ORIGINAL ARTICLE

Profiles of general physical fitness of young men training in combat sports

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Artur Litwiniuk [1ABCDE], **Robert Bąk** [2ABCDE], **Andrzej Chodała** [3ABCDE]

[1] Faculty of Physical Education and Health, Biala Podlaska, Jozef Pilsudski University of Physical Education in Warsaw, Warsaw, Poland

[2] College of Medical Sciences, Institute of Physical Culture Studies, University of Rzeszow, Rzeszow, Poland

[3] Faculty of Physical Education, Military University of Technology, Warsaw, Poland

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Abstract

Background and Study Aim: Conclusions about the modifying effect of a specific combat sport on general physical fitness make sense if the compared groups of athletes are similar primarily in terms of the following variables: gender, age, training length, weekly training load (number, duration, and intensity of training sessions). The cognitive aim of this study is to answer the question: does long-term training in combat sports modify the overall physical fitness of young men in a pronounced way?

Material and Methods: Three groups of combat sports athletes, in each n = 24 men and in each range of age 19 to 22 years: ju-jitsu (body height 172.25 ±4.8 cm, range 163 to 179 cm, body mass 69.98 ±7.98 kg, range 58.6 to 84.1 kg, training experience 3 to 5 years); karate kyokushin (body height 177.96 ±8.01 cm, range 163 to 197 cm, body mass 77.71 ±9.31 kg, range 57.8 to 103.6 kg, training experience 3 to 5 years); taekwondo ITF (body height 179.08 ±5.62 cm, range 167 to 19 1cm, body mass 76.92 ±7.35 kg, range 64.4 to 92.2 kg, training experience 3 to 5 years). The reference group (the most homogeneous) consisted of military cadets (n = 24), who had received one year of hand-to-hand combat training as part of their university military studies (age 19.8 years, body height 178.2 ±6.5 cm, range 163 to 186 cm, body mass 75 ±6.8 kg, range 71 to 95 kg).

General physical fitness was measured by the International Physical Fitness Test (IPFT). Identification criteria were based on the recommendations of Tadeusz Ulatowski on the basis of results addressed to athletes: overall score (IPFT 8 trial total points) outstanding level 641 and more points, high level 561 to 640-, medium level 481 to 560-, low level 401 to 480-, very low level 400 and less points.

Results: In terms of mean score, taekwondo ITF training has the strongest impact on shaping overall physical fitness (M = 529.9 points, range 486 to 605), while annual military training based significantly on hand-to-hand fighting exercises has the least (M = 484 points, range 433 to 521). The difference is statistically significant ($p<0.01$). Also, the mean score of karate kyokushin athletes (527.5 points) is significantly higher ($p<0.001$) than that of military cadets, similarly ju-jitsu athletes (M = 500.46 points), $p<0.05$. A statistically significant difference ($p<0.001$) also applies to the results of karate kyokushin athletes vs ju-jitsu and taekwondo athletes vs ju-jitsu. The ranking of the assessed motor skills of military cadets begins with the score of trial sit ups (M = 70.88 points), ends with 50 m dash (M = 50 points); taekwondo athletes, respectively: hand grip (M =74.91 points), sit ups (M = 59.41 points); karate kyokushin athletes bend trunk (M = 70.04 points), 50 m dash (M = 62.21 points); ju-jitsu athletes bent arm hang (M = 64.5 points), 50 m dash (M = 61.04 points). Only among military cadets 2.08% of individual trials diagnosed at a very low level (50 and less points).

Conclusions: The modifying effect of multi-year training of individual combat sports on general physical fitness was found, with the results providing significant evidence that systematic training of at least 2 years shapes individual motor abilities to at least a low level. The empirical set-up used can provide a methodological basis for a comparative study of the effects of long-term training of any sport (systematic physical activity) in adult men, if the researchers used (or will use) the International Physical Fitness Test.

