98 - ANALYSIS OF THE DEVELOPMENT OF FORCE IN PRACTICING IN JUDO PREPUBERTAL AND PUBERTAL

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INTRODUCTION

The Judo practice began in 1882 in Japan, founded by Professor Jigoro Kano, with the ultimate origin the Tenjin Shinyo Ryu and Kito-ryu styles of classical jujutsu. The name comes from Judo congruence of terms, "Ju" meaning soft and "Do" means way, translating as Soft Way (KODOKAN, 2013).

Even with the changes made by Jigoro Kano in order to transform the martial art in a non-violent sport, its basic principle is direct contact, body-to-body, which requires the practitioner great physical and mental vigor, whether at championship or for those who seek self-realization (BERTO & RUFFONI, 2009).

The athletic success of this method depends on a high level technical and tactical, based on aerobic capacity, anaerobic power and capacity, flexibility and strength (Little, 1991), especially in the upper limbs (FRANCHINI, 2010). According to Beaton (apud FRANCHINI, 2010), potency is characterized as the integration between strength and speed needed in times of input coup in competition.

However, by committing to results of sporting performance should be mindful of the age characteristics of these athletes as early specialization can cause further damage to the motor repertoire (GALLAHUE, 1987; TANI ET AL., 1988; WEINECK, 2001) as well as physiological damage (Takito et al. 1996) and psychological (Freitas, 1989) to the individual.

Despite the increased popularity of this sport leading to the growth of the practice in various age groups, most practitioners start their learning even during middle childhood (7 to 10/11 years) (Castropil, 1996). At this stage the training overhead can result in a domination of metabolism at the expense of functional metabolism plastic, creating disturbances in the development of the child's organism, and therefore a reduced tolerance to stimuli (WEINECK, 2001).

In judo, especially learning and training are most effective and appropriate only after puberty, because in this period the individual already possesses able to learn some more specific aspects of technical and tactical mode (FRANCHINI, 2010). Rowland (2008) defines puberty as a "succession of anatomical and physiological changes in early adolescence that marks the transition from the non-sexual state ripe for the full fertility." According Weineck (2001) this period is for girls between 12 and 13 years and for boys between 13 and 15 years, with its beginnings in the prepubertal period from 11/12 years.

At this stage the hypothalamic -pituitary - gonadal has intensified its action by increasing the secretion of sex hormones and thus causing marked physiological changes in the individual. In men these changes generated by increased blood levels of testosterone led to the development of sexual function and also the development of the somatic characteristics, particularly increased muscle mass and decreased linear growth (Rowland, 2008) .

Despite efforts to identify the element activator mechanism of puberty in humans, Brook (apud ROWLAND, 2008) states that "the simple truth is that we have no idea how puberty is triggered." However, even without the trigger deeply understand this phenomenon, it is extremely important to understand well its effects, especially with regard to physical activity.

Thus, the aim of this study is to analyze the development of strength in judo male residents in the west of the city of Rio de Janeiro, in prepubertal and pubertal.

METHODOLOGY

We conducted a cross-sectional study ex post facto and descriptive evaluated the body mass index (BMI) and the strength of lower limbs (LL), upper (UL) and abdomen (ABD) 64 judo male, with at least six months of practice, divided into two groups: Pre-puberty (PP), boys born in 2003, 2002, 2001 (10-12 years), and pubescent (PU), boys born in 2000, 1999 and 1998 (13 to 15 years) (ROWLAND, 2008; WEINECK, 2001). In addition, individuals tested were residents of the western city of Rio de Janeiro and trained at least twice a week, lasting at least an hour each session.

In order to better prepare the assessors and standardize data collection instruments, a pilot test was conducted with the participation of athletes of this age and all the researchers responsible for conducting the tests. In addition, all raters received a booklet containing the procedure for evaluation and testing, with every description of the protocol, and a results sheet for recording the same (Appendix 1).

The tests were conducted in various associations of the area west of the city, always at the end of practice and using own training area. For use of space and body athletes, was previously sent a cover letter (Appendix 2) to the head of each guild, requesting permission. With regard to testing and publication of the results was requested to charge each athlete to complete a consent form (Appendix 3).

In order to calculate the BMI of athletes was performed anthropometric measurements of height and weight to each individual, using a scale model Filizola precisely 100 grams , and a stadiometer Sany, scaled by 0.5 centimeters. Were used as a criterion of the study excluding any pathological factor that can alter the performance of athletes during the tests, such as muscular disease, or chronic metabolic, plus practice time judo less than six months and intent of non- cooperation with the study procedures.

