Handgrip strength, physical activity level and quality of life of Judo master competitors

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Martaliz DIMARE*
Fabrício Boscolo Del VECCHIO*
Bruno Ezequiel Botelho XAVIER*

*Escola Superior de Educação Física, Universidade Federal de Pelotas, Pelotas, RS, Brasil.

Abstract

The aim of this study was to evaluate and test the correlation between isometric handgrip (IH), physical activity level (PA) and quality of life (QOL) of master judo competitors. The sample was composed by 44 men (45-64 years) participating in the Pan-American Master Judo Championships, 2011. To evaluate the handgrip strength was used isometric handgrip test. Additionally, were employed WHOQOL-Bref questionnaire and Global Physical Activity Questionnaire (GPAQ). In the statistical analysis, after checking the normal distribution of the data, they are presented as mean [95% confidence interval]. In the comparison between age groups, we conducted analysis of variance (ANOVA) with Tukey post-hoc. For bivariate correlations, we used the Pearson test. The judo athletes showed: 1) high amount of PA (661 [513-810] min of moderate to vigorous PA) when considering the population recommendations; 2) moderate values of FIPM (bilateral sum equal to 87.1 [82.3 -91.9] kgf) compared with physically active people and the elderly; and 3) QOL scores higher than in other studies. Additionally, we highlight two main findings, no significant differences in subjective perception of QOL and FIPM by age groups and positive correlation between weekly amount of moderate to vigorous PA and QoL scores.

Key Words: Motor activity; Martial arts; Muscle strength; Life style.

Introduction

The Judo is one of the most popular sports modalities in the world, activating all body segments, induce the increase of muscle strength, increase flexibility and balance and generates improvements of neurologic and psychologic aspects[1-3]. Moreover, the Judo can be practiced for children and adolescents[4]. However, few attention has been aimed to others age groups, although it would be interesting investigate the impact of long time martial arts training in the physical fitness and health of subjects[5-6]. Although muscle strength is a physical capacity fundamental to obtain success in the modality[3], fighters did not show high values when compared with no fighters in the peak of handgrip isometric strength (PHIS), but the fighters showed lower fatigue rate when there is sustenance of contraction for 10 seconds[7]. Furthermore, it is well know that the PHIS have a positive correlation with health parameters[8-10]. Among institutionalized elderly, for instance, it was observed that lower levels of PHIS become the elderly susceptible to falls[11].

On the other hand, it is well known that the Judo can contribute to the psychosocial development of the practitioners include with great development of character, respect, sincerity, courage and auto control[12]. The quality of life (QL), in turn, was object of study in Germans practitioners from different oriental martial arts, and it was observed that perception of QL was higher when compared to no practitioners, probably because the practice of martial arts it involves physical fitness and social and spiritual aspects[13]. Between Brazilian elite athletes, it was observed that men shown different values compared to women regarding the personal belief domain[14], however, more studies are necessary.

Thus, the martial arts have been used to improve the level of physical activity of elderly as well as to improvement of physical fitness and quality of life[6].

However, there are few studies with martial arts practitioners and combat sports in the middle-age[5]. On the other hand, many events and competitions stimulating the modality to this age has been promoted[6, 13]. Additionally, purposes of incentive to the physical activity and sports practice to the adult population have been disclosed, and the search for different corporal practice can motivate the practice of martial arts and sports modalities of combat. It is relevant to verify the effects of long time of Judo practice in the health of adults. Thus, the aim of this study was to evaluate the level of physical activity, the handgrip isometric strength and the quality of life of master Judo competitors. Also, it was tested the correlations between different variables of interest.

Method

Study type and variables characterization

The study is characterized as analytic transversal observational, that investigated the level of physical activity, handgrip of isometric strength and quality of life as dependent variables. As independent variables it is identified the competitive category of master Judo competitors.

Population and sample

The research was carried out at Rio Grande do Sul, during the first Master Pan-American of Judo, at Porto Alegre city in September of 2011. In that opportunity, 251 male competitors were enrolled.

