong	Asteraceae	Blumea balsamifera (L.) Dc.	8	5	1.6
Gotu kola	Pennywort	Apiaceae	Centella asiatica (L.) Urb.	10	5	2
Hagonoy	Siam weed or Christmas bush	Asteraceae	Chromolaena odorata L.	7	5	1.4
Hilbas	Mugwort	Compositae	Artemisia vulgaris L.	26	5	5.2
Kalabo	Oregano	Lamiaceae	Coleus amboinicus Lour.	20	5	4
Kamantigue	Balsam or Touch me not	Balsaminaceae	Impatiens balsamina L.	4	5	0.8
Kandikandilaan	Blue porterweed	Verbenaceae	Stachytarpheta jamaicensis L.	4	5	0.8
Katyubong	Devil's trumpet	Solanaceae	Datura metel L.	6	5	1.2
Kugon	Cogon grass	Poaceae	Imperata cylindrica (L.) Raeusch.	14	5	2.8
Lagnob	Curtain fig	Moraceae	Ficus septica Burm. f.	11	5	2.2
Lagundi	Five-leaf chaste tree	Lamiaceae	Vitex negundo L.	6	5	1.2
Likod-likod	Sampasampalukan	Phyllanthaceae	Phyllanthus urinaria L.	3	5	0.6
Luy-a	Ginger	Zingiberaceae	Zingiber officinale Roscoe	6	5	1.2
Macassar kernels	Macassar kernels	Simaroubaceae	Brucea javanica L.	2	5	0.4
Makahiya	Touch me not	Fabaceae	Mimosa pudica L.	17	5	3.4
Mandalusa	Gandarusa	Acanthaceae	Justicia gendarussa L.	5	5	1
Mangagaw	Asthma plant	Euphorbiaceae	Euphorbia hirta L.	4	5	0.8
Mani-mani	Peanut plant	Leguminosae	Senna tora (L.) Roxb.	6	5	1.2
Mayana itum	Painted nettle or Flame nettle	Lamiaceae	Plectranthus scutellarioides (L.) R. Br.	9	5	1.8
Monggos	Mung bean or Green gram	Leguminosae	Vigna radiata (L.) R. Wilczek	11	5	2.2
Panigbin	Jute mallow or Nalta jute	Malvaceae	Corchorus cordifolius Salisb.	1	5	0.2
Scoba nga mayawis	Common wireweed	Malvaceae	Sida acuta Burm. f	4	5	0.8
Sinaw-sinaw	Shiny bush	Piperaceae	Peperomia pellucida (L.) Kunth	16	5	3.2
Tuba-tuba	Physic nut	Euphorbiaceae	Jatropha curcas L.	10	5	2
Tuba-tuba tapol	Bellyache bush	Euphorbiaceae	Jatropha gossypifolia L.	9	5	1.8
Tuway-tuway or tulay-tulay	Spanish needle	Asteraceae	Bidens pilosa L.	9	5	1.8

Legend: (UV=1 and above) Mostly commonly used, (UV=0.99 and below) Least commonly used

Illnesses treated with medicinal plants used by traditional healers in Aurora, Zamboanga del Sur

Based on the findings, out of fifty-four (54) medicinal uses of the collected medicinal plant species, the highest uses were: fever (18 species), headache (11 species), diarrhea (9 species), body pain, relapse, and stomachache (8 species each), cough, nausea, and stomach acidity (6 species each). Thus, the plant species with the highest number (5 or 6) of various medicinal uses are Eleusine indica, Heliotropium indicum, Ficus septica, Mimosa pudica, Vigna radiata, and Bidens pilosa. Moreover, these plants were used to treat ailments and help people overcome the illnesses that caused them. The results coincide with the study of Assefa et al. (2019), stated that the most widely distributed human disease includes relapse, abdominal pain, common cold, cough, nausea, skin infection, stomachache and others.

Based on the study of Pucot and Demayo (2021), as cited by Unilab Incorporated (2019), the majority of people get these ailments, especially those with compromised immune systems. The symptoms known as bughat or relapse will often occur. Pucot and Demayo (2021) claimed that because women are more likely to give birth, which happened more likely to develop this illness. However, same citation claimed that men can develop this illness, particularly those who have loaded jobs that involve physical strength. As a result, many illnesses will cause the body's immune system to deteriorate, which could cause death if untreated.

