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Phytochemical Analysis of Selected Indigenous Medicinal Plants in Quirino Province, Cagayan Valley, Philippines

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Abstract: ***Medicinal plants have bioactive components which are used for curing various human diseases. They also play an essential role in healing. Fresh fruits and leaves of collected plant samples were used following standard solvent extraction protocol and qualitative analysis to detect secondary plant metabolites. The ethanolic extracts of eight indigenous medicinal plants of Quirino Province, Cagayan Valley, Philippines, were subjected to phytochemical analysis. Results confirmed alkaloids, saponins, phytosterols, phenolic compounds, and flavonoids in specific extracts. The inferences of the findings are discussed in light of the role of indigenous plants in the traditional medicinal system.***
Keywords: Secondary metabolics, phytochemical, indigenous, medicinal plants

I. INTRODUCTION

Medicinal plants are of great significance to the health of individuals and communities (Edeoga et al., 2015). Besides being therapeutic agents, they are also sources of information for various chemical constituents, which could be developed as drugs with precise selectivity (Yadav et al., 2017).

The medicinal ability of these plants lies in their phytochemical constituents that cause definite pharmacological actions on the human body (Akinmoladum et al., 2016). The phytochemicals are classified into two main categories, namely: primary constituents, which include amino acids, common sugars, proteins and chlorophyll, etc.; and secondary constituents, which consists of alkaloids, essential oils, flavonoids, tannins, terpenoids, saponins, phenolic compounds and others (Edeoga et al., 2015; Krishnaiah et al., 2017). The therapeutic value of these medicinal plants comes from their respective phytochemical contents (Doctor & Manuel, 2016).

Recently, the Department of Health (DOH) had advocacy to go back to traditional medicines. The agency would like to upsurge the knowledge and understanding of the population on the plants and their medicinal value. According to Gonzales (2016), synthetic medicines are costly, and many Filipinos, especially those in far-flung areas, cannot afford them.

Hence, massive research on the use of cheaper plant-based therapy is imperative nowadays. It is indeed essential to explore locally available indigenous medicinal plants that are potentials for medicinal purposes.

Tropical countries like the Philippines are abundant in natural and medicinal plants (doctor & Manuel, 2016). In Quirino Province, Cagayan Valley, Philippines, indigenous medicinal plants are popularly used by the people, especially in the far-flung communities. It is rich in plant species, but only a few of them were investigated in detail (Galvez, 2015).

Balangcod & Balangcod (2016) study only identified some of the ethnomedicinal plants used by the natives in the province, but no further investigation was conducted. To discover and develop therapeutic agents, this study confirmed the presence of secondary metabolites in ethanolic extracts from the fruits and leaves of the selected indigenous medicinal plants in Quirino Province, Cagayan Valley, Philippines.

II. RESEARCH METHODOLOGY

A. Sample Collection and Authentication

Plant samples collected in the study and subjected to phytochemical analysis are presented in Table 1. These materials consist of part of the ethnomedicine and healthcare system of the natives in Quirino Province, Cagayan Valley, Philippines, despite the absence of scientific bases (Balangcod & Balangcod, 2016).

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Table 1: Indigenous medicinal plants and their traditional uses.

Plant Samples	Local Name/s	Plant Part	Traditional Use/s
Cyphomandra betecea (Cav.)	Dulsi	Fruit	Fruits are eaten for hypertension.
Sendtn Passiflora edulis	Masaplora	Fruit	Juice of the fruits is taken orally for cough.
Medirilla pendula Merr.	Balangbang	Leaves	Decoction of leaves is taken orally for cough.
Desmodium sequax Wall.	Pullet	Leaves	Crushed leaves are applied to wounds.
Drymaria cordata (L.) Willd ex J.A. schultes	Hithit	Leaves	Crushed leaves are applied to treat boils.
Allium odoratum L.	Danggon hapon	Leaves	Crushed leaves are used as a poultice or dressing on blisters caused by measles and chickenpox.
Physalis minima (L.)	Kamkamatis/Kamahit	Leaves	Decoction of leaves is taken orally for cough and diarrhea.
Centella asiatica (L.)	Batuwang/Batiwang Kannapa/Canapa	Leaves	Decoction of leaves is taken orally to relieve cough. Also, crushed leaves and stems are applied to burns.

Fresh fruits of *Cyphomandra betecea (Cav.)* and *Sendtn Passifora edulis* and fresh leaves of *Medinilla pendula Merr.*, *Desmodium sequax Wall.*, *Drymaria cordata L.*, and *Physalis minima L.* were collected from the different municipalities of Quirino, Cagayan Valley, Philippines. The plant samples were identified by Dr. Glorina A. Orozco, a botanist from the Department of Biology, Far Eastern University Manila, Philippines.

