Artículo de investigación

Relationship between motor movement and physical fitness with physiological variables

Relación entre movimiento motor y el estado físico con variables fisiológicas
Relação entre movimento motor e estado físico com variáveis fisiológicas

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Abstract

Physical fitness is one of the basic needs of human life. Physical fitness means being able to do things daily without feeling tired. The purpose of this study was to investigate the relationship between motor fitness and physical fitness of karate athletes with their physiological characteristics. This research was a kind of relationship and using descriptive and inferential statistics has been attempted to investigate the relationship between motor movement and physical fitness or physiological resting heart rate, heart rate after exercise (Harvard step) and vo2max karate. Data analysis was performed using Pearson statistical method at a significant level of $p < 0.05$ and using SPSS software version 22. The end result of the research is the proof of this hypothesis, one of the success codes in Karate, is better preparedness and more favorable in motor movement and physical fitness readings and physiological variables.

Keywords: Karate, physiological, physical fitness, motor fitness.

Resumen

La aptitud física es una de las necesidades básicas de la vida humana. La aptitud física significa poder hacer cosas diariamente sin sentirse cansado. El propósito de este estudio fue investigar la relación entre el estado física motor y la condición física de los atletas de karate con sus características fisiológicas. Esta investigación fue un tipo de relación y mediante el uso de estadísticas descriptivas e inferenciales, se intentó investigar la relación entre el movimiento motor y la condición física o la frecuencia cardíaca fisiológica en reposo, la frecuencia cardíaca después del ejercicio (paso de Harvard) y el vo2max. El análisis de los datos se realizó utilizando el método estadístico Pearson a un nivel significativo de $p < 0.05$ y utilizando el software SPSS versión 22. El resultado final de la investigación es la prueba de esta hipótesis, uno de los códigos de éxito en el Karate, es una mejor preparación y más favorable en el movimiento motor y lecturas de aptitud física y variables fisiológicas.

Palabras claves: Karate, fisiológico, actitud fisica, estado fisico motor.

Resumo

A aptidão física é uma das necessidades básicas da vida humana. Aptidão física significa ser capaz de fazer coisas diariamente sem se sentir cansado. O objetivo deste estudo foi investigar a relação entre o estado físico motor e a condição física de atletas de karatê com suas características fisiológicas. Esta investigação foi um tipo de relação e através do uso de estatística descritiva e inferencial, procurou-se investigar a relação entre movimento motor e condição física ou frequência cardíaca fisiológica em repouso, freqüência cardíaca após exercício (degrau de Harvard) e o vo2max. A análise dos dados foi realizada utilizando o método estatístico de Pearson em nível significativo de $p < 0,05$ e utilizando o software SPSS versão 22. O resultado final da investigação é o teste desta hipótese, um dos códigos de sucesso em Karate. , é uma preparação melhor e mais favorável no movimento motor e leituras de aptidão física e variáveis fisiológicas.

Palavras-chave: Karate, fisiológico, atitude física, estado físico motor.

Introduction

Physical fitness is one of the basic needs of human life. Physical fitness means the ability to do daily affairs without feeling tired. Preparation is a good condition that allows a person to easily perform daily activities, reduces the risk of physical inactivity due to lack of mobility, and allows for participation in various activities and physical exercises. Better adaptation to the environment requires the balance of physical fitness and physical composition of individuals, and if people do not have favorable conditions in terms of their physical condition and body composition, they are usually angular, pessimistic and isolated, and in other words, they will not have the appropriate psychological balance (Lozoff et al,1991). Physical fitness is a collection of intrinsic and acquired features that determine physical activity ability.

Physical fitness factors include muscular endurance, cardio respiratory endurance, strength, speed, flexibility, agility, reaction time and body coordination. On the other hand, exercise and practice should include psychological and social dimensions that are essential in order to improve the performance and fitness of the athlete (Gharakhanloo et al, 2004). The results of the articles have shown that participation in sports programs, smoking and alcohol reduces depression and psychosomatic symptoms in adolescents and increases their physical fitness.

Every person needs a minimum amount of physical fitness for health, this is at least achievable for everyone and is possible with physical activity (Pastor et al, 2003). Sports activities that are commonly used are different types: martial arts, gymnastics, football, volleyball, climbing, and other sports, each of which has a special significance in health and the promotion of physical fitness. One of these is the popular sport among children, teenagers and karate youth. This beautiful and diverse sport is performed using various rhythmic movements and performing complex and combined skills (Shabani et al, 2011).

