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THE EXAMINATION OF MINI TRAMPOLINE TRAINING PROGRAMS PLANNED WITH DIFFERENT DIET REGIMENS ACCORDING TO SELECTED VARIABLES[1]

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ABSTRACT

The aim of this research is to investigate the effects of short-term high carbohydrate and high protein diet programs on the speed, endurance performance, and body composition of participants with mini trampoline training. The research was approved by the ethics committee of Istanbul Gelisim University on 18.08.2022, with decision number 2022-13 in the meeting 23-01-36. Participants included 15 male volunteers who were students of Istanbul Gelisim University School of Physical Education and Sports and participated in mini trampoline training. Participants were divided into three groups: high carbohydrate diet group (n:5), high protein diet group (n:5), and control group (n:5). As a pre-test, participants' body composition measurements and endurance (30-15$_{IFT}$) and 20-meter sprint tests from motor skills were conducted. Personalized diet programs were created for the high carbohydrate diet group with a ratio of 70% carbohydrates, 10% protein, and 20% fat, and for the high protein diet group with a ratio of 30% carbohydrates, 35% protein, and 35% fat. Participants were asked to perform mini trampoline training regularly twice a week and follow their diet programs for 2 days before the final test. SPSS 17 package program was used for data analysis. Tests for body composition and motor skills were analyzed using ANOVA. As a result, the high carbohydrate diet programming applied with mini trampoline training resulted in a decrease in body composition parameters, but this difference was not found to be significant. In the high protein diet application, although an increase was observed in VO_2max and 20-meter sprint running test values obtained from the 30-15$_{IFT}$ endurance test, no significant difference was detected.

Keywords: Carbohydrate, protein, trampoline gymnastics, 30-15$_{IFT}$, speed.

[1] This study was carried out by Melis HALİLOĞLU, a graduate student of Istanbul Gelişim University, Graduate Education Institute, Department of Coaching Education, Department of Movement and Training Sciences, with the reference number: 810840, titled *'Examination of mini trampoline training planned with different diet programs according to selected variables'* derived from undergraduate thesis.

INTRODUCTION

Sustaining life, maintaining health, growth and development, and a quality lifestyle are highly dependent on nutrition, especially adequate and balanced nutrition. Adequate and balanced nutrition is achieved by meeting the individual's need for nutrients according to age, gender, physical activity, and health status. The amount of food to be consumed also varies depending on the intensity, duration, and duration of the physical activity performed. In this context, the field of athlete nutrition stands out. Athlete nutrition is the consumption of the necessary nutrients by the individual before, during, and after competitions or training sessions. The type of training performed, genetics, and psychological conditions affect this level (Taşdelen, 2021).

The nutrition of the athlete should be personalized. The main purpose here is to protect the health of the athlete and to increase performance. In this direction, an appropriate nutrition program should be created by determining the energy level, macro and micro nutrients needed by the athlete. The recovery period in athletes is also considered as the pre-exercise period. It gains importance in terms of replenishing glycogen stores and providing fuel in training (Almada, 2013; Austin and Seebohar, 2011; Ivy and Portman, 2004). The initial level of carbohydrate and glycogen stores used plays a role in the regeneration of glycogen stores (Fery, Plat, and Balasse, 2003). The time of feeding before the activity, the type of carbohydrate consumed, the use of carbohydrates alone (Almada, 2013; DeMarco et al., 1999) and with protein are the points to be considered before the activity (Kreider et al., 2007; Williams, 2007). Proteins that prevent muscle protein breakdown and support protein synthesis in athletes. The most effective way to achieve this is when the activity is used before, during and after exercise. It contributes to energy formation in exercise, has a positive effect on performance, and after activity, it has a regenerative effect on glycogen stores (Phillips and Van Loon, 2011).