To evaluate the strength of each group of athletes we used the following tests: Horizontal Impulse (explosive strength of the lower limbs); Throwing Medicineball test (upper limb explosive strength); Abdominal Strength Test (Strength Weathered abdomen). All tests are part of the tests proposed by Gaya (2004) Sport Brazil project, filed and appropriate at this age.

Results are expressed as mean (), standard deviation (s) and minimum and maximum values, using the t test to calculate the significance of the data between the groups pre-puberty (PP) and pubertal (PU) pre-defined, er Pearson to calculate the significance between variables BMI and lower limb strength of the PU group, having adopted significance level $p < 0.05$.

ANALYSIS AND DISCUSSION OF RESULTS

Table 1: Mean (), standard deviation (s) and minimum and maximum values of BMI groups PP and PU ($p > 0.05$)

BODY MASS INDEX (BMI)		
	Prepubertal (10 to 12 years)	Pubertal (13 to 15 years)
n	28	36
$\bar{x}$	17	22
s	2,18	3,76
Minimum	15	17
Maximum	23	32

On Table 1 we observed significant growth in BMI according to the transition between the two phases . It is believed that this is because of the resulting increase in muscle mass, which can vary 27-40 % in this period (ISRAEL & BUHL, 2001) , caused by increasing serum testosterone level after the first pubertal phase (Hansen et al, 2000, WEINECK, 2001) . According Weineck (1991) the variables that make up the BMI, weight and height , arouse great interest among professionals working with elite sport , as there is a clear association between these values and sports performance .

In a comparative study done by Schneider & Meyer (2005) among swimmers also phases PP and PU with a mean age of 09.0 ± 0.7 and 13.6 ± 1.2 respectively, were also found large differences between the two anthropometric groups, particularly with respect to IMC. In addition to the average increase in this index (PP = 18.3 ± 2.5 PU = 19.6 ± 1.6), was also found in the same study, a higher percentage of fat in the PP group and highest value of arm circumference and thigh the PU. Similar results were also found in other studies involving volleyball players (Schneider et al., 2005), non-athlete children (Schneider et al., 2002) and soccer players (VILLAR & DENADAI , 2001), which supports the hypothesized that increased BMI is characteristic between maturational stages and is related to muscle mass .

Note that the gain in muscle mass during PU could be hidden in BMI by losing fat percentage also present at this stage, which would equal the results. However, it is expected that the percentage of fat in athletes, even in the PP phase are not high, and the mass gains in the group of athletes more pronounced PU (Schneider & Meyer, 2005).

In Tables 2 and 3 below, we can see the relationship between the phases PP and PU, BMI, and increased rates of force in two of the three variables presented, with the only Horizontal Thrust to provide lower rates.

Table 2: Average ( ), standard deviation (s) and minimum and maximum values of BMI and the force on each body segment of athletes during pre -puberty (10-12 years)

	BMI	Lower Limbs (cm)	Upper Limb (cm)	abdomen (repet.)
n	28	28	28	28
$\bar{x}$	17	201	285	42
s	2,18	0,45	0,29	9,40
Minimum	15	145	236	27
Maximum	23	271	315	56

Table 3: Mean (), standard deviation (s) and minimum and maximum values of BMI and the force on each body segment of the athletes in the pubertal stage (13-15 years)

	BMI	Lower Limbs (cm)	Upper Limb (cm)	abdomen (repet.)
n	36	36	36	36
$\bar{x}$	22	187	369	49
s	3,76	0,29	0,75	8,82
Minimum	17	123	222	36
Maximum	32	248	494	65

Increases in levels of strength in the upper limbs and abdomen are easily explained by the increase in muscle mass and an improvement in muscular capacity under anaerobic conditions. Children at PP do not yet have your anaerobic lactic system fully formed having a reduced glycolytic capacity, especially with regard to strenuous activities lasting up to about 60 seconds, as is the case of Abdominal Strength Test (WEINECK, 2001; SILVA 2010).

However, the gain in strength in the upper limbs and abdomen were not accompanied by corresponding gain strength in the lower limbs, which led to lower results in this segment in PU phase. Suppose by association that this effect is due to the observed increase in BMI, which would impair the performance in the long jump. This correlation is displayed in the chart below.