Keywords: International Physical Fitness Test • ju-jitsu • karate kyokushin • taekwondo ITF

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Author's address: Robert Bąk, College of Medical Sciences, Institute of Physical Culture Studies, University of Rzeszow, Cicha 2A Str., 35-326 Rzeszow, Poland; email: rbak@ur.edu.pl

INTRODUCTION

Scientific associations and researchers of the phenomenon of positive health recommend physical fitness as one of the indicators of somatic health [1-5]. Prominent Polish scientists such as Bator and Kasperczyk [6], Kuński [7], Januszewski and Mleczko [8] and Osiński [9] have made significant contributions to the promotion of health-promoting physical activity. However, since three basic dimensions of health (somatic, mental and social) are distinguished, the most valuable methods and means of stimulating positive health understood in this way are those that affect its dimensions simultaneously. However, the most vivid evidence of the analytical approach to this phenomenon is the multitude of specialized scientific journals dedicated to particular dimensions of health. Thus, in the scientific journals Sport Science and Medical Science, one should expect to learn, among other things, about strengthening primarily somatic health. The more physical exercise is narrowed down to stimulating one or a few motor abilities, the smaller the health effect. An example of a one-sided influence on motor abilities and body endurance is the media popularization of running. Meanwhile, cycling stimulates not only these fitness abilities, but also coordination motor abilities. Swimming, on the other hand, in addition to stimulating the mentioned characteristics, is one of the very important survival competences (increases personal safety in a water environment).

The unique methods and means of the new scientific discipline, 'innovative agonology' (INNOAGON), recommended in the global science space, comprehensively strengthen all dimensions of health and the ability to survive [10-12]. Due to the escalation of various forms of violence and aggression, self-defense competencies most effectively stimulate various forms of exercises and hand-to-hand combat (fighting) systems. In this work, we consistently do not use the term 'martial arts', because under this attractive name preceded by the word 'mixed' the practice of neo-gladiatorship is camouflaged [13, 14].

Since the set of hand-to-hand fighting exercises and systems is not homogeneous, it is expected that this group of forms of physical activity may differentiate adaptive effects. Therefore, when examining the phenomenon of stimulating general physical fitness with these forms of activity, one must be aware of two heterogeneities. Firstly, the general physical fitness profiles of people practicing specific hand-to-hand combat systems may differ significantly. Secondly, defensive competences will be limited by repeated repetition, in the motor sense, of the so-called combat techniques. Division of the combat sports under forms of the direct confrontation – workings of weapons; hits (strokes); throws and grips of immobilization of opponent's body – is recommended by the *theory of combat sports* [15]. Paradoxically, in the year of publication of the *theory of combat sports* (2000), Sergei Novikov [16] founded the International Unifight Federation (UNIFIGHT) and registered in Paris [17, 18]. UNIFIGHT combines, but only to some extent, all these techniques – 'working of weapons' (shooting with paintball weapons and throwing knives) are elements of the first round (obstacle course) [19].

The closest to the UNIFIGHT concept is taekwondo ITF (pentathlon, of which only one event is closely related to 'hand-to-hand fighting' [20]. In a sense, the circumstances of promoting neo-gladiation by the electronic media, while completely ignoring UNIFIGHT, become simple, but at the same time a very important indicator of public health (easily documented by reports on the viewership scale). Similarly, ignoring the health benefits of Brazilian capoeira [21]. Chinese

Innovative agonology – is an applied science dedicated to promotion, prevention and therapy related to all dimensions of health and regarding the optimization of activities that increase the ability to survive from micro to macro scales [11, p. 274].

INNOAGON – acronym 'innovative agonology' [12].

Neo-gladiator – a person who trains mix martial arts (MMA) and similar forms of hand-to-hand fighting that do not meet the definition of sport according to the Olympic Charter [13].

Capoeira – ***noun*** a martial art and dance form, originally from Brazil, that is used to promote physical fitness and grace of movement [87].

