

## Toxicity of Herbal Plants as Determinant of their Use

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### Abstract

In many regions of the world, conventional medical practices are still given significant importance. Medicinal herbs are frequently used in the treatment of illness in traditional medical practice. This is due to the low cost of medicinal herbs and the ease with which they can be prepared. The vast majority of herbs that are used contain some level of toxicity, which is one of the aspects that plays a role in deciding how they ought to be utilized. The purpose of this research was to carry out a literature review on the subject of the application of medicinal plants, in addition to the potential and possible toxic status of these plants.

**Keywords:** *Traditional Medicine; Medical Herbs; Patients; Diseases; Toxicity*

### Introduction

The present review covers various sections including tradition medicine, and the toxicity of some medical plants of popular use.

#### Traditional medicine

Before the advent of what is now known as "modern medicine", various strategies for preserving and regaining one's health were practiced all over the world. These strategies are collectively referred to as "traditional medicine" [1]. It is a component of medical care that is available in almost all countries around the world, but it is not given the appreciation it deserves [2]. The application of traditional medicine has been utilized for the purpose of promoting overall health and wellness, as well as for the purpose of preventing, diagnosing, enhancing, or treating a wide variety of physical and mental conditions [3]. Herbal medicine is the practice of using herbs, herbal materials, herbal preparations, and finished herbal products [4]. These are derived from various parts of plants such as leaves, stems, flowers, roots, and seeds. Herbal medicine is defined as the practice of using herbs. Herbal medicine is defined as the practice of using herbs. The World

Health Organization (WHO) describes the use of herbs as the practice known as herbal medicine [5]. Over the past decade, there has been a global uptick in both the interest in and the demand for the utilization of traditional medicine. This trend can be seen in every region of the world [6]. According to projections provided by the World Health Organization (WHO), approximately 80 percent of the world's population receives the majority of their primary healthcare from traditional and complementary practices [7]. Traditional medicine continues to be widely practiced across the world, despite the fact that the frequency with which it is done varies greatly from country to country [1]. Traditional medicine is practiced by anywhere from 40 - 65 percent of the population in Asian countries, with China having the lowest percentage at 40 percent and India having the highest percentage [1]. In a manner analogous, the use of traditional medicine constitutes 31% of the healthcare system in Belgium, 49% in France, and 70% in Canada [7].

### Examples of medical plants

Garlic (*Allium sativum* L.), Chamomile (*Matricaria chamomilla* L.), Echinacea (*Echinacea purpurea* L.), Ginger (*Zingiber officinale* Roscoe), Peppermint (*Mentha piperita* L.), Echinacea (*Echinacea purpurea* L.), Cranberries (*Vaccinium oxycoccos* L. and *Vaccinium macrocarpon* L.), Garlic [8].

### Historical perspectives of using medicinal plants

Since the beginning of recorded history, people have used plants for a variety of purposes in human life. However, the most common uses have been as food and medicine, specifically for the purpose of providing nutrition and treating diseases, respectively, in both humans and animals. They are utilized in every culture on the planet and have been relied upon for the support, promotion, and restoration of human health for a number of millennia now. They can be found in the following: It is a common practice in all African societies to use them with the goal of preserving one's health and well-being, and they are an essential part of traditional medicine (TM), which is another name for African folk medicine. They are used as remedies for the prevention of as well as treatment for or management of a wide variety of diseases and conditions, including relatively new diseases and conditions such as HIV/AIDS [9].

Traditional medicine was the only form of treatment that the entire African population sought out prior to the development of allopathic or conventional medicine [10]. This was the case before either of these forms of medicine came into existence. After the Alma Ata Conference Declaration in 1978, which aimed to achieve primary health care for all people by the year 2000 through the utilization of traditional medicine [11], the practice received international recognition. Traditional medicine, and particularly herbal medicine, remains the cornerstone of rural healthcare in Africa, and it is estimated that it supports between 80 and 90 percent of the continent's population [12].

### The use of herbal medicine in treating HIV and their toxic limitations

Anywar, *et al.* [13] conducted a study In Uganda, in the light of the fact that there is a sizeable population of HIV-positive people who make regular use of alternative treatments like herbal medicine. On the other hand, there has been no investigation into either their safety or their toxicity. Patients who use these plants run the risk of their health being harmed in some way as a result of the use of these plants. The purpose of this study was to investigate the cytotoxic potential of a variety of medicinal plant species that are commonly used by patient living with HIV (PLHIV). Cytotoxicity assessment was carried out for the following plants *Warburgia ugandensis*, *Erythrina abyssinica*, *Cryptolepis sanguinolenta*, *Albizia coriaria*, *Psorospermum febrifugum*, *Gymnosporia senegalensis*, *Zanthoxylum chalybeum*, *Securidaca longipedunculata*, *Vachellia*. The results showed that the ethanol extracts of *W. ugandensis* and *A. coriaria* were extremely cytotoxic. The indigenous people's traditional knowledge of the toxic effects that could be experienced if the plants were not utilized in the appropriate manner was comparable to the cytotoxicity of *W. ugandensis* and *A. coriaria*. If the plants were not utilized in the appropriate manner, toxic effects could be experienced. On the other hand, most of the plant extracts, 15 out of 22, exhibited low to moderate cytotoxicity [13].

