Influence of Some Flavoring Substances on the Hematological Parameters of Rats

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Keywords: flavoring, hematological parameters

Introduction: Given the risk of side effects of flavoring substances used in the food industry, their cytotoxic effect on mouse fibroblast cell cultures and the risk of malignant degeneration, in this paper we observed eventual changes to hematological parameters of rats under the influence of flavorings: (±) - limonene p-methyl-1,8-diene (orange flavoring substance), (±) -3,7-dimethyl-6-octenal (lemon flavoring substance), ethyl format (rum flavoring substance) and 4-hydroxy-3-methoxybenzaldehyde (vanilla flavoring substance).

Materials and methods: The changes were followed in red blood cell counts, red cell indices, hemoglobin in erythrocytes, leukocytes, differential blood count, platelet count and platelet indices. For measurements we used white Wistar rats, weighing 240±10 g. The flavoring substances were administered in doses of 25 mg/kg orally for 7 days compared to a control group treated with saline solution at a dose of 10 mg/kg orally. Blood was collected after 7 days of treatment in tubes with EDTA-Na 1 mg/2 ml blood and measurements were made with an automated hematology analyzer.

Results: After 7 days of treatment we found the orange and lemon flavoring substances determined a significant decrease in the number of erythrocytes, hematocrit and hemoglobin values, mean corpuscular volume, mean erythrocyte hemoglobin, mean erythrocyte hemoglobin concentration, but the number of leukocytes and platelet count did not change significantly. The vanilla and rum flavoring produced no statistically significant changes in hematological parameters.

Conclusions: The orange and lemon flavoring substances studied after statistical processing of experimental data by Student t-tests and ANOVA has modified significant the hematological parameters (number of erythrocytes, hemoglobin and hematocrit value).

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Fig. 1. Treatment effect on red blood count

Fig. 2. Treatment effect on hemoglobin

Fig. 3. Treatment effect on hematocrit

Fig. 4. Treatment effect on medium corpuscular volume

Fig. 5. Treatment effect on mean erythrocyte hemoglobin

Fig. 6. Treatment effect on mean erythrocyte hemoglobin concentration

Fig. 7. Treatment effect on red cell distribution

Fig. 8. Treatment effect on leukocyte count
dium corpuscular volume (MCV) (p<0.001) and mean erythrocyte hemoglobin (MCH) (p<0.001) (Figures 4, 5), and a statistically significant decrease in the mean erythrocyte hemoglobin concentration (MCHc) (p<0.001). At the same time while red cell distribution (RDW) values did not change significantly (Figures 6 and 7).

There were no statistically significant changes in leukocyte count (WBC), polymorphonuclear granulocytes (PMN), lymphocytes (LYM), and monocytes (Mono) (Figures 8–11).

Also, no statistically significant changes were observed regarding the number of platelets (PLT), the average platelet volume (MPV) and platelet distribution (PDW) (Figures 12–14).

**Discussion**

The erythrocyte count is a test based on evaluating erythropoiesis. Low blood cell count causes anemia. In combination with hematocrit and hemoglobin concentration, erythrocyte count is useful in the detection and monitoring of anemia and erythrocytosis/polycythemia [6–10]. If the corpuscular volume is below average suggests iron deficiency anemia or thalassemia [11,12].

To our knowledge there are no other studies regarding the influence of these flavoring substances on the hematological parameters of rats. The changes on these parameters following the treatment with orange and lemon flavoring substances confirm the cytotoxicity of these substances on mouse fibroblast cell cultures and histo-
pathological changes occurred in rats following this treatment [3,4].

Conclusions
It is shown that the treatment of animals with orange and lemon flavoring substances reduces significantly the number of erythrocytes and hemoglobin, the hematocrit and hemoglobin concentration mean erythrocyte.

References