The Effects of *Portulaca oleracea* Seed Extract on RBC Membrane Stability in Male and Female Rats

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***Abstract*—** There are evidences showing the effects of *Portulaca oleracea* on various systems of body. The main aim of this study was to determine the *Portulaca oleracea* seed extract on RBC membrane stability in male and female rats. In this laboratory experimental study, female and male Wistar rats blood samples were divided to control group and groups exposed to 6mg/kg/body weight of hydroalcoholic *Portulaca oleracea* seed extract. In each group 5 blood samples of 5 rats were examined. Membrane stabilizing activity of each blood sample was calculated and the data were analyzed using ANOVA. Membrane stabilizing activity of the extract was significantly lower in male rats compared to control group (P<0.001); however, in female rats there was no significant difference between membrane stabilizing activity of the extract and control group. Our results indicated that 6mg/kg/body weight of hydroalcoholic *Portulaca oleracea* seed extract has anti-stabilizing activity on RBC membrane stability in male rats; according to which, may have inflammatory effects.

***Keywords*—** Portulaca oleracea, Membrane stabilizing activity, RBC, Rat.

I. Introduction

PORTULACA OLERACEA falls under the family of Portulacaceae. It is an annual sprawling succulent weed with thick, hairless red stems, obovate leaves and small yellow flowers that widely grows in tropical and subtropical regions [1]. *Portulaca oleracea* is a fascinating plant recognised in most cultures for its extensive nutritional benefits. It has been used traditionally as a vegetable for human consumption. On the other hand, traditional medicinal systems of China, India, Europe and Middle Eastern countries have used *P oleracea* to treat various human ailments such as haemorrhoids, burns and wounds, pain, headache, scurvy, fever and urinary disorder. Extensive modern pharmacological studies have attested its wide range of biological effects[2]. Many of these researches have verified the importance of *P. oleracea* [3]. Furthermore, with its high ethnopharmacological values and the present of cytotoxic polysaccharides and flavonoid especially luteolin, it is a promising plant in the investigation of cancer prevention [4].

The red blood cell (RBC) membrane is composed of a lipid bilayer, integral proteins, a sub-membranous skeletal protein network of spectrin, and peripheral proteins[5]. Organization of the erythrocyte plasma membrane is a protein network forming a "cytoskeleton" underlies the cytoplasmic surface of the red blood cell lipid bilayer. Spectrin (alpha and beta), actin, adducin, 4.1R and p55 are the main constituents of the skeleton. Interactions between these proteins are defined as lateral interactions. This protein network is anchored to the lipid bilayer through two vertical interactions, one involving ankyrin and Band 3, the other one involving $4.1R^{80}$, p55, and GPC. Band 3 also binds to protein 4.2. Deformability and stability are two essential qualities of the RBC membrane that play a crucial role in the maintenance of normal blood flow and supply to tissues[6]. Consequently, any variation in RBC membrane deformability, as in the case of malaria or sickle cell diseases can potentially compromise the micro-circulatory function. Studies have demonstrated that the protein network underlying the RBC membrane, together with the membrane bilayer and the network of membrane-associated proteins, play a key role in regulating RBC membrane deformability and stability[7]. The main aim of this study was to determine the *Portulaca oleracea* seed extract on RBC membrane stability in male and female rats.

II. Material and Methods

In this laboratory experimental study, male and female Wistar rats blood samples were divided to control group (normal saline receiving) and groups exposed to 6 mg/kg/body weight of hydroalcoholic *Portulaca oleracea* seed extract. In each group 5 blood samples of 5 rats were examined. Membrane stabilizing activity of each blood sample was calculated and the data were analyzed using ANOVA.

III. Results

Membrane stabilizing activity of the extract was significantly lower in male rats compared to control group (P<0.001); however, in female rats there was no significant difference between membrane stabilizing activity of the extract and control group (Fig. I and II).

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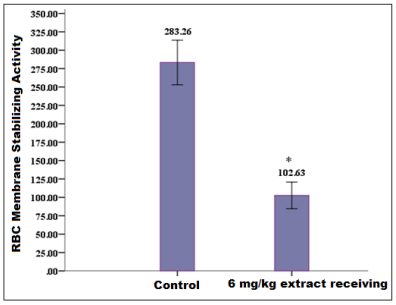

Fig. 1 RBC membrane stabilizing activity of *Portulaca oleracea* seed extract in male rats. * indicates significant difference (P<0.001) compared to control group.

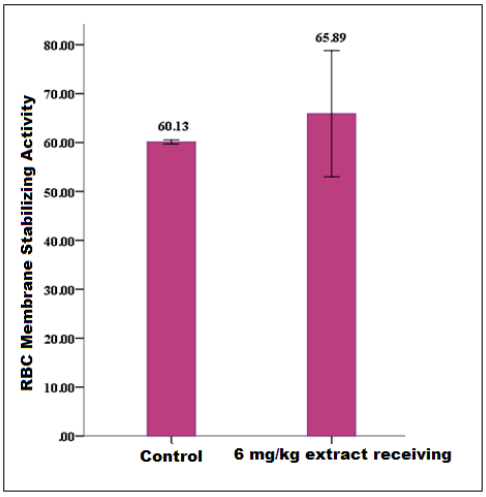

Fig. 2 RBC membrane stabilizing activity of *Portulaca oleracea* seed extract in female rats.

IV. Discussion

Our results indicated that 6mg/kg/body weight of hydroalcoholic *Portulaca oleracea* seed extract has anti-stabilizing activity on RBC membrane stability in male rats but has not significant effect on RBC membrane stability in female rats.

Although we have shown that hydroalcoholic *Portulaca oleracea* seed extract has anti-stabilizing activity on RBC membrane stability in male rats, many of previous studies have demonstrated the improving effects of the extract on different systems of body. The traditional use of this plant in treating ulcers and inflammations has been reported. Moreover, this plant is reported to have hepatoprotective neuropharmacological antihyperglycemia, antibacterial and even bronchodilatory effects [4]. Anti-proliferative effect of *Portulaca oleracea* has also been reported. It has been reported that water soluble polysaccharides isolated from this plant possesses mild cytotoxic activity against cervical cancer HeLa cell line and the sulphated form of these polysaccharides enhances the anti-tumour effect [8]. *Portulaca oleracea* was reported to contain a high antioxidant property, which is mainly attributed to the rich source of omega-3 polyunsaturated fatty acids and flavonoid compounds; particularly kaempferol, apigenin, myricetin, quercetin, luteolin, carotene and alkaloids [9] –[12]. Studies have also shown that the plant possesses significant analgesic and anti-inflammatory activities when compared with synthetic drugs[9]. Despite many beneficial effects *Portulaca oleracea* on body systems reported by researchers, our finding indicates that 6mg/kg/body weight of hydroalcoholic *Portulaca oleracea* seed extract has anti-stabilizing activity on RBC membrane stability in male rats, according to which, may have inflammatory effects in the male.

V. Conclusion

We have shown that 6mg/kg/body weight of hydroalcoholic *Portulaca oleracea* seed extract has anti-stabilizing activity on RBC membrane stability in male rats; according to which, may have inflammatory effects in male.

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