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EFFECTS OF PHYSICAL EXERCISE ON THE HEMATOLOGY OF TAMBAQUI *Colossoma macropomum*.

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THEMATIC AREA AND ODS

Field of Knowledge/Subfield: 02 Biological Sciences / Physiology and Immunology
Related ODS: ODS14: Life Below Water - Conservation and sustainable use of the oceans, seas, and marine resources for sustainable development.

1. INTRODUCTION

Hematology is fundamental for understanding health, immune response, and adaptation to stimuli, providing essential information about blood cells (De Paiva et al., 2013). Physical exercise, although it may initially destabilize homeostasis, promotes adaptations that benefit health and physical performance, highlighting the importance of combining hematological knowledge with the effects of exercise to optimize the development of organisms (Araujo, 2013; Kyu et al., 2016; Lavie et al., 2021).
For tambaqui (*Colossoma macropomum*), a significant fish in aquaculture due to its rapid growth rate and adaptability, understanding the effects of exercise on its hematology is crucial, especially given the scarcity of studies in this area. The tambaqui is economically valuable and offers insights into survival strategies and adaptation to environmental challenges (De Paiva et al., 2013; Val; De Oliveira, 2021). Thus, this study aims to evaluate the effects of physical exercise on the hematology of tambaqui.

Figure 1 – Tambaqui (Colossoma macropomum**)**

2. MATERIALS AND METHODS

In this study, adult tambaqui were used from two captive environments. The first environment, with physical exercise stimulation, featured a centralized island and measured 8.0 meters in diameter and 1.60 meters in depth. The second environment, without exercise stimulation, was slightly larger, measuring 8.58 meters in diameter and 1.70 meters in depth, and did not have a central island.

Both tanks were equipped with biological filters composed of crushed stone beds, which supported aerobic microorganisms to convert and oxidize organic matter. These filters, operated in series, were configured to maximize nitrification and ensure water quality.

2.1 Blood collection and sample preparation.

Anesthesia with Eugenol 0.40 mL/L and intracardiac puncture.

10 mg of DiOC6(3) in 1.747 mL of dimethyl sulfoxide.

400 µg of Acridine Orange in 1 mL of the DiOC6 solution.

10 µL of blood + 1.950 mL of DPBS + 40 µL of dye cocktail.

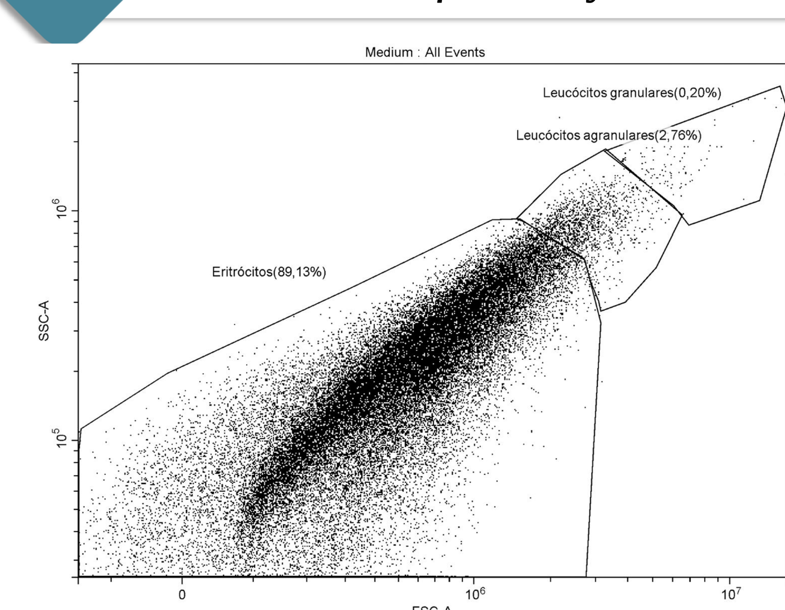
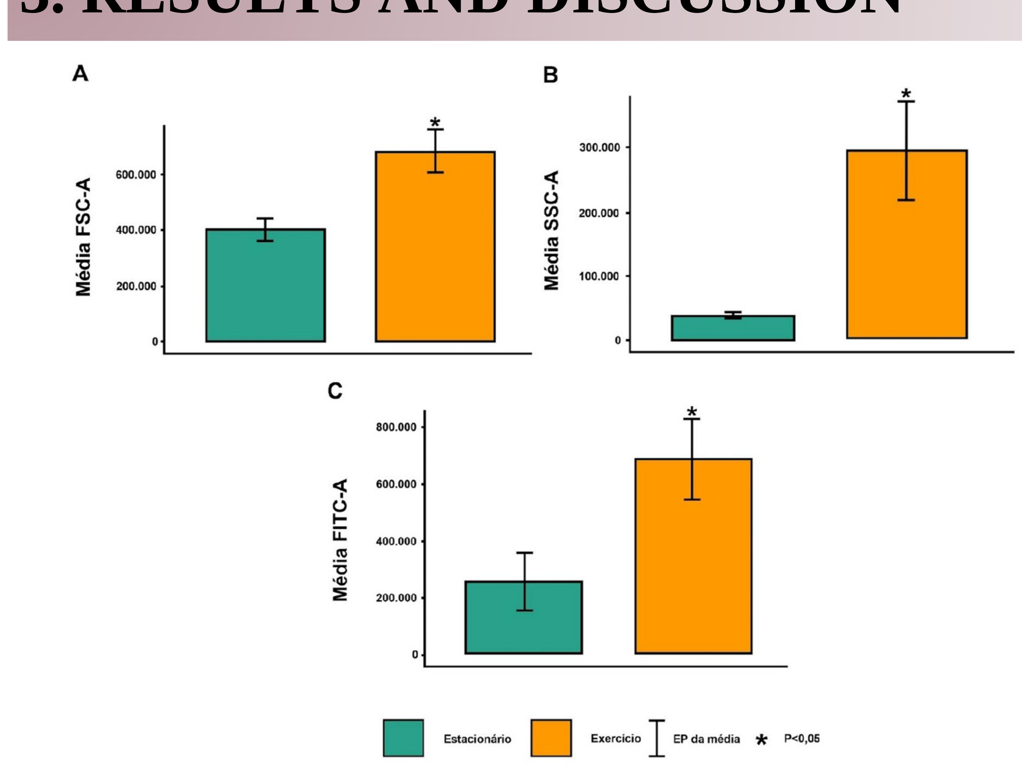