The optimal and optimal performance of sports skills is due to the complex interaction of physiological, anthropometric, psychological and bioengineering factors. The prerequisite for the achievement of athletic achievements is physical fitness, such as specified anthropometric and physiological characteristics (Classene, 1994). Understanding the anthropometric and physiological characteristics of each sport is one of the important factors that determines the performance of athletes.

Knowing these features is important when comparing athletes with oneself and others, in identifying weaknesses and fixing them, and in the correct design of training programs. It has been seen in many studies that athletes have special physiological and anthropometric properties in each sport. According to the above questions, what is the effect of motor movement and physical fitness of karate athletes on their physiological characteristics? The main purpose of the present research is to answer this question.

Literature Review

Levin et al. (1999) investigated the Russian Longitudinal Monitoring Survey in Russia. They surveyed 2101 teenagers aged 14 to 18 to assess physical activity such as cycling, hiking, and tougher activities such as karate, gymnastics, and the rate of underage work for teenagers, such as watching TV in the week. Their research found that most Russian youths enrolled in RLMS earn enough physical activity per week, but may attempt to increase moderate to severe regular physical activity (Levin et al,1999).

Bertini et al. (2003) have studied the variations in the body composition of karate athletes.

They monitored body composition variations in nine elite karateists during a 3-year period (T1, T2, T3). Arm circumference (AC) and six skinfolds were measured. Arm muscle circumference (AMC) and area (AMA) were then calculated. Fat mass (FM) was calculated using the Durnin- Womersley, Sloan-Weir (S-W). Result of their research the S-W equation did not seem to reflect the modifications in the amount of FM as evidenced by the total sum of the six skinfolds (Bertini, 2003).

Fong et al (2013) to survey, Health through martial arts training: Physical fitness and reaction time in adolescent Taekwondo practitioners. They did survey in their research about five physical fitness tests (a sit-and-reach test, leg split test, skinfold measurement, one-minute curl-up test, and ruler-drop reaction time test) between 10 and 14 and 20 age-matched. Result

of their research: The results thus suggest that although TKD training may improve reaction times in adolescents, it may have little effect on flexibility, muscular endurance, and body composition (percentage of fat). TKD may be a suitable exercise for improving simple reaction time, but it may not be suitable for improving general physical fitness in adolescents (Fong et al, 2013).

Adveeva and Tulyakova (2018) did survey about, Indicated factors of physical development, physical readiness, functional condition and efficiency of female students in the process of adaptation to training. In this research, it was examined female students at the beginning of the first and second year of training (n = 342, age 18-20 years). The investigation was conducted on 10 indicators of physical development, 9 indicators of physical preparedness and 13 indicators of functional status and performance. Conclusions of this research: Indicated factors of female students adaptation to learning is to be considered the strength of the hand (factor of physical development), long jump from the place (factor of physical preparedness), the Genci test (factor of the functional state), the coefficient of circulation efficiency and the endurance factor (Avdeeva & Tulyakova, 2018).

Collins and Staples (2017). did survey about, The role of physical activity in improving physical fitness in children with intellectual and developmental disabilities. The results of paired sampled t-tests showed participation in 15-h PA program can significantly increase aerobic capacity and muscular strength and endurance in children with IDD. Conclusions and implications: This study is aimed at understanding the role of PA in helping children with IDD to develop the fitness capacities essential to participation in a wide variety of activities (Collins&Staples,2017).

Castillo et al. (2016) did survey about, Physical fitness and physiological characteristics of soccer referees. The results showed no significant differences between FR and AR, or between NR and PR groups. However, > 35 yr were significantly slower ($P \leq 0.01$) than the ≤ 35 yr in the 20 m sprint, 30 m sprint and the MATF. Moreover, the > 35 yr covered significantly ($P \leq 0.01$) less distance in the YYIR1 than the ≤ 35 yr group and HRmax was significantly ($P \leq 0.05$) lower in the > 35 yr group. MATF was strongly related to the 20 m ($r = 0.762$) and 30 m ($r = 0.757$) sprints. Our findings suggest the necessity of implementing specific training programs focused on maintaining change of direction ability, acceleration and aerobic capacity in referees older than 35 years (Castillo et all,2016).

Monyeki and Kemper (2007) did survey about, Positive Relationship between Physical Fitness and Physical Activity in Children. The included observational studies met the criteria used in the selection covering physical fitness and physical activity in children between the age from 5 to 14 years old. The observed results therefore warrant further investigation on this relationship over a period of time from different cultural contexts (Monyeki & Kemper, 2013).

