

**THE EFFECT OF AEROBIC AND ANAEROBIC PHYSICAL TRAINING ON THE  
ABSORPTION OF CARBOHYDRATE AND PROTEIN IN SMALL  
INTESTINE OF RATTUS NORVEGICUS STRAIN WISTAR**

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**ABSTRACT**

The purpose of this study is to investigate the morphofunctional response of villous (number, length, diameter), total number of absorptive cells, and carbohydrate and protein absorption capability in small intestine of *Rattus norvegicus* strain Wistar (RNSW) that has been subjected to aerobic and anaerobic physical training based on the morphofunctional physiobiological paradigm.

This study was based on the separate sample pretest-posttest control group design, using t-test, and multivariate SPSS ten program analysis, with five percent level of significance.

The sample consisted of one hundred and twenty male RNSW, with average age of five months, and body weight of 246-278 grams. They were divided in twelve groups at random, i.e. four pretest groups, two control groups, and six treated groups where different diets were given thirty minutes before undergoing posttest.

The experimental animals underwent four weeks physical training (twelve times), three groups were given aerobic physical training by swimming with a burden of three percent fasting body weight, the other three groups received anaerobic physical training by swimming with a burden of nine percent fasting body weight. The experiment were conducted at night, between 7.30 PM to 10.30 PM, with a temperature of 28°C to 30°C.

Results of the study revealed: (1) Aerobic and anaerobic physical training increased the villous morphofunctional response (in number, length, and diameter) of the small intestine (Hotelling's Trace = 5,148, Sig. = 0,000), increased the number of absorptive cells ( $t = -73,281$ , Sig. = 0,000), and increased the absorptive capacity of carbohydrate and protein (Hotelling's Trace = 0,244, Sig. = 0,000). (2) There was a difference in influence of aerobic and anaerobic physical training on the increased villous morphofunctional response (in villous number, length, and diameter) (Hotelling's Trace = 0,328<sup>a</sup>, Sig. = 0,000). The increased number and diameter of

villous were observed more in aerobic physical training compared to anaerobic physical training, while the increase in villous length in aerobic physical training was less than that in anaerobic physical training. (3) There was a difference in the increased absorptive capacity of carbohydrate and protein among groups (Hotelling's Trace = 0,404<sup>a</sup>, Sig. = 0,000). Aerobic physical training had less influence than anaerobic physical training on the increased number of absorptive cells, and the absorptive capacity of carbohydrate and protein in the small intestine.

In conclusion, (1) Aerobic physical training of swimming with a burden of three percent fasting body weight, and anaerobic physical training of swimming with a burden nine percent fasting body weight correlate with the increase of villous morphofunctional response (villous number, length, and diameter), the number of absorptive cells, and carbohydrate and protein absorptive capacity of the small intestine. (2) Aerobic physical training of swimming with a burden of three percent fasting body weight has better correlation than anaerobic physical training of swimming with a burden nine percent fasting body weight with the increased number and diameter of villous. On the other hand anaerobic physical training of swimming with a burden nine percent fasting body weight has better correlation on the increased length of villous the small intestine. (3) Anaerobic physical training of swimming with a burden nine percent fasting body weight has better correlation than aerobic physical training of swimming with a burden of three percent fasting body weight with the increased number of absorptive cells, and the absorptive capacity of carbohydrate and protein in the small intestine.

**Key words:** *physical training, absorptive cell, absorption, small intestine.*