Taekwondo – ***noun*** a Korean martial art that resembles karate but also employs a wide range of acrobatic kicking moves [87].

Budo (Budō) – originally a term denoting the 'Way of the warrior', it is now used as a collective appellation for modern martial arts of ***kendō***, ***jūdō***, ***kyūdo*** and so on. The primary objective of these 'martial ways' is self-perfection (***ningen – kesei***) [25].

Kumite – is a semi-contact karate competitive concurrence, where two athletes perform various kicking, punching and blocking techniques towards each other with maximum control in order to gain points and win the match. Destruction is fictive.

health exercises based on hand-to-hand fighting systems [22-24], and the wide offer of budo [25-27] justifies the adoption of these phenomena as simple indicators proving the lack of due concern of public affairs coordinators for the state of public health.

The cognitive aim of the study is to answer the question whether long-term combat sports training significantly modifies the general physical fitness of young men?

MATERIAL AND METHODS

Three groups of combat sports athletes, in each n = 24 men and in each range of age 19 to 22 years: ju-jitsu (body height 172.25 ±4.8 cm, range 163 to 179 cm, body mass 69.98 ±7.98 kg, range 58.6 to 84.1 kg, training experience 3 to 5 years); kyokushin karate (body height 177.96 ±8.01 cm, range 163 to 197 cm, body mass 77.71 ±9.31 kg, range 57.8 to 103.6 kg, training experience 3 to 5 years); taekwondo ITF (body height 179.08 ±5.62 cm, range 167 to 191 cm, body mass 76.92 ±7.35 kg, range 64.4 to 92.2 kg, training experience 3 to 5 years). The reference group (the most homogeneous) consisted of military cadets (n = 24), who had received one year of hand-to-hand combat training as part of their university military studies (age 19.8 years, body height 178.2 ±6.5 cm, range 163 to 186 cm, body mass 75 ±6.8 kg, range 71 to 95 kg).

General physical fitness was measured by the International Physical Fitness Test (IPFT) [28]. Identification criteria were based on the recommendations of Tadeusz Ulatowski [29] on the basis of results addressed to athletes: overall score (IPFT 8 trial total points) outstanding level 641 and more points, high level 561 to 640-, medium level 481 to 560-, low level 401 to 480-, very low level 400 and less points. However, depending on the context, individual or collective results were also related to or against IPFT health standards [28].

Statistical analysis

The estimation of the results is based on the following indicators: frequency (N, n); mean (M); minimum (Min); Maximum (Max); standard deviation (SD or ±); skewness (g_1); kurtosis (g_2); significance level, probability (p). In the studies, the level of at least $p<0.05$ and higher was shown as statistically significant differences. The Pearson correlation coefficient between pairs of specified variables was calculated.

RESULTS

The leader in the ranking of hand-to-hand fighting practitioners are taekwondo athletes (M = 529.92 IPFT points). The maximum result indicates a high level of general physical fitness according to the standards for athletes. The lowest score corresponds to a low level. A slight positive skewness (g_1 = 0.97) indicates a relatively small proportion of athletes who revealed a high level of general physical fitness, while (g_2 = 2.50) indicates a significant platykurtic. The results of military cadets, closing this ranking, with a slightly negative skewness (g_1 = −0.39) and with an equally negative kurtosis (g_2 = −0.79) basically confirm that the distribution is close to normal. Results closest to the normal distribution model characterize ju-jitsu athletes. The most platykurtic distribution of results is characteristic of karate kyokushin athletes (Table 1).

The dominant motor skill of the surveyed men, revealed by TKD athletes (M = 74.92 points), is hand grip. The lowest average result of motor skill was revealed by military cadets (M = 54 points) and it is speed. However, MC turned out to be the leaders in abdominal muscle strength (M = 70.88 points) (Table 2, Figure 1).