In this study, the sample was composed for master competitors of Judo, from three different categories: M4, M5 and M6 and superiors, presented in the respective age limit: Group 1(45-49 years), Group 2 (50-54 years) and Group 3 (55-64 years). In these categories, 84 competitors were enrolled which 44 (52%) composed the sample of the present study, because the others chosen do not participate of data collecting. Although it was an international championship, only Brazilian competitors were enrolled. The present study was approved by the Local Ethic Committee (Protocol n.: 003/2012) and all participants signed an informed consent before study begin.

Experimental design

The study was conducted between 22 and 25 of September of 2011, in during the day in different steps:

First step: The Gaúcha Federation of Judo was consulted and allowed that the data were collected during athlete's enrolment before the fights, still in the concentration area.

Second step: The individuals were instructed initially about the general purpose of the study and if agreed, the subjects signed an informed consent. Afterwards, the subjects filled the anamneses and the questionnaires about the level of physical activity and quality of life and, ending, the subjects performed the maximum handgrip isometric strength test.

Procedures of data collection and data register

Two Physical Education students, previously trained, applied the questionnaires that contained questions about age, time of Judo practice, weekly frequency of training and duration of each session. Regarding dependent variables:

Level of physical activity: It was evaluated by Global Physical Activity Questionnaire (GPAQ), instrument structured by World Health Organization (WHO), composed by 16 questions. To complete this questionnaire, the subject reports the work daily activities, locomotion, recreation and sedentary life style. The questionnaire is internationally validated with Kappa between 0.63 and 0.73 and Spearman correlation between 0.67 and 0.81[15].

Quality of life: The subjective perception of quality of life was evaluated by WHOQOL-Brief previously translated and validated to Portuguese language[16], which presents 26 questions distributed in four different domains: physique (alpha of Cronbrach = 0.84 and r = 0.81), psychological (alpha of Cronbrach = 0.79 and r = 0.69), social relations (alpha of Cronbrach = 0.69 and r = 0.80) and environment (alpha of Cronbrach = 0.71 e r = 0.75).

Handgrip isometric strength: The test was performed with an electronic dynamometer (DayHome®, Model EH 101), previously calibrated and handled according with manufacturer's guidelines. The evaluation occurred with the subject in the orthostatic position, with slight lateral distance from inferior limbs, arms along the body and extended wrist and elbow. To this

evaluation, the subjects pressed the dynamometer strongest as possible during 5 seconds[17]. Three attempts were performed to each hemi body with 3 minutes of interval between sets and the mean was considered to analysis[3]. This procedure to evaluate muscle strength presents high repeatability, with intraclass correlation coefficient of 0.93[17].

Statistical analysis

Firstly, the Shapiro-Wilk test was performed to verify the data normality. After that it was used the mean as centrality measure and confidence interval [IC95%] as dispersion measure.

It was performed a Pearson correlation test between the level of physical activity and the different domains of quality of life. After perform Levene test, which all p values were lower than 5%, the comparison between different age groups occurred from variance analyses (ANOVA), followed by Tukey post hoc teste when necessary. Statistical analysis was performed using SPSS, v. 14. It was considered 5% as statistical significance level.

Results

The sample composed by 44 Judo fighters was separated in three different age groups: Group 1 showed 46.78 [46.1- 47.47] years, Group 2 showed 53 [51.2-54.6] years, Group 3 showed 60.4 [57-63.8] years. There is a significant difference between them ($p < 0.01$). In general, the fighters showed approximately 29 years of Judo practice, with a weekly frequency of three times, with 2h per training session. Regarding amount of physical activity and sedentary life style, no differences were found between groups. It was found that Judo master practitioners performed approximately 661 minutes of moderate and vigorous activities per week, with a mean of 94.4 minutes per day. Regarding handgrip isometric strength, there is no significant difference between groups, with mean of values of 44.7 kgf to the right side and 42.4 kgf to the left side and summation of 87.1 kgf. Details of different variables are presented in the TABLE 1.

