

Decreasing Carbon Tetrachloride Toxicity using Date-seed (*Phoenix dactylifera* L.) Steeping in Rats

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Abstract

Objective: Many toxic compounds in foods cause liver damage and disturbance of bodily function. Inflammation will precede liver damage as an initial response to poisoning. The inflammatory response depends heavily on the strength of the body's immune system. Many foods, drugs, and other compounds can decrease the immune system, but few serve as immunostimulants. This study aims to prove the decreasing of carbon tetrachloride toxicity using date-seed (*Phoenix dactylifera* L.) steeping to improve rat immunity.

Methods: This was an experiment with pre- and post-test with a control group design. Wistar white rats were grouped into 6 groups, healthy control (HC), negative control (NC), positive control (PC), treatment dose 1 g/kg (T1), treatment dose 3 g/kg (T3), and treatment dose 5 g/kg (T5). All of the groups were induced by CCL₄ before treatment except the HC group. The observed data were interleukin-6 (IL-6), lymphocyte count, and C-reactive protein (CRP). Data from the groups were compared with an ANOVA test and followed by a post hoc test if a significant result was found.

Results: The results showed that there were significant differences between IL-6, lymphocyte count, and CRP between HC and other groups that CCL₄-induced. After the delivery of date-seed steeping, levels of IL-6 and CRP decreased, and the lymphocyte count increased significantly. The group with the 5 g/

kg treatment dose was the most effective group for inhibiting the increase of IL-6 and CRP, but a dose of 3 g/kg was the most effective to increase lymphocyte count.

Conclusion: Date-seed steeping suppresses pro-inflammation mediators; it has a potency which improves cytokine pro-inflammation by inhibiting the inflammation process. Thus, date seed can be used as a cheap source of anti-inflammation that can be considered as a health opportunity for developing countries.

Keywords: Carbon tetrachloride, Anti-inflammation, Date seed, IL-6, CRP, Lymphocyte count

Introduction

Liver damage often occurs due to toxic compounds exposure in food. One of them is carbon tetrachloride¹ from the industry on household appliances, which can enter into the human body. Carbon tetrachloride as free radicals will cause inflammation of the liver to cause damage². Inflammation is a basic protective response to increase survival in humans³. The inflammation process will lead to increased capillary permeability resulting in increased exudate formation, interstitial edema, no angiogenesis, increased pain, and other signs. This is due to increased inflammatory mediators of interleukin-6 (IL-6), lymphocytes, and C-reactive protein (CRP). Excess exudate will cause maceration of the wound and inhibit granulation and tissue epithelization. The healing wound will result in significant increases in neutrophils, cytokines, IL-8, and VEGF⁴. Chronic inflammation increases the secretion of chemical mediators to form exudates that inhibit wound granulation. One way to accelerate the inflammation time is to improve the immune system, and one means of doing this is to give date-seed steeping.

Date seed contains many flavonoid, phenolic, glycoside, oleic, and procyanidine compounds^{5,6}. The content of phenolic acid as an antioxidant in date seed can lower free radicals⁷⁻¹². Date-seed steeping has been shown to increase antioxidant status and decrease oxidative stress in premenopausal women¹³. In addition, date seed was also shown to increase T and B lymphocytes synthesis¹⁴. Date seed contains bioactive components such as polyphenols and fiber in large quantities,