

Impact of 24 Systemic Cryotherapy Treatments on the Rheological and Morphological Properties of Blood in Healthy Men

M. Kepinska, Z. Szygula, A. Teleglow and Z. Dabrowski

University School of Physical Education in Krakow, al. Jana Pawla II 78, 31-571, Krakow, Poland

1 INTRODUCTION

Cryotherapy and cryostimulation have recently become popular in the prevention and treatment of musculoskeletal system overloads in sports disciplines and sports medicine, as well as in biological regeneration of healthy persons and in increasing the immunity (Szygula et al 2014).

The aim of this paper was to assess the impact of a series of whole body cryotherapy (WBC) treatments on the rheological and morphological properties of blood in healthy men.

2 MATERIAL AND METHODS

The study involved 10 healthy men, students of the University School of Physical Education in Krakow, Poland aged 22.1 ± 2.16 . Each participant gave a written assent before participating in the study, according to the Declaration of Helsinki. The study was approved by the local Ethics Committee (Krakow District Medical Chamber, Poland). All subjects took part in initial medical qualification in order to eliminate those with potential contraindications to WBC.

All the subjects were healthy and normotensive, with average body height was 179.2 ± 6.4 cm, weight 79.6 ± 8.8 kg and BMI 23.4 ± 2.6 kg/m².

The control group consisted of the same persons who had taken part in the project.

24 whole body cryotherapy treatments (3 times a week, every second day, for 2 months) were performed in a special cryogenic chamber at the temperature of about -120°C for 3 minutes in the Małopolskie Centrum Krioterapii in Krakow, Poland.

To analyse the morphological and rheological properties of blood, the blood was sampled immediately before the first treatment (control blood sample) and 24 hours after the last treatment. In the blood were determined the rheological properties (red blood cell deformability) and blood

morphology, including the number of leukocytes, erythrocytes, hemoglobin, hematocrit, as well as the mean corpuscular hemoglobin, mean corpuscular volume and mean corpuscular hemoglobin concentration, the platelet count and the red cell volume distribution width, total cholesterol, HDL, LDL and triglycerides and total protein.

RBC deformability was analyzed using a laser-assisted optical rotational cell analyzer (LORCA; Mechatronics, Hoorn, The Netherlands) which measures elongation of the cells at increasing shear stress.

The results were analysed using the Student t-test and Wilcoxon's matched pairs test was used for not-normally distributed values in the Statistica 10 program (StatSoft, Poland), a statistically significant difference $p < 0.05$.

3 RESULTS

After 24 hours following the last systemic cryotherapy treatment, there was recorded a statistically significant decrease in the mean corpuscular hemoglobin concentration, no changes in the erythrocyte count and an increase in the mean corpuscular volume. There was also observed an increase in the mean platelet volume and in the platelet large cell ratio, with no change in the platelet count. No changes were found in the rheological properties and other morphological indicators of blood.

All results were within the physiological norms.

4 CONCLUSIONS

1. An increase in the mean corpuscular volume may result from an increased number of reticulocytes in the peripheral blood, by erythropoiesis stimulation.
2. Systemic whole body cryotherapy results in small changes in the morphological properties of blood, which stay within the the normal range.

The project was financed from the funds of the National Science Centre in Krakow, Poland on the basis of a decision no. DEC-2012/05/N/NZ7/01107.

REFERENCES

Szygula, Z., Lubkowska, A., Gienza, Cz., Skrzek, A., Bryczkowska, I., Dolegowska, B., 2014.

Hematological Parameters, and Hematopoietic Growth Factors: Epo and IL-3 in Response to Whole-Body Cryostimulation (WBC) in Military Academy Students, PLoS One 9(4): e93096



SCITEPRESS
SCIENCE AND TECHNOLOGY PUBLICATIONS