B. Sample Preparation and Extraction

Leaves and fruits of the plant samples were washed thoroughly with running tap water. The leaves were air-dried for three weeks and were ground and pulverized. Two hundred grams of the samples which were grounded, were put in a 3-L capacity flask. Then 95% ethyl alcohol was added to completely submerge the plant samples. These amber bottles were covered and stored at room temperature for 48 hours; then, the plant samples were filtered using a Buvhner funnel with placid sucking. Each filtrate was then concentrated in a rotary evaporator until approximately 20% of the filtrate was left. For *Cyphomandra betecea (Cav.)* and *Sendtn Passifora edulis*, the fresh juice extracted from the fruit of the plant was used as 100% pure extract and subsequently diluted with sterile water to give 50% extract and 25% extract (Alade & Irobi, 2015).

C. Phytochemical Screening

Fresh fruits and ethanolic leaf extracts prepared were analyzed for the presence of alkaloids, anthraquinones, saponins, triterpenes, phytosterols, phenolic compounds, tannins, and flavonoids (Himesh et al., 2015).

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III. RESULTS AND DISCUSSION

The study confirmed the presence of phytochemicals in the extracts, which are considered active metabolites with medicinal properties (Table 2). Each plant sample studied contains specific and does possess all secondary metabolites analyzed.

Table 2. Phytochemical analysis of selected indigenous medicinal plants in Quirino Province, Philippines.

Plant Samples	Alkaloids	Antra-quinones	Saponins	Triter-penes	Phyto-steroids	Phenolic Compound	Tannins	Flavonoids
Cyphomandra betecea (Cav.)	+	-	+	-	+	-	-	+
Sendtn Passiflora edultis	+	-	+	-	+	+	-	+
Medinilla pendula Merr.	-	-	+	-	-	+	-	-
Desmodium sequax Wall.	-	-	+	-	-	+	-	+
Drymaria cordata (L.) Willd ex. J.A. Schultes	+	-	+	-	+	+	-	+
Allium odoratum L.	+	-	-	-	-	+	-	+
Physalis minima (L.)	+	-	+	-	+	+	-	-
Centella asiatica (L.) Urban	+	-	-	-	+	+	-	+

Legend:
(-) - absent
(+) - present

Phenolic compounds were present in all plant samples except for *Cyphomandra betecea (Cav.)* and *Sendtn Passifora edulis*; whereas, anthraquinones, triterpenes, and tannins were absent. Phenolic compounds give essential functions in the reproduction and growth of plants and act as defense mechanisms against pathogens, parasites, and predators and contribute to the color of plants (Baides et al., 2017). These compounds exhibit a wide range of antimicrobial and antioxidant effects (Balasundram et al., (2015); Abah & Abah, (2017). Various bioactivities of it are responsible for their chemo-preventive properties (e.g., antioxidant, anticarcinogenic, or anti-mutagenic and anti-inflammatory effects) as they add to their generating apoptosis by arresting cell cycle, normalizing carcinogen metabolism and ontogenesis expression, preventing DNA binding and cell adhesion, migration, proliferation or differentiation, and blocking signaling pathways (Huang et al., 2015).

Alkaloids were also identified in *Cyphomandra betecea (Cav.), Sendtn Passifora edulis, Passiflora edulis, Drymaria cordata (L.)* Willd ex. J.A. Schultes, *Allium odoratum L., Physalis minima (l.), Centella asiatica (L.)* Urban. According to Parsaeimeh et al. (2016), most alkaloids are very toxic and have the potential function in the chemical defense against herbivores and microorganisms. Pietta (2015) reported that plants having alkaloids are used in medicines for reducing headaches and fever due to their antibacterial and analgesic properties. Also, it possesses various pharmacological properties like analgesic, antamoebic, emetic, anticholinergic, antihypertensive, antitumor, skeletal, and smooth muscle relaxants (Gyawali et al., 2017).

In addition, flavonoids were found in all plant extracts except for *Medinilla pendula Merr.* and *Physalis minima (L.).* It is anti-inflammatory, antihepatotoxic, anti ulcerative, antioxidants, free radical scavengers, anticancer (Okwu & Josaiah, 2015), and maintains membrane integrity (Gyawali et al., 2017).

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Moreover, saponins existed in all plant samples, excluding *Allium odoratum L.* and *Centella asiatica (L.)* Urban. They are considered parts of the plants' defense systems, and as such, they have been contained in a significant group of protective molecules found in plants called 'phytoanticipins' or 'phytoprotectants' (Morrissey & Osbourn, 2016).

Many pharmacological effects such as molluscicidal (Huang et al., 2016), anti-inflammatory (Takagi et al., 2015), antimicrobial (Tamura et al., 2016), antifungal (Delmas, 2017), antiviral (Apers et al., 2015), antihelmintic, anti dermatophytic, antitussives, and cytotoxic effects have been demonstrated in the saponins of plants (Sparge et al., 2018). Other pharmacological activities of saponins are antioxidant, anticancer, and immune system booster (Gyawali et al., 2017).

Furthermore, phytosterols were identified in all plant samples except in *Medinilla pendula Merr.* and *Allium odoratum L.*. In plant cells, they provide regulation of the fluidity and permeability of cell membranes. They are the substrates for synthesizing numerous secondary plant metabolites and act as biogenic precursors of compounds structurally related to mammalian cell-delivered cholesterol that function as essential constituents of plant cell membranes (Lichtenstein, 2018). Phytosterols are used in medicine and cosmetics and are taken as food additives to lower cholesterol (Christiansen et al.,2016). Other health benefits have been attributed to phytosterols for their anti-inflammatory, anticancer, and immune regulatory effects (Carr et al., 2015).