The TABLE 2 presents the values of quality of life, according to age and WHOQOL-Brief domains. It was found that there is no significant difference between age groups to the domains of quality of life.

It was observed a positive correlation between PHIS of both sides ($r = 0.9$; $p < 0.01$) and also significant values between evaluated variables. The quantity of moderate weekly physical activity showed a positive correlation with physique domain ($r = 0.32$; $p = 0.03$) and psychological of WHOQOL-Brief, as well as with the general score ($r = 0.38$; $p = 0.01$). The weekly quantity of vigorous physical activity showed a significant correlation with psychological domain ($r = 0.39$; $p = 0.01$) and with the general score of WHOQOL-Brief ($r = 0.34$; $p = 0.02$). The summation of moderate and vigorous activities showed a correlation with psychological domain and with general score of WHOQOL-Brief (FIGURE 1). Finally, it was not observed significant correlations between PHIS and level of physical activity or subjective perception of quality of life.

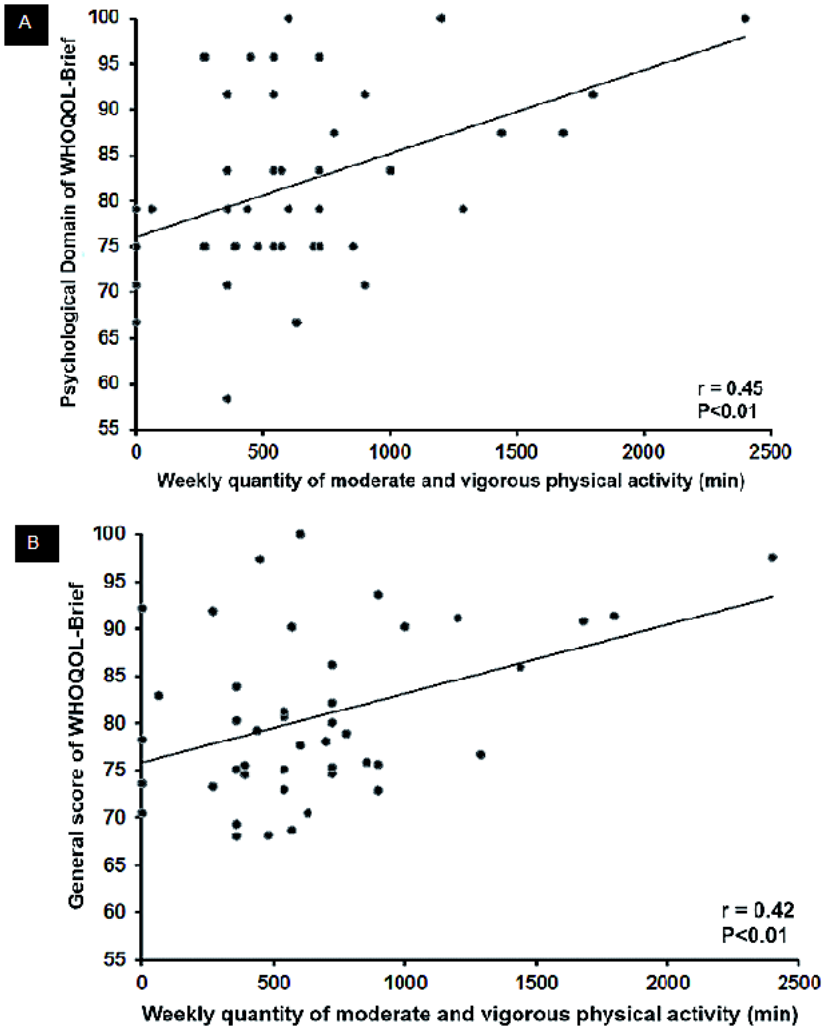
TABLE 1 - Judo practical history, level of physical activity and handgrip isometric strength, mean [CI 95%].

