

Review of the Potential Value of Medicinal Plants in Forensic Investigation

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When consumed in high doses, medicinal plants have the potential to be used both as specific therapy dosages and as lethal poisons that may be used to commit murder or suicide. Forensic professionals can gather traces and leftover components from these dangerous medicinal herbs during a crime scene. Forensic professionals can gather traces and leftover components from these dangerous medicinal herbs. Also, additional studies need to be thoroughly carried out in the future to comprehend the importance of medicinal herbs in forensic investigations to discover these criminal activities. Additionally, to provide a thorough understanding of chemical substances that can have an impact on human life in either a positive or negative way at various doses, as well as to identify the ideal or overdose concentrations for either treatments or poisonous effects using more recent biotechnological approaches.

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Introduction

Phytochemicals are significant biological substances found in plants. They are categorised as bioactive substrates, and they provide a variety of health advantages to people (Hasler and Blumberg, 1991, Quideau et al., 2011). These biological substances, often known as phytochemicals or substrates, include terpenes, polyphenols, and alkaloids. Alkaloids, which have anti-cancer and anti-asthma properties, are the main components of pharmaceuticals (Kittakoop et al., 2014). Moreover, several poisonous substances might be transformed into alkaloids like tubocurarine and atropine (Awuchi, 2019). Nowadays, especially in developing nations, medicinal plants are regarded as a normal component for

making pharmaceuticals to cure patients. For centuries, people have utilized medicinal herbs to treat conditions including parasite infection, coughing, inflammation, and colds. Plants that are mentioned include "oils of the *Commiphora sicutica* (myrrh), *Cedrus sp.* (cedar), *Glycyrrhiza glabra* (licorice), *Papaver somniferum* (poppy juice), and *Cupressus sempervirens* (cypress)" (Dar et al., 2017).

It is addressed that medicinal plants have a double-edged nature and can be used not only for medical treatments, in which case they are referred to as alternative medicine (AM), but also for a number of harmful ends, including causing death, severe injury, and stupor by manipulating the concentration of poisonous substances. Poisonous plants are one of several naturally occurring toxins that can be fatal or create major disruptions. (Pillay and Sasidharan, 2019).

Medical Plants

Application of plant chemical analysis and extraction of active chemicals led to the development of a new mass-scale science. New medications were made possible by the extraction of strychnos ipecacuanha quinine from the cinchona tree and alkaloids like morphine from poppies. Salicylic acid's history dates back to 1853, whereas morphine's dates back to 1826, marking the beginning of the modern period of drug research (Awuchi, 2019).

- ✚ **Uses and importance of medical plants:-** A variety of therapeutic benefits of medicinal plants make them useful in alternative medicine. Because they are less expensive than a synthetic medicine sold in a pharmacy, the usage of these natural treatments is constantly rising. Often used as a beverage without a prescription, these formulations. Moreover, less adverse effects from alternative therapy than from traditional medication (So et al., 2018). The existence of plant-based in vitro systems (such as callus cultures, cell suspension cultures, and organ cultures), as well as genetic engineering to enable the production of desired plants and plant products, have recently presented appealing potential. Due to the fast destruction of natural habitats, biotechnology in vitro has been employed to produce secondary products in higher numbers than those found in in vivo farmed plants (Lata et al., 2008, Efferth, 2019).

- ✚ **Identifying the effectiveness of medicinal plants for human health:-** Humans have utilised plants for a variety of reasons from the beginning of time, most notably as food for sustenance and as medicine to alleviate illnesses in both people and animals. All cultures employ plants to maintain, enhance, and restore human health, and this has been the case for many centuries. (Awuchi, 2019). A study has determined that 73% of all current pharmaceutical products include ingredients derived from natural products (Wangchuk, 2018). (See some examples in table 1).