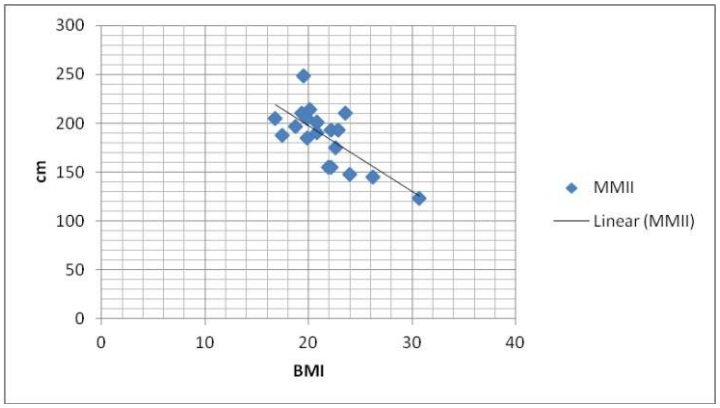

Figure 1 - Correlation between the test result and the horizontal thrust BMI of athletes during PU (r = -0.71)

Furthermore, the considerable difference in the results of the gain in strength between upper and lower limbs would be the specific characteristics of the practice of judo, where there is a much higher request of SLM in training and the fight (Thomas et al., 1989).

Following this conjecture , Franchini (2010) in his book "Judo: Competitive Performance", conducted a literature review and documentary comparing results with many judokas in Wingate tests, noting that the average results achieved by high performance athletes in power test in upper limbs than the average observed in the lower limbs in healthy non- athletes .

FINAL CONSIDERATIONS

Based on the results obtained we can see that there is significant variation in the rates of strength in judo male between phases PP and PU, plus relevant morphological transformation in the individual.

The anthropometric measurements of height and weight used to calculate BMI, found increased between phases in this index, which can also be observed in several other studies in this age group. It was observed that this effect stems from the muscle growth caused by the increase in serum testosterone levels characteristic of this period.

Strength tests showed a sharp gain in the upper limbs, followed by a less significant gain in the abdomen and lower limbs. The gain in strength between phases PP and PU are real and derive the increase in muscle mass and improves anaerobic lactic capacity, because the PP phase the body still can not metabolize pyruvate, limiting his ability in activities of high intensity and short duration.

It is believed the data for the inverse correlation found that the decrease in the strength test results for lower limb is related to an increase in BMI as the horizontal thrust test, the weight increase would damage the assessed. Moreover, the main advantage of increasing BMI in this period, it would gain muscle mass seems to have been concentrated in the upper limbs, which is characteristic of the practitioners of this sport.

Finally the study proved relevant to the point that, through this, we can diagnose the specific characteristics of judo athletes in the transition period between the PU and PP phases, such as the sharp rise in BMI and increased strength concentrated in upper limbs .

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ANALYSIS OF THE DEVELOPMENT OF FORCE IN PRACTICING IN JUDO PREPUBERTAL AND PUBERTAL

ABSTRACT

The Judo is a sport commonly starts in childhood and often accompanies the person throughout maturational period. The aim of this study is to analyze the development of strength in judo male residents in the western city of Rio de Janeiro, aged 10-15 years. Therefore, we performed a cross-sectional and descriptive ex post facto that assessed the body mass index (BMI) and the strength of lower limbs (LL), upper (UL) and abdomen (ABD) 64 judo male at least six months of practice, divided into two groups: Pre-puberty (PP), 10-12 years, and pubescent (PU), from 13 to 15 years. In BMI was observed a significant increase

between phases as well as a sharp gain strength in the upper limbs, followed by a gain less significant in ABD and a loss of strength in lower limbs. The gain in strength between phases PP and PU are real and derive the increase in muscle mass and improves anaerobic lactic capacity. However, the decrease in strength of the lower limbs found in the study is inversely related to the increase in BMI, because the gain in muscle mass and strength athletes in this sport are considerably larger in the upper limbs. Thus, we can diagnose in the present study the specific characteristics of judo athletes in the transition period between phases PP and PU.

KEYWORDS: Judo, Strenght, Pre-pubertal, Pubertal.