In addition, several of the mentioned plant species have been specially utilized to treat a variety of conditions. To treat gastrointestinal infections such as diarrhea, constipation, stomachache, stomach acidity, nausea, most of the traditional healers cited *Chromolaena odorata* L., *Impatiens balsamina* L., *Pseudelephantopus spicatus*, *Jatropha gossypifolia* L., *Senna tora* L., *Corchorus cordifolius* Salisb., *Ficus septica* Burm.f., *Psidium guajava* L., *Chrysophyllum cainito* L., *Brucea javanica* L., and *Datura metel* L. To treat skin diseases, most cited medicinal plants were *Justicia gendarussa* Burm.f., *Centella asiatica* L., *Plectranthus scutellarioides* L., *Phyllanthus urinaria* L., and *Stachytarpheta jamaicensis* L. To treat common cold and cough, the traditional healers cited *Blumea balsamifera* L., *Vitex negundo* L., and *Coleus amboinicus* L. Lastly, to treat fever, relapse, body pain and fatigue, the respondents cited *Bidens pilosa* L., *Heliotropium indicum* L., *Artemisia vulgaris* L., *Kyllinga nemoralis* L., *Euphorbia hirta* L., *Mimosa pudica* L., *Vigna radiata* L., *Sida acuta* L., and *Eleusine indica* L.

However, the traditional healers used various treatment methods and diagnosis depending on the type of ailment occurrence. Based on the data gathered, some traditional healers were used the method of decoction in which if the patients suffered from certain illnesses like fever, relapse, and nausea. The decoction method increased the efficacy of the plant by boiling the fresh parts for a longer time to soften the tougher woody substance and release its active cellular ingredients (Morilla and Demayo, 2019).

Furthermore, some traditional healers also used the extraction of plants through poultice where plant materials, preferably fresh, ground, crush or pound were topically applied directly to the affected area. Further, the traditional healers also utilized the method of infusion, in which involved burning or heating the plant portion with flames. In most cases, the infusion method was used in which the warm water was used as the solvent, and plant components were allowed to steep there like when making tea. According to the information obtained from traditional healers, the patient or attendants were significantly asked for the signs and symptoms observed and the duration of the health problem and accordingly the prescription is ordered.

Qualitative phytochemical screening of five medicinal plants used by traditional healers in Aurora, Zamboanga del Sur

The qualitative phytochemical screening of five selected medicinal plants tested showed the presence of terpenoids, anthraquinones, phenols, and saponins. The results revealed the presence of medically active cellular chemical contents in the five medicinal plants that were studied.

Table 4. Qualitative Analysis of phytochemical constituents of Ethanol extracts from five medicinal plants collected from the Municipality of Aurora, Zamboanga del Sur

Phytochemical Constituents	Plant Extract				
	<i>Stachytarpheta jamaicensis</i>	<i>Jatropha gossypifolia</i>	<i>Impatiens balsamina</i>	<i>Phyllanthus urinaria</i>	<i>Pseudelephantopus spicatus</i>
Terpenoids	++	+++	++	+++	+
Anthraquinones	+	++	+++	-	+++
Phenol	++	+	+	-	-
Saponins	++	++	++	+++	++

Legend: (+++) Strongly present, (++) Present, (+) Weakly Present, (-) Absent

Based on the above table, it can be deduced that, terpenoids and saponins were present in all plants. Anthraquinones were absent only in the leaves of *Phyllanthus urinaria*. While phenols were absent in the leaves of *Phyllanthus urinaria* and *Pseudelephantopus spicatus*. Additionally, as far as phytochemical screening is concerned, the plants with the most abundant phytochemical constituents were *Stachytarpheta jamaicensis*, *Jatropha gossypifolia*, and *Impatiens balsamina* abundant for terpenoids, anthraquinones, phenols as well as saponins. As such, terpenoids were strongly present in the leaves of *Jatropha gossypifolia* and *Phyllanthus urinaria*. It implied that these two medicinal plants *Jatropha gossypifolia* and *Phyllanthus urinaria* constitutes higher level of phytoconstituents. As stated in the study of Rabi (2009), the terpenoids have been found to be useful in the prevention and therapy of several diseases, including cancer.

Stachytarpheta jamaicensis (kandikandilaan), was an erected and branched half-woody plant, 1 to 1.5 meters high as recorded in the Philippine Medicinal Plants. This plant was common weed in open and waste places at low and medium altitudes in settled areas throughout the Philippines. In terms of its chemical constituents, Hoffman and Déciga-Campos (2017), stated that the four chemical components of *Stachytarpheta jamaicensis* were terpenoids, anthraquinones, phenols, and saponins. *Stachytarpheta jamaicensis* was one of many plant species that frequently include these kinds of secondary metabolites. These substances were known to engage in a variety of biological processes and contribute significantly to plant defense mechanisms against herbivores, pathogens, and stressors from the environment. *Stachytarpheta jamaicensis* likely possesses a variety of defensive mechanisms against potential threats in its environment given the existence of these substances in the plant. For instance, terpenoids were recognized for its insecticidal qualities and its ability to stop herbivores from feeding on the plant. Thus, anthraquinones were frequently employed as natural pesticides despite

being harmful to many insects (Fernández-Pérez, 2019; Lahlou, 2004; Trigo, et. al, 2010). However, according to the study of Cushnie and Lamb (2005) stated that phenols and saponins have antimicrobial qualities and can protect the plant from bacterial and fungal infections.

