THE EFFECT OF DAILY PHYSICAL EXERCISES AND DIET ON KINETIC MECHANICAL AND VITAL ENERGY VARIABLES FOR YOUNG MIDDLE-DISTANCE ATHLETES

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Abstract

The importance of the study came as an evaluation of mechanical energy (kinetic and vital), and the changes that occur in them in the (pre and post-test) after they undergo their daily training and dietThis is related to his assessment of the athlete's health, and the calories expended that express the consistency of effort and the output of these calories to assess the functional and physical condition of young middle-distance athletes, and according to functional and mechanical requirements, the research aims to identify the bio-energy variables related to calorie production and mechanical kinetic energy (physical work) for middle-distance athletes, and to identify the effect of daily exercises and diet on mechanical energy variables (kinetic and vital) in the pre and post tests for athletes , the study was applied to (9) of the national youth team for middle distance runners, the researcher used the descriptive approach, the research sample was subjected to a special diet in (Pre and post- tests), energy variables (calories and work units) were measured after they implemented a special training unit. The sample continued to apply its daily exercises for (8) weeks, after which the same diet was applied and mechanical energy variables (kinetic and vital) were measured after they implemented the same unit. special training The study concluded that the expended calories variable was almost equal in both tests, and the expended calories variable, resulting from food combustion in terms of (kilo-joules) were consistent with calories taken from food, which was proportional to the effort exerted by the research sample. The energy cost index for each (1 kg) of the body indicates that there is no balance between calories and their product (kilo-joules), they concluded the need to use the cost index for evaluating mechanical energy output (kinetic and vital), as a system for continuous monitoring of the functional and mechanical level of athletes.

Keywords: Sports psychology. Sports exercise. Daily physical exercises. Kinetic mechanical. Vital energy

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Introduction

Energy production in the human body is one of the important topics in the field of sports training because it is closely related to the efficiency of functional organs in the body during physical activity. This relationship is essential for muscular activity.

To test the ability of skeletal muscles, it is necessary to identify energy sources, types, and different ways that provide energy to these muscles, it is known that many sports and physical activities depend on sources (aerobic and anaerobic energy), resulting from the decomposition of chemical bonds adenosine triphosphate. ATP, CP, creatine phosphate, and muscle glycogen, among those sports is the medium running competition and athletics, the performance of which requires strong and high-intensity muscle contractions and results in the production of high rates of energy in a relatively long time, according to what has been achieved by global figures.

The term energy is associated with the body's ability to achieve kinetic energy, which is related to the functional and mechanical aspects.

The importance of the study is that it is looking at evaluating the mechanical, kinetic, and vital energy of young middle-distance runners, and studying the changes that occur in them according to their physical training and their daily diet, and what is related to its evaluation of the athlete's health and level of development, and the calories he consumes that express the output of vital energy, which enables game specialists to reveal some scientific facts to put them into consideration when training middle-distance runners, according to the functional and physical requirements of the game.

Research Problem

The use of the correct scientific foundations that are based on many scientific theories in various fields (functional - skill - physical) gives an accurate perception of the player's kinetic ability, on this basis specialists began to link these aspects that affect the movement from their mechanical aspects.

In the field of middle-distance running, in which the international achievement currently achieved is linked to indicators, which leads to the need for this activity to integrate(functional and mechanical aspects, which can give indications of the high consistency of the player's vital energy, Without the destruction of vital tissues through the adequacy of metabolic processes, and its proportionality with the required mechanical kinetic energy productshere was no study that dealt with kinetic, and vital energy and the required calories, which reflects the need for the development of the functional and physical aspects of middle-distance runners that, this topic was studied to put some solutions related to this aspect.

Research Objective

1. To identify the variables of mechanical kinetic energy (physical work - and vitality) for Youthmiddle-distance runners.
2. To identify the effects of daily physical exercise and diet on mechanical energy variables (kinetic - vital) in the pre and post-tests for Youthmiddle-distance runners.

Research Hypotheses

1. There are statistically significant differences between the pre and post-tests in the kinetic mechanical energy (physical work) and vitality variables.