ANALYSE DE DEVELOPPEMENT DE LA FORCE DES PRATICIENS DE JUDO ÉTAPES PRÉPUBERTAIRE ET PUBERTAIRE

RÉSUMÉ

Le judo est un sport commence habituellement dans l'enfance et accompagne souvent votre médecin tout au long de la période de maturation . Le but de cette étude est d'analyser le développement de la résistance chez les résidents masculins de judo dans la ville occidentale de Rio de Janeiro , dans le groupe d'âge 10-15 ans . Par conséquent , nous avons effectué une étude transversale descriptive et ex post facto qui a évalué l'indice de masse corporelle (IMC) et la force des membres inférieurs (LL) , supérieur (UL) et de l'abdomen (ABD) 64 judo masculin au moins six mois de pratique , divisés en deux groupes: les pré-puberté (PP) , 10-12 ans , et pubescent (PU), 13-15 ans . Dans l'IMC a été observé une augmentation significative entre les phases ainsi que d'une force de gain forte dans les membres supérieurs , suivie par un gain moins important dans ABD et une perte de force dans les membres inférieurs. Le gain de résistance entre phases PP et PU sont réels et d'en déduire l'augmentation de la masse musculaire et améliore la capacité anaérobie lactique . Cependant, la diminution de la force des membres inférieurs trouvés dans l'étude est inversement proportionnelle à l'augmentation de l'IMC , car le gain de masse musculaire et les athlètes de force dans ce sport sont beaucoup plus important dans les membres supérieurs. Ainsi, nous pouvons diagnostiquer dans la présente étude les caractéristiques spécifiques des athlètes de judo dans la période de transition entre les phases PP et PU.

MOTS-CLÉS: Judo, Force, Prépubertaire, Pubertaire.

ANÁLISIS DEL DESARROLLO DE LA FUERZA DE LOS PROFESIONALES EN JUDO ETAPAS PREPUBERAL Y PUBERAL

RESUMEN

El judo es un deporte comúnmente comienza en la infancia y suele acompañar a su médico durante todo el período de maduración . El objetivo de este estudio es analizar el desarrollo de la fuerza en los residentes masculinos de judo en la occidental ciudad de Rio de Janeiro , en el grupo de edad de 10-15 años . Por lo tanto , se realizó un estudio transversal y descriptivo ex post facto que evaluó el índice de masa corporal (IMC) y la fuerza de los miembros inferiores (LL) , superior (UL) y abdomen (ABD) 64 judo masculino al menos seis meses de práctica , divididos en dos grupos: pre - pubertad (PP) , 10 a 12 años , y pubescentes (PU), 13 a 15 años . En IMC se observó un aumento significativo entre las fases , así como una resistencia a la ganancia aguda en las extremidades superiores , seguido por una ganancia menos significativa en ABD y una pérdida de fuerza en las extremidades inferiores . El aumento de la resistencia entre fases PP y PU son reales y derivar el aumento de la masa muscular y mejora la capacidad anaeróbica láctica. Sin embargo, la disminución de la fuerza de los miembros inferiores que se encuentran en el estudio está inversamente relacionada con el aumento de índice de masa corporal , debido a que el aumento de la masa muscular y atletas de fuerza en este deporte son considerablemente más grandes en los miembros superiores. Por lo tanto, podemos diagnosticar en el presente estudio las características específicas de los atletas de judo en el período de transición entre las fases de PP y PU.

PALABRAS CLAVE: Judo, Fuerza, Pre-puberal, Pubertad.

ANÁLISE DO DESENVOLVIMENTO DA FORÇA EM PRATICANTES DE JUDÔ NAS FASES PRÉ-PUBERE E PÚBERE

RESUMO

O judô é uma modalidade esportiva comumente iniciada na infância e que muitas vezes acompanha seu praticante durante todo período maturacional. O objetivo do presente estudo é analisar o desenvolvimento da força em praticantes de judô do sexo masculino, residentes na zona oeste do município do Rio de Janeiro, na faixa etária de 10 a 15 anos. Sendo assim, foi realizado um estudo transversal ex post facto e descritivo que avaliou o índice de massa corporal (IMC) e a força de membros inferiores (MMII), superiores (MMSS) e abdômen (ABD) de 64 atletas de judô do sexo masculino, com no mínimo seis meses de prática, divididos em dois grupos: Pré-púbere (PP), de 10 a 12 anos; e Púbere (PU), de 13 a 15 anos. No IMC foi observado um aumento significativo entre as fases assim como um acentuado ganho de força nos MMSS, seguido de um ganho menos expressivo no ABD e uma perda de força nos MMII. O ganho de força entre as fases PP e PU são reais e derivam do aumento na massa muscular e da melhora na capacidade anaeróbia lática. Porém a diminuição na força de MMII encontrada no estudo está inversamente relacionada ao aumento no IMC, pois o ganho de massa muscular e de força nos atletas dessa modalidade são consideravelmente maiores nos MMSS. Sendo assim, podemos diagnosticar através do presente estudo as características específicas dos atletas de judô no período de transição entre as fases PP e PU.

PALAVRAS-CHAVE: Judô, Força, Pré-pubere, Púbere.