All things considered, the presence of these four chemical substances in *Stachytarpheta jamaicensis* suggested that the plant has evolved a sophisticated defense mechanism to protect itself from potential hazards in its surroundings. However, specific effects of these compounds on the health and survival of the plant will vary depending on several conditions, such as the severity and frequency of attacks by pathogens and herbivores as well as the availability of resources for the plant to generate these compounds.

Jatropha gossypifolia (tuba-tuba tapol), was a species of flowering plant in the spurge Family Euphorbiaceae. Based on Philippine Medicinal Plants, *Jatropha gossypifolia* L. was an erected, branched shrub usually less than one-meter high. It was widely distributed particularly in waste places at low altitudes. It was known to contain a wide range of phytochemicals, including terpenoids, anthraquinones, saponins, and phenols. Another important medicinal plant also possesses these four chemical contents. The strong presence of terpenoids in *Jatropha gossypifolia* presented several benefits to the plant, including protection against pests and diseases, as well as serving as a defense against herbivores. Terpenoids have also been shown to have medicinal properties, including anti-inflammatory and anti-cancer activities (Dinesh Kumar, 2011).

Terpenoids were also known to possess antimicrobial, antifungal, antiparasitic, antiviral, anti-allergenic, antispasmodic, antihyperglycemic, antiinflammatory and immunomodulatory properties. However, numerous studies have investigated the biological activities and potential therapeutic applications of various terpenoids. For instance, a study by Singh and Sharma (2020) demonstrated the potential of monoterpenoids, such as limonene, to inhibit the growth of cancer cells and reduce inflammation. In another study, Sengul et al. (2018) investigated the antioxidant and antimicrobial properties of sesquiterpenoids extracted from various plants, showing promising results for its potential as natural preservatives in the food industry.

However, the presence of anthraquinones and saponins in *Jatropha gossypifolia* also contributed to its medicinal properties. Anthraquinones have been shown to have laxative and antimicrobial activities, while saponins have been shown to have anti-inflammatory and anti-tumor activities (Li, et al., 2015; Olajide, et al., 2000). Thus, the weak presence of phenols in *Jatropha gossypifolia* not have a significant impact on the plant's overall properties, as phenols were known for its antioxidant properties and may also serve as a defense against herbivores and pathogens (Patil, et al., 2011; Souza, et al., 2013; Vogel and Furniss, 1978).

Impatiens balsamina (kamantigue), was a genus of about 850-1,000 species of flowering plants, and together with the puzzling *Hydrocera triflora*, the genus makes up the Family Balsaminaceae. According to Philippine Medicinal Plants, this plant was an annual, erected, succulent, branched herb, 1-meter-high or less that constitutes four cellular chemical contents. Among the four compounds anthraquinones got the strong presence in the leaves of *Impatiens balsamina*. This implies that this plant has medicinal properties due to its antioxidant and anti-inflammatory effects. As supported by Lin (2005), stated that if anthraquinones were strongly present in this plant, it has medicinal properties due to its antioxidant and anti-inflammatory effects. Terpenoids and saponins were also present in *Impatiens balsamina*, which have various biological activities such as antimicrobial, anti-inflammatory, and anticancer properties. However, the weak presence of phenols in *Impatiens balsamina* was not have a significant impact on the plant's overall properties. Thus, phenols also have antioxidant and anti-inflammatory effects, so its weak presence still contributed to the plant's medicinal properties to some extent.

Phyllanthus urinaria (Likod-likod), was an erected, branched, slender smooth herb growing 50 to 60 centimeters high. Leaves were small and oblong, alternate and often imbricated, oblong to elliptic-oblong, 5 to 8 millimeters long, rather pale beneath, and on very short stalks. According to the Philippine Medicinal Plants, this plants was found commonly on roadside and garden weed throughout the Philippines. This plant constitutes only two phytoconstituents such as terpenoids and saponins that has strongly presence in its leaves. This implies that *Phyllanthus urinaria* possess anti-tumor, anti-inflamatory, antibacterial, antiviral, and antimalarial same with saponins. This was supported by Liao, et al., (2006), stated that if terpenoids and saponins were strongly present in *Phyllanthus urinaria*, this indicate that the plant has developed these compounds as a defense mechanism against herbivores or pathogens. Terpenoids were known for its antifungal, antibacterial, and insecticidal properties, while saponins were often toxic to various animals, including insects, fish, and mammals. Therefore, the high concentration of terpenoids and saponins help *Phyllanthus urinaria* to determine herbivores and protect itself from infections.