	Age groups			
	Group 1(n = 18)	**Group 2 (n = 13)**	**Group 3 (n = 13)**	**All (n = 44)**
Judo practice				
Years of training	27.9 [22-33]	35 [28-42]	25.1 [15-34]	29.1 [25-33]
Weekly frequency	3.5 [3-4]	3 [2.5-3.5]*	3.8 [3.3-4.5]	3.4 [3.1-3.7]
Duration of training (h)	1.9 [1.5-2.2]	2.5 [0.8-4.3]	1.99 [1.7-2.2]	2.1 [1.6-2.6]
Weekly PA (min)				
PA displacement	115 [25-205]	90 [43-224]	147 [27-323]	117 [49-186]
Moderate PA	292 [170-413]	196 [32-359]	261 [85-438]	254 [174-334]
Vigorous PA	425 [254-595]	415 [265-564]	373 [200-547]	407 [317-496]
MVPA	717 [457-977]	611 [342-881]	635 [327-942]	661 [513-810]
Sedentary life style	241 [165-317]	180 [99-260]	269 [174-364]	231 [156-276]
PHIS (kgf)				
Righ side	45.5 [42.3-48.6]	45.4 [41.5-49.3]	43.1 [35.5-50.6]	44.7 [42.4-47.3]
Left side	42.7 [40.3-45.1]	42.1 [38.8-45.5]	41.9 [34.6-49.3]	42.4 [39.9-44.6]
Sum	88.2 [82.9-93.5]	87.6 [80.7-94.4]	85.1 [70.3-99.8]	87.1 [82.3-91.9]

PA: physical activity; PHIS: pressure of handgrip isometric strength; * significant difference from group 3 (p = 0.04); MVPA: Moderate and vigorou physical activity.

TABLE 2 - Domains scores of quality of life analyzed by age group, mean and [CI 95%].

	Age groups			
	Group 1(n = 18)	**Group 2 (n = 13)**	**Group 3 (n = 13)**	**All**
Domains				
Physical	84.2 [78.9-89.4]	82.1 [74.9-89.2]	78.9 [71.1-86.8]	82 [78.5-85.5]
Psychological	80.3 [76.7-83.8]	83 [75.7-90.3]	83.8 [76.9-90.8]	82.14 [79.1-85.2]
Social	81.9 [74-89.9]	85.9 [79.6-92.3]	80.8 [71.3-90.4]	82.80 [78.4-87.2]
Environmental	77.8 [72.9-82.7]	73.2 [66.7-79.6]	75.5 [68.3-82.8]	75.77 [72.5-79.1]
General score	81.1 [76.8-85.4]	81 [76.7-85.3]	79.6 [73.2-86.1]	80.64 [77.9-83.3]



Panel A: Psychological Domain of WHOQOL-Brief.
Panel B: General score of WHOQOL-Brief.

FIGURE 1 - Correlation between weekly quantity of moderate and vigorous physical activity and quality of life in Judo master athletes.

Discussion

The aim of the present study was to verify the levels of physical activity and quality of life, as well as the PHIS of master Judo competitors. It is highlighted to main finds. The first is that there are no significant differences to the perception of quality of life and PHIS to the second age group. The second is regarding to the positive correlation between weekly quantity of moderate and vigorous physical activity and quality of life.

As the practice of physical exercise is preventive factor to chronic degenerative diseases and psychological[18], the incentive to the health promotion to middle age people, to improve physical fitness and quality of life is essential. This strategy can minimize aggravating factors from old age, decreasing posterior institutionalization[11]. In this sense, it has been proved that the physical exercise mitigates the limitations caused by age[19] and can be practiced in different modalities[20-21]. Moreover, the muscular endurance increase and there are many studies demonstrating that it contributes significantly to the decrease of falls in elderly[11].

