IX CLINICAL BIOCHEMISTRY WORKSHOP

Effect of exercise training on hematological and biochemical parameters: data from a rat model of mammary cancer.

Jessica Silva[1,2], Tiago Azevedo[1,2], Abigaël Valada[1], Lara Anjos[1], Tânia Moura[1], Ana I. Faustino-Rocha[2,3], Paula A. Oliveira[1,2], José A. Duarte[4,5]

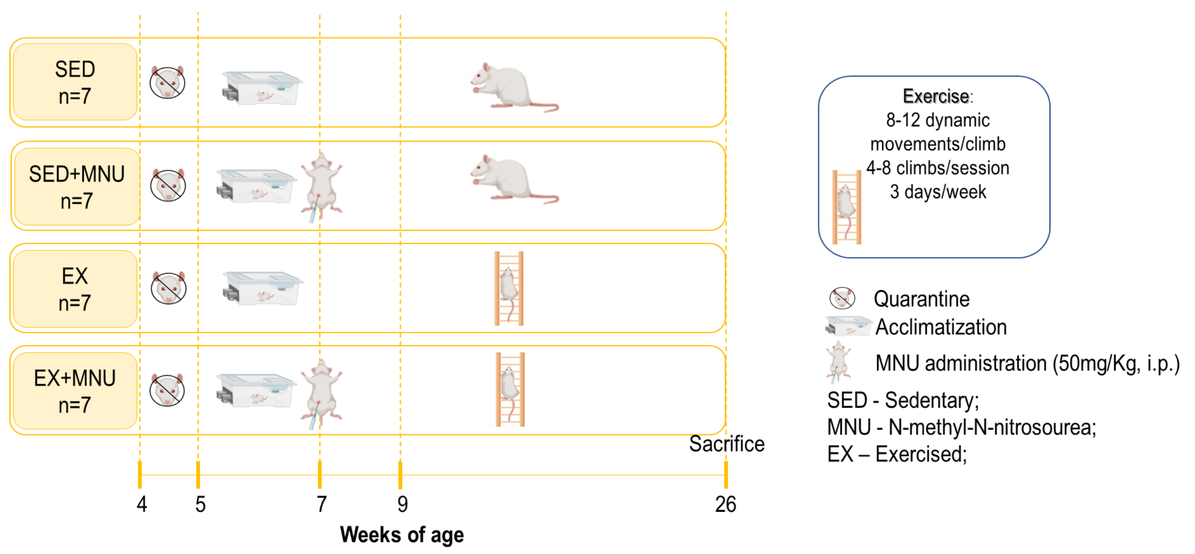
[1]Department of Veterinary Sciences, University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal; [2]CITAB, Inov4Agro, Vila Real, Portugal; [3]Department of Zootechnics, School of Sciences and Technology, CHRC, University of Évora, Évora, Portugal; [4]CIAFEL, ITR Laboratory, Faculty of Sport, University of Porto, Porto, Portugal; [5]TOXRUN–Toxicology Research Unit, CESPU, Gandra, Portugal.

Introduction

Breast cancer is the most common oncological disease among women. Exercise training has been recognized as a potent modulator of various physiological parameters, influencing both hematological and biochemical markers. Understanding how exercise training may influence these markers can provide valuable insights into the potential therapeutic benefits and physiological adaptations associated with physical activity in the context of mammary cancer. This study assessed the impact of exercise training on hematological and biochemical parameters in a rat model of mammary cancer.