Parnow et al. (2005) have studied the physical, physiological and anthropometric composition profiles of the elite futsal players and the relationship between some of the measured characteristics. The results of their research showed that, with increasing body fat percentage, aerobic performance decreases, while the increase in body fat does not affect the anaerobic power. Also, the compositing profile of the subjects showed that the players had average height and weight (Parnow et al, 2005).

Mirzaei et al. (2012) investigated the relationship between the physiological and functional characteristics of adolescents and young people from the Kayak Women national sailing team in. The results of their research showed that in addition to large body dimensions, the anaerobic system has a significant contribution to the performance and performance of the teens and youths of the Kayak Women (Mirzaei et al, 2012).

Chaabène et al. (2015) investigated the physiological responses to specific karate activities in their research. Their results showed that kumite activity required more metabolism than kata (Chaabène et all,2015).

Research Hypothesis

It seems that one of the keys to success in karate is better and more favorable preparation of physical and physical variables and physiological variables.

Research Methodology

The present study investigates the relationship between physical fitness and fitness with physiological (resting heart rate, heart rate after

activity, Harvard stepping stroke, and VO2max) in karate. The statistical population of this research includes a number of karate who have at least one world championship record in their work. The statistical sample of this study consisted of 10 karate puppets in various carat weight grades with an average age of 16 to 21 years, an average height of 177 cm, an average weight of 60 kg, all karate targeted and voluntary with approximately Equal conditions were included in this research. In this first research, after having coordinated with the Russian Karate Federation from the elite courage karate, they selected 10 karate at different volumes and participated in the test, the test conditions for all karate were as much as possible identical.

Research Variables

Motor movement and physical fitness variables included: SEMO (general agility), reaction, long jump, two 49, two 45 m speed, static balance, jump, height and sitting. Physiological variables included resting heart rate, heart rate after exercise (Harvard step) and VO2max. To measure these variables, several measurement methods were used (Fox & Matyus,1994; Ghazelifar,2002; Giampietro et al, 2003; Miga Siewicz, 1999).

Research Tool

1. 50-meter strip for measuring distance in double tests, jump length (muscle strength of the legs), jump height.
2. A stopwatch to measure time in general agility tests, standing on a foot (balance), 45 m (speed), 49 m (agility), long and sitting (muscular endurance), resting heart rate, heart rate after exercise Harvard step).
3. Modular ruler to measure fingers reaction.
4. Sand bag for 49 meter (general agility) test.
5. Metronome to measure and coordinate the Harvard step.

Research Methodology

This research has been a kind of relationship and using descriptive and inferential statistics, we have tried to investigate the relationship between physical fitness and physiological readiness of resting heart rate, heart rate after exercise (Harvard step) and vo2max in karate. Data analysis was performed using Pearson statistical method at a significant level of $p < 0.05$ and using SPSS software version 22.

Research Findings

The description and relationship of collected data were among the goals of this research that the summary is presented in Tables 1 and 2. In table (1), the mean and standard deviation of physical, motor movement, physical and physiological fitness variables are shown.

Table 1. Descriptive statistics of motor movement, physical and physiological fitness of World Champion Karate

Descriptive Statistics

	Mean	Std. Deviation	N
SEMO General Agility	13.4178	.73523	9
Reaction	8.5000	2.28522	10
Long Jump	2.4110	.21116	10
Run 4X9	9.0310	.63616	10
Run 45 meters speed	5.8830	.43932	10
Balance	19.4760	16.86395	10
High jump	48.6000	10.87505	10
Sit-ups	62.0000	5.09902	8
Resting heart rate	59.6000	3.97772	10
Heart rate after exercise	1.5000E2	20.59126	10
(Harvard step)	3.1300	.76891	10
Maximum Oxygen Consumption			

In table (2), the relationship between the mean of fitness and physical fitness readings with the physiologic karate of the champions of the world is observed.

Table 2. Inferential statistics of the relationship between the characteristics of motor movement, physical and physiological fitness of World Championship Karate

