27 - CORRELATION BETWEEN THE TEST OF 1 MR AND THE EQUATIONS OF MAXIMUM LOAD PREDICTION OF EPLEY AND O'CONNER WITH MEN BETWEEN 20 AND 25 YEARS.

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Introduction

The search increase for weightlifting modality in academies and clubs determines a huge control necessity of the training load intensity for a better result attainment as for the security of the practitioner (PEREIRA & GOMES, 2003; FLECK & KRAEMER, 1999). It's recommended that weightlifting becomes part of a routine of trainings for adult people (ACMS, 1998) and aged (ACMS, 1998). It is indicated that in the assembly of training it has an eight to ten sequence of exercises for the main muscular groups, with a frequency of two or three times per week. In each exercise from eight to twelve repetitions must be carried through, for third age people are recommended from ten to fifteen repetitions (ACMS, 1998).

The more used test for the determination of the maximum load is the test of a maximum repetition, that can be defined as the biggest load that the individual is capable to carry through only one correct form repetition (PEREIRA & GOMES, 2003), however for being a little operational test, and with a risk of injury for the tested individual, which is little evidenced (SHAW et al, 1995; ADAMS et al, 2000; FAIGENBAUM et al, 2003), the test is hardly used in the academies and clubs, therefore most of the time the loads for this public are determined of subjective form, being able to occur super or a underestimation of real load for the individual.

Many studies had been carried through in intention to validate equations that predict the value of a maximum repetition (ALTORFER et al, 1997; DOHONEY et al, 2002; PLOUTZ-SNYDER & GIAMIS, 2001). Even with this great amount of studies, we still don't have enough results to affirm the efficiency of them for beginning or experienced individuals that work-out in weightlifting rooms.

In scientific research in which it makes necessary the knowledge of the possible maximum load next to the Real, as much to know the state before and after trainings as well as for lapsing the training, then the application of the test of a maximum repetition takes place, however the problem still persists when the research is made with an aged public, becoming still more necessary another mechanism that is more operational for the determination of the maximum load of an individual.

The present work had as main objective compare the results of maximum load in elbows flexion, known exercise as thread biceps, in the test of a maximum repetition, in the maximum load tests considered by Epley and O' Conner, intending to verify which of the equations could be used to determine the load of training without the use of the test of maximum repetition.

Methodology

The sample is composed of eighteen people, all of the masculine gender with age varying between 20 and 25 (23,17±1,65), the inclusion criteria were having at least six months of practical strength training and being physically active (more than two times per week). The sample after being clarified of the procedures of the tests had signed an assent term, had been also informed that the participation of them in the study was voluntary being able the same ones to give up at any time, law 196/96. The present study deals with a descriptive research, of experimental character, and transversal boarding, also considered correlational, therefore it searches the degree of relation between the selected 0 variable (THOMAS & NELSON, 2002).

The initial test consisted on 1 MR, after the familiarization and the warming up, was used the principle of the descending load. The attempts had been carried through from a load more raised until a load where the movement was carried through in all its amplitude (BROWN & WEIR, 2001). The chosen exercise was the cubit flexion, after the knowledge of the maximum voluntary load the volunteer was submitted to the test for maximum repetition (EPLEY, 1995; ' CONNER, 1989).

With the objective to create a standardization in the application of the tests, one brief communication regarding the execution speed and amplitude was done, also a warming up with 50% of the initial load of the test, with intention to prevent the appearance of injuries and the familiarization with the adopted standards carried through.

The material used for the accomplishment of the tests had been weights of Physicus and a bar of the same manufacturer, the bar had 90 cm and weighed 6 kg. To guarantee the uniformity and precision of the weight of the used material, the same was weighted in a Filizola scale with a precision of 100 grams. All this material belonged to Corpore Academy, place where the tests had been developed and where the sample was selected.

The selected variables for the study had been the loads obtained the test of 1 maximum repetition, the used load and the repetitions in the test for repetition, age of the participants and time of practical in the modality used in the research.

The statistical treatment was carried through from the creation of a data base in Excel for Windows version 2003, after that test "t" Student for paired data was applied with significance of 95% , also was analyzed the "r" of Pearson in the correlations.

Results

On table 1 the average, shunting line standard, minimum and maximum of loads gotten in the test of 1 RM and the test for repetition can be observed.