Table 1

Some examples of medicinal plants and their active components and utilizations:

No.	Plants	Active components	Utilization and toxic effects
1	<i>Glycyrrhiza glabra</i> (liquorice)	Glycyrrhizic acid 18 β -glycyrrhetic acid, glabrin A and B, isoflavones	Antibacterial, anti-inflammatory, antiviral, antioxidant, and anti-diabetic activities
2	<i>Nerium Oleande</i>	Oleandrin - cardenolide and pregnatriene compounds	Arrange heart beats disorder - toxic effect
3	<i>Peganum harmala</i>	β -carboline alkaloids	Aistinctive cardiovascular impact, such as bradycardia, diminished systemic blood vessel function, - toxic effect
4	<i>Strychnos ipecacuanha</i>	Strychnos indole alkaloids	Anti-tumor alkaloids

- ✚ **Poisonous medicinal plants:-** Several of these therapeutic herbs might be fatal if consumed in excessive amounts due to their poisonous properties. As an example, consider the plant known as Syrian rue (*Peganum harmala*), which is frequently used as a medicine (Khlifi et al., 2013) β -carboline alkaloids included in *P. harmala* have a pronounced cardiovascular effect that includes bradycardia, decreased systemic blood vessel function, and decreased blood volume. It has been demonstrated to have anti-platelet aggregation actions and is used to treat various nervous system illnesses, such as Parkinson's disease. It also contributes to peripheral vascular resistance (Khlifi et al., 2013). In other words, *P. harmala* is dangerous to both people and animals. An overdose's side effects include nausea, vomiting, and hemorrhaging. Physical

examination reveals a little increase in body temperature, a rapid heartbeat, low blood pressure, convulsion, trembling in the limbs and face, visual hallucinations, and stomach discomfort.

- ✚ **Medicinal plant overdose causing human death:-** Based on how rapidly it exerts its impact, an unsafe dosage might be acute or chronic (take effect after a long period of exposure). Toxic or dangerous side effects of most therapeutic herbs are recognised, nevertheless, and are avoided unless under the guidance of experts or knowledgeable people.

Forensic diagnosis

The main focus of forensic toxicology is on the medico-legal aspects of the harmful effects of xenobiotics on people and animals. While more pertinent to civil courts than criminal courts, forensic toxicology also includes the study and evaluation of medications as well as the conservation of agricultural, industrial, and public health legislation to preserve clean air, pure water, and provisioning of safe food. This analysis recognises the advantages and restrictions of specimen preservation events. Matching techniques for samples in alleged intoxications should be directly useful right now (Dinis-Oliveira et al., 2010). The first incident happened in 1935 when Bruno Hauptmann was tried for kidnapping. Some very hazardous poisonous plant species, such Conium, Cicuta, Nerium, Aconitum, Datura, and Ricinus, which are also utilised for homicidal and suicidal reasons, are especially helpful in forensics for the capture of offenders.

In crime scenes, forensic experts can preserve evidence related to intentional or unintentional poisoning using deadly plants. Crime sites including woodlands and gardens, as well as signs of poisoning, may help investigators by providing information on plant parts. (Dinis-Oliveira et al., 2010).

- ✚ **A dose of a poisonous plant may be a panacea or a lethal poison:** A traditional method for treating most illnesses, including chronic ailments, involves the use of deadly plants. The WHO revealed that 25% of Indians use contemporary pharmaceuticals made from separated plants, whereas 80% of the population depends on plant-based medications. (Tamilselvan et al., 2014)The Siddha method is an approach to Indian traditional medicine that engages poisonous plants to treat patients with chronic illnesses.

- ✚ **What can forensic research tell us about crimes involving poisonous medicinal plants?:** The identification of specific poisons linked to specific animal or human organs or tissues using molecular and biotechnological methods. Enzyme-linked immunosorbent tests, High-performance liquid chromatography, radioimmunoassays, reverse transcription-polymerase chain reactions (RT-PCR), liquid chromatography-tandem mass spectrometry, and gas chromatography-mass spectrometry are among the methods frequently used for forensic investigations. The probe binding mechanism, which readily attaches to particular receptor molecules, is one example of new technology employed by scientists. In situations of rape or sexual harassment, RT-PCR is frequently employed for multi-fold amplification to compare specific proteins or genetic materials, such as the victim's DNA or RNA (Dinis-Oliveira et al., 2010).

Conclusion

Based on the dosage, medicinal plants can be the difference between life and death. They can also be used as fatal poisons to commit suicide or murder. Additionally, forensic professionals may gather traces and leftover components from these dangerous medicinal plants at a crime scene and utilise them as forensic evidence to solve cases and unravel the riddles surrounding crimes using various molecular analysis and forensic techniques. For the purpose of defining the ideal and proper concentrations of plants to be employed in diagnostic forensic tests, further research and studies must be efficiently carried out in the future.

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