The idea of trampoline was first conceived in response to the difficulties experienced by circus acrobats and was initially used for entertainment purposes. It was later used in military training, gymnasiums, and schools. The use of trampoline became widespread with shows and aerobic exercises. Mini trampolines have become more popular with performances and aerobic exercises. The reason for the increasing preference for mini trampolines is that they are easily portable, require less supervision, are easy to set up, make exercise easier, and are relatively cheaper than other options (Esposito and Esposito, 2009; Maharaj and Nuhu, 2016; Hahn, Shin and Lee, 2015). Rebound exercises performed with mini trampolines are often preferred for their aerobic benefits. It significantly reduces the load on the back and legs compared to hard floors and requires minimal effort (Maharaj and Nuhu, 2019).

METHOD

In this study, experimental methods were used as quantitative research methods. Among the experimental methods, the semi-experimental research method's non-equivalent groups pre-test - post-test design was applied. Quantitative research is based on observing, objectifying, measuring, and reporting events and phenomena numerically. Experimental methods are often preferred in sports sciences. The experimental

method, a quantitative research method, measures whether there is differentiation in the effects of events on groups or groups in terms of certain variables. It determines the cause-and-effect relationships between events and predicts hypotheses. The non-equivalent groups pre-test - post-test design from the semi-experimental research method is; There is no unbiased assignment. While an operation is applied to one of the groups, the control group is tested without any operation (Ekiz, 2003).

Research Model

Research Group

The study was conducted with 15 voluntary participants between the ages of 18-24 who regularly practice mini trampoline and are students of Istanbul Gelisim University School of Physical Education and Sports, for 6 weeks. These participants were divided into three groups: those who consumed a normal diet (n:5), those who consumed a high carbohydrate diet (n:5), and those who consumed a high protein diet (n:5). Participants consuming a normal diet (n:5) constituted the control group.

Data Collection

Technique In the study, a personal information form filled out online through Google Forms was used to obtain demographic information and factual data. Before the application and diet planning, a questionnaire called "General Information and Nutrition Behaviors" was applied face-to-face. In addition, the height, weight, and body composition measurements of the participants were taken, and speed (20-meter sprint) and endurance (intermittent fitness running test; 30-15$_{IFT}$) tests were applied.

Table 1. Classification of basic nutrition knowledge and food preference knowledge scores

	Classification
Basic nutrition knowledge	
>65	Excellent
56-65	Good
45-55	Moderate
<45	Poor
Food preference knowledge	
>42	Excellent
37-42	Good
30-36	Moderate
<30	Poor

Batmaz, H. (2018)

Height (cm), Body Weight (kg), Body Composition

The individual's body is positioned upright with their eyes looking straight ahead. Their feet should be bare. The head should be in the Frankfurt plane (the upper part of the ear and the lower part of the eye are in a horizontal

position and at the same level, and the gaze is parallel to the ground), and the body should be kept tense. A portable stadiometer with a range of 80 cm to 200 cm, a footrest, 1 mm precision, and portability was used for measurements. Body weight was measured in the morning on an empty stomach with light clothing. The person is asked to step onto the scale barefoot and stand in an upright position without moving for 3-4 seconds, and the result is recorded (Pekcan, 2018). For body composition, participants should stand on the scale barefoot and in light clothing. They should not have any metal objects (belt, buckle, necklace, earrings, etc.) on them. Ensure that the right foot is pressed towards the right metal foot area of the device and the left foot towards the left metal foot area. Then, they should firmly grip the metal of the device with their right hand and the metal of the device's left arm with their left hand. Wait without moving or speaking until the device completes the measurement. The "InBody Personal Body Analysis Device" was used for measurements. This device allows access to parameters such as body weight, fat, muscle and water percentage, distribution of these values in the body, bone mineral mass, metabolic age, and body mass index.

Body Mass Index (BMI) (kg/m²)

It is calculated with the results of body weight and height measurements of the individual. It is calculated using the formula "Body weight (kg) / Height (m)²". According to the result obtained; <18.50 kg/m²: Underweight; 18.5 - 24.99 kg/m²: Normal; 25.00 - 29.99 kg/m²: Overweight; >30.00 kg/m²: Obese (Pekcan, 2018).

