雌雄 흰쥐에서 phenylhydrazine으로 유발된 용혈성 빈혈에 오미자 약침의 항반혈효과

신혜숙¹· 김이화²· 김창주³
¹경희대학교 의과대학 간호과, ²서명대학교 한의과대학 경혈학교실, ³경희대학교 의과대학 생리학교실

Anti-anemic Effect of Aqueous Extracts of Fructus schisandrae on Phenylhydrazine-induced Hemolytic Anemia in Female Sprague-Dawley Rats

Hye-Sook Shin, Ee-Hwa Kim², Chang-Ju Kim³
¹Dept. of Nursing Science, College of Medicine, Kyung Hee University; ²Dept. of Meridian & Acupoint, College of Oriental Medicine, Semyang University; ³Dept. of Physiology, College of Medicine, Kyung Hee University

Abstract

목적 : 흰쥐에서 phenylhydrazine으로 유발된 용혈성 빈혈에 오미자 약침의 항반혈효과를 알아보기 위해서 적혈구수, hematocrit ratio, hemoglobin, 혈청 철항유량 및 serum total iron binding capacity (TIBC)를 관찰하였다.

방법 : 실험동물은 정상군, 대조군, 250 mg/kg 오미자 두어군 및 500 mg/kg 오미자 두어군으로 총 4개의 군으로 분류하였다. 정상군의 흰쥐는 아무런 처치도 하지 않았고, 대조군은 phenylhydrazine으로 용혈성 빈혈을 유발하였다. 오미자 두어군은 용혈성 빈혈을 유발한 후 7일간 매일 250 mg/kg 및 500 mg/kg의 용량으로 중화혈구자란하였다.

결과 : 적혈구수, hematocrit ratio 및 hemoglobin은 대조군에서 정상군에 비해 감소한 반면 오미자 두어군은 증가하였다. 혈청 철항유량과 TIBC는 대조군에서 증가하였으나, 오미자 두어군에서는 감소하였다. 이러한 결과로 중화혈구자란 오미자 약침은 phenylhydrazine으로 유발된 용혈성 빈혈에서 항반혈효과가 있는 것으로 사료된다.

Keywords : Fructus schisandrae; Hemolytic anemia; Phenylhydrazine

1. Introduction

Among the diseases common in women, anemia is the most commonly encountered. In general, anemia is defined as a condition in which the red blood cell count, hematocrit ratio and hemoglobin content of the circulating blood falls below normal. Because the normal range for many hematologic parameters are not defined, adult women with blood hemoglobin content of 12 g/dL or lower are classified as being anemic in accordance with WHO criteria.

Treatment and prevention of anemia in women are important because the occurrence of this disease is relatively higher in women than in men due not only to their monthly menstruation but also to pregnancy and parturition. Medical therapy is the most common way of controlling and managing
anemia. Taking iron supplement pills is recommended for women, especially those who are pregnant. However, these iron supplements are known to cause irritation of the stomach and the intestines, constipation, and digestive troubles. For this reason, it has become necessary to develop new drugs for prevention and treatment of anemia with minimal side effects.

Fructus schisandrae, also classified as Schisandrae chinensis Baill, is a well-known Oriental herb. It is widely encountered in everyday life, not only as materia medica but also in tea, food, and beverages. Fructus schisandrae is a major astringent, with a sour taste, and consists of organic acids including citric acid, tartaric acid, protocatechuic acid, and ascorbic acid. It has been reported that Fructus schisandrae is effective against virus- and chemical-induced hepatitis. A synthetic schisandrin analogue, dimethyl dicarboxylate biphenyl (DDB), is now widely used as a hepato-protective drug, with high effectiveness in normalizing liver functions and very few side effects; the protective effects of Fructus schisandrae against damage due to physical injury in rats and cyclohexamide-induced amnesia have also been reported.

However, the effect of Fructus schisandrae on hemolytic anemia has not been reported yet. In the present study, the anti-anemic effect of Fructus schisandrae on phenylhydrazine-induced hemolytic anemia in female Sprague-Dawley rats was investigated.

2. Materials and methods

2.1. Experimental animals

Adult female Sprague-Dawley rats weighing 150 ± 10g (5 weeks old) were obtained from a commercial breeder (Daehan Biolink Co., Chungbuk, Korea). The experimental procedures were performed in accordance with the animal care guidelines of NIH and the Korean Academy of Medical Sciences. Animals were housed under controlled temperature (20 2 °C) and lighting (07:00 - 19:00 hr) conditions with sufficient food and water supplied. The experimental animals were randomly classified into 4 groups: the normal group, the phenylhydrazine-induced-hemolytic anemia group, the anemia-with-250 mg/kg-Fructus schisandrae-treatment group, and the anemia-with-500 mg/kg-Fructus schisandrae-treatment group. Animals of the normal group (n = 6) received no particular treatment, while those of the phenylhydrazine-induced-hemolytic anemia group (n = 6) were given injection of 25 mg/kg of phenylhydrazine HCI into a tail vein. The animals of the anemia-with-250 mg/kg Fructus schisandrae-treatment group (n = 6) and the anemia-with-500 mg/kg-Fructus schisandrae-treatment group (n = 6) received 250 mg/kg and 500 mg/kg of Fructus schisandrae per day, respectively, for 7 consecutive days after injection of phenylhydrazine. Fructus schisandrae was force-fed to the rats using a sonde. Blood was collected by heart puncture at the 3rd and 7th days after the start of the experiment. The red blood cell count, hematocrit ratio, and hemoglobin content were measured from the collected blood, and the iron content and total iron binding capacity (TIBC) were measured from the serum.

2.2. Reagents

The Fructus schisandrae used in the experiment was obtained from the Kyung Hee Medical Center Pharmacy (Seoul, Korea). 200