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The Effect of a Training Program on the Pulse Rate, Lactic Acid and Some Components of the Body of the Beginners of Judo

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Abstract: Aim of this study is to examine the effect of a training program on the pulse rate, the concentration of lactic acid and some components of the body of the judo players less than 15 years. The research sample was chosen of 10 Judo beginners from Port Said Club. The subjects' mean (±SD) age, weight and height were: 13.70±0.82 years, 51.46±5.48 kg and 158.80±4.26 m. The pre-measures were conducted for all members of basic research sample which contained 10 players for 2 days in the Judo Hall, Port Said Club. These measures included the implementation of the training program. The post-measures were conducted by using the same method and at the same place where pre-measures was done. The physiological variables were measured by using devices, physiological tests .Length was measured by using Restameter. All data were analyzed using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel program. It could be concluded that the training program improved the functional level of the heart and that the level of lactic became less and body mass index (BMI), fat percentage, the percentage of total water, the circulation resistance of the electrical current in the body, the basic metabolic rate and the net body weight of the players. There were statistical significant differences between the pre and post-measures of the pulse rate, the concentration of lactic acid and some components in favor of the post-measure.

Key words: Training program · Physiological variable · Judo

INTRODUCTION

Judo is one of the sports which occupied an advanced position among the individual games, on which are competed at the international and Olympic levels. It has gained a great advance in the technical tactic and legal aspects. This advancement is normally accompanied by advancement in the level of the player's preparation, which is a pillar to achieve a high standard of performance in this sport. Motor performance, which has a complicated nature "compound" of the basic movements forming the special skills in the sports activity, is affected by the factors of physical performance represented in strength, speed, agility, ability and harmony [1, 2].

Various effects of practicing sports activities on the composition of the human body and its vital organs attracted much attention of authors based on the organic and functional integrity of the body, as it acts a basic rule on which the fitness and physical efficiency are built [3].

Studying functional and Physiological aspects recently represents an important side of the scientists' studies to identify the changes that happen under the effect of practicing various physical activities [4]. Changes existed in the basic compositions of the human body as a result of practicing the sport can be an indicator to specify and deeply judge the functional and physiological operations in the human body. As an increase in the muscle mass and its strength are accompanied by clear changes in the osseous system as well as the ratio of fats. Furthermore, it effectively reflects the training status of the individual [5, 6].

Identification of Physiological information is of the most important factors affecting the adaptation of various training programs in a form which achieves the goals those programs are established, in addition to allowing the various biological functions of the organs of the human body to be developed. Studying the physical compositions and physiological variables of the judo player served to give information concerning the physical

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and physiological capabilities of the player, which contributes to the guidance and the rationalization of selecting judo player and beginners as well as the good basis for targeted practicing. To achieve this goal, the current research aims at identifying the effect of the training program on the pulse rate and the concentration of lactic acid at the Judo players [7].

Therefore, the author thinks that it is important to plan a training program to identify the changes it causes on some variables that physiologically occur in the body. They enable us to have an access to a new cycle of science that shows the way to keep pace with the progress and increase the performance level of the judo players through using modern methods. The present study aims at identifying the effect of the training program on the pulse rate and the concentration of Lactic Acid and some compositions of the human body upon judo beginners.

MATERIALS AND METHODS

The experimental method was used along with using the experimental design of the pre and post-measures on one group. The training program was prepared according to the scientific bases through reviewing the scientific literature specialized in the field of sports training and judo [8].

The training program was specified with twelve weeks (3 months). This period was divided into three phases: first, 3-week general preparation; second, 6-week particular and finally 3-week preparation for games [6, 9, 10]. The increase in time of the second phase is due to the need of beginners to physical adaptation. The number of weekly training units of the training program was identified with four training units per week of totally 48 training units throughout the program. The time of training unit in the training program was specified by 120 minutes per training unit, in addition to 10 minutes for warm-up and 5 minutes for resting away of training unit time so that total time of the program became 5760 minutes of 96 training hours (Tables 1-3).

Ten junior Judo players, less than 15 years, were intentionally chosen from Port Said Club. The subjects' mean (±SD) age, weight and height were 13.70±0.82 years, 51.46±5.48 kg and 158.80±4.26 m. All the subjects were from an athletic background and the players consented to participate in the study.