At the same time, military cadets turned out to be the only group in which the minimum results were lower than 50 points (i.e., lower than the population average) and concerned five motor abilities. There are 17 such cadets in total. However, only among the military cadets were two people who documented the level of two different trials with a score of 100 points. The full correlation (r = 1) of the ranking positions groups with the RP results of individual trials concerns the standing broad jump, while the almost full negative correlation (r = −0.945) of the RP groups with the raw results of this trial. We found the largest number of first RP trials (n = 5) in the karate kyokushin athletes group, although they rank second RP among the studied groups in terms of the general IPFT result. Also, karate athletes stand out with the lowest sum RP (12), while ju-jitsu athletes, occupying the third RP (21) among the surveyed groups, and the leaders, taekwondo athletes have 22 (Table 3).

Table 1. Estimation of the general IPFT score of young men practicing various forms of hand-to-hand (the ordinal variable is the ranking positions assigned to groups from the highest to the lowest IPFT value): statistically significant differences (1÷3; 1÷4***; 2÷3; 2÷4); *p<0.05; **p<0.01; *** p<0.001.

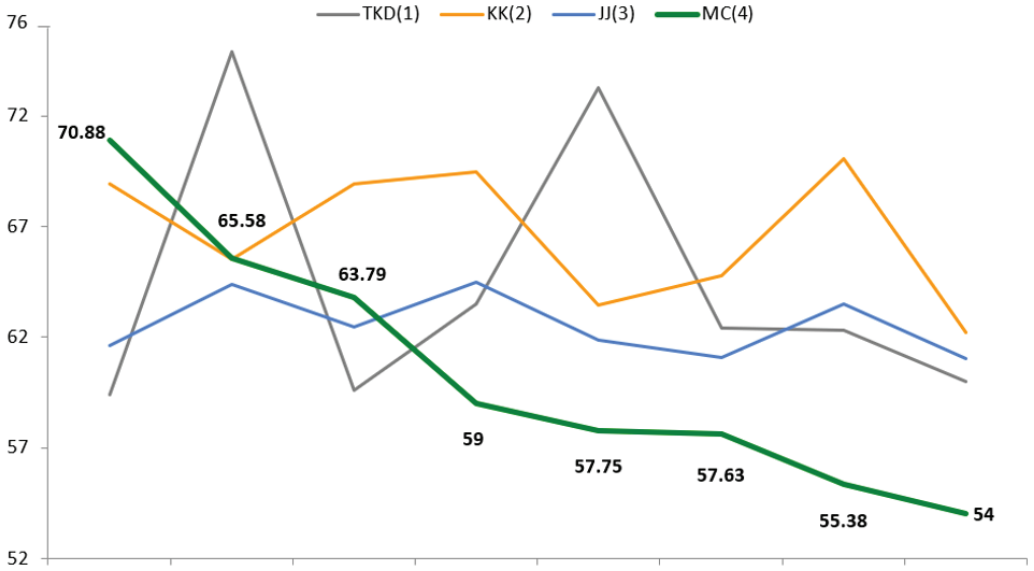
Statistic indicator	Ranking position and group code			
	1	2	3	4
	TKD	KK	JJ	MC
M	**529.92**	**527.54**	**500.46**	**484.0**
SD	24.20	20.24	22.61	24.48
Min	486	500	456	433
Max	605	594	548	521
g1	*0.97*	*1.55*	*0.06*	*−0.39*
g2	*2.50*	*3.50*	*−0.47*	*−0.79*

Note: **TKD** taekwondo; **KK** karate kyokushin; **JJ** ju-jitsu; **MC** military cadet

Table 2. Estimation of trials of IPFT of young men practicing different forms of hand-to-hand (the ordinal variable is the results of the reference group MC and RP from the highest mean to the lowest arithmetic IPFT).

