

STUDY ON THE EFFECTIVENESS OF AN EXERCISE PROGRAM IN REDUCING OVERWEIGHT AND OBESITY IN 10-YEAR-OLD CHILDREN

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Abstract: Childhood obesity is one of the most serious public health problems facing contemporary society. The increase in the number of overweight and obese children is driven by changes in lifestyle, a decrease in physical activity, and the adoption of unhealthy eating habits. At age 10, children are at a critical stage of biological and psychological development, and being overweight can negatively affect their growth and healthy development. This paper presents an exercise program designed to combat overweight and obesity in 10-year-olds, based on the principles of physical education and sports training adapted to the specific needs of this age group. The program includes aerobic exercises, bodyweight strength exercises, dynamic games, and recreational activities, with the primary goal of reducing body fat and improving overall health.

Introduction

In recent decades, the prevalence of childhood overweight and obesity has increased significantly in most countries around the world. The World Health Organization considers obesity one of the most significant public health challenges, as it contributes to the development of chronic conditions as early as childhood and adolescence. [7, 9] Social and technological changes have contributed to a decrease in children's physical activity levels. Excessive use of electronic devices, time spent watching television, a lack of play areas, and a reduction in sports activities have led to an increase in sedentary behavior. At the same time, increased consumption of foods high in sugar, fat, and calories contributes to weight gain. At age 10, children go through a developmental stage characterized by accelerated growth and maturation. During this period, educational and physical interventions can have significant effects on future behavior. Physical exercise is one of the most effective methods for preventing and combating obesity, as it helps increase energy expenditure and promotes the harmonious development of the body. [2, 5]

Being overweight refers to the excessive accumulation of adipose tissue that exceeds normal values for a person's age and sex. Obesity is a more severe form of being overweight, characterized by an excessive amount of body fat that affects an

individual's health. In medical practice, excess weight is assessed using the body mass index (BMI), calculated using the following formula:

$$\text{BMI} = \text{Weight (kg)} / \text{Height}^2 (\text{m}^2)$$

For children, BMI is interpreted by comparing it to age- and sex-specific percentiles. The main causes of obesity include an imbalance between energy intake and expenditure, a high-calorie diet, lack of physical activity, excessive consumption of sweets and fast food, oversized portions, and frequent snacking between meals. Obesity is associated with an increased risk of numerous chronic diseases, such as type 2 diabetes, cardiovascular disease, hypertension, musculoskeletal problems, sleep apnea, and certain types of cancer. Preventing and treating obesity involves lifestyle changes, such as a healthy diet, regular physical activity, and, in some cases, medical treatment or surgery. [4,10]

Material and method

Physical activity is an essential component of a healthy lifestyle. Exercise increases energy expenditure and improves the body's functioning. Among the benefits of physical exercise are the following physiological effects: accelerated metabolism, increased cardiorespiratory fitness, muscle development, improved blood circulation, and weight management, as well as psychological benefits: reduced stress, increased self-confidence, improved mood, and enhanced teamwork. [1] The WHO recommends that children aged 5 to 17 engage in at least 60 minutes of moderate- or vigorous-intensity physical activity daily. Activities should include aerobic exercise, exercises to build muscle strength, and exercises to strengthen the skeletal system. The aim of the study was to evaluate the effectiveness of a 12-week exercise program in reducing overweight and obesity in 10-year-old children.

In designing the exercise program, age-specific developmental characteristics were taken into account, such as: a marked increase in motor learning ability, harmonious development of the musculoskeletal system, increased coordination, interest in games and group activities, and responsiveness to motivational stimuli. These characteristics allow for the use of complex physical exercise programs adapted to their level of development. It is hypothesized that the systematic implementation of a physical exercise program tailored to age-specific characteristics will lead to a reduction in body mass index and an improvement in motor skills among 10-year-old overweight and obese children. [8]

The research objectives aim to increase the level of physical activity, reduce body mass index, develop general endurance, improve joint mobility, develop basic motor skills, foster health-oriented behavior, assessing the initial level of physical development, determining body mass index, implementing the exercise program, evaluating the final results, and comparing the initial data with the final data. The study was conducted on a group of 20 10-year-old students—11 boys and 9 girls—who were identified as overweight or obese based on age-specific BMI values.

The exercise program lasted 12 weeks, with 4 weekly sessions of 45–60 minutes each, including warm-up exercises (10 minutes)—walking with different arm positions, light jogging, jumping in place, and joint mobility exercises; aerobic exercises (15–20 minutes)—continuous running for 8–15 minutes, brisk walking, jumping rope, obstacle courses, aerobic dance; strength exercises (15 minutes)—squats, lunges, trunk lifts, modified push-ups, abdominal exercises; dynamic games (10 minutes)—relays, ball games, tag, mini-team competitions; cool-down and stretching (5 minutes)—slow walking, breathing exercises, stretching, relaxation.

The intensity of the exercise was continuously adjusted to the participants' fitness level. The following measurements and tests were used to evaluate the results: height (cm), body weight (kg), body mass index, 600-meter endurance run, number of squats in 30 seconds, and number of sit-ups in 30 seconds. [3, 6]

Weekly Schedule Template

Day	Activities	Duration
Monday	Running and dynamic games	50 min
Tuesday	Strength and coordination circuit	45 min
Thursday	Aerobic exercises and relays	60 min
Friday	Sports games and stretching	50 min

Results:

Table 1 - Changes in Body Weight

Indicator	Initial Test	Final Test	Difference
Average Weight (kg)	54,2	50,8	-3,4

The decrease in the average BMI demonstrates the program's effectiveness in reducing excess weight.