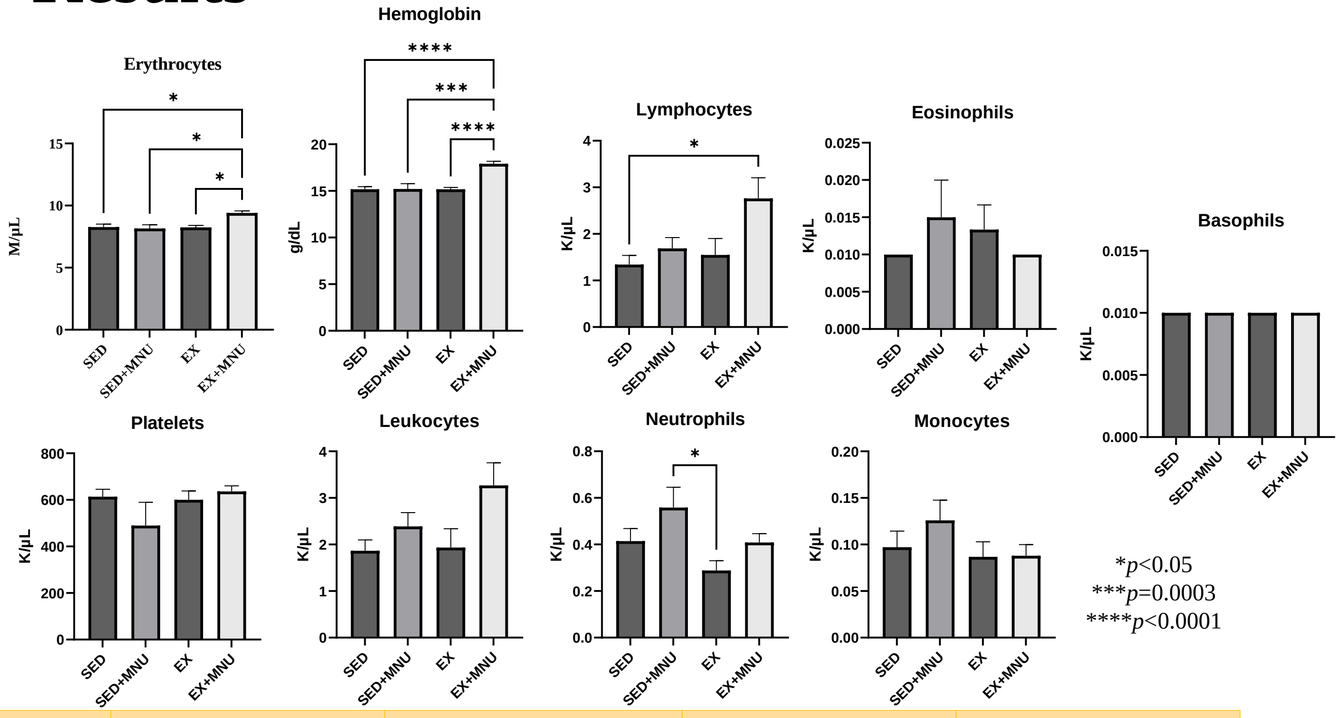
Material and Methods

Twenty-eight female rats were randomly divided into four groups (n=7): Sedentary (SED); SED+*N*-methyl-*N*-nitrosourea (MNU); Exercised (EX); and EX+MNU. SED+MNU and EX+MNU animals received an intraperitoneal injection of the carcinogen MNU (50mg/Kg) at seven weeks of age. Exercised animals were trained 3 days/week for 18 weeks, by climbing a 1-meter-high homemade ladder, 8-12 dynamic movements/climb and 4-8 climbs/session. At the end of the study, animals were sacrificed by intraperitoneal injection of ketamine and xylazine, followed by exsanguination by cardiac puncture. Blood samples were collected for hematological and biochemical analysis. Data were compared using SPSS.



Results

The results indicate notable variations in hematological and biochemical parameters among different experimental groups. Erythrocytes and hemoglobin were higher in EX+MNU group when compared with remaining groups (p<0.05). Leukocyte count revealed increased neutrophils in the MNU *vs.* EX group (p<0.05) and lymphocytes in EX+MNU *vs.* SED group (p<0.05). Serum albumin, cholesterol, urea, alanine aminotransferase (ALAT) and creatinine kinase-MB (CK-MB) levels were similar among groups (p>0.05). Glucose and triglycerides were elevated in MNU group when compared with EX group (p<0.05).



	Albumin	Cholesterol	Glucose	Urea	Triglycerides	ALAT	CK-MB
SED	4.77 ± 0.68	104.77 ± 29.50	263.63 ± 131.96	43.73 ± 10.16	77.83 ± 36.38	62.69 ± 58.30	471.15 ± 160.0
SED+MNU	4.52 ± 0.02	90.20 ± 6.64	359.70 ± 116.17*	34.13 ± 8.60	122.45 ± 61.95*	53.23 ± 25.63	558.94 ± 429.60
EX	4.10 ± 0.90	85.20 ± 26.69	163.34 ± 29.07	32.44 ± 7.63	53.54 ± 11.11	22.74 ± 6.39	230.83 ± 166.20
MNU+EX	3.56 ± 1.05	104.47 ± 29.24	244.00 ± 76.20	40.30 ± 4.39	88.77 ± 20.62	32.73 ± 11,20	202.66 ± 145.05

* p<0.05 when compared with EX group.

Conclusions

The notable rise in erythrocytes suggests that exercise positively impacts their production, counteracting the bone marrow's negative response to mammary cancer. The concurrent elevation of hemoglobin was expected, being a component of erythrocytes. Neutrophilia in the MNU group and lymphocytosis in the EX+MNU group suggested an ongoing inflammatory response triggered by cancer. Serum, albumin, cholesterol, urea, ALAT, and CK-MB may not be significantly influenced by either exercise or mammary cancer induction in this experimental setting. The exercise also promoted a decrease in glucose and triglycerides levels, contributing to lower systemic values of these parameters. These observations underscores the potential benefits of exercise in modulating metabolic factors, indicating a favorable impact on glucose and triglyceride regulation in the studied context.

Acknowledgments

This work was supported by FCT, under the projects UIDB/04033/2020 and LA/P/0126/2020, and the PhD grant 2020.07999.BD.