However, the absence of anthraquinones and phenols in *Phyllanthus urinaria* was suggested that the plant does not rely on these compounds for its survival or medicinal properties. According to Parekh and Chanda (2007), anthraquinones were known for its laxative and antimicrobial effects, while phenols have antioxidant and anti-inflammatory properties. However, the absence of these compounds does not necessarily mean that *Phyllanthus urinaria* was not useful medicinally, as it also contained other bioactive compounds that have different pharmacological effects. The study of Parekh and Chanda (2007), examined the phytochemical composition and antimicrobial activity of several Indian medicinal plants, including *Phyllanthus urinaria*. The researchers found that if the plant did not contain anthraquinones or phenols, it did contain other bioactive compounds such as tannins, flavonoids, and alkaloids. The researchers also observed significant antimicrobial activity against several bacterial strains. To sum it up, the absence of anthraquinones and phenols in *Phyllanthus urinaria* was suggested that the plant does not rely on these compounds for its survival or medicinal properties, but it still contains other bioactive compounds that contribute to its therapeutic potential.

Pseudelephantopus spicatus (Dila-dila sa iro), was an erected, much branched, hairy or nearly smooth, rather stiff herb, 20 to 80 centimeters in height. Leaves are oblong-obovate and 9 to 14 centimeters long, with a blunt tip and narrowed base; those of the upper part of the stem were smaller. Based on the Philippine Medicinal Plants, this plant commonly found in waste places generally. This plant was screened and found that constitutes anthraquinones which was accumulates the strongest presence found in its leaves. Both terpenoids and saponins compounds were also present yet not that strong enough like anthraquinones. This implies that the presence of different chemical compounds in this plant can have various effects on its physiology and interactions with other organisms. Anthraquinones were organic compounds that were commonly found in many plant species and have been shown to have a range of biological activities, including antimicrobial, antifungal, and antiviral properties.

The strong presence of anthraquinones in *Pseudelephantopus spicatus* indicated that the plant has developed these compounds as a defense mechanism against pests and pathogens (Akinyemi, et. al., 2010). However, saponins were another class of organic compounds that were often found in plants, and it has been shown to have a range of biological activities, including anti-inflammatory, antimicrobial, and antifungal properties. The presence of saponins in *Pseudelephantopus spicatus* also suggested that the plant has developed these compounds as a defense mechanism (Santos, et al. 2013). As stated by Sánchez-Medina, et al. (2012), the weak presence of terpenoids in *Pseudelephantopus spicatus* suggested that this plant species was not heavily rely on these compounds for its survival or defense against predators. However, the absence of phenols in *Pseudelephantopus spicatus* indicated that this plant species may have evolved other mechanisms to protect itself against oxidative stress and microbial infections (Gutiérrez and Mitchell, 2011).

Conclusions

In this study, qualitative phytochemical analysis of five selected medicinal plants clearly reveals the medically active cellular phytoconstituents such as terpenoids, anthraquinones, phenols, and saponins that were present in *Stachytarpheta jamaicensis*, *Jatropha gossypifolia*, *Impatiens balsamina*, *Phyllanthus urinaria*, and *Pseudelephantopus spicatus* leaves. These medicinal plants appeared to be rich in chemical contents, widely used in traditional medicine to combat and cure various ailments. The anti-inflammatory, antibacterial, antiviral, antimalarial, antiparasitic, antianalgesic and antioxidant can be attributed to the high anthraquinones, phenols, terpenoids and saponins in the leaves of the five medicinal plants.

Therefore, this study has shown that many plants used in traditional medicine in the Philippines especially in the Municipality of Aurora have very potent different activities like antibacterial, antiviral, antimalarial, etc. and bioactive components of the plant may vary. The characterization of the active cellular components of these plants may lead to full utilization by the local folks particularly for *Stachytarpheta jamaicensis*, *Jatropha gossypifolia*, *Impatiens balsamina*, *Phyllanthus urinaria*, and *Pseudelephantopus spicatus* leaves. The findings of this study may also be of commercial interest to research institutes and pharmaceutical industries in the development of new drugs.

Based on the findings of this study, the qualitative phytochemical analysis of selected medicinal plants used by traditional healers in Aurora, Zamboanga del Sur is highly recommended to future research as reference method to determine the different active cellular chemical contents in the leaves of five medicinal plants. However, the presence of phytoconstituents like terpenoids, anthraquinones, phenols and saponins should take note importantly by the traditional healers or even community in order to have a better understanding on how the plants combat and cure the specific ailments. Furthermore, the study recommends that all medicinal plants should take care of and the future researchers conduct more studies on phytochemical screening of medicinal plants for better understanding on when and how to use different medicinal plants to treat different ailments. Lastly, the study also suggests to future research that instead of focusing only on traditional healers as respondents, it is recommendable that the researcher should involves those people who are knowledgeable enough about administering folk medicine as part of the study.

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