

dysfunction, which can lead to infertility. Clomiphene citrate is a standard drug used as first-line option for the induction of ovulation in women, however its long-term use could cause serious adverse effects. Therefore, bioflavonoids are now considered as potential therapeutics that can be used in the treatment or prevention of various diseases with low adverse effects.

**Purpose of the research..** In the current work, we investigated the potential of hesperetin (HSP) to modulate some endocrine and metabolic parameters in a polycystic ovarian condition induced by hyper- androgenization with DHEA in C57Bl/6 mice.

**Materials and methods.** Effect of HSP on the morphological micrographs of the liver, kidney and heart tissues are examined in the current work.

**Obtained results.** The morphological observation of liver sections in all groups showed a normal hepatic architecture with normal hepatocytes, normal sinusoidal spaces and a central vein. There was no abnormalities or histological changes in the liver of mice treated with HSP at different doses (5, 10, 25 and 50 mg/kg/day), as well as LET and CC. On the other hand, the histological examination of heart sections of all groups showed the cardiac muscle, the myocardium constituted of cross-striated muscle cells, cardiomyocytes with one centrally oval single nuclei. No abnormality in histology of the heart was observed in all experimental groups as seen under microscope. No changes were found in cardiomyocytes after treatment with HSP at doses up to 50 mg/kg/day for 30 consecutive days. Similarly, histological micrographs showed that the kidney of all groups had normal renal structure of cortex, which showed normal histological structures of the glomeruli surrounded with Bowman's space, and renal tubules in the cortical and medullary portions without any inflammatory changes. All these results demonstrated that HSP can be administered intraperitoneally up to 50 mg/kg/day for 30 consecutive days without notable adverse effect on liver, heart and kidney which therefore warrants its safe usage in the treatment of DHEA-induced PCOS mouse model.

All these results highlighted that HSP at 5, 10, 25 and 50 mg/kg for 30 days restored the morphology of ovary and ameliorated hormonal changes without any adverse effect on liver, heart and kidney. It therefore suggests that HSP can be further explored as an alternative treatment for the alleviation of major disturbances observed in PCOS.

**Conclusions.** However, further studies are needed to confirm therapeutic effects of HSP.

### THE THERAPEUTIC PERSPECTIVES OF POLYSACCHARIDES FROM THE SPECIES OF *POTENTILLA* L. GENUS

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**Introduction.** The genus Cinquefoil (*Potentilla* L., *Rosaceae* Juss.) comprises approximately 400 species. Cinquefoils are mainly perennial herbaceous plants, but annual and biennial representatives are also common. Worldwide, *Potentilla* spp. are valuable ethnomedicinal plants used as antiseptic, anti-inflammatory and adstringent agents. Nowadays, researchers pay much attention to the species of *Potentilla* L. genus as promising sources of phytochemicals with potent therapeutic potential.

**Purpose of the research.** A present mini-review aimed to summarize data available in public domain on pharmacological activities of polysaccharides from the species of *Potentilla* L. genus in

order to demonstrate their therapeutic perspectives, and to determine objects for further phytochemical and pharmacological research.

**Materials and methods.** For the present mini-review, we performed a search in NCBI-PubMed database (<http://www.ncbi.nlm.nih.gov/pubmed>) using “Potentilla” and “Polysaccharides” as keywords. In total, we obtained 25 search results, of which 12 best matched the aim of the present research.

**Obtained results.** According to NCBI-PubMed database, polysaccharides only from three *Potentilla* spp., namely *P. indica* (Andrews) Th. Wolf (*Duchesnea indica* (Andr.) Focke), *P. anserina* L. and *P. chinensis* Seringe were characterized from phytochemical and pharmacological points of view.

Xiang et al., 2019 isolated a neutral polysaccharide (DIP-1) from *P. indica* (*D. indica*), composed of mannose, glucosamine, glucose, galactose and arabinose. DIP-1 exhibited a potent dose-dependent scavenging activity on hydroxyl, DPPH, ABTS radicals, and inhibited the growth of SKOV-3 and Hep-G2 cells in vitro.

From *P. indica* (*D. indica*), Jiang et al., 2013 isolated two non-sulfated acidic heteropolysaccharides with antiviral activity against varicella-zoster virus.

In a model of dexamethasone-induced oxidative stress in mice, *P. anserina* polysaccharide (PAP) increased thymus and spleen indices, glutathione level, superoxide dismutase activity and total antioxidant capacity, and decreased the content of hydrogen peroxide and nitric oxide. Authors believe that PAP may be involved in the restoration of immune system after oxidative damage (Hu et al., 2009).