Speed

20-Meter Sprint 20-meter sprint: Participants start the test by sprinting at maximum speed over a predetermined distance of 20 meters and complete it at maximal speed. The running time is measured in seconds/milliseconds using an electronic photoelectric cell. Athletes perform the measurement twice, and the best time achieved is recorded (Sevim, 1997).

Endurance

Intermittent Fitness Running Test (30-15$_{IFT}$): The 30-15 Intermittent Fitness Test (30-15$_{IFT}$) was developed by M. Buchheit to assess aerobic power and aerobic capacity in sports with intermittent loading and resting such as basketball and football (Buchheit, 2008). Although it is classified as an aerobic test, it can evaluate many fitness parameters. It is a test that provides coaches with a prescription for gaining information about fitness capacity. In addition to aerobic capacity, it provides information about motor skills such as change of direction (Buchheit et al., 2011). The test, which starts from point A, requires the athlete to run at a specific time and speed for 30 seconds. Then, there is a 15-second rest period. The test starts at a speed of 8 km/h and increases by 0.5 km/h every 30 seconds. The test ends if the athlete stops running or cannot reach the 3-meter zones simultaneously with the beep sound three times in a row. The last successful run that can be completed is accepted as the test speed (Buchheit, et al., 2009). In the literature, it has been reported that the test has a high reliability coefficient with the test-retest method (Buchheit, et al., 2011). Maximum oxygen consumption capacity is calculated

according to the following formula: VO_2max calculation; C = gender (male = 1; female = 2), Y = age, K = body weight (kg), H = speed; VO_2max (ml.kg–1.min–1) = 28.3 – (2.15 x C) – (0.741 x Y) – (0.0357 x K) + (0.0586 x Y x H) + (1.03 x H) (Buchheit, 2008).

Training Program

The training program was planned for two days a week (Tuesday-Thursday), with each session lasting 1 hour. Participants began the training with 10 minutes of general warm-up exercises. Then, they performed 3 repetitions of vertical jumps (straight), 3 repetitions of vertical jumps (45-degree rotational movements), 3 repetitions of vertical jumps (90-degree rotational movements), 3 repetitions of vertical jumps (120-degree rotational movements), 3 repetitions of vertical jumps (180-degree rotational movements), 3 repetitions of vertical jumps (360-degree rotational movements), 3 repetitions of dolphin somersault, 5 repetitions of half twist (cartwheel), and finally, 5 repetitions of single jump movements. The training session concluded with 10 minutes of general cool-down exercises.

Data Analysis

In the study, data will be presented as mean and standard deviation. The SPSS package program will be used for data analysis. The normality levels of the data will be assessed using the Shapiro-Wilks and Kolmogorov-Smirnov tests. Descriptive statistics of the data will be calculated. If the data is parametric, repeated measures ANOVA will be applied, and if the data is non-parametric, the Friedman or Cochran Q test will be used. If the course of the study requires different analyses to be added or if planned statistics need to be removed or modified, it will be possible to make these adjustments accordingly.

FINDINGS

The pre-test and post-test data performed to determine the endurance (30-15_{IFT}), maximum oxygen consumption capacity (VO_2max) and speed (20 meter sprint) values of the experimental group with high carbohydrate and protein groups are given in the tables below. Statistical analysis results were evaluated in the explanation section of the tables.

Table 2. Pre-test - post-test values of the 30-15_{IFT} test (Km/S) for groups

Diet groups	N	Pre-test (mean±std)	Post-test (mean±std)	Difference	t	p
High carbohydrate diet group	5	14,40±,89	15,10±1,34	-,70	-4,333	**,040***
High protein diet group	5	14,70±1,09	18,80±1,48	-1,10	-1,668	,171
Control group	5	13,80±,27	14,4±,65	-,60	-2,449	,070

**P>0,05*

The average 30-15_{IFT} test scores for the high carbohydrate diet group, high protein diet group, and control group before the intervention were found to be 14.40±0.89, 14.70±1.09, and 19.80±0.27, respectively. After the implementation of the diet and training programs, the post-test results were as follows: High Carbohydrate Diet