The researcher used the continuous training, low-intensity interval training and high-intensity interval training and frequent training. The formation of training load cycle indicates that the formation of load is a planning of the method of exchange between work and rest with proper time between fatigue and recovering in addition to give the body a chance to regain the lost energy and the vital organs return to their natural state. and thus, the mutual relationship between the degrees of load and periods of rest, whether in the daily training unit, in its weekly cycle, in the period of annual training or throughout the entire year, takes the undulating form namely rise and fall in the load in line with the interval fluctuations that occur in the functions of internal organs through natural rhythms of the vital processes in the human body [9]. The undulating method is the most convenient way to form the degree of load within its weekly cycle. The various experiments proved that training by regularly using different degrees of load

Table 1: The relative and temporal distribution of the different preparations over the phases of the program

	First Phase		Second Phase		Third Phase		
Preparation	Percentage	Time	Percentage	Time	Percentage	Time	Total
Physical Preparation	60%	864 M	40%	1152 M	10%	144 M	2160 M
Skilful Preparation	40%	576 M	60%	1728 M	30%	432 M	2736 M
Tactical Preparation	-	-	-	-	60%	864 M	864 M
Total	100%	1440 M	100%	2880 M	100%	1440 M	5760 M

Table 2: The relative and temporal distribution of the general and particular physical preparation over the phases of the program

	First Phase		Second Phase		Third Phase		
Preparation	Percentage	Time	Percentage	Time	Percentage	Time	Total
General Physical Adaptation	60%	519 M	40%	462 M	-	-	981 M
Particular Physical Adaptation	40%	345 M	60%	690 M	100%	144 M	1179 M
Total	100%	864 M	100%	1152 M	100%	144 M	2160 M

Table 3: The relative and temporal distribution of the general and particular physical characteristics

General Physical Characteristics	%	Time in the first three weeks	Time in the second six weeks	Time in the third three weeks	Total
Muscular strength	25%	7785 Sec	6930 Sec	-	58860
Speed	20%	6228 Sec	5544 Sec	-	Sec =981 Min
Endurance	25%	7785 Sec	6930 Sec	-	
Flexibility	10%	3114 Sec	2772 Sec	-	
Agility	10%	3114 Sec	2772 Sec	-	
Balance	10%	3114 Sec	2772 Sec	-	
Particular Physical Characteristics	%	Time in the first three weeks	Time in the second six weeks	Time in the third three weeks	Total
Muscular strength	20%	4140 Sec	8280 Sec	1728 Sec	70740 Sec =1179 Min
Strength characterized by speed	20%	4140 Sec	8280 Sec	1728 Sec	
endurance	15%	3105 Sec	6210 Sec	1296 Sec	
Motor Speed	15%	3105 Sec	6210 Sec	1296 Sec	
Flexibility	10%	2070 Sec	4140 Sec	864 Sec	
Agility	10%	2070 Sec	4140 Sec	864 Sec	
Balance	10%	2070 Sec	4140 Sec	864 Sec	
Total	100%	20700 Sec	30960 Sec	8640 Sec	12960 Sec = 2160 Min

training within one week leads to rapid upgrading of the level of capabilities of the individual [11]. The selection of a particular type of the form of training load depends on the individual's capabilities and the nature of the specialist activity, the period of training and competition conditions, so the author formed the formation of the training load within the training units by using the method of formation [12].

The author worked to ration training load in the training program by identifying the appropriate frequency for all the sample players by self-observation of the player during the performance of the exercise. It is the frequency which starts after a technically defect being taken place in the performance and then the mean of frequencies is determined to be the number of repetition times. Identifying the time of interval rest, the proper time of interval rest after performance is identified depending on the pulse rate by computing the period time, which the pulse rate works from 110 to 120 pulses per minute P/M after the performance, based on the unanimous agreement between both Abdel-Maksoud [6] and Abdul-Basir [8] that the proper period of interval rest is achieved when pulse rate reach 120 P/M at its end.

Number of Groups The author used what he concluded of the number of frequencies and time of interval rest convenient for each exercise to reach the maximum possible number of groups after which the player cannot properly perform the exercise or control the speed of performance. Therefore, we get the total time to perform the exercise.

Abdel-Khalek [9] indicated that skilful adaptation, in principle, last for the training year; however, its share in the total training tasks and objectives related to specific considerations such as the level of skilful performance, the importance of motor skill to achieve in the specialist activity and temporary tasks of the annual training. Consequently, the time of skilful adaptation was distributed on the various phases of the program according to the preceding considerations.

It is noticeable that the increase of percentage of particular physical adaptation rather than general one from the time of physical adaptation in general, especially during the second and third phases in accordance with what indicated by Allawi [11] that during the second phase of adapting period which directly aimed at achieving the highest performance of the individual. While the particular physical adaptation occupies the biggest space, the magnitude of general physical adaptation is less as well.

