ARTICLE / INVESTIGACIÓN

Study the antioxidant of *Matricaria chamomilla* (Chamomile) powder: *In vitro* and *vivo*

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Abstract: Oxidative stress is oxidative damage caused by free radicals and reactive oxygen species (ROS). These ROS can cause oxidative damage to cellular components, including membrane lipids, receptors, enzymes, proteins, and nucleic acids. It would eventually lead to cell apoptosis and the appearance of certain pathological conditions. This work investigates the antioxidant potentials of chamomile extract in vitro by evaluating the extract activity to scavenge 2,2-Diphenyl-1-picrylhydrazyl (DPPH), also in vivo by investigating its effects on oxidative stress-induced rats by assessing the total oxidant status (TOS) and total antioxidant capacity in the radiation exposed rats with and without the treatment with chamomile extract. The results have shown that chamomile extract contains materials with antioxidant properties. The in vitro analyses have indicated activity to detoxify the DPPH radicals almost as powerful as pure ascorbic acid. Furthermore, rats exposed to electromagnetic radiation have shown a disturbance in the balance of oxidants and antioxidants, in which the levels of TOS were elevated while the levels of TAC were reduced. Chamomile extract has been shown to exhibit a powerful function as an antioxidant in vivo. It has enhanced the antioxidant capacity of rats, reduced their total oxidant status, and protected exposure to radiation.

Key words: Total antioxidant capacity, peach fruit, rats, DPPH, total oxidant status.

Introduction

Oxidative stress is a term used for oxidative damage caused by free radicals and reactive oxygen species (ROS)[1]. The stability of the ROS is shallow, and therefore they are highly reactive, which can cause oxidative damage to cellular components, including membrane lipids, receptors, enzymes, proteins, and nucleic acids[2]. This oxidative effect would eventually lead to cell apoptosis and the appearance of certain pathological conditions[3,4]. Nevertheless, ROS are generally produced in the living system to perform an essential role in signaling as second messengers[5].

The term ROS includes a wide range of oxygen-containing species such as hydroxyl radical (.OH), superoxide anion (O^{2-}), hydrogen peroxide (H_2O_2), nitric oxide (NO.) and other species[6]. The mitochondrial electronic transport chain produces some of these species generally upon aerobic metabolism[7]. Other sources of ROS include NADH oxidases, xanthine oxidoreductase, arachidonic acid cascade enzymes, etc.[3,8,9] which all increase the level of ROS under certain pathological conditions[10]. Other sources that can increase the level of ROS in the living systems are exogenous and include smoke, radiation, and other pollution[11].

To detoxify the oxidative damage of ROS and free radicals, the living system includes a synergistic defense system called antioxidants. The antioxidant materials can reduce ROS's oxidative damage and eliminate their toxicity by different mechanisms[12]. These antioxidants are classified as endogenous, like superoxide dismutase (SOD), glutathione (GSH), glutathione peroxidase (GPx), catalase (CAT), and uric acid, in addition to others[3]. While the other sources of antioxidants introduced by diet[13], most notably plants. The plant contains various antioxidant materials like vitamins C and E, carotenoids, polyphenols, coenzyme Q10, and flavonoids[14-16].

Chamomile is anti-inflammatory[17], anticancer[18], antioxidant[19], anti-diarrheal[20], neuroprotective[21], anti-allergic[22], and antibacterial[23]. It also has heart-health benefits. In preclinical studies using skin and ovarian cancer models, medicinal herbs have been shown to have potential growth-inhibitory effects[16,23]. In cancer cells, chamomile has been found to promote apoptosis. Terpenoids -bisabolol is the primary constituent in chamomile essential oil[24]. We have aimed to investigate the antioxidant potentials of chamomile extract in vitro by evaluating the extract activity to scavenge 2,2-Diphenyl-1-picrylhydrazyl (DPPH), also in vivo by investigating its effects on oxidative stress-induced rats.

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