Research fields

- Human field: The national Youth middle distance runners team.
- Time range: the period from (1/7/2021) until 29/8/2021.
- Spatial domain: Al Shaab International Stadium, as well as the halls of the Colleges of Physical Education at the University of Baghdad.

Research methodology and field procedures

The researcher used the descriptive approach by studying the comparative method of reasons.

Sample

The sample was selected from middle-distance runners (4 runners - 1500 m \ 4 runners - 800 m \1 runner \ 3000 m hurdles), the total sample (9) runners, their ages ranged (with a mean of 22.64 years - with an SD of ± 1.5), the percentage of fat in The body was (7.8-SD, ±0.9), their training age (mean 7.6, SD ±1.34), apparent weight (mean ±70 kg, SD ±3.54), and their height (mean 1.71 cm, SD ±6.5).

Information gathering tools and devices used:

1. Arab and foreign references and the international Internet.
2. Timing hours (with a range of 100 sequential timings) number (3).
3. Tests and measurements.
4. A ruler measuring the length of the player.
5. Treadmilldevice (3).
6. Electronic device (Body Balance Comfort F5) - of German origin.

Main Experiment Procedures

The pre-test was conducted over two days on the players of the research sample on two days (Wednesday - and Thursday, 1/2-7-2021, at Al-Shaab International Stadium and the halls of the Colleges of Physical Education - University of Baghdad.,

The conditions for all tests were fixed in terms of (assisting work team - time - place - tools - devices) to provide similar or close conditions when conducting post-tests.

Test description

On the first day, the height was measured from a moderate standing position, so that the heels were close together and the arms were placed next to the body, the measurement was done using a rulerThe player performing the test stands (so that the heels - buttocks - and the shoulder blade - and the back of the head touches the wall), the head must be in its normal position, from this position a machine and a ruler are placed on the head of the player taking the test so that it is at an angle with the numbered ruler .Measuring the fat-free body mass using an electronic scale (Valencia et al., 2019). and an electronic display screen to measure the percentage of fat, where the player who performs the test climbs barefoot on the device after entering its information into the electronic device by the observer, which is (Height for each player - age – gender), then press the (OK) button the device starts reading the data related to the player, the observer records the numbers that appear on the display screen for each measurement, starts by giving (weight and then body fat), that the device's memory capacity is (8) players,On the second day, nutrition was determined and the test was conducted.

Nutrition has been determined

In the pre-test on Thursday (2-7-2021)

- In the post-test on Saturday (29-8-2021)

Average daily energy for the normal research sample was (2870) calories - (kcal) (Thomas et al., 2016)

Total calories available from daily food (1730 calories) from the following meals:

A-Breakfast: 2 pieces of bread - 2 fried eggs - a cup of milk tea, (630 calories).

B-Lunch: 100 gm. - soup - red meat - a loaf of bread - drinks (1100 calories).

- The sample members were asked to maintain their daily diet during the period between (the pre-and post-tests) and to follow their usual eating habits.

The players were monitored once a week to measure their weight and check their food.

- Measuring the energy cost of (calories - and kilojoules) by running on a treadmill for a distance of (5000 m), meaning (running 200 m at a time of 28.3 seconds - equivalent to an intensity of 85%) and for implementation (200 m x 10) x 2 - running volume (4000 m) and a positive rest equivalent to (2700 m), so the rest is between groups or repetitions, so the total energy expended for this volume is (500 calories) approximately (measured through special approved tables (Wilmore et al., 2005). these measurements were made previously, we extract The number of calories expended or its equivalent (kilojoules) per hour per day.
- Measure the remaining energy through the product (subtracting the energy consumed per day in calories from the energy expended) and converted it into (kilojoules).
- Comparing the remaining energy per (1 kg) with the energy standard per (1 kg) of the body, which is equal to (30.5 kilos \ calories/joules- per 1 kg).
- The procedures that were followed in the pre-tests are applied after (8) weeks, through the post-test, to evaluate the level (functional and physical) according to the daily exercise that was given to the research sample.

Example: We assume that one of the players weighs (50 kg - 40 kg - fat-free mass), and the daily amount of energy consumed is (1500 calories) - (6300 kilojoules)? Note: Each calorie equals (4.2 joules).