People who are HIV-positive and have AIDS make extensive use of traditional medicines, which are very popular in these populations and have a long history of successful treatment [14]. HIV/AIDS is the immunosuppressive disease that has affected the most people all over the world. The human immunodeficiency virus is to blame for the development of this condition [15]. In Uganda, 5.4% of adults were living with HIV, with the prevalence rate being significantly higher among females (6.8%) [16]. In Uganda, particularly in rural areas, more than ninety percent of the population relies on traditional herbal remedies to manage their day-to-day health care requirements [17].

In South Africa, for instance, patients who reported recently using traditional medicines were found to have significantly increased rates of dehydration, vomiting and diarrhea, in addition to experiencing changes in their mental status. A wide variety of conventional treatments have been linked to the alleviation of these symptoms [18]. In a similar manner, the use of traditional herbal treatment has been associated with dysfunctions of the liver and kidneys, which have been associated with a high patient mortality rate [18]. One of the most serious side effects of taking traditional medicines, but also one of the least recognized, is acute renal failure. Despite this, acute renal failure is a significant contributor to the etiology of renal diseases in the clinical practice of routine medicine [18,19]. In Africa, the consumption of herbal remedies has been linked to approximately one third of all cases of acute renal failure that have been documented there. On top of that, it is believed that this number is lower than it actually is due to the fact that traditional health practices and the utilization of traditional remedies are shrouded in secrecy. This is because of the fact that traditional health practices and the utilization of traditional remedies are shrouded in secrecy [18].

The ingestion of potentially poisonous medicinal herbs can lead to contamination, which can lead to the improper replacement of necessary medication with poisonous herbs, adulteration, herb-drug interactions, the use of suboptimal un-standardized herbal medicines, and a lack of regulations or the enforcement of those regulations are some of the most significant problems associated with the use of herbal medicines [20]. It is also common knowledge that the beginning, composition, and method of preparation of herbal remedies can change depending on the prevalent local healing practices as well as the level of expertise and knowledge possessed by the herbalist. This is something that can be said about herbal remedies in general, however [14].

Aquaculture has the potential to be a beneficial source of economically viable and nutritionally sound protein for human consumption, which has the potential to improve overall well-being. Aquaculture also has the potential to increase biodiversity. The most dangerous kind of illnesses that can affect aquatic animals are those that are caused by viruses, and they present a significant challenge to the expansion of the aquaculture industry. In the context of antibiotic-free farming, one of the most pressing concerns in the industry of aquaculture is the research, development, and implementation of antibiotic substitutes. This is due to the fact that antibiotic-free farming is becoming increasingly popular. In recent years, it has come to light that a variety of medicinal plants and the active pharmaceutical ingredients found within them are useful in the treatment of viral diseases and the prevention of those diseases in aquatic animals. These findings have only come to light in the past few years. Medicinal plants, in contrast to chemical drugs and antibiotics, are associated with a reduced risk of adverse effects, a reduced likelihood of the development of drug resistance, and a lower likelihood of causing water pollution. In addition, the use of medicinal plants is associated with a lower likelihood of environmental damage. Because it has been demonstrated that the majority of medicinal plants can effectively improve the growth performance of aquatic animals, these plants are gaining a growing amount of value and are being utilized more frequently in aquaculture. This article provides a summary of the promising antiviral activities of medicinal plants and the active pharmaceutical ingredients that can be found in those plants in order to combat aquatic viruses. In addition to this, it provides an explanation of their potential mechanisms of action as well as potential implications in the treatment or prevention of viral diseases in aquaculture. This article has the potential to pave the way for the future development of non-harmful drugs that can be used for the prevention and control of outbreaks of viral diseases in aquaculture. There is a possibility that this article will pave the way for the future development of these drugs [21].

There is one species of herbaceous plant known as *Senecio vulgaris* L., and it can be discovered all over the world. There is a significant risk of contamination of plant material batches that are aimed at the market for herbal teas as a result of this species' ability to invade a