Figure 2 – Analysis by flow cytometry using CytExpert 2.4 software (Beckman Coulter, Inc.), displaying the distribution of different cell populations in a blood sample from *Colossoma macropomum*. SSC (Side Scatter) on the Y-axis and FSC (Forward Scatter) on the X-axis, corresponding to cellular complexity and size, respectively.

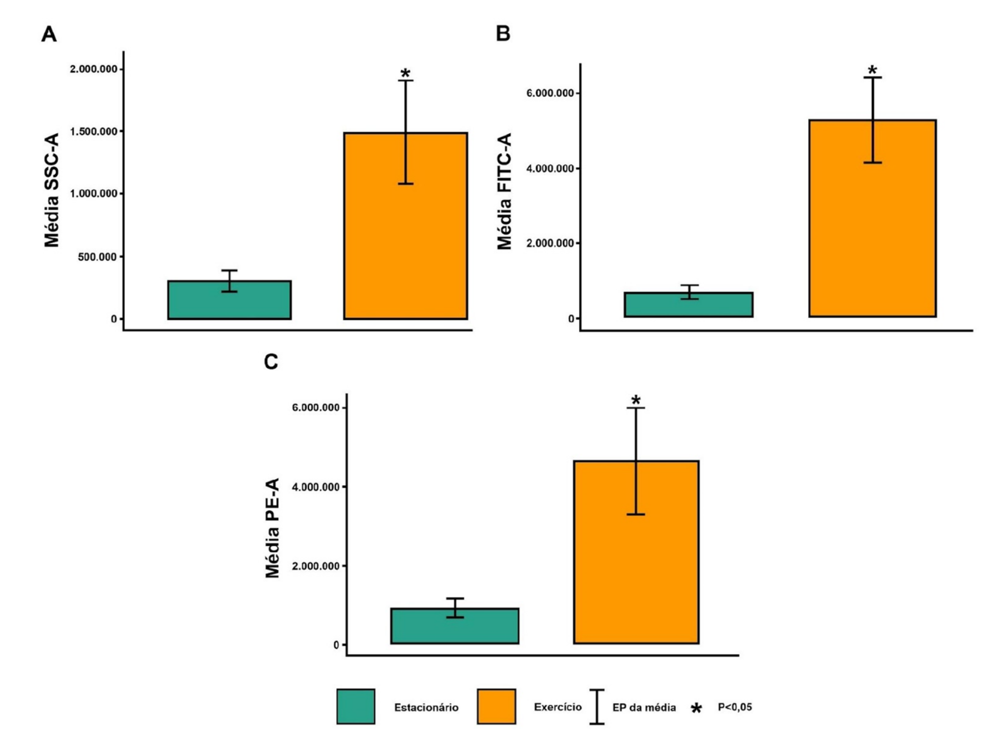
2.2 Statistical analysis

Shapiro-Wilk test: Used to assess the normality of the data. Student's T-test: Employed to compare two groups with normal distribution. Mann-Whitney U test: Used to compare two groups with non-normal distribution. The significance level set was $p < 0.05$.

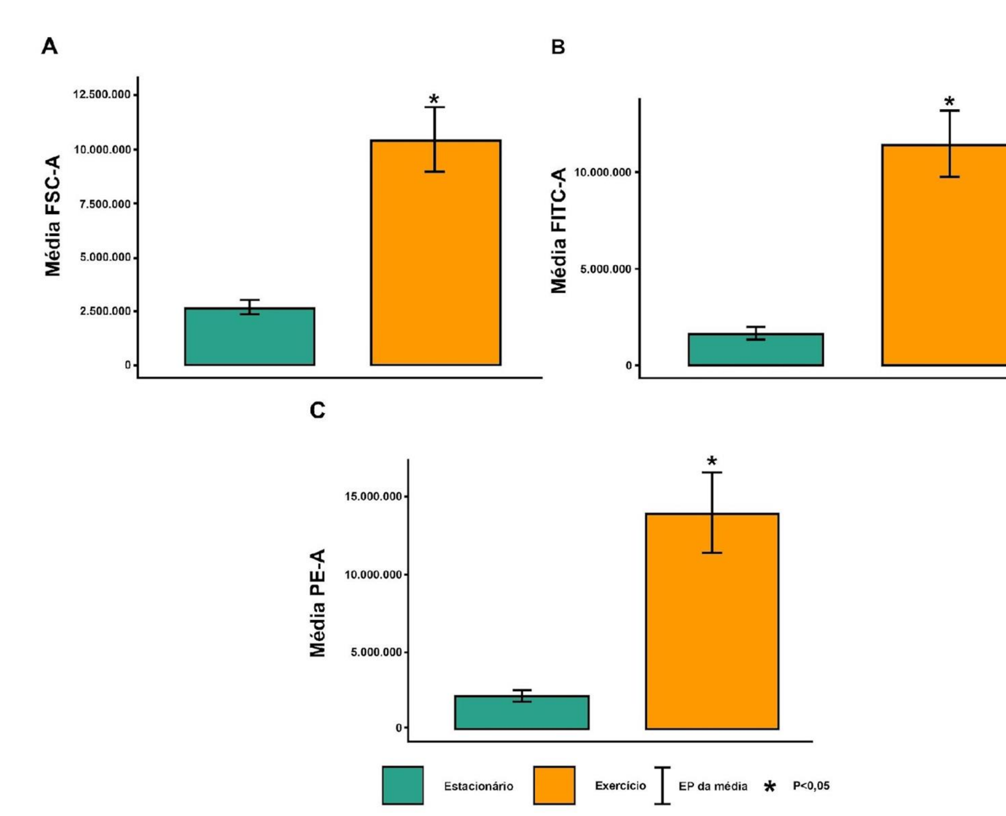
3. RESULTS AND DISCUSSION



Graph 1 – Estimation of cell size (FSC) (A), complexity (SSC) (B), and green fluorescence intensity (FITC) (C) of erythrocytes from the experimental groups of *Colossoma macropomum*.



Graph 2 – Estimation of cellular complexity (A), relative green fluorescence intensity (B), and relative fluorescence intensity emitted by RNA (C) of agranular leukocytes from the experimental groups of *Colossoma macropomum*.



Graph 3 – Estimation of cellular size (A), relative green fluorescence intensity (B), and relative fluorescence intensity emitted by RNA (C) of granular leukocytes from the experimental groups of *Colossoma macropomum*.

4. CONCLUSION

In summary, our results suggest that physical exercise stimulation can induce morphological changes in erythrocytes and leukocytes, increase DNA and RNA content, and promote hyperpolarization of membranes. These changes may reflect an improvement in oxygen transport and a strengthening of the immune response in *Colossoma macropomum*.

5. REFERENCES

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