Group: 30-15$_{IFT}$ post-test value: 15.10±1.34 Pre-test to post-test difference: -0.70 t-value: -4.333 p-value: 0.040; High Protein Diet Group: 30-15$_{IFT}$ post-test value: 18.80±1.48 Pre-test to post-test difference: -1.10 t-value: -1.668 p-value: 0.171; Control Group: 30-15$_{IFT}$ post-test value: 14.40±0.65 Pre-test to post-test difference: -0.60 t-value: -2.449 p-value: 0.070. In summary, the high carbohydrate diet group showed a statistically significant improvement in the 30-15$_{IFT}$ test score after the diet and training program (p = 0.040). The high protein diet group exhibited an increase in the test score, but it was not statistically significant (p = 0.171). The control group also had an increase in the test score, which was not statistically significant (p = 0.070).

Table 3. VO_2max pre-test - post-test values for the groups (ml/kg/min)

Diet groups	N	Pre-test (mean±std)	Post-test (mean±std)	Difference	t	p
High carbohydrate diet group	5	40,92±2,08	43,11±3,83	-2,18	-1,987	,118
High protein diet group	5	41,50±2,63	44,51±4,42	-3,03	-1,570	,192
Control group	5	39,43±2,05	40,88±1,44	-1,45	-2,621	,059

The average VO_2max values for the high carbohydrate diet group, high protein diet group, and control group before the intervention were found to be 40.92±2.08, 41.50±2.63, and 39.43±2.05, respectively. After the implementation of the diet and training programs, the post-test results were as follows; High Carbohydrate Diet Group: VO_2max post-test value: 43.11±3.83, Pre-test to post-test difference: -2.18 t-value: -1.987 p-value: 0.118 ;High Protein Diet Group: VO_2max post-test value: 44.51±4.42 Pre-test to post-test difference: -3.03 t-value: -1.570 p-value: 0.192; Control Group: VO_2max post-test value: 40.88±1.44; Pre-test to post-test difference: -1.45 t-value: -2.621 p-value: 0.059. In summary, the high carbohydrate diet group showed an increase in VO_2max after the diet and training program, but it was not statistically significant (p = 0.118). The high protein diet group also exhibited an increase in VO_2max, but it was not statistically significant (p = 0.192). The control group had a slight increase in VO_2max, and it approached statistical significance (p = 0.059).

Table 4. Pre-test and post-test values of 20-meter sprint test for groups (seconds)

Diet groups	N	Pre-test (mean±std)	Post-test (mean±std)	Difference	t	p
High carbohydrate diet group	5	3,24±,11	3,22±,17	,01	,365	,734
High protein diet group	5	3,24±,04	3,12±,08	,12	3,161	**,034**
Control group	5	3,35±,11	3,27±,09	,08	1,871	,135

The pre-test average value of the High Carbohydrate Diet Group for the 20-Meter Sprint Test was 3.24±0.11, the High Protein Diet Group was 3.24±0.04, and the Control Group was 3.35±0.11. After the diet and training programs were applied, the post-test values for the High Carbohydrate Diet Group were 3.22±0.17, with a pre-test to post-test difference of 0.01, a t-value of 0.365, and a p-value of 0.734. The High Protein Diet Group had post-test values of 3.12±0.08, with a pre-test to post-test difference of 0.12, a t-value of 3.161, and a p-value of 0.034. The Control Group had post-test values of 3.27±0.09, with a pre-test to post-test difference of 0.08, a t-value of 1.871, and a p-value of 0.135.

