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Impact of Sea Buckthorn Oil and Dexamethasone on Hematological Parameters in Hypoxia-Exposed Rats

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ABSTRACT

Oxygen deficiency, whether due to atmospheric conditions or various diseases, leads to multiple functional disturbances in the body. Investigating the physiological mechanisms underlying these disturbances is a key area in modern theoretical and applied biology and medicine. The present study aimed to examine the antioxidant effects of sea buckthorn oil under conditions of acute hypobaric hypoxia (altitude = 7600 m, FiO_2 = 21%, pO_2 = 131.4 mm Hg). A total of 24 male rats were used and divided into three groups: 1. Control group; 2. Group exposed to hypoxia for 6 hours; 3. Group pre-treated for 3 days with sea buckthorn seed oil (2.5 ml/kg/day) and dexamethasone (1 ml/kg/day), followed by 6 hours of hypoxia exposure. Sea buckthorn oil was obtained by cold-pressing the seeds of *Hippophae rhamnoides* spp. and administered orally via a gastric feeding tube. Dexamethasone was administered intraperitoneally once daily for three days. Blood samples were collected from all animals and analyzed using an automated 3-Diff hematology analyzer designed for veterinary use (Model: URIT-3000Vet). Under hypoxic conditions, the organism initiates compensatory processes characterized by an increase in erythrocyte count and, consequently, elevated hemoglobin levels. Hematocrit values also rise. An increase in leukocyte count is observed, along with a shift in the leukocyte formula toward neutrophilia. The combined administration of sea buckthorn oil and dexamethasone results in a reduction in both erythrocyte and leukocyte counts, although these values remain above normal. The leukocyte formula also trends toward normalization. No structural changes in erythrocytes were observed, as indicated by stable values of MCV, MCH, and MCHC within the normal range across all experimental groups. In conclusion, sea buckthorn oil demonstrates significant antioxidant activity under hypoxic conditions, functioning as a regulator of erythropoiesis and contributing to the maintenance of blood quality.

Keywords: hypoxia, sea buckthorn oil, RGB, WBC, HGB, HCT

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