Variables		Reaction	Long Jump	Run 4X9	Run 45 meters speed	Balance	High Jump	Sit-ups	Resting heart rate	Heart rate after exercise	Maximum Oxygen Consumption
SEMO General agility	Pearson Correlation	.076	-.882	.856	.052	-.732	-.800	-.578	.063	.085	.374
	Sig. (1-tailed)	.423	.001*	.002*	.447	.012*	.005*	.087	.436	.414	.161
	N	9	9	9	9	9	9	7	9	9	9
Reaction	Pearson Correlation		-.177	.080	.404	-.212	-.130	.219	-.122	-.227	.446
	Sig. (1-tailed)		.312	.413	.123	.279	.361	.301	.368	.264	.098
	N		10	10	10	10	10	8	10	10	10
Long Jump	Pearson Correlation			-.668	.153	.541	.631	.285	-.084	-.011	-.477
	Sig. (1-tailed)			.017*	.337	.053*	.025*	.247	.409	.488	.082
	N			10	10	10	10	8	10	10	10
Run 4X9	Pearson Correlation				-.124	-.375	-.592	-.555	.481	.274	.126
	Sig. (1-tailed)				.366	.143	.036*	.076	.079	.222	.365
	N				10	10	10	8	10	10	10
Run 45 meters speed	Pearson Correlation					-.323	-.260	-.215	-.269	-.662*	.543
	Sig. (1-tailed)					.181	.234	.304	.226	.019*	.052
	N					10	10	8	10	10	10
Balance	Pearson Correlation						.869	.653	.222	-.116	-.120
	Sig. (1-tailed)						.001*	.040*	.269	.375	.371
	N						10	8	10	10	10
High Jump	Pearson Correlation							.685	.058	-.210	-.165
	Sig. (1-tailed)							.030*	.437	.280	.325
	N							8	10	10	10
Sit-ups	Pearson Correlation								-.472	-.207	.264
	Sig. (1-tailed)								.119	.311	.264
	N								8	8	8
Resting heart rate	Pearson Correlation									.098	-.214
	Sig. (1-tailed)									.394	.277
	N									10	10
Heart rate after exercise	Pearson Correlation										-.759
	Sig. (1-tailed)										.005*
	N										10

In analyzing the research data, as shown in the inferential statistics table, the data were calculated using Pearson statistical method at a significant level of 0.05 p and using SPSS software

version 22, variables whose relationship between them it is meaningful to be marked with a star and an underline.

The research results showed that the hypothesis is zero and the research hypothesis is accepted. Some physical and physical fitness variables or some physiological variables of karate have been observed.

- Between the variables at 45 meters speed with the variable VO2max karate relationship with the significant level (0.52), the correlation coefficient (r = 0.543) is observed.
- There was a negative correlation between the two variable speeds of 45 m with heart rate (Harvard step) Karate with a significant level (0.19) and correlation coefficient (r = 0.662).
- There is a positive relationship between the run 4x9 variable with the Karate Rest Heart rate variable and the correlation coefficient is lower than the mean.

Also, there was a negative relationship between physiological variables with each other, such as heart rate after activity (Harvard step) with VO2max variance, with a significant level (0.005) and correlation coefficient (r = 0.759).It should be noted that there is a significant relationship between the variables of motor and physical fitness with each other. In some examples, it is referred to with more correlation coefficients.

- Between SEMO (general agility) and karate length jump variables, there was a negative relationship with significant level (0.001) and correlation coefficient (0.882) is observed.
- Between the SEMO variables (general agility) with a running variable of run 49 elite karate, there is a positive correlation with the significant level (0.002) and high correlation coefficient (0.856) is observed.
- Between the SEMO variables (general agility) with elite karate height jump elevation variable has a negative relationship or a significant level (0.005) and a high correlation coefficient (-0.800) is observed.
- Between SEMO variable (general agility) with the static equilibrium of elite karate had a negative correlation with significant level (0.12) and high correlation coefficient (0.732) is observed.
- Between the static equilibrium variable or the jump height elite karate height with positive relationship with significant level (0.001) and high correlation coefficient (0.869) is observed.

Conclusion

This research is in consistent with readiness variables such as abdominal muscle endurance and endurance, or Giampietro et al. research (Castillo et al, 2016), of course, in some studies, the research protocol is not identical. The present study is not consistent with research (Bertini et al, 2003) that adolescent athletes have a superior predominance in speed and agility compared to non-athletic ones in muscular strength (longitudinal or vertical jumps).
This research is not consistent with Ghahramantabrizi and many studies due to the results of speed, agility and explosive power variables due to non-alignment with other variables. This research is inaccurate with the research by Parnow et al. (Levin et al, 1999) in some protocols. Some physical and physical fitness factors such as SEMO (general agility), response, jump length, running 4x9 m, running 45 m, static balance, jump, height, and sitting can be effective and successful factors on karate performance.
Each of the variables with a significant level and a higher correlation coefficient can show the superiority of a karate with another karate. Also, any karate that has better physical and physical fitness can be said to be more favorable with physiological parameters such as resting heart rate, heart rate after activity (Harvard step) and VO2max, and a significant level and correlation coefficient.
Therefore, the end result of the research proof of this hypothesis is that one of the success codes in karate is better and more favorable preparation of physical and physical variables and physiological variables.

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