Table 5. Inter-group BMI pre-test - post-test values

Diet groups	N	Pre-test (mean±std)	Post-test (mean±std)	Difference	t	p
High carbohydrate diet group	5	21,76±2,43	20,76±1,32	1,00	1,805	,145
High protein diet group	5	22,92±2,61	22,72±2,86	,20	1,319	,258
Control group	5	21,96±2,39	21,34±2,67	,50	3,010	**,040***

*P>0.05, (kg/m²: Kilogram per square meter)

After the implementation of diet and exercise programs, the BMI value of the high-carbohydrate diet group had a pre-test - post-test difference of 1.00 kg/m², with a t-value of 1.805, and a p-value of 0.145. The high-protein diet group had a pre-test - post-test difference of 0.20 kg/m², with a t-value of 1.319, and a p-value of 0.258. The control group had a pre-test - post-test difference of 0.20 kg/m², with a t-value of 3.010, and a p-value of 0.040. Significant differences were observed in the BMI values of the control group compared to the other groups. The reasons for this significant difference in the control group parallel the results of body weight. In this regard, participants engaging in different sports disciplines, the possibility of inadequate and unbalanced nutrition, the lack of intervention in their nutrition and training, and the small number of participants could explain the significant difference in BMI values.

CONCLUSION and DISCUSSION

In our study, participants were divided into three groups, each consisting of 5 individuals. The first group followed a high-carbohydrate diet, the second group followed a high-protein diet, and the third group served as the control group. When examining the differences in body weight between the groups, it was observed that the body weight of the high-carbohydrate diet group decreased from 65.6 kg to 62.6 kg after following the special diet program and mini trampoline training, resulting in a point difference of -2.9 kg. The high-protein diet group, on the other hand, saw a decrease from 70.3 kg to 69.9 kg after following the diet program and training, resulting in a point difference of -0.4 kg. The control group had a body weight of 67.4 kg in the pre-test and 65.6 kg in the post-test, with a point difference of -1.8 kg, which was statistically significant. The significant difference in the control group can be attributed to various factors such as participants engaging in different sports disciplines, lack of intervention in their nutrition and training, the possibility of inadequate and unbalanced nutrition, and the small number of participants.

Based on this data, it can be concluded that mini trampoline training, in conjunction with high-carbohydrate diet planning, high-protein diet planning, and the control group, resulted in more weight loss, although it was not statistically significant.

In a study conducted by Sahin, Demir, and Aydin (2016), an 8-week mini trampoline training program did not have a significant effect on body weight but could lead to a decrease in body fat percentage.

Similarly, another study by Malysz et al. (2019) found no significant difference in body weight after mini trampoline training.

When looking at the BMI levels between the groups, the pre-test BMI values were 21.76 kg/m² for the high-carbohydrate diet group, 22.92 kg/m² for the high-protein diet group, and 21.96 kg/m² for the control group. After the diet program and training, the BMI values decreased to 20.76 kg/m² for the high-carbohydrate diet group, 22.72 kg/m² for the high-protein diet group, and 21.34 kg/m² for the control group, with the decrease in the control group being statistically significant. This significant difference in the control group is in parallel with the results of body weight. Participants engaging in different sports disciplines, lack of intervention in their nutrition and training, the possibility of inadequate and unbalanced nutrition, and the small number of participants can explain the significant difference in BMI values.

Based on this data, it can be concluded that mini trampoline training, in conjunction with high-protein diet planning, high-carbohydrate diet planning, and the control group, resulted in a higher decrease in BMI level compared to the control group, although this result was not statistically significant.

According to O'Donovan et al. (2005), mini trampoline training led to a decrease in body fat percentage and body weight, although this difference was not significant.

When looking at the differences in the 30-15$_{IFT}$ endurance test, the pre-test 30-15$_{IFT}$ endurance test results were 14.4 km/s for the high-carbohydrate diet group, 14.7 km/s for the high-protein diet group, and 13.8 km/s for the control group. After the diet program and training, the 30-15$_{IFT}$ endurance test results were 15.1 km/s for the high-carbohydrate diet group, 15.8 km/s for the high-protein diet group, and 14.4 km/s for the control group, with the differences between the pre-test and post-test being -0.70, -1.10, and -0.60, respectively. The increase in the high-carbohydrate diet group was statistically significant. The high-carbohydrate diet provides intense energy, which may provide an advantage in endurance exercises, explaining the significant results in the 30-15$_{IFT}$ test. Based on this data, it can be concluded that mini trampoline training, in conjunction with high-carbohydrate diet planning, high-protein diet planning, and the control group, resulted in a significant increase in the 30-15$_{IFT}$ endurance test compared to the control group.

