# Effectiveness of the combined use of fitness training and changes in the diet depending on the initial body weight

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**Abstract**

**Objective of the study** was to evaluate the effectiveness of the combined use of fitness training and dietary changes depending on the initial body mass index.

**Methods and structure of the study.** 81 untrained women aged 48.9±2.4 years were examined. Depending on the initial body mass index, women were divided into four groups. Fitness training was carried out using body weight and without the use of sports equipment, lasting 45 minutes, three times a week, in groups of 6-8 people.

**Results and conclusions.** In all groups, a decrease in the body mass index and circumference of the studied parameters was established, but the degree of change in individual anthropometric parameters depended on the initial body weight. At normal body weight, only a statistically significant downward trend in waist circumference was found; with overweight, a significant decrease was found in the circumference of the hips and arms; with obesity, a significant decrease was found in the circumferences of the chest, waist and hips, more pronounced in women with obesity of the 1st degree.

The use of a complex of fitness training with a change in diet helps to reduce the circumference of the chest, waist, hips, legs, arms, and body mass index.

**Keywords:** *physical activity, fitness, obesity, nutrition.*

**Introduction.** Involving the population in mass physical culture classes in order to prevent the most common diseases in the population is one of the leading tasks of today [4]. In this regard, fitness classes are of great interest, since they are not only a means of body shaping, but also promote health, increase the functional reserves of the body, endurance, stress resistance, coordination and development of aesthetics, physical image [6,9,10]. One of the most effective ways to reduce body weight and fight obesity is to control the daily diet and regular moderate physical activity [1,3]. At the same time, the effectiveness of measures taken to correct body weight will be influenced by the initial morphological and functional parameters of a person [7].

**Objective of the study** was to evaluate the effectiveness of the combined use of fitness training and dietary changes depending on the initial body mass index.

**Methods and structure of the study.** A survey was conducted of untrained women (81 women in total), whose average age was 48.9±2.4 years, who had a medical permit for fitness. Body mass index (BMI) was calculated according to the generally accepted method: BMI=weight (kg)/height (m2). Subjects were divided into groups depending on the BMI: (Group 1) – with normal weight (n=7); group 2 - overweight (n=32); group 3 - with obesity of the 1st degree (n=30); 4th group - with II degree obesity (n=12). The follow-up period for all study participants was 85±5 days. Anthropometric studies were performed by measuring the circumference of the chest, waist, hips, legs (measured at the level of the middle of the thigh), arms (measured at the level

of the flexor, above the elbow), BMI. All parameters were controlled before, during and after the study.

Actual nutrition was assessed by the method of 24-hour (daily) reproduction of nutrition, on the basis of which, taking into account concomitant diseases, recommendations were given to each subject for the duration of the study in the form of a seven-day diet. Recommendations for women of the 1st group are given in accordance with individual preferences in the form of a moderate reduction in the energy value of the diet by limiting simple sugars and increasing the proportion of fresh fruits and vegetables. The subjects of the 2nd, 3rd and 4th groups were prescribed a diet with moderate and high carbohydrate reduction (ration No. 6) [8].

For the subjects, under the guidance of sports coaches, fitness training with their own weight was carried out without the use of sports equipment, with an emphasis on the duration and rhythm of the exercises, the principle of which was the exclusion of competitive elements and the achievement of a sports result [5]. Trainings were held for 45 minutes, three times a week, in groups of 6-8 people and included three stages: warm-up - 10 minutes, main part - 30 minutes, final part - 5 minutes. The warm-up consisted of alternating raising the knees to the chest, standing, circular movements of the shoulders, forearms and hands, turning the head to the sides, back and side, squats, lunges, balance on one leg. The main part of the workout is standing, sitting and lying on the floor. Standing exercises included: one-leg jump lunge, jump squat, straight leg toe raise, elevated heel drop, squat side lunge, palm and forearm plank (including dynamic plank with alternating palm rest and forearms), side plank with a leg lift, in emphasis on the palm of your hand, alternately pulling your knees to your chest, from a standing position or a knee-elbow position, steps with your hands with push-ups. In a sitting position - turn the body to the sides. In the prone position: raising and holding the legs, alternately raising the legs while lying down, twisting the body while alternately pressing the knee to the chest.

The obtained data were processed by the Statistica 10.0 program with the determination of the arithmetic mean (M), standard deviation (M± ), representativeness error of the mean (M±m) and 95% confidence intervals (95% CI) of the sample means. After checking for normality of distribution using the Shapiro-Wilk test, the significance of the difference was determined by Student's t-test. Differences were considered significant at $p<0.05$.