Trials estimation of IPFT: M, SD (Min÷Max), g_1, g_2 (ordinal variable: MC trials scores from highest to lowest)								
RP →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Trial →	**sit ups**	**hand grip**	**shuttle run**	**bent arm**	**standing broad jump**	**1000 m run**	**bend trunk**	**50 m dash**
Motor ability →	**abdominal muscle strength**	**hand grip**	**agility**	**arms muscle strength**	**legs muscle strength**	**endurance**	**flexibility**	**speed**
	Code group (RP – ranking position of group) and results of trials IPFT group							
TKD(1)	**59.42** ±6.68	**74.92** ±12.82	**59.58** ±4.46	**63.50** ±10.23	**73.29** ±6.00	**62.42** ±5.25	**62.33** ±5.20	**60** ±3.76
	(51÷77)	(52÷96)	(52÷68)	(53÷95)	(63÷88)	(52÷71)	(52÷71)	(54÷66)
	$g_1$0.93; $g_2$0.51	*$g_1$0.26; g_2−0.99*	*$g_1$0.03; g_2−0.66*	*$g_1$1.82; $g_2$3.38*	*$g_1$0.68; $g_2$0.12*	*g_1−0.42; g_2−1.00*	*g_1−0.41; g_2−0.97*	*$g_1$0.21; g_2−1.06*
KK(2)	**68.92** ±5.04	**65.54** ±6.65	**68.92** ±5.04	**69.46** ±6.43	**63.46** ±3.98	**64.79** ±5.21	**70.04** ±7.86	**62.21** ±4.51
	(62÷82)	(56÷78)	(62÷82)	(60÷80)	(56÷71)	(58÷82)	(62÷97)	(55÷74)
	g1 0.82; g2 0.33	*g1 0.73; g2 −0.42*	*g1 0.82; g2 0.33*	*$g_1$0.23; g_2−1.30*	*g_1−0.20; g_2−0.59*	*$g_1$1.50; $g_2$3.61*	*$g_1$2.19; $g_2$5.36*	*$g_1$0.26; $g_2$0.54*
JJ(3)	**61.63** ±5.92	**64.38** ±8.40	**62.46** ±3.76	**64.50** ±8.15	**61.87** ±7.38	**61.08** ±5.55	**63.50** ±9.35	**61.04** ±5.65
	(53÷72)	(54÷80)	(54÷68)	(52÷80)	(51÷76)	(51÷72)	(50÷97)	(52÷76)
	g_1−0.10; g_2−1.30	*$g_1$0.29; g_2−1.27*	*g_1−0.49; g_2−0.36*	*$g_1$0.38; g_2−0.77*	*$g_1$0.03; g_2−1.19*	*$g_1$0.01; g_2−0.55*	*$g_1$1.97; $g_2$5.86*	*$g_1$0.52; $g_2$0.45*
MC(4)	**70.88** ±24.48	**65.58** ±13.44	**63.79** ±4.31	**59** ±11.94	**57.75** ±6.60	**57.75** ±3.13	**55.38** ±9.91	**54** ±3.10
	(58÷100)	(46÷100)	(56÷71)	(41÷86)	(43÷70)	(50÷63)	(35÷73)	(47÷60)
	$g_1$1.50; $g_2$1.87	*$g_1$1.16; $g_2$0.62*	*g_1−0.26; g_2−0.68*	*$g_1$0.73; g_2−0.11*	*g_1−0.04; $g_2$0.04*	*g_1−0.35; $g_2$1.54*	*g_1−0.28; g_2−0.06*	*g_1−0.22; g_2−0.31*

Note: **TKD** taekwondo; **KK** karate kyokushin; **JJ** ju-jitsu; **MC** military cadet; **RP** ranking position



1	2	3	4	5	6	7	8
sit ups	hand grip	shuttle run	bent arm	standing broad jump	1000 m run	bend trunk	50 m dash
abdominal muscle strength	hand grip	agility	arms muscle strength	legs muscle strength	endurance	flexibility	speed

Figure 1. Results visualization in Table 2 based on arithmetic averages of reference group trial results according to variable ordering from highest value to lowest (full value data labels limited to military cadets).