When looking at the differences in VO_2max between the groups, the pre-test VO_2max values were 40.92 ml.kg^–1.min^–1 for the high-carbohydrate diet group, 41.50 ml.kg^–1.min^–1 for the high-protein diet group, and 39.43 ml.kg^–1.min^–1 for the control group. After the diet program and training, the VO_2max values were 43.11 ml.kg^–1.min^–1 for the high-carbohydrate diet group, 44.51 ml.kg^–1.min^–1 for the high-protein diet group, and 40.88 ml.kg^–1.min^–1 for the control group, with differences between the pre-test and post-test of -2.18, -3.03, and -1.45, respectively. However, these differences were not statistically significant.

When examining the differences in the 20-meter sprint test between the groups, the pre-test 20-meter sprint times were 3.24 seconds for the high-carbohydrate diet group, 3.24 seconds for the high-protein diet group, and 3.35 seconds for the control group. After the diet program and training, the 20-meter sprint times were 3.22 seconds for the high-carbohydrate diet group, 3.12 seconds for the high-protein diet group, and 3.27 seconds for the control group, with differences between the pre-test and post-test of 0.01 seconds, 0.12 seconds, and 0.08

seconds, respectively. It was observed that the high-protein diet group had a significant advantage in the 20-meter sprint test compared to the high-carbohydrate diet group and the control group. This data is statistically significant.

In the study conducted by Ronnestad et al. (2008), no significant difference was found when the 20-meter speed values before and after the mini trampoline training were compared. In the study conducted by Seymen (2023), it was observed that mini trampoline training did not have a significant effect on speed parameters, but when the post-tests of the experimental group and control group were compared, the increase in speed was higher in the experimental group.

According to İşeri and Mendeş (2020), it was determined that there was a significant difference in the speed values related to mini trampoline training between the experimental and control groups.

In the study conducted by Güler et al. (2019), it was concluded that mini trampoline training did not have a significant effect on endurance, but the experimental group had an advantage compared to the control group.

When our study was compared with other studies in the literature, it was seen that it was similar to the findings we obtained as a result of our research. In conclusion, mini trampoline training, in conjunction with high-carbohydrate diet planning, high-protein diet planning, and the control group, resulted in a decrease in body composition parameters such as body weight, BMI, body fat weight, and body fat percentage, although these differences were not statistically significant. High-carbohydrate diet planning in combination with mini trampoline training resulted in a significant increase in the 30-15$_{IFT}$ endurance test, a measure of endurance. High-protein diet planning, on the other hand, showed a significant advantage in the 20-meter sprint test. It should be noted that participants in the study had a moderate level of basic nutrition and dietary preference knowledge. The duration of our study was limited to 6 weeks, and extending this duration could help reveal significant differences. The study consisted of groups of 5 individuals each, and increasing the number of participants would be beneficial for future studies. The implementation of the diet programs could be increased from 2 days to 4-6 days. To observe the long-term effects, the number of days can be increased. Personalized, balanced diet programs should be prepared for individuals participating in mini trampoline.

RECOMMENDATIONS

It should be noted that participants in the study had a moderate level of basic nutrition and dietary preference knowledge. The duration of our study was limited to 6 weeks, and extending this duration could help reveal significant differences. The study consisted of groups of 5 individuals each, and increasing the number of participants would be beneficial for future studies. The implementation of the diet programs could be increased from 2 days to 4-6 days. To observe the long-term effects, the number of days can be increased. Personalized, balanced diet programs should be prepared for individuals participating in mini trampoline.

ETHICAL TEXT

In this article, journal writing rules, publication principles, research and publication ethics rules, journal ethics rules were followed. The author is responsible for any violations that may arise in relation to the article.

The research was approved by the ethics committee of Istanbul Gelisim University on 18.08.2022, with decision number 2022-13 in the meeting 23-01-36.

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