Pre-measures were conducted for all members of basic research sample which contained 10 players in the Judo Hall, Port Said Club. It took 2 days. These measures included the implementation of the training program. It was applied on the members of research sample for 2 weeks at 4 training units per week.Post-measures The post-measures were conducted by using the same method and at the same places where pre-measures were taken at the end of specified period needed for applying the training program lasted 2 days.

All data were analyzed using the Statistical Package for Social Sciences (version 10.0; SPSS Inc, Chicago, IL) for Microsoft Windows. The data were handled in terms of mean, median, standard deviation, range, coefficient of skew, Wilcoxon Test and multiple regression.

RESULTS AND DISCUSSION

Table 4 shows that there was a statistical significant at the level of 0.05 between the two pre and post-measures in the pulse rate for the members of the research sample according to the value of computed z by applying Wilcoxon Signed-Ranks Test of the significance of differences. Asymptotic significance level equaled 0.02, which is smaller than statistical significant at the level of 0.05. This means that the differences between the pre and post-measures in the pulse rate for the members of the research sample is real.

Table 5 revealed that the value of computed z, by applying Wilcoxon Signed-Ranks Test of the significance of a difference between the two pre and post-measures ,in the lactic rates for the members of the research sample is statistically significant at the level of 0.05. Asymptotic significance level equaled 0.00, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measures in the lactic rate for the members of the research sample is real

Table 6 showed that there was a statistical significant difference between the two pre and post-measures in the body mass index for the members of the research sample is statistically significant at the level of 0.05. Asymptotic significance level equaled 0.02, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in the body mass index for the members of the research sample is real.

Table 7 showed that there was a statistical significant difference between the two pre and post-measures in Basal metabolic rate (BMR) for the members of the research sample is statistically significant at the level of 0.05. Asymptotic significance level equaled 0.04, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in Basal metabolic rate (BMR) for the members of the research sample is real

Table 8 showed that there was a statistical significant difference between the two pre and post-measures in Impedance to the flow of an electrical current through the body IMP for the members of the research sample at the level of 0.05. Asymptotic significance level equaled 0.03, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in IMP for the members of the research sample is real.

Table 9 showed that there was a statistical significant difference between the two pre and post-measures in the Fat percentage for the members of the research sample at the level of 0.05. Asymptotic significance level equaled 0.01, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in Fat percentage for the members of the research sample is real.

Table 10 showed that there was a statistical significant difference between the two pre and post-measures in the Body Fat Mass for the members of the research sample at the level of 0.05. Asymptotic significance level equaled 0.01, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in the Body Fat Mass for the members of the research sample is real.

Table 4: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measures in the pulse rate for the members of the research sample.n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Pulse rate	n/min	5.67	4.00	51.0	4.00	-2.41	0.02

Table 5: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measures in the lactic rate for the members of the research sample. n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Lactic Rate	Mg / dl	5.50	0.00	55.00	0.00	-2.82	0.00

Table 6: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measures in the body mass index for the members of the research sample n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Body mass index BMI	Kg/M	5.25	3.00	42.00	3.00	-2.31	0.02

Table 7: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measures in basal metabolic rate (BMR) for the members of the research sample.n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Basal metabolic rate BMR	Calorie	8.4	1.06	18.4	32.0	-0.88	0.04

Table 8: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measures in impedance to the flow of an electrical current through the body IMP for the members of the research sample. n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	The value of computed z	Asymp. sig
Flow rate of an electrical current through the body IMP	0	4.50	6.17	18.0	37.0	-0.97	0.03

Table 9: Wilcoxon Signed-Ranks Test of the the significance of differences between the pre and post-measures in the fat percentage for the members of the research sample. n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Percentage of fat	%	54.0	1.00	6.00	1.00	-2.70	0.01

Table 10: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measure in the body fat mass for the members of the research sample. n1 = 10

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Body Fat Mass	Kg	51.5	3.5	5.72	3.5	-2.45	0.01

Table 11: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measure in the fat free mass FMM for the members of the research sample

		Sum of Ranks		Mean of ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Fat free mass (FFM)	Kg	45.00	4.2	6.25	4.6	-2.67	0.01

Table 12: Wilcoxon Signed-Ranks Test of the significance of differences between the pre and post-measure in the total body water (TBW) for the members of the research sample. n1 = 10

		Sum of Ranks		Mean of Ranks			
Variable	Measure unit	-	+	-	+	Value of computed z	Asymp. sig
Total Body Water (TBW)	Kg	6.25	5.31	12.5	42.5	-1.53	0.028

Table 11 showed that there was a statistical significant difference between the two pre and post-measures in the fat free mass FFM for the members of the research sample at the level of 0.05. Asymptotic significance level equaled 0.01, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in the fat free mass FFM for the members of the research sample is real.