Note: **TKD** taekwondo; **KK** karate kyokushin; **JJ** ju-jitsu; **MC** military cadet

Table 3. Ranking positions of motor abilities (trials) according to the ordinal variable of military cadets' raw results in relation to RP groups.

	Ranking positions								
RP →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Sum RP**
Trial →	**sit ups**	**hand grip**	**shuttle run**	**bent arm**	**standing broad jump**	**1000 m run**	**bend trunk**	**50 m dash**	
Motor ability →	**abdominal muscle strength**	**hand grip**	**agility**	**arms muscle strength**	**legs muscle strength**	**endurance**	**flexibility**	**speed**	
TKD (RP1)	4	2	4	3	**1**	2	3	3	22
KK (RP2)	2	3	**1**	**1**	2	**1**	**1**	**1**	**12**
JJ (RP3)	3	4	2	2	3	3	2	2	21
MC (RP4)	**1**	**1**	3	4	4	4	4	4	25
Correlations RP groups with RP trials and raw scores motor abilities									
RP trials	–0.800	0.400	–0.200	0.400	**1.000**	0.800	0.400	0.400	
Raw scores	0.752	–0.767	0.204	–0.555	**–0.945**	–0.781	–0.589	–0.677	

Ranking positions									
RP →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Sum RP**
Trial →	**sit ups**	**hand grip**	**shuttle run**	**bent arm**	**standing broad jump**	**1000 m run**	**bend trunk**	**50 m dash**	
Motor ability →	**abdominal muscle strength**	**hand grip**	**agility**	**arms muscle strength**	**legs muscle strength**	**endurance**	**flexibility**	**speed**	
Number of person with the lowest and maximum trial results									
Range	**49**	**54**	**30**	**54**	**45**	**32**	**62**	**29**	**N**
Min	51	46	52	41	43	50	35	47	
Group & n	TKD, n = 2	MC, n = 1	TKD, n = 2	MC, n = 5	MC, n = 2	MC, n = 1	MC, n = 7	MC, n = 1	21
Max	100	100	82	95	88	82	97	76	
Group & n	MC, n = 1	MC, n = 1	KK, n = 1	TKD, n = 1	TKD, n = 1	KK, n = 1	KK, n = 1 JJ, n = 1	JJ, n = 1	9

Note: **TKD** taekwondo; **KK** karate kyokushin; **JJ** ju-jitsu; **MC** military cadet; **RP** ranking position

DISCUSSION

The empirical profiles of men's general physical fitness presented in this work are only an example for the use of numerous applications, especially regarding the selection of various task groups (military, police, rescue, etc.). Focusing on the methodological layer of the results of these studies, one can see the usefulness of this approach in many areas of medical practice and even in such a seemingly distant field as scientific research.

In our opinion, the analysed indicators of this manifestation of physical fitness within 4 groups of men with different hand-to-hand combat competencies have universal methodological value. First, the reference group is military cadets. This choice was determined by the highest level of homogeneity of the surveyed men (similar age, identical standards of higher education, identical conditions of accommodation, food and other social benefits). Secondly, the psychomotor stimuli important for this research (related to teaching and military hand-to-hand combat training) were used in identical time and content of educational tasks and were similar in terms of exercise intensity during two semesters of the first year of studies. The other three groups of men of similar age differed significantly not only in terms of combat sports practice (ju-jitsu, karate, taekwondo), but also in training experience (3-5 years).