**Results of the study and their discussion.** Without taking into account the division into groups, after the study, a statistically significant decrease in the value of all indicators, except for leg circumference, was noted. The most significant decreases were: waist circumference (by 5.6%), arms (by 6.7%), body weight (by 5.4%) and BMI (by 5.2%). Similar data were obtained by other researchers [2]. Taking into account the duration of the study, the average weight loss per month was 1.8 kg.

For the subsequent evaluation of the effectiveness of the applied complex, an analysis of changes in anthropometric indicators by groups was carried out. The results are presented in the table.

In the subjects of the 1st group, at the end of the study, a decrease in all the studied indicators

*Anthropometric indicators of women with different body mass index before and after the study*

| Group | | Researched indicators, (95% CI) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Circumference, cm | | | | Arms | Weight body, kg | BMI, Unit |
| | | Chest | Waist | Hips | Legs | | | |
| 1st | Before | 90,5 - 95,2 | 72,7 - 84,1 | 95,7 -100,1 | 48,7 - 59,3 | 27,7 - 31,7 | 58,5 - 63,9 | 21,9 -24,7 |
| n=7 | After | 87,0 -93,6 | 67,4 -78,4 | 91,5 -98,1 | 51,4 - 56,2 | 26,1 - 29,3 | 56,2 -62,8 | 21,4 -23,8 |
| 2nd | Before | 99,0 -103,8 | 86,4 -91,4 | 106,0 -109,6 | 54,5 -59,9 | 31,6 -36.0 | 69,7 -75,1 | 27,5 -28,3 |
| n=32 | After | 96,5 -100,9 | 82,8 -87,8 | 100,4-104,0* | 57,7 -58,5 | 30,4 -31,6* | 66,3 -70,7* | 26,1 -26,9* |
| 3rd | Before | 111,1 -115,1 | 100,9 - 105,7 | 112,4 -116,4 | 58,7 -63,5 | 34,8 -38,0 | 83,9 -89,3 | 32,0 -33,2 |
| n=30 | After | 107,1 -111,1* | 94,7 -98,7* | 107,0109,8* | 57,1 -61,9 | 32,7 -36,3 | 79,1 -83,9* | 30,1 -31,3* |
| 4th | Before | 115,8 - 120,5 | 105,7 -113,5 | 118,2 -126,0 | 59,8 -68,8 | 36,6 -40,2 | 92,4 -99,8 | 36,6 -38,2 |
| n=12 | After | 111,7 -116,7* | 98,1 -105,9* | 113,5 -120,5 | 60,3 -68,5 | 34,3-37,5 | 87,3 -93,9* | 34,3 -36,3* |

*Note: * - differences are statistically significant compared to the initial value of the indicator* p≤0,05.

was noted, however, a statistically significant trend of 7.0% (p=0.098) was found only in the waist circumference. It should also be noted the largest decrease in this indicator among all groups of women surveyed. This complex can be recommended to women with normal BMI values for waist circumference correction.

The subjects of the 2nd group also showed a statistically significant trend towards a decrease in waist circumference by 4.1% (p=0.072), however, the largest and most significant decrease was found in the circumference of the hips by 5.2% (p<0.001) and arms by 9, 2% (p=0.012), which makes it possible to recommend this complex specifically for correcting these indicators. The average value of the leg volume increased slightly, which can be explained by the strengthening of the calf muscles due to regular physical activity.

In the subjects of the 3rd group, the use of the complex received the highest estimate of effectiveness, since a significant decrease was noted in the circumference of the chest by 3.5% (p=0.011), waist by 6.4% (p 0.001) and hips by 5.3% (p 0.001). It can be assumed that this complex has the greatest place of application in the form of pronounced fat deposits, against the background of a sufficiently high amplitude of movements, namely in women with obesity of the 1st degree.

Quite effective, but less pronounced effect of the complex compared to women of the 3rd group, was found in women of the 4th group. Thus, there was a significant decrease in chest circumference by 3.4% (p=0.041) and waist circumference by 6.9% (p=0.024), against the background of a statistically significant trend towards a decrease in hip circumference by 4.2% (p=0.087) and hands by 6.5% (p=0.052). A somewhat smaller effect of the complex compared to women of the 3rd group can be explained by the forced relatively low mobility and a decrease in the amplitude of the exercises performed in women, due to a significant excess of body weight over normal.

It is important to note a significant decrease in body weight and BMI in women of the 2nd, 3rd and 4th groups.

**Conclusions.** The use of a complex of fitness training with a change in diet helps to reduce the circumference of the chest, waist, hips, legs, arms and body mass index. The effectiveness of using a complex of fitness training with a change in diet depending on the initial body weight is different, with the greatest efficiency in women with obesity of I and II degrees. Women with normal and overweight can be recommended to use a complex of fitness training with a change in diet to correct individual anthropometric indicators.

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