In 2009, Shuai et al. isolated water-soluble polysaccharides from *P. anserina* roots (PAPF). Authors found that PAPF is composed of rhamnose, arabinose, glucose and galactose. A dose dependent reduction of H<sub>2</sub>O<sub>2</sub>-induced oxidative damage by PAPF was established. In apoptotic cells treated with PAPF, apoptotic bodies formed in lesser extent and PAPF significantly reduced H<sub>2</sub>O<sub>2</sub>-induced ladder bands.

Established was that PAP stimulates the phagocytosis, increases thymus and spleen indices, the levels of lactate dehydrogenase and acid phosphatase in the spleen, and IL-10 and IFN- $\gamma$  in serum in immunosuppressed mice. Authors suggest an immunostimulant potential of PAP (Chen et al., 2010).

Zhao et al., 2013 showed that selenylation of PAP could significantly increase its antioxidant activity.

Polysaccharides from *P. anserina* showed antitussive and expectorant activities in mice and guinea pigs (Guo et al., 2016). Authors believe that polysaccharides may be the main *P. anserina* phytochemicals responsible for these activities.

In 2018, Shen et al. established antioxidant and anti-apoptotic activities of PAP on kidney damage induced by Cd. An improvement of redox homeostasis was observed both in vivo and in vitro, as well as attenuation of the mitochondrial dysfunction, degeneration, and fibrosis of kidney induced by Cd.

A protective effect and potential treatment mechanism of PAP in high altitude cerebral edema (HACE) (Shi et al. 2020) and an anti-hypoxia effect of PAP (Shi et al., 2021) in rats were studied. Authors established respective alleviations of brain tissue and lung tissue injuries, reduction of malondialdehyde and nitric oxide levels, and increased activity of superoxide dismutase and glutathione level. In addition, a blockage of NF- $\kappa$ B and an activation of HIF-1 $\alpha$  signaling pathway inhibited the generation of downstream pro-inflammatory cytokines. Authors concluded that PAP has

a potential to treat and prevent HACE and hypoxia by suppression of oxidative stress and inflammatory response.

Cheng et al., 2021 showed that PAP partially prevented the autophagic cell death in neurons induced by Cd via inhibition of the PI3K class III/Beclin-1 signaling pathway in vitro and in vivo.

In 2020, Qiu et al. isolated water-soluble polysaccharides (composed of mannose, rhamnose, glucose, galactose and arabinose) and acidic polysaccharides (consisted of mannose, rhamnose, galacturonic acid, glucose, galactose and arabinose) from *P. chinensis*. Immunological tests indicated the increase of NO production, promotion of splenocyte proliferation and NF- $\kappa$ B activation, and can be considered as promising immunomodulating agents.

Data shown in the present mini-review provide evidence that polysaccharides from three *Potentilla L. spp.*, namely *P. indica*, *P. anserina L.* and *P. chinensis* are promising phytochemicals with potent therapeutic potential.

**Conclusions.** Considering domestic raw materials base, these findings justify a need for comprehensive study of polysaccharides from *Potentilla spp.* of Ukrainian flora.

### STUDY OF SERUM GLUCOSE WITH ECDISTEN IN EXPERIMENTAL ANIMALS WITH HYPERANDROGENISM

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**Introduction.** Hyperandrogenism in women is an endocrinopathy, in which the synthesis of androgens increases in the body of women. Hyperandrogenism leads to pathologies such as polycystic ovaries, menstrual irregularities, hirsutism, infertility and others. In order to increase the demography of the country, not only in our republic, but throughout the world, a number of studies are being conducted directly related to the adequate diagnosis and treatment of neuroendocrine disorders of the menstrual cycle, accompanied by infertility.

**Purpose of the research.** The aim of our study is to develop a method for increasing the activity of the aromatase enzyme in women with hyperandrogenic syndrome using the domestic drug ecdisten.

**Materials and methods.** We used testosterone enanthate 250, manufactured by Aburaikhan Pharmaceutical Co.(Iran), ecdisten (Institute of the Chemistry of Plant Substances Academy of Sciences of Uzbekistan, Uzbekistan), mice of the BAL/c line, weighing 20-25 g, contained in plastic cages (5per cage) under standardized conditions: relative humidity (50-60%), temperature (22°C) and light mode (12 hours of darkness and light). The mice received standard commercial food and drinking water ad libitum. All manipulations with laboratory animals were carried out in strict accordance with the Declaration of Helsinki on the humane treatment of animals (World Medical Association, Edinburgh, 2000). The method is based on a glucose tolerance test.

**Obtained results.** Androgens are male sex hormones involved in the manifestation of masculinity and reproductive activity. Androgens are produced in the body of both men and women, but in different quantities. Excessive male hormones can cause problems, leading to consequences such as polycystic ovary syndrome, infertility, blood sugar abnormalities, as well as symptoms such as acne, male hair growth and insulin resistance.