wide variety of habitats and the fact that it has been shown to contain pyrrolizidine alkaloids. Additionally, this species has been shown to contain these alkaloids. As a direct consequence of this, there is a risk that these herbal teas pose to the health of the consumers who purchase them. In light of the information that has been presented thus far, the primary objective of this study was to investigate the cytotoxic and genotoxic activity of extracts of *S. vulgaris* in HepG2 cells. Both an organic solvent-based procedure (using methanol and chloroform) and an environmentally friendly extraction procedure (i.e. aqueous extraction), which mimicked the preparation of herbal teas in the home, were used to grind the dried plants and extract the active ingredients. The home preparation of herbal teas was used as a model for the grinding and extraction process (5, 15, and 30 minutes of infusion). After that, the potential for the extracts to be cytotoxic and genotoxic was evaluated using HepG2 cells. Both extracts produced results that were virtually identical to one another. At concentrations that were not cytotoxic, they showed a moderate dose-dependent genotoxicity, which was associated with a slight decrease in cell viability at the highest concentration that was tested. It was discovered that the genotoxic effect of aqueous extracts is even more pronounced than that of solvent-based extracts. This was discovered by comparing the two types of extracts. Even at the lowest concentration that was examined, these extracts were still able to cause primary DNA damage after being infused for only five minutes. This experimental method could be proposed as a screening tool in the analysis of plant material lots aimed at the market for herbal infusions. Keeping in mind the widespread consumption of herbal infusions around the world, this would be an appropriate application for the method [22].

The consumption of herbal remedies has skyrocketed all over the world in recent years. In developing countries, many people patronize them primarily due to the fact that they are culturally acceptable, readily available, and inexpensive. They are utilized in developed nations due to the fact that they are natural, and as a result, it is presumed that they are safer than allopathic medicines. In more recent times, however, there has been an increase in concern regarding their level of safety. Because of this, conversations about how they should be utilized have become fraught with ambiguity. If the appropriate precautions are not taken, the use of certain medicinal plants that contain constituents that are themselves toxic can result in unwanted side effects. Other factors, including interactions between herbs and pharmaceuticals, a lack of adherence to good manufacturing practice (GMP), inadequate regulatory measures, and adulteration, are also potential contributors to the occurrence of adverse events associated with their use. The debate on the safety of herbal medicines will likely continue because most *in vitro* tests on isolated single cells mostly using extracts that aren't aqueous show results that contradict those of many *in vivo* tests on aqueous extracts, which largely support the notion that herbal medicines are safe to use. It is reasonable to anticipate that toxicity studies pertaining to herbal medicine will reflect their traditional use. This will make it possible for rational discussions to take place regarding the herbs' safety for their beneficial applications. Even though there are many studies ongoing to determine whether or not various herbal medicines are safe for use in humans, it is still important to use them with extreme caution and maturity [12].

### Characteristics that contribute to the toxicity of certain chemicals

The degree to which a substance is able to stimulate unfavorable responses in living organisms is referred to as its toxic potential [23]. Toxicology is the study of the potentially harmful effects that chemicals can have on living organisms, as well as the symptoms, mechanisms, and treatments that are associated with those effects. Toxicology also examines how these effects can be treated. Toxicology is the study of poisons and other potentially harmful substances, and it is also the name of the related academic field. Studies of toxicity can be categorized as having acute effects, subacute/subchronic effects, or chronic effects, depending on the amount of the agents that were administered and for how long [24]. Acute effects refer to the body's immediate response to the agent, while subacute/subchronic effects and chronic effects occur over a longer period of time. The term "acute effects" describes the way in which the body reacts immediately to the agent, whereas "subacute/subchronic effects" and "chronic effects" refer to reactions that take place over a longer period of time [24].

### The acute negative effects of the toxin on the body

Acute toxicology is a branch of toxicology that studies the aftereffects of a single, high-dose exposure to a toxic substance that lasts for an extended period of time. In most cases, the duration of these studies is restricted to twenty-four hours. The research that is considered

to fall under this category often involves the use of animals. As a direct result of this, the organism in question may be subjected to severe detrimental biological effects, some of which may even lead to the organism's demise. Not only are the findings of acute toxicity significant when thinking about accidental poisoning with a chemical, but they are also utilized in the process of planning chronic toxicological research [25]. Not only are the findings of acute toxicity significant, but they are also utilized in the process of planning chronic toxicological research. Not only are the findings of acute toxicity significant, but they are also used in the process of planning research that is conducted in the area of chronic toxicology [14].

### Long-term contact with toxic substances can be harmful

Chronic exposure refers to the ingestion of a toxin over an extended period of time, which is typically measured in terms of months or years. This type of exposure can be fatal. The toxicity that may develop as a consequence of this form of poisoning may not be treatable. The terms "subacute" and "subchronic" are used to refer to the stages of exposure that are described as occurring between the "acute" and "chronic" stages. A new drug or an existing drug with little or no documentation of its systemic toxicity can be evaluated for any potentially hazardous effects with the assistance of the findings of chronic and acute toxicological studies. These studies look at the toxicity of the drug over time. This evaluation is applicable to both recently developed medicines and those already on the market [14].

### Conclusion

Traditional medicine has been around for a very long time; however, not nearly enough research has been conducted to determine whether or not it is effective and whether or not it has any adverse side effects. The majority of plants that are used for therapeutic purposes have a low level of toxicity, whereas other medical plants have a high level of cytotoxicity. This is because cytotoxicity refers to the ability of a plant to kill or damage cells. We encourage researchers to look into medicinal plants and classify the different levels of toxicity that they contain.

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