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Essential and Non-Essential Elements in Medicinal Plants: A Review

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ABSTRACT

Aim: Particularly trace elements play an essential role in assessing the medicinal value of plants, health, and disease treatment. For most organisms, such as plants, animals, and humans, these elements are essential for all biochemical and physiological processes.

Methodology: The review explored the influence of trace metals in medicinal plants. This research area has received little attention and a thorough understanding of trace metals' roles in medicinal plants.

Result & Conclusion: This review summarizes the survey on evaluating these elements' status in medicinal plants. Hence, a thorough study was considered necessary to determine these two toxicity levels of plants. Also, in-vitro and in-vivo studies must be conducted to demonstrate its safety and effectiveness. Besides, harvest season is another climatic factor related to changes in element concentration in medicinal plants.

Introduction

A medicinal plant contains the necessary nutrients, carbohydrates, fats, and primitive proteins required for the human body and is considered the best energy source. In addition to these biomolecules, some plants are also crucial for human health. Micro and Macro-elements, as well as heavy metals, are considered as a potential health risk [1,2]. plants are also primary sources of food, minerals, vitamins, and essential antioxidants for many communities facing economic difficulties. However, some researchers have found similar anti-nutrients in many conventional and traditional plants [3-5]. Although knowledge of plant materials is generally limited, there is little data on nutrients and proximity elements [6]. This article will enrich the literature to provide worth full information on trace minerals of medicinal plants. Fresh plant material contains 80-90% of water, and the remainder over 90% consists of C, H, and O. Organic material is removed by the dried plant samples by ashing. The remaining 1.5% of the plants, the fresh weight represents its mineral content [7,8]. Elements such as carbon, hydrogen, nitrogen, phosphorus, sulfur, potassium, calcium, magnesium, iron, boron, manganese, copper, zinc, chlorine, sodium, and silicon are present in various medicinal plants [9]. The herbs also naturally produce trace metals such as zinc, cadmium, copper, manganese, aluminum, iron, and lead. Usually, the herbs contain Zn (666 ppm), Cu (118 ppm), Pb (44 ppm), Ni (33 ppm), V (24 ppm), Mo (19 ppm), Cr (10 ppm), and Co (11 ppm) [10-12].

Most of the research focuses on the role of metabolic function of trace elements throughout the world. There is a need to analyze these medicinal plants' elements to detect their components, essential for normal human body function. In the case of an abnormal quantity of these elements, the human body faces different disorders. Moreover, even a small amount of toxic elements can harm the average human body. Therefore, it is necessary to measure the appropriate amount of these elements in the human body [13-15]. The plants produce several essential chemicals [16,17]. The deviation of the plant element content is mainly due to the difference in a plant structure (botanical) and availability of minerals in the soil where the plants are implanted. Other factors include the climate conditions, irrigation water, use of fertilizers, and absorptive capacity of the plant [18-20]. Metals are categorized with macro (primary) or micro (trace) elements. The 3rd class is the ultra-trace elements. Macro-minerals contain Calcium, Phosphorus, Sodium, and Chloride, whereas the micro-elements include Iron, Copper, Cobalt, Potassium, Magnesium, Iodine, Zinc, Manganese, Molybdenum, Fluoride, Chromium, Selenium, and Sulphur [21]. The macro minerals are required in amounts greater than 100 mg/

dl, and the micro-minerals are required in amounts less than 100 mg/dl. [22].

The level of elements permitted by the WHO should not endanger the health of consumers [23,24]. Trace elements are inorganic substances that exist in trace elements at low concentrations. The essential elements at trace levels play a role in the human body and can cause some diseases beyond the limit of average concentration. The recommended daily trace elements mineral intake (about 1.5 grams) is considered adequate for healthy people [24]. Trace elements are present in all body tissues and fluids, and their presence is necessary. Although they do not produce energy, they play an essential role in many activities in the body [25]. Trace elements comprise only a fraction of the total body weight Table 1. These are crucial for many body functions. These include transporting oxygen, normalizing the central nervous system (CNS), and stimulating the growth, maintenance, and repair of tissues and bones [26]. It has been reported in the literature that most of the trace elements found in the tissues and body fluids are also present in the blood [27]. Nevertheless, plants' composition depends on several factors, such as the industrial use of components of human activities and climatic conditions Table 2. These components are essential to ensure the quality of plant raw materials and pollutants' presence if human consumption is core [28-30].

Table 1: Arrangement of trace elements.

Essential Elements	Essential Trace Elements	Non-Essential Elements
Calcium	Chromium	Aluminum
Chloride	Copper	Arsenic
Magnesium	Cobalt	Barium
Phosphorus	Fluorine	Beryllium
Potassium	Iodine	Cadmium
Sodium	Iron	Lead
Sulfur	Manganese	Lithium

Table 2: List of important medicinal plants.

Cortex Berberidis	Fructus Agni Casti
Gummi Boswellii	Bulbus Allii Cepae
Fructus Bruceae	Radix Althaeae
Radix Bupleuri	Oleum Azariah
Testa Plantaginis	Aloe Vera Ge
Radix Platycodi	Radix Althaeae
Aetheroleum Melaleucae Alternifoliae	Folium cum Flore Crataegi
Herba Valerianae	Stigma Croci
Cortex Viburni Prunifolii	Folium Ocimi Sancti
Radix Withaniae	Oleum Oenotherae Biennis

Conclusion

This review summarizes research regarding the trace elements of commonly used medicinal plants. Many plants contain a large number of trace elements, which even cross the limit permitted by WHO. In the case of overuse of such plants, it can be toxic. Hence, a thorough study was considered necessary to determine these two toxicity levels of plants. Also, in-vitro and in-vivo studies must be conducted to demonstrate its safety and effectiveness. Besides, harvest season is another climatic factor related to changes in element concentration in medicinal plants.

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