The guidelines to physical activity indicates that elderly need practice 30 min of moderate physical activity during 5 days (150 min per week) or 20 min of vigorous physical activity during 3 days per week[21], which the combination moderate and vigorous can be performed to attend the guidelines. In the present study, the subjects performed 661 min

of moderate and vigorous physical activity weekly (approximately 94 min per day), suggesting that the studied population reaches the physical activity guidelines to health promotion.

It have bas been showed that physically active children become physically active adults[22]. Thus, the present data showed that individuals with 29 years of Judo practice showing that there was continuity along of the life. Probably its happened because Judo is not only combat sports modality, Judo is considered a philosophy of life[23-24], that can attract the participant even with the apparent limitations induce by age.

In the physical fitness related to health, the muscle strength has been identified as a protector factor, independently of the body mass index, physical activity level, aerobic capacity and muscle mass. Although the mechanisms are not totally elucidated, it is related to protein ingestion and decrease of physical function[25]. A cohort study of 24 years, studied approximately 800 subjects (65 years old or more) and produced curves of survival of Kaplan-Meier, adjusted by PHIS, with three different values: 1) lower than 41 kgf; 2) between 42 and 49 kgf (where the most of fighters are allocated); and 3) higher than 49 kgf, and identified that the PHIS can to predict the mortality by different causes as well as cardiovascular diseases and cancer, independently of body composition[9]. Additionally, it is known that elevated levels of strength are related to high subjective perception of quality of life in middle age subjects[8].

Among young Judo practitioners, the thoracolumbar strength is positively associated to personality characteristics and PHIS with associated aspects of tension / excitement / anxiety and self confidence[12]. Regarding the PHIS, study that investigated Brazilians black belt well trained and no trained people observed that the well trained subjects did not show significant difference to peak of strength (dominant hand 51.3 ± 8.15 kgf versus 52.5 ± 8.31 kgf, respectively); however, the fighters showed better results in the rate of fatigue test compared to untrained people (0.12 ± 008 au; 0.15 ± 0.08 ua, respectively)[7]. Possible, these differences are derived from Judo practice that used the application of strength continually which the individuals maintain long contact with Judogui (Clothing used to practice) and using strength to the domain and overbalance the opponent[3].

Among middle age subjects (50-59 years old), it was observed a manual pressure of 47.1 kgf to dominant hand while the non-dominant hand showed lower values 42.8 kgf[26]. It was also registered a decrease along of age, although it is not observed in the present investigation. Possible, the constant practice of the modality and the absence of difference in the Judo session duration contributed to this result.

In the study, the values of manual pressure strength are better compared to the Rebelatto et al.[11] study, showed similar values compared to Novaes et al.[26] and lower than Dias et al.[7] and Douris et al.[5], possible explained by the differences between studies and level of competition.

The study of relation between strength and quality of life is scarce[8, 10], and in the present study no significant correlations were observed. It is known, for instance, that studies that investigated untrained older person showed better performance in the PHIS test it is associated with superior scores of quality of life in two domains of SF-36, the physique function (OR = 2.37) and vitality (OR = 1.83)[10]. In Judo practitioners, higher values of thoracolumbar strength are positively related with personal characteristics, with conscience level ($r = 0.47$, $p < 0.05$), interpersonal positive relations ($r = 0.48$, $p < 0.05$) and self-confidence ($r = 0.45$, $p < 0.05$). The PHIS, is related with tension / excitement / anxiety ($r = 0.73$, $p < 0.01$) and self-confidence ($r = 0.6$ and $p < 0.05$)[12].

Regarding quality of life, recently the normative values of WHOQOL-Bref were presented[27]. Considering that the population of the present investigation is allocated between two age group proposed (30-44 years and 45-64 years), the physical domain presents respectively 57.9 ± 10,5 points and 59.2 ± 10.2 points, the psychological 62.5 ± 12.4 points and 63 ± 12.3 points, social relations 68.9 ± 21,7 points and 72.7 ± 17.3 points and ending the domain of environment 59.7 ± 15.1 points to the group between 30-44 years and of 62.2 ± 15.9 points to people between 45 and 64 years[27]. The data of the present study are higher compared to all these results and higher compared to Brust[28], that analyzed the level of quality of life in the physical exercise practitioners (45-59 years old). Additionally, among these people, it was observed significant differences between physical domain and social, in the others domains, although without significant different, it is noted a decrease of quality of life in the higher age group, 55-59 years old.