Therefore, the adaptation effects identified with a homogeneous criterion (partial and total IPFT score) provide knowledge about the modifying impact of repeatedly repeated exercises specific to these forms of hand-to-hand combat on the general physical fitness measured in this way. We found the most pronounced modifying effect in the studied group of taekwondo athletes. There are logical grounds for combining the result of 74.92 points trial measuring hand grip with repeated repetition during training of exercises preparing for the competition (*kyokpa* – breaking boards with dimensions of 30x30x1.5 cm). The average standing broad jump result of 73.29 points is combined with exercises that strengthen the strength of the lower limb muscles, which determine success in two taekwondo ITF competitions (special techniques and strength tests, and *kumite*).

Additionally, individual training loads are an important element modifying the results of individual groups of combat sports athletes. A simple indicator (partly quantitative and partly qualitative) of this phenomenon is, in a sense, the range of results: trial hand grip 44 points (min 52, max 96); trial standing broad jump 25 points (min 63, max 88). Since the average results of both groups are very similar, and the range indicates less differentiation in individual

trial jump results, there are grounds for concluding that the stimuli stimulating the strength of the legs muscles were very similar.

This similarity is not necessarily a consequence of identical exercise times, number of repetitions, number of sets etc. It is most likely the result of an optimal selection of exercise loads for individual athletes. Of course, these are stimulus loads that precisely stimulate legs muscle strength.

In the profile of recreational krav-maga trainees during the pandemic period, the highest score was for agility (shuttle run 66 points, min 52, max 70) and the second highest score was for abdominal muscle strength (sit ups 57 points, min 47, max 71) [30].

Such a comparison of the effects of taekwondo (TKD) training with recreational krav-maga training has limited cognitive value. The modifying power of these stimuli must be much smaller. However, the comparison of the results of krav-maga practitioners with the dominant motor skills of taekwondo athletes (TKD ÷ krav-maga points: hand grip 74.92÷48.65; standing broad jump 73.29÷47.80) strengthens the empirical argument that the long-term specialization of particular forms of hand-to-hand combat exercises has a selective impact on individual motor skills of a person.

When theoretically analysing the non-sports confrontation (hand-to-hand combat) of TKD athletes against krav-maga practitioners, the most obvious implication is that the latter does not equal the energy potential of the limbs of the former. The average result of trial bent arm was 63.50 TKD athletes, while the average result of krav-maga practitioners was 48.90 (hand grip 48.65, long jump 47.80).

In the available scientific literature, general physical fitness profiles based on complete IPFT results apply to both men and women practicing various combat sports and other forms of hand-to-hand fighting. The differentiating factors include not only gender and the form of hand-to-hand fighting, but also training experience and age. The most complete set of such profiles in relation to judo practitioners was developed by Władysław Jagiełło individually or in research teams [31-34]. Three profiles of the Polish judo female athletes population in 2007 were prepared by Beata Wolska [35]: 11 athletes of the Olympic team (25.2 ±3.7 years, training experience 14.2 ±4 years); 15 representatives of the national and provincial teams of Pomerania (16.8 ±0.7 years, training experience 7.2 ±2.5 years); 14 juniors, representatives of the Pomeranian provincial team (13.9 ±1.1 years, training experience 5.5 ±1.9 years). Wolska et al. [36] moreover, it correlated the general and special physical fitness indices with body weight and composition 13-16 year-old. Moreover, a team of researchers from Wroclaw (Poland) compared the general physical fitness profile of 11-12 year old boys (n = 22) with their peers (n = 22) who do not practice sports [37] based on the IPFT results. These studies were conducted in the same environment where 16 years earlier, Jagiełło [32] selected judo athletes aged 11 to 18 for his own research. Profiles of 265 policemen (between 25-50 years of age) and 55 policewomen of similar age, based on the IPFT, were prepared by Danuta Bukowiecka [38, 39]. Andrzej Chodała [40] established a general physical fitness profile based on IPFT for those military cadets who followed a standard military training program with a limited number of hours of hand-to-hand combat. But he also developed such profiles for female military cadets [41-43]. However, Joanna Syska [44] based the full general physical fitness profile of students on EUROFIT – both those who completed a two-semester program of modern gymnastic and dance forms with elements of self-defence and the control group.

