

Abstract

San Lucas Tolimán is a Guatemalan municipality located on the southeastern shore of Lake Atitlan. Throughout the years, its environment and population has been shaped by Spanish conquest, Maya traditions, and globalization. Within this municipality, the traditional and first-sought method of pharmacological agents comes in the form of plants, many grown by locals within their communities. In fact, the World Health Organization suggests that over 80% of the world's population relies on traditional herbal medicine (WHO, 2008). The objectives of this study were to present an overview of some plants used among the Maya people in San Lucas Tolimán, their common uses, and interactions that may occur in combination with biomedicine. Botanical vouchers were collected from the Women's Center in San Lucas Tolimán, and an interview with Güicha, the director of the center and head medicine woman was conducted. While there are benefits in the use of medical ethnobotany, it was found that in combination with biomedicine, some of these ethnobotanical treatments can be toxic when used in excess and may pose severe interactions with commonly used medications (Bent, 2008). Considering the rise of globalization and increased access to medicinal herbs, it is important for medical practitioners to be aware of patients' use of ethnobotany in combination with biomedicine as interactions may occur during treatment.

Introduction

San Lucas Tolimán is a Guatemalan town with a rich history. It is a town with high rates of poverty, and a demographic composed of over 82% indigenous Maya known as the Kaqchikel people (Walsh, 2016). In 1968, the region gained aid from the Diocese of New Ulm and the Mission of San Lucas was started. Since the inception of the Mission, San Lucas has flourished, with a noticeable growth in health care, education, and employment opportunities for the locals (Friends of San Lucas, 2022). With all its growth, however, the people of San Lucas Tolimán maintain their cultural use of medicinal plants for treating various ailments and complaints. Guatemala, similar to most countries in Central America, continues to use ethnobotany due to its access, low cost, and cultural traditions (Michel et al., 2006). When compared with pharmaceuticals, which are primarily paid for by household out-of-pocket costs, herbs and plants can easily be grown in backyards or community centers which can be accessed by the community for free or at a significantly more affordable price (Avila, 2015). Many of these ethnobotanical compounds, although used by the people in San Lucas Tolimán, can also be found throughout the world. Now more than ever, with globalization and the internet, it is incredibly easy for anyone in any part of the globe to gain access to plants that have been used as medicine for centuries.

In comparison to San Lucas Tolimán, the United States has a vastly different demographic when examining the use of herbal medicine. It is estimated that over 3 million individuals in the United States utilize ethnobotany to treat their conditions, with surveys showing that over 70% of users are white females of middle to advanced age (Rashrsh, Schommer & Brown, 2017). This same survey also found that between 38-42% of individuals utilizing medical botany concurrently use prescribed or over-the-counter medication. It is unlikely that a patient will inform physicians of their supplemental use of herbal medicine, and herb-drug interactions, while rare, can occur (Asher, Corbett, & Hawke, 2017). While the literature on these interactions is limited, there is a growing body of evidence showing the necessity for physicians to be aware of herbal supplementation taken by patients in the event of possible drug interactions (Izzo & Ernst, 2001; Babos et al., 2021).

This study aimed to compare commonly utilized plants found in San Lucas Tolimán to those utilized in the United States and discuss the negative interactions that can occur when they are taken in combination with pharmacological medicine.

Methods

A total of 5 individuals from the town of San Lucas Tolimán were interviewed, including the director of the women's center, an MD-PhD candidate studying in the area, and locals working at the hospital. Interview methods to gather information on Kaqchikel cultural beliefs and practices included authors' observation and participation in typical daily activities (building homes, making tortillas, and clothes-washing), open and unstructured interviews with men and women, botanical voucher collections, and discussions with members of the San Lucas Mission Hospital. Interviews were conducted in Spanish. Participants were asked to name the plant species they most commonly used and the conditions they were used for. Interviews varied from 5 minutes to 1 hour, depending on the informant's level of knowledge. This information was analyzed in a qualitative manner, based on the plants mentioned in the interview. The plant names were cross-referenced to find their scientific and common names, as well as their common uses and interactions.