Table 1
Load test values for 1 MR and by repetition

	1 MR	By Repetition
Average	42,67	34,13
Shunting line Standard	5,09	4,07
Minimum	34	27
Maximum	50	40

On table 2 the statistical treatment is observed, in which was applied test "t" Student and the "r" of Pearson, among the maximum load test, test of Epley and the test of O'Conner.

Tests	"r" of Pearson	Test "t"
1 MR/Epley	0,98	0,59
1 MR/O'Conner	0,99	0,41

On table 3 the "r" of Pearson and test "t" Student are demonstrated within the test of Epley and the O'Conner.

Tests	"r" of Pearson	Test "t"
Epley/O'Conner	0,99	0,18

Discussion

Corroborating with carried through studies for validation of equations of load prediction for a maximum repetition, it did not have statistical significant difference and one high correlation among the found values in the test of 1 maximum repetition and the values reached in the equation of Epley, what still fortifies the use of this equation for beginners, in places where the individuals carry through non-athletic training, searching for one better quality of life, or any another related benefit the health (CUMMINGS & FINN, 1998; PEREIRA & GOMES, 2003).

However even with results presented in studies giving account that is possible the usage of prediction equations of 1 maximum repetition, others researches of crossed validation had presented results that super or underestimate the values of maximum load, having as justification for this the specificities, considering the sample, the exercise itself, and the form of execution (LESUER et al, 1997; WARE et al, 1995; MAYHEW et al, 1995).

However works published with the equation of Epley, had been carried through with different samples, different exercises and with different speeds of execution and in the majority of them the validation was reached, with high correlations and statistical insignificant differences, evidencing the results founds for the present sample.

In relation to the results gotten with the equation of O'Conner it had, as well as in the other equation of this study, reached high correlation and a statistical insignificant difference in comparison to the test of 1 maximum repetition, thus being evidenced the possibility of the use of this resource for maximum voluntary load prediction for lapsing exercises of weightlifting for beginners, contradicting studies published with this equation (LESUER et al, 1997; MAYHEW et al, 1995).

However, published data demonstrate a super or a underestimation of loads predicted in this equation, even in research with similar samples to this study, and what can justify these results are the used exercises or the form of execution of the same ones, in view that among these studies does not have a standardization concerning to the respect of these aspects, making it difficult to compare the results among the research.

Although this, for this sample was evidenced that the use of this equation of prediction, is sufficiently trustworthy to the results that had been found with the use of a test of 1 maximum repetition, what is very useful for day-by-day of physical teacher inside the weightlifting room, considering the associated risks to the application of a maximum load test for a public of beginners.

Making an analysis among the data of the equation of Epley and the equation of O'Conner, found in the present study also observed that, even though the published research demonstrate that among the two equations only Epley's is cited as efficient to decide what is considered, with this sample statistical significant difference wasn't observed, also one high correlation, what it can be explained by the homogeneity of the participants of the sample, in what it says respect to the familiarization of the considered exercise and time of practical.

Conclusion

The data of this study demonstrated that the equations of Epley and O'Conner for this population can be used with intention to predict the maximum voluntary load, however become necessary more studies with a bigger sample and other exercises searching to find results that corroborate with the joined ones in this research.

References

O'CONNER BJ, SIMMONS J, O'SHEA P. Weight training today. St Paul, MN: West Publishing, 1989;26-33

EPLEY B. Poundage chart. Boyd Epley workout. Lincoln, NE, 1995.

LESUER DA, McCORMICK JH, MAYHEW JL, WASSERSTEIN RL, ARNOLD MD. The accuracy of prediction equations for estimating 1-RM performance in the bench press, squat and deadlift. J Strength Cond Res 1997;11: 211-3.

BROWN, L.E.; WEIR, J.P. ASEP procedures recomendations I: accurate assessment of muscle strength and power. Journal of Exercise Physiologyonline, v.4, p.1-21, 2001.

AMERICAN COLLEGE OF SPORTS MEDICINE. Position Stand: The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. Med Sci Sports Exerc 1998;30:975-91.

AMERICAN COLLEGE OF SPORTS MEDICINE. Position Stand: Exercise and physical activity for older adults. Med Sci Sports Exerc 1998;30:992-1008.

FLECK SJ, KRAEMER WJ. Fundamentos do treinamento de força muscular. 1999; 2a ed. Porto Alegre: Artmed.

ALTORFER GL, ABADIE BR, SCHULER PB. Does a regression equation to predict maximal strength in novice lifters, remain valid when the subjects are technique trained? Med Sci Sports Exerc. 1997 28:S8.

