The Anti-inflammatory Effects of Watercress Extract on RBCs in Female Rats

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Abstract— Watercress (Nasturtium officinale) a fast-growing, aquatic or semi-aquatic plant native to Europe and Asia is claimed to have several improving effects on body systems. The main aim of this study was to determine the Watercress extract on RBC membrane stability as an anti-inflammatory activity in female rats. In this study, female Wistar rats were divided into control group and 4, 6 and 12mg/kg/body weight of hydroalcoholic watercress extract exposed group of 7 each. Membrane stabilizing activity of each blood sample was calculated and the data were analyzed using ANOVA. Membrane stabilizing activity was significantly increased in groups exposed to 4 and 6 mg/kg/body weight of hydroalcoholic Watercress extract compared to control group (P<0.001); however, there was no significant difference between membrane stabilizing activity of the group exposed to 12 mg/kg/body extract and control group. Our results indicated that 4 and 6mg/kg/body weight of watercress extract has anti-inflammatory effect on RBC in female rats.

Keywords— Watercress, Anti-inflammatory, RBC, Rat.

I. INTRODUCTION

PLANTS are the main stay of medicine and credited with mystical and almost supernatural powers of healing. Watercress (Nasturtium officinale) is a fast-growing, aquatic or semi-aquatic, perennial plant of the Mustard family (Brassicaceae or Cruciferae) native to Europe and Asia and naturalized throughout North America which share a suite of glycosinolates compounds known as mustard oils [1]. The plant bears four-petalled, white flowers and delicate, light-green, piquant young basal leaves rich in ascorbic acid (vitamin C) used in salads or as seasonings and garnishes since 1st century A.D. [2]. The plant is very nutritious with constituents, including beta carotene(vit A), ascorbic acid(vit C), calcium, folic acid, iron, iodine, phosphorous, amino acids, such as arginine, glycine, lysine, tryptophan, also the antioxidant a-tocopherol and the plant primary flavoring component, phenethyl isothiocyanate(PEITC) [3] which is a chemopreventive of several tobacco specific carcinogens through inhibiting hypoxia inducible factor and following angiogenesis [4] and also inhibiting cell growth in breast cancer cells [5] and reducing prostate cancer risk [6]. It was claimed to have antiangiogenic cancer-suppressing properties which help defend against lung cancer [7], [8] and also swollen breathing passages in the lung, coughs, bronchitis, flu, and swine flu. It was suggested as a remedy for scurvy [9]. Also, it acts as a stimulant, a source of phytochemicals and antioxidants, a diuretic, an expectorant, and a digestive aid [10]. Research have found that watercress has antigenotoxic properties against induced oxidative damage and enhances cell viability [11]. Watercress has also claimed to have anti-inflammatory properties in vivo and in vitro [12]. On the other hand, inflammation as a part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, or irritants [13], is associated with enzyme release from neutrophil lysosomes leading to variety of disorders. The extracellular activity of these enzymes is said to be related to acute or chronic inflammation [14]. Therefore, nonsteroidal drugs act either by inhibiting these lysosomal enzymes or by stabilizing the lysosomal membrane [15]. Since RBC membrane is similar to lysosomal membrane [16], the study was undertaken to check the stability of RBC membrane by watercress extract to examine the anti-inflammatory activity.

II. MATERIAL AND METHODS

In this laboratory experimental study, female Wistar rats blood samples were divided to control group and groups exposed to 4, 6 and 12mg/kg/body weight of hydroalcoholic Watercress extract. In each group 5 blood samples of 7 rats were examined. The prevention of heat induced hemolysis of RBC membrane was used to assess membrane stabilization as an anti-inflammatory activity [16], [17]. The data were analyzed using One-Way ANOVA.

III. RESULTS

Membrane stabilizing activity of the extract was significantly increased in groups exposed to 4 and 6 mg/kg/body weight of hydroalcoholic Watercress extract compared to control group (P<0.001); however, there was no significant difference between membrane stabilizing activity of the group exposed to 12 mg/kg/body extract and control group (Fig. 1).
**REFERENCES**


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**IV. DISCUSSION**

Our results indicated that membrane stabilizing activity of the extract was significantly increased in groups exposed to 4 and 6 mg/kg/body weight of hydroalcoholic watercress extract compared to control group. This finding is consistent with research which have shown the anti-inflammatory properties of watercress in rabbit burn injury [18] and inflammation animal models [12]. Also, there are studies suggesting anti-inflammatory activity of some American [19], African [20] and Asian [21] plants. Besides, isothiocyanates, constituents of watercress suppress LPS induced production of nitric oxide and prostaglandin E2 in macrophages [22] and have anti-NF-κB and anti-inflammatory activities [23]. Since Stabilizing basement membrane involve the inhibition or total abolishing of action potentials from being propagated across the membrane, a possible explanation for the stabilizing activity of the extractive due to an increase in the surface area/volume ratio of the cells which could be brought about by an expansion of membrane or shrinkage of the cell, and an interaction with membrane proteins [24]. However, the prevalence of parasites, such as liver fluke, Fasciola hepatica in this commonly used vegetable [25], [26] and its inhibitory effect on the cytochrome P450 CYP2E1, which may results in altered drug metabolism for individuals on certain medications such as chloroxazone [27] may confine its consumption.

**V. CONCLUSION**

We have shown that 4 and 6 mg/kg/body weight of hydroalcoholic watercress extract has stabilizing activity on RBC membrane stability in female rats; according to which, may have anti-inflammatory effects in the female.

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