Passiflora edulis and *Drymaria cordata (L.)* Willd ex. J.A. Schultes has the most phytochemicals present, indicating a higher medicinal value while indicating a higher therapeutic value while *Desmodium sequax Wall.* and *Allium odoratum L.* have the least. Thus, from the present investigation, the medicinal properties of the selected eight indigenous medicinal plants can be recognized based on the phytoconstituents present in them.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the findings, the study concludes that the eight selected indigenous medicinal plants all contain specific combinations of phytochemicals that can justify their therapeutic value. The presence of these metabolites in crude extracts from traditional preparations and application may account for the folkloric claims of the natives in Quirino Province, Cagayan Valley, Philippines. The study recommends the conduct of qualitative analyses of these phytochemicals. It is also recommended that these medicinal plants be used for development of food products for human diets as well as herbal medicinal products. Future researchers in the field of business can use this research for a feasibility of products containing combinations of phytochemicals.

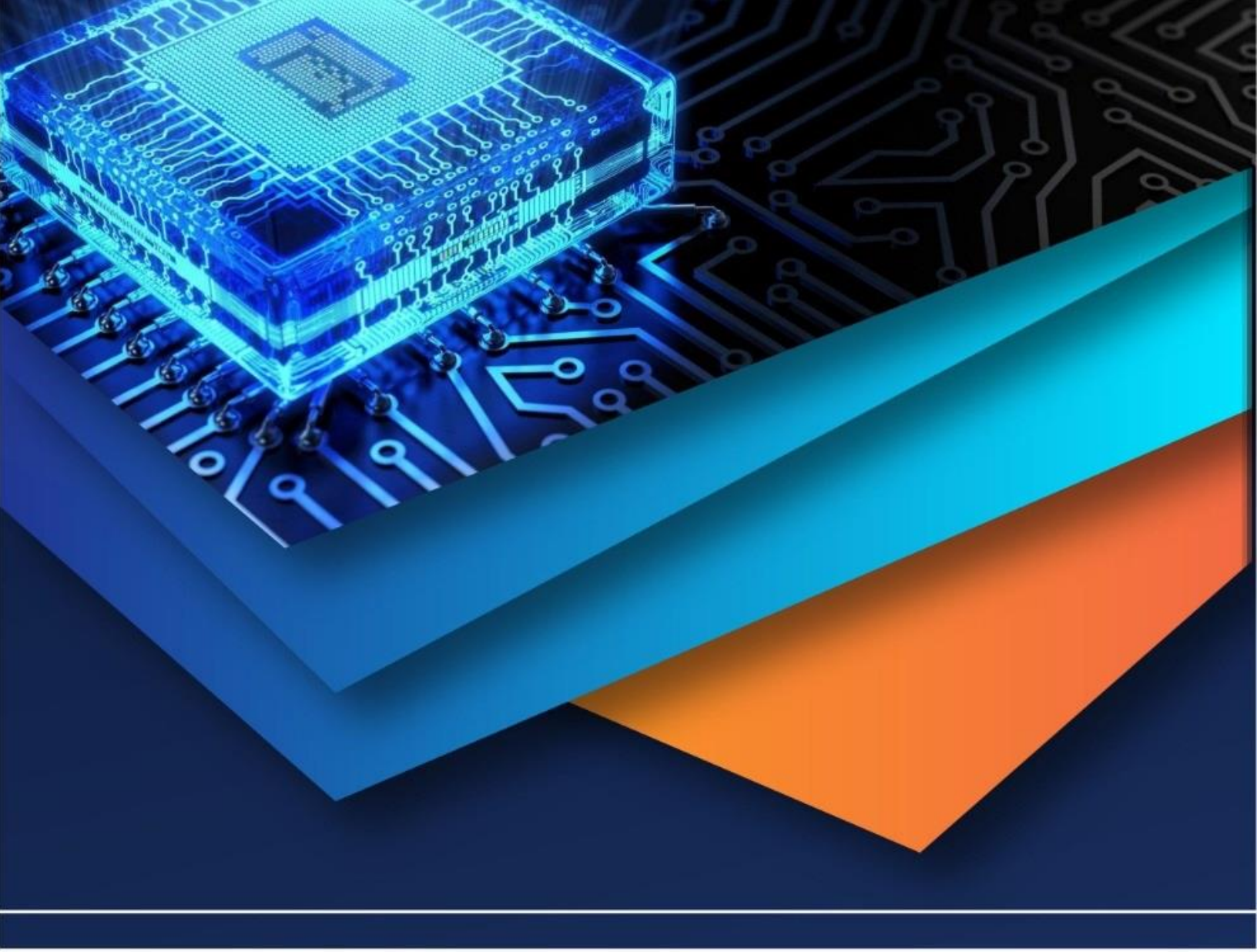
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