DOHONEY P, CHROMIAK JA, LEMIRE D, ABADIE BR, KOVACS C. Prediction of one repetition maximum (1-RM) strength from a 4-6 RM and a 7-10 RM submaximal strength test in healthy young adult males. J Exerc Phys [periódico on line] 2002 Vol. 5 n. 3. Disponível em: http://www.css.edu/users/tboone2/asep/fldr/fldr.htm. Acesso em 23.08.2006

PLOUTZ-SNYDER LL, GIAMIS EL. Orientation and familiarization to 1-RM strength testing in old and young women. J Strength and Conditioning Research 2001; 15(4): 519-523.

THOMAS JR. Métodos de pesquisa em atividade física / Jerry R. Thomas e Jack K. Nelson; trad. Ricardo Peterson ... [et al.].- 3 ed. - Porto Alegre: Artmed, 2002.

SHAW CE, MCCULLY KK, POSNER JD. Injuries during the one repetition maximum assessment in the elderly. J Cardiopulm Rehabil 1995; 15:283-7.

ADAMS KJ, SWANK AM, BARNARD KL, BERNING JM, SEVENE-ADAMS PG. Safety of maximal power, strength, and endurance testing in older African American women. J Strength Cond Res 2000;13:254-60.

FAIGENBAUM AD, MILLIKEN LA, WESTCOTT WL. Maximal strength testing in healthy children. J Strength Cond Res 2003;17:162-6.

MAYHEW JL, PRINSTER JL, WARE JS, ZIMMER DL, ARABAS JR, BEMBEN MG. Muscular endurance repetitions to predict bench press strength in men of different training levels. J Sports Med Phys Fitness 1995;35:108-13.

WARE JS, CLEMENS CT, MAYHEW JL, JOHNSTON TJ. Muscular endurance repetitions to predict bench press and squat strength in college football players. J Strength Cond Res 1995;9:99-103.
CUMMINGS B, FINN KJ. Estimation of a one repetition maximum bench press for untrained women. J Strength Cond Res 1998;12:262-5.

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CORRELATION BETWEEN THE TEST OF 1 MR AND THE EQUATIONS OF MAXIMUM LOAD PREDICTION OF EPLEY AND O'CONNER WITH MEN BETWEEN 20 AND 25 YEARS.

ABSTRACT

The objective of this study was to correlate the found values of maximum load in the test of 1 Maximum Repetition (1 MR), and the equations of Epley and O'Conner. Eighteen men aging between 20 and 25 years practicing weightlifting for at least six months participated the research. Two tests, one of 1 maximum repetition, and other of maximum repetitions had been carried through, within an interval of 48 hours between the tests. In the values of loads found in the test of maximum repetition the equations of Epley and O'Conner's had been applied, the estimate of maximum load was found, was applied a "t" student test for p=0,05, to determine if there was statistical difference among the values of the estimate equations and the test of 1 MR, was also calculated the "r" of Pearson correlation of those samples. These same calculations had been made between the two equations. The results had demonstrated that between the equation of Epley and 1 MR there wasn't significant statistical difference (0,59) and one high correlation (0,98), the same happening between O'Conner and 1 MR (0.41 and "r" of 0,99), comparing the values of the equations also did not have statistical significant difference (0,18) and one high correlation (0,99). The conclusion for this group is that whether the 1 RM test or any one of the studied equations could be used.

Key Words: maximum strength, 1 MR, maximum load prediction

CORRÉLATION ENTRE L'ESSAI DE 1 RM ET LES ÉQUATIONS DE PRÉVISION DE CHARGEMENT MAXIMUM D'EPLEY ET' CONNER AVEC DES HOMMES ENTRE 20 ET 25 ANS.