Draxler et al.[13] related that the German society has been used the physical exercise practice as prevention to decrease health costs. As very defunded activity at Germany, the martial arts (Judo, karate, jujutsu, taekwondo, ESDO and

kendo or wing-tsun) were investigated in the perspective of quality of life. It was demonstrated that practitioners of martial arts presents many beneficial to health and quality of life higher than compared to general population, with highlight to domains related to physical function and psychological aspects. In this context, the positive relation between physical activity and quality of life has been registered from different perspectives[29-30]. Among elderly adults, it was observed that elevated quantity of physical activity is positively correlated with the physical function domain of quality of life[10]. Corroborating, positive correlations between moderate and vigorous physical activity and quality of life were found in the present study. Possible, the correlation was found due to the satisfaction of the individuals with their capacity of perform activities and physical well star feeling proportionate for the modality practice.

Moreover, it is pointed that the major of the studies that showed similar results with elderly, health adults or sick people, were carried out in underdeveloped countries[31]. Thus, the present investigation it is characterized as pioneer.

However, there are some limitations in the present study that need be clarified as well as the small sample and limited number of evaluations. In this sense, it is suggested more studies to investigate the influences of modalities of fights, include not competitive modalities.

In conclusion, the master Judo competitors of the resent study showed higher values of physical activity compared to the populational recommendations. Regarding PHIS, there is no difference between age group and it was registered optimum levels compared to elderly and physically active people, but lower compared to young athletes and higher competitive levels. To the quality of life, it was showed values relatively higher compared to others studies, with difference between age groups. The psychological domain and the general score of quality of life related to the health of these judokas are positively correlated with quantity of moderate a vigorous physical activity performed weekly.

Resumo

Força de preensão manual, nível de atividade física e qualidade de vida de competidores máster de judô

O objetivo do presente estudo foi avaliar e testar a correlação entre força isométrica de preensão manual (FIPM), nível de atividade física (AF) e qualidade de vida (QV) de competidores máster de judô. A amostra foi composta por 44 homens (45 a 64 anos), participantes do Campeonato Panamericano Master de Judô de 2011. Para avaliar a força manual, utilizou-se teste de força isométrica de preensão manual. Empregaram-se os questionários WHOQOL-Breve e Questionário de Atividade Física Global (GPAQ). Na análise estatística, após a verificação da normalidade na distribuição dos dados, os mesmos são apresentados com média [Intervalo de confiança 95%]. Na comparação entre grupos etários, foi conduzida análise de variância (ANOVA), com pos-hoc de Tukey. Para correlações bivariadas, empregou-se o teste de Pearson. Os competidores de judô demonstraram: 1) quantidade elevada de AF (661 [513-810] min de AF moderada a vigorosa) quando se consideram as recomendações populacionais; 2) FIPM com valores moderados (soma bilateral de 87,1 [82,3-91,9] kgf) comparados com pessoas fisicamente ativas e idosos; e 3) escores de QV superiores aos registrados em outros estudos. Adicionalmente, destacam-se dois principais achados, ausência de diferenças significantes para percepção subjetiva de QV e de FIPM segundo grupos etários e correlação positiva entre quantidade semanal de AF moderada a vigorosa e escores de QV.

Palavras-chave: Atividade motora; Artes marciais; Contração muscular; Estilo de vida.

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ADRESS
Martaliz Dimare
Escola Superior de Educação Física
Universidade Federal de Pelotas
R. Luiz de Camões, 625
96055-630 - Pelotas - RS - BRASIL
e-mail: martalizdimare@yahoo.com.br

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