- If the cost of daily training (1 hour/day) = 600 calories = (2520 kilojoules), the remaining available energy (600-1500) = 900 calories = (3780 kilojoules).
- Available energy per (1 kg) of fat-free body mass = 40/900 = 22.5 calories / kg, or (95 kilojoules) per (one kg of fat-free mass).
- When the available energy level falls below the average daily consumption, (30 calories/kg) = (135 kJ) per 1 kg of fat-free mass, this leads to a significant impairment in metabolic and hormonal function (Clark et al., 2003) and this deficiency can affect (performance, growth, and health) because each (ATP molecule) = (30.5 calories/joule), on this basis the results of the research sample will be extracted because this can be a guide for coaches to monitor their players to maintain their health.
- This work is carried out after giving a physical effort characterized by an energy expenditure of not less than (500 calories) in the pre-tests that were conducted, then the sample is left for training according to its training curricula for (8) weeks, then the researcher conducts a post-test, which includes the same effort and an expenditure of energy also of not less than (500 calories) to evaluate the functional and physical level.

Statistical methods

1-SPSS statistical package -2- mean -3- standard deviation -4- Law (T) of correlated samples. Display, analyze, and discuss the results of mechanical, kinetic (physical work), and vital energy for the pre and post-tests (Table 1).

Table 1 shows the research sample in (caloric variables) available in the body before training, which reached in the pre-test as a mean (1730) and the post-test (1740)and reached its equivalent in kilojoules (as completed work), with a pre-mean of (7277), and with a Post- mean (7308), and in the calories expended by training test, which reached a pre- mean (500) and a post-mean of (555.55), equivalent to (kilojoules) with a pre- mean (2100) and a post-mean (2333.31),And in measuring the fat-free mass (in kg) with a pre- mean (59.5) and post- mean (60.9), and it's equivalent in Newton's, with a pre-mean (583.1) and a post-mean (596.82).

And in the variable energy remaining in calories after training, with a pre-mean (1230) and a post-mean (1184.45), and equivalent to the same variable (kilojoules) with a pre- mean (5166) and with a post-mean (4974.69)As for the energy cost per

(1 kg) of the body, which expresses the efficiency of the physical and health aspect or not The pre- mean in calories (20.67 calories/kg) and the post-mean in calories (19.45 calories/kg),And the equivalent of the same variable (kilojoules/kg), the pre- mean reached (86.814) and the post-mean was (81.69) (Table 2).

It is noted that there are insignificant differences between each of the variable calories available to the research sample before training ,This indicates that the research sample possesses similar calories resulting from their regularity in a similar diet and according to what is available to their families. However, measuring these calories in terms of (kilojoules) was statistically significant, and this indicates that the available calories affected achieving better physical work (kinetic energy) in the post-test, even if the differences were random in the same variable in calories, and their energy storage rate was in The post-test is better than the pre-test and is in agreement with the statistically significant differences for this variable.

As for the variable calories spent in the post-test, the differences were statistically significant. The differences appeared to be significant for the same variable in terms of (kilojoules) in favor of the post-test. These differences are caused by the fact that the body has adapted somewhat to (physical effort) according to the thermal energy it needs and the resulting from the burning of food, The resulting kinetic mechanical energy in terms of (kilojoules) was consistent with the calories taken from food, which was proportional to the effort exerted by the research sample.

As for the energy variable remaining in the body after performing the effort,

Table 1: The results of the arithmetic means and standard deviations pre-and-post for energy (in calories - & in kilojoules) for the research sample.

Variables	Unit of measure	Pre-test		Post-test	
		A	B	a	b
Available calories	calories	1730	123.7	1740	114.5
	kJ	7277	119.5	7308	110.3
Spent calories	calories	500	10.35	555.55	12.5
	kJ	2100	43.47	2333.31	52.5
Fat-free mass	kg	59.5	2.1	60.9	1.08
	Newton	583.1	20.58	596.82	10.584
remaining Energy	calories	1230	19.7	1184.45	20.23
	kJ	5166	82.74	4974.69	84.966
Energy cost per (1kg)	calories/kg	20.67	1.78	19.45	1.85
	KJ/kg	86.814	7.476	81.69	7.77

Table 2: The results of the differences between (pre & post-tests) in the research variables.