RÉSUMÉ

L'objectif de cette étude a été corréler les valeurs de chargement maximum trouvées dans l'essai de 1 Répétition Maxima (1 RM), et dans les équations d'Epley et le' Conner. Ont participé de la recherche dix-huit hommes avec âge entre 20 et 25 ans pratiquants de musculação pour le moins six mois. Ont été réalisés deux essais, une de 1 répétition maxima, et autre de répétitions maximum, pour cela est donnés un intervalle de 48 heures entre les essais. Nous des valeurs des chargements trouvés dans l'essai de répétition maxima ont été appliquées les équations d'Epley et ce du' Conner, trouvé l'estimation de chargement maximum, a été appliquée l'essai « t » student pour p=0,05, pour déterminer a différence statistique entre les valeurs des équations d'estimation et l'essai de 1 RM, aussi a été calculé la corrélation entre les mêmes à travers le « r » de Pearson. Ces mêmes calculs ont été faits entre les deux équations. Les résultats obtenus ont démontré qu'entre l'équation de d'Epley et 1 RM il n'a pas y eu différence statistiquement significative (0.59) et une haute corrélation (0.98), le même en arrivant entre le' Conner et 1 RM (0.41 et « r » de 0.99), en comparant les valeurs des équations aussi n'a pas eu différence statistiquement significative (0.18) et une haute corrélation (0.99). Il se conclut que pour ce groupe tant peut être utilisée l'essai de 1 RM que quiconque une des équations étudiées.

Mots - clé : Force maxima, 1 RM, prévision de chargement maximum.

CORRELACIÓN ENTRE la PRUEBA de 1 RM Y las ECUACIONES de PREVISIÓN de CARGAMENTO MÁXIMAS de EPLEY ET' CONNER CON HOMBRES ENTRE 20 Y 25 AÑOS.

RESUMEN

El objetivo de este estudio fue correlacionar los valores de cargamento máximos encontrados en la prueba de 1 Repetición Máximos (1 RM), y en las ecuaciones de Epley y le' Conner. Participaron de la investigación dieciocho hombres con edad entre 20 y 25 años que practicaban de musculação por lo menos seis meses. Se han realizado dos pruebas, una de 1 repetición máximos, y se dan demás de repeticiones máximas, para eso un intervalo de 48 horas entre las pruebas. Se nos aplicó de los valores de los cargamentos encontrados en la prueba de repetición máximos las ecuaciones de Epley y se aplicó esto du' Conner, encontrado la estimación de cargamento máxima, la prueba "t" student para p=0,05, para determinar tiene diferencia estadística entre los valores de las ecuaciones de estimación y la prueba de 1 RM, por eso se calculó la correlación entre el mismos a través del "r" de Pearson. Estos mismos cálculos se hicieron entre las dos ecuaciones. Los resultados obtenidos demostraron que entre la ecuación de Epley y 1 RM no hay diferencia estadísticamente significativa (0.59) y una alta correlación (0.98), el mismo llegando entre le' Conner y 1 RM (0.41 y "r" de 0.99), comparando los valores de las ecuaciones también no tuvieron diferencia estadísticamente significativa (0.18) y una alta correlación (0.99). Se concluye que para este grupo puede tanto utilizarse la prueba de 1 RM como cualquiera una de las ecuaciones estudiadas.

Palabras clave: Fuerza máximos, 1 RM, previsión de cargamento máxima.

CORRELAÇÃO ENTRE O TESTE DE 1 RM E AS EQUAÇÕES DE PREDIÇÃO DE CARGA MÁXIMA DE EPLEY E O'CONNER COM HOMENS ENTRE 20 E 25 ANOS.

Resumo

O objetivo deste estudo foi correlacionar os valores de carga máxima encontrados no teste de 1 Repetição Máxima (1 RM) e nas equações de Epley e O'Conner. Participaram da pesquisa dezoito homens com idade entre 20 e 25 anos, praticantes de musculação a pelo menos seis meses. Foram realizados dois testes, um de 1 repetição máxima e outro no qual foi utilizada uma carga suficiente para realizar mais de uma repetição até a falha concêntrica, para isso foi dado um intervalo de 48 horas entre os testes. Nos valores das cargas encontradas no teste de repetição máxima, foram aplicadas as equações de Epley e a de O'Conner. Encontrada a estimativa de carga máxima, foi aplicado o teste "t" student para p=0,05, para determinar se havia diferença estatística entre os valores das equações de estimativa e o teste de 1 RM, também foi calculada a correlação entre os mesmos através do "r" de Pearson. Estes mesmos cálculos foram feitos entre as duas equações. Os resultados obtidos demonstraram que entre a equação de Epley e 1 RM não houve diferença estatisticamente significativa (0,59) e uma alta correlação (0,98), o mesmo acontecendo entre O'Conner e 1 RM (0,41 e "r" de 0,99). Comparando os valores das equações, também não houve diferença estatisticamente significativa (0,18) e uma alta correlação (0,99). Conclui-se que para esse grupo, tanto poderia ser utilizado o teste de 1 RM como qualquer uma das equações estudadas.

Palavras - chave: Força máxima, 1 RM, predição de carga máxima.