The scientific literature also includes physical fitness profiles based on IPFT but with a reduced number of trials (the results were correlated with the effectiveness of test fights in a vertical and/or horizontal stance) [45, 46] or associated with safe falling competencies [47]; morphological profiles based on various anthropological methods [48-56]; body composition profiles in a broader or narrower sense [57-61], and personality profiles of athletes representing various combat sports and hand-to-hand-combat systems [62-66, 13, 67]. However, there are no publications that would simultaneously inform about several such profiles of people practicing various forms of hand-to-hand combat, which would be developed on the basis of research in a strictly defined period of time (e.g., two weeks from the first to the last measurement in a fixed order).

Therefore, the methodology of complementary research [68] opens a new cognitive perspective for exploring a wide area of activity identified with the phenomenon of hand-to-hand combat. It is clearly emphasized that we will not directly identify neogladiatorship with this area of scientific exploration, because this profession does not fall within the mission of the International Olympic Committee: "1. (...) the promotion of ethics and (...) ensuring that, in sport, the spirit of fair play prevails and violence is banned" (Olympic Charter, p. 18).

This does not mean that we are putting any pressure on the scientific community to boycott neogladiatorship research (we are, however, firmly opposed to calling this profession a sport) using the same research methods and tools. On the contrary, such knowledge may be useful in increasing the effectiveness of the prevention of bodily injury and death. One implication would be part of the evidence documenting somatic health and mental health losses. Secondly, it is part of the empirical argumentation in educating about necessary self-defence. Moreover, the popularity of the term 'self-defence' in scientific publications [69] indicates the wide possibilities of implementing INNOAGON outside the area of hand-to-hand combat.

The epidemiology of injury and death among combat sports athletes [70-72], but also documented cases of destruction of the mental layer and interpersonal relationships among these athletes are sufficient grounds to justify the need for complementary research mentioned here – the latest statistics show 1,114 boxer deaths during or after a fight.

However, we focus on the optimistic aspects of the application INNOAGON methodology in the broadly understood fight against all factors threatening health and life. An example of successfully combining knowledge from seemingly distant areas of taekwondo [73] training and recreation activity within the rehabilitation of adults is the work of Patryk Wicher et al. [74]. This is all the more true for the content of works in which the authors discuss the struggle with diseases or external threats [75-78] and refer to the INNOAGON methods [11, 12, 68], because the basic method of this new applied science is the complementary approach. The methodological potential of INNOAGON shows the possibilities of secondary analysis of works seemingly distant from the subject of struggle [e.g., 79-86], but still regarding the period of the COVID-19 pandemic i.e., the fight against its numerous negative effects (reducing physical activity, stress, limited interpersonal relationships, etc.).

We emphasize sticking to the methodological aspects of our research. By substituting indicators of any other phenomena in place of any of the eight empirical variables analysed in this work, the reader can obtain a simulation of any competence he can imagine. In these studies, these are motor abilities measured by one of many renowned general physical fitness diagnostic tools. The distinctive advantage of the IPFT are the raw results normalized according to the T scale. If we assume that in order to increase the probability of achieving the goal by a task group of twenty men, an individual level of general physical fitness of each of them is necessary, documented by at least the result of each of the eight trial 55 points, then it would not be sense of entrusting the task to military cadets. If the entrance criteria indicated competences estimated by the result of 100 point trials measuring abdominal muscle strength and hand grip, then two candidates are only among military cadets.

CONCLUSIONS

The modifying effect of multi-year training of individual combat sports on general physical fitness was found, with the results providing significant evidence that systematic training of at least 2 years shapes individual motor abilities to at least a low level. The empirical set-up used can provide a methodological basis for a comparative study of the effects of long-term training of any sport (systematic physical activity) in adult men, if the researchers used (or will use) the International Physical Fitness Test.

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