Table 12 showed that there was a statistical significant difference between the two pre and post-measures in the Total Body Water (TBW) for the members of the research sample is statistically significant at the level of 0.05. Asymptotic significance level equaled 0.02, which is smaller than statistically significant at the level of 0.05. This means that the differences between the pre and post-measure in the Total Body Water (TBW) for the members of the research sample is real .

The first hypothesis was that there would be statistical significant differences between the pre and post-measures in the pulse rate and the percentage of Lactic acid in blood in favor of the post-measure

The improvement in the physiological variables (the pulse rate and the percentage of lactic acid in blood (Tables 4 and 5) was due to persevere in training during the period of applying the training program which led the functional efficiency of internal player's organ to be raised and thus the physiological capability of player is improved. This is consistent with both Abdel-Maksoud [6] and McGettigan [13] who mentioned that regular training would help the internal organs of the body to adapt to any new load in addition to improving metabolic process leading to raise the player's functional capability.

The decrease of pulse rate (Table 4) is due to increase the efficiency in the work of the heart as a result of regular training. Abdel-Maksoud [6] explained that the athletic training leads to improve the system of capillaries, which leads to the possibility of increasing the maximum capacity of the flow of blood in the muscle. In addition to enabling the trained individual to possibly perform a load in the area of pre-maximum intensity by fewer amounts than blood flow (the speed of blood flow in the muscle) as a sign of improving blood circulation.

The author thinks that the decrease in the percentage of lactic Acid in blood (Table 5) after exerting physical effort is due to an increase in the training level as a result of regularity in sports training, which lead to an increase in the physical and functional capability of the player.

The athletic training leads to increase the capacity of consuming oxygen, which in turn leads to reduce the production of lactic acid. the capacity and efficiency of the circulatory and respiratory system in providing oxygen help the non-split and its transformation to lactic acid, which called glycolysis process. quoted from Lamb; the size and number Mitochondrial increase leading to increase the capacity of producing Adenosine triphosphate, ATP, due to the activity of Krebs cycle enzymes in addition to the system of electrons transfer. These changes lead to less production of the lactic acid by the trained muscles compared with less trained muscle. [14-20]. Thus, the first hypothesis was supported.

The second hypothesis was that there would be statistical significant difference between pre and post–measure in the body composition of the group in favor of post-measure.

Regarding the compositions of the body, the author thinks that the improvement in the body compositions of the players (Tables 6-12) is due to the regularity in training during the period of applying the training program which leads to noticeable improvement in the compositions of the body. This is consistent with what concluded by Gomaa [21] that regular training rationing for a long time leads to increase the physiological efficiency of the body and affect the body compositions of the players.

There is a reduction in the Body Mass Index (BMI) (Table 7) upon the members of research sample. According to the author, the reduction in the average of players' weight is due to rationing training program. The body mass index BMI is a technical method to express the body weight BW and its relationship to height HT. It is an important indicator for the expression of the degree of obesity. Accordingly, the body mass index BMI would decrease [21-23].

The author attributes the rise in basal metabolic rate of the body to increase in net body mass (BMR) (Table 8) as a result of the regularity in the training program where there is close link between them. The less net body mass is, the less basic basal metabolic rate is and vice versa [21]. Tzankoff and Norris [24] indicated that the index of energy production of BMR is associated with body mass.

There was a reduction in the impedance to the flow of an electrical current through the body (IMP) upon the members of research sample (Table 9). There is a relationship between electrical conductivity in the body and net body mass and the impedance to the flow of an electrical current through the body could be identified to estimate the body compositions by some private attempts. The author attributed the reduction of impedance to the flow of an electrical current through the body to the reduction of net body mass for the players as a result of applying the training program [25].

The author attributes the reduction of the percentage of body fat, body fat mass and the rise in fat free mass (FFM) upon players (Tables 10 and 11) to the regularity in training during the application of the training program period as well as the rise in the intensity of training load, especially in the third phase of the training program. The rise of the degree of physical effort and its continuation for long periods help to increase fat burning due to depending on it as a source of supply of energy for the body to continue in the performance of physical effort. These results are consistent with the results of the study conducted by both Salama [7] and Gomaa [21].

There was a reduction in the total body water (TBW) upon the members of research sample (Table 12). The author attributes this conclusion to the increase of training load intensity, especially during the last phase of training program. Furthermore, Judo is characterized with the rise of exerted physical effort. These two factors lead to losing great quantities of water along with players' neglect to redress the lost water. These findings are consistent with the results of the study conducted by both Gomaa [21] and Al-tahlawy [23]. Thus, the second hypothesis was supported.

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