Results

Scientific Name	Common Name	Uses	Interactions/Side Effects
<i>Ruta chalepensis</i> L	Ruda Fringed Rue	Parasitic Infections	Neurotoxic in high doses
<i>Achillea millefolium</i>	Milenrama Yarrow	Inflammation Stomach cramps Bloating Indigestion Insomnia Anxiety	Increased risk of bleeding if taken in combination with blood thinners. Allergy (Type 1 Hypersensitivity reaction) Photosensitivity Contraindications with stomach acid reducing agents
<i>Eriobotrya japonica</i>	Hoja de Nispero Loquat	Cancer Hyperglycemia Hyperlipidemia Inflammation	Hypotension Prolonged blood clotting Must be stopped 2 weeks before surgery due to anticoagulatory effects
<i>Euphorbia lancifolia</i>	Ixbut Spurge	Hypogalactia	Osteoporosis with long term use Ocular Toxicity with eye contamination Nausea Vomiting
<i>Marrubium vulgare</i>	Marrubio White Horehound	Hyperglycemia Stomach Cramping Inflammation Congestion	Vomiting Hypoglycemia Arrhythmias Hypotension Should not be taken with other diabetes or antihypertensive agents. Must be stopped 2 weeks before surgery due to blood glucose management during and after surgery
<i>Costus Igneus</i>	Insulina Fiery Costus	Hyperglycemia	Hypoglycemia
<i>Glycyrrhiza Glabra</i>	Maria Luisa Licorice root	Inflammation Cough	Arrhythmia Syndrome of Apparent Mineralocorticoid excess Hypertension Hypokalemia Metabolic Alkalosis
<i>Tagetes Erecta</i>	Flor de Muerto Marigold	Hypertension Parasitic Infections Insomnia	Interacts with sedatives and antihypertensive agents



Discussion

It is undeniable that medical ethnobotany plays an important role in the medical regimens of many. In San Lucas Tolimán, Guatemala, the people rely on the plants around them out of tradition and necessity. However, herbal medicine also plays an important role for many in the United States. With the rise in pharmacology and improved healthcare around the world, the number of individuals combining herbal medicine with prescribed or over-the-counter medication is increasing. For this reason, it is important to increase awareness on herb-drug interactions and the possible side effects that may occur.

The data collected supports the hypothesis that while herbal medicine is beneficial, it can be detrimental to one's health when used in excess or in combination with other drugs. For example, an individual who is taking *Achillea millefolium* to treat stomach cramps increases their risk of bleeding when used in combination with a blood thinner. A mother who has hypogalactia can use plants in the *Euphorbia* genus as a treatment but risks developing osteoporosis with long term use. While herbal medicine is valuable, it is necessary for users to be aware of side effects and interactions, such as those mentioned in the data, to prevent causing more harm than good.

Physicians should be having more conversations with their patients in a manner that builds trust and promotes openness, so that a patient discloses any potential use of herbal supplements. With this information, the physician and patient are better able to work together to make decisions on their own pharmacological regimen, while being aware of any possible interactions. Part of this issue can also be tackled by decreasing the stigma surrounding alternative/traditional medicine. As we can see with San Lucas Tolimán, there is a strong component of cultural tradition behind the use of medicinal ethnobotany due to its accessibility and cost across the community. This is similarly applicable for all those in the United States, who may use herbal medication for a multitude of reasons.

As of February 2022, one database exists for Healthcare Professionals, researches and plant based-medicine manufacturers to search for herb-drug interactions (Perrot et al., 2022). While the database is limited at this time for private use, it's the beginning of a centralized location for physicians to access information regarding these interactions. As the database grows and more research is conducted to collect information, we advocate that a similar database be accessible to the public. With this data available, individuals can make better informed decisions prior to taking herbal supplements by cross-referencing any potential side-effects. It will also allow for the spread of information globally, which may be a great benefit to all those taking herbal medicine.

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