Table 2 - Changes in the Body Mass Index

Indicator	Initial Test	Final Test	Difference
Average BMI	25,4	23,7	-1,7

The decrease in the average BMI demonstrates the program's effectiveness in reducing excess weight.

Table nr.3 - Endurance test

Indicator	Initial Test	Final Test
600-meter run time	4 min 28 sec	3 min 57 sec

A significant improvement in cardiorespiratory capacity is observed.

Table nr.4 - Lower-body strength

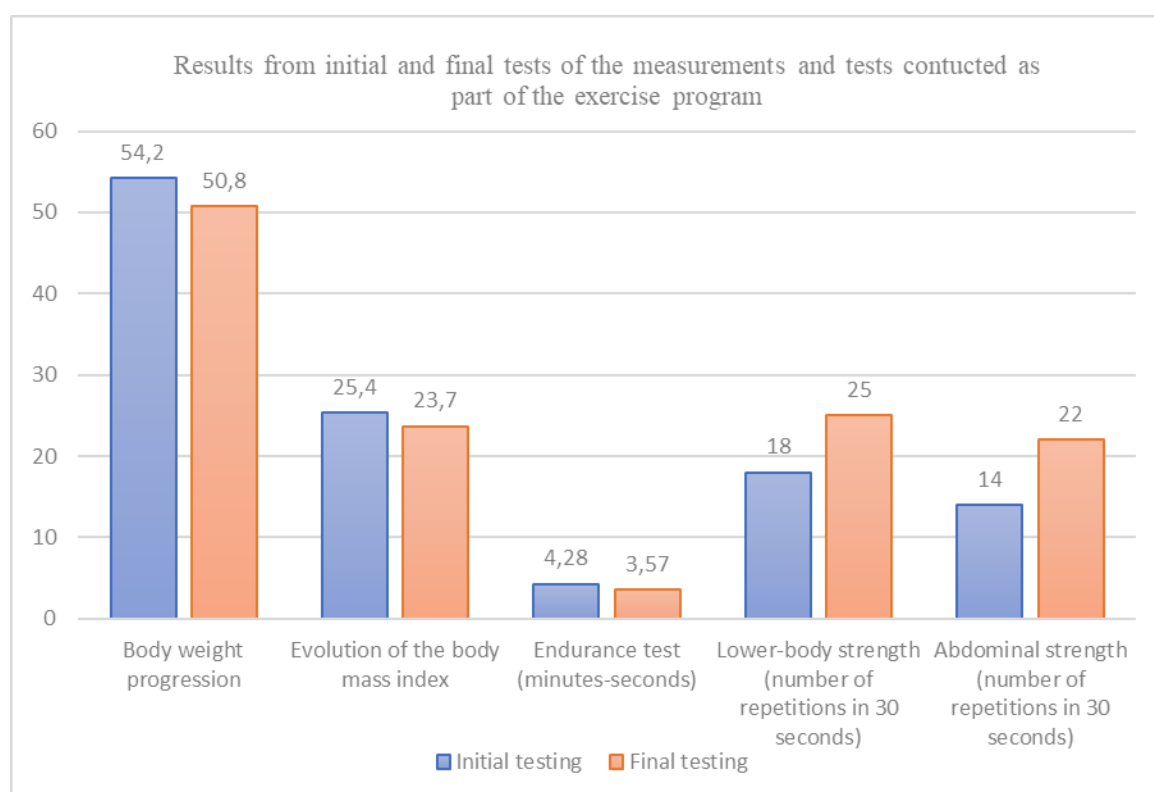
Indicator	Initial Test	Final Test
Squats/30 sec	18	25

An increase in the number of repetitions indicates the development of muscle strength.

Table nr.5 - Abdominal Strength

Indicator	Initial Test	Final test
Sit-ups /30 sec	14	22

The results show a significant improvement in abdominal muscle tone.



Graph No. 1 – Results from the initial and final tests of the measurements and tests conducted as part of the exercise program

Conclusions

A comparative analysis of the data obtained from the initial and final tests shows that the exercise program had beneficial effects on the participants' physical and functional development.

The reduction in body weight and body mass index confirms that regular physical activity helps combat overweight and obesity at age 10.

At the same time, the improvement in motor test results demonstrates an increase in exercise capacity and physical fitness levels.

The research findings are consistent with the recommendations of specialists in the fields of physical education and public health, who emphasize the need for children to engage in regular physical exercise. Childhood obesity is a major public health problem. Regular physical exercise helps reduce excess weight. The 12-week program produced positive changes in body weight and body mass index. Cardiorespiratory fitness and muscle strength improved significantly. Physical activities organized in the form of games increase children's motivation and participation. Collaboration between families and schools is essential for maintaining the results achieved.

Childhood obesity is a complex problem that requires multidisciplinary interventions. Regular physical activity is one of the most important factors in preventing and combating excess weight in children. To achieve optimal results, the following is recommended: limiting screen time to a maximum of two hours per day; encouraging outdoor activities; maintaining a regular sleep schedule; eating fruits and vegetables daily; avoiding fast food; and involving the family in shared sports activities. It is recommended to introduce similar programs in schools; increase the number of extracurricular sports activities; periodically monitor body mass index; educate parents on the importance of physical activity; and limit sedentary behaviors and screen time. Physical education teachers should adapt exercises to the children's developmental level and create a positive, motivating environment. The success of the intervention depends on collaboration between families, schools, and physical education specialists, as well as on maintaining a balance between nutrition and physical activity.

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