Variables	Unit of measure	Pre-test	Post-test	A	b	Value-t-	Error level	Significance
		c	s					
Available calories	Calories	1730	1740	10	5.38	2.23	0.121	insignificant
	kJ	7277	7308	31	8.7	3.56	0.023	significant
Spent calories	Calories	500	555.55	55.55	14.1	3.94	0.048	significant
	kJ	2100	2333.31	233.34	55.5	4.23	0.001	significant
remaining Energy	Calories	1230	1184.45	45.55	10.5	2.34	0.068	insignificant
	kJ	5166	4974.69	191.31	45.66	2.19	0.31	insignificant
Energy cost per (1kg)	calories/kg	20.67	19.45	1.22	0.6	2.03	0.543	insignificant
	KJ/kg	86.814	81.69	5.124	2.19	2.34	0.421	insignificant

whether (calories or kilojoules), the differences were insignificant. This means that the amounts of energy remained the same, both in the pre-test and in the post-test.

This means that the biological efficiency of the research sample about the appropriate energy expenditure during the effort, and what was left of it after the effort was not different in both tests and that the oxidation takes place similarly in the cells of the body of the research sample, and the quantities thermal emanating from them resulting from the rates representation food necessary for this effort and according to the energy possessed by the research sample before the effort.

The real indicator that indicates that the rate of (metabolism) is related to the production of kinetic mechanical energy associated with doing the required muscular work when executing the effort required by the research sample,which indicates the body's physical efficiency through the product of demolition and construction that appeared in the energy cost index per (1 kg) of the body,the differences were insignificant between what the body consumes during physical activity and the remaining calories in the body, and that there is an imbalance between calories and their product (kilojoules), which the research sample takes from food,The calories they burn for physical effort, as the variable indicates that the output was less than (30 calories/1 kg), which is equivalent to (128 kilojoules/kg) of fat-free body mass, and this deficiency can affect (performance - growth - health), because each ATP molecule is equal to (30.5 calories/mol) and this means that there is a significant weakness in the metabolic function (Hew-Butler et al., 2005).

This is because their demolition operations are greater than the construction operations as a result of the physical effort they are exposed to, which gives a negative impact on the development of their physical levels.Research has shown that eating (0.3-0.6 grams) of carbohydrates per (1 kg) of body weight within two hours of endurance training is necessary to build glycogen stores. The reason for this is that consuming carbohydrates stimulates the production of insulin, which helps produce glycogen in the muscles. However, the effect of carbohydrates on glycogen storage reaches certain limits.

The above result does not refer to the output of aerobic metabolism needed to produce the energy needed to perform an endurance effort, as the energy output depends on the oxygen resulting from the conversion of nutrients (carbohydrates, fats, and protein) into ATP, and this work depends on the blood circulation to transport oxygen to the working muscles Aerobic metabolism is primarily used during exercise of special endurance, which is related to the type of food that was not sufficient to produce this energy in the research sample.

Conclusions

- The variable calories available during the test were almost equal in both the pre and post-tests.
- Better physical work (kinetic energy) was achieved in the post-test of the research sample as a result of the calories they had from their regular diet.
- The energy cost variable per (1 kg) of the fat-free body, whether (in calories or kilojoules), indicates that oxidation takes place similarly in the cells of the body in the research sample.
- The product of cost per (1 kg) of the body, indicates that the demolition operations are more than the construction operations and that the daily food available is not commensurate with the daily exercises that the research sample is exposed to.

Recommendations

- Emphasis on monitoring the daily nutrition of the research sample, because of its importance in maintaining the work of muscle cells, and producing the necessary work in them.
- It is necessary to use the cost index for the evaluation of (mechanical, kinetic, and vital energy output) as a system for continuous monitoring of the physical and functional level of middle-distance runners.
- The necessity of applying the variables addressed by the researcher to other games (individual or team).
- The need to take into account the type of food according to the calories of each type to be included in the special nutrition program for the game with the daily training program for them.

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