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INFLUENCE OF FAT PERCENTAGE ON THE STRENGTH OF MEN TRAINED

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ABSTRACT

Introduction: Weight, lean body mass, and body fat can all influence a person's maximum strength. This information can be based on the physical structure that the individual develops and maintains their physical abilities to perform an activity. Objective: To analyze if there is influence of the amount of body fat on the force. Methodology: Twenty men were divided into two groups: Group 1 (G1: 10 lean) and Group 2 (G2: 10 obese). The anthropometric tests were performed to evaluate the percentage of fat and the test of 1RM in bench press and LegPress for the analysis of maximum strength. Statistical analysis was performed using the Student's t-test for independent samples, considering p <0.05. Significant values were observed in the obese group as maximum force in LegPress (23%, p <0.05), Pearson correlation in relation to weight vs 1RM (P <0.05) and fat (60%, p <0.05), and a higher amount of lean mass (43%, p <0.05). Conclusion: In this study it can be observed that a higher amount of body weight leads to a greater amount of lean body fat mass, which significantly influences the maximum force.

Key words: Obesity. Strength. Body fat. Physical fitness.

RESUMO

Influência da percentagem de gordura na força de homens treinados

Introdução: O peso, a quantidade de massa magra e a gordura corporal podem ter influência na quantidade de força máxima de uma pessoa. Essas informações podem ser baseadas pela estrutura física que o indivíduo desenvolve e mantem suas capacidades físicas para realizar uma atividade. Objetivo: Analisar se há influência da quantidade de gordura corporal sobre a força. Metodologia: Participaram 20 homens, divididos em 2 grupos: Grupo 1 (G1=10 homens magros) e Grupo 2 (G2: 10 homens obesos). Foram realizados os testes antropométricos para avaliação do percentual de gordura e o teste de 1RM em supino e LegPress para a análise de força máxima. A análise estatística foi realizada utilizando o teste T Student para amostras independentes, considerando p<0.05 diferentes. Ainda, foi utilizado o teste de correlação de Pearson, considerando p<0.05 diferentes. Resultados: Foram observados maiores valores significativos no grupo obeso como força máxima no LegPress (23%; p<0.05), correlação de Pearson em relação ao peso vs 1RM (R2=0.37; p<0.05) e maior quantidade de massa magra (43%; p<0.05) e gordura (60%; p<0.05). Conclusão: Nesse trabalho pode se observar que maior quantidade de peso corporal leva a uma maior quantidade de massa magra de gordura corporal, o que influencia de forma significativa a força máxima.

Palavras-chave: Obesidade. Força. Gordura corporal. Aptidão física.

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INTRODUCTION

Strength training with weights has several goals within the sport such as helping in conditioning, promoting health, improving performance in sports. It is also very important for the promotion of health, in the aid to improve the physical capacities, aid in the fight against chronic diseases (McCartney and McKelvie, 1996; McCartney, 1988).

Strength training aims not only to increase strength, but also helps for increased muscle power and aerobic endurance (Ghorayeb, 1999). There have been studies showing that aerobic training combined with strength training in patients with coronary disease had no difference in VO_2 max, but the anaerobic threshold presented a significant increase in the groups that performed combined work (Santa Clara, 2002).

From a healthy view, excess weight and the amount of excess fat become a major concern of much of the population. The physical assessment is done to analyze the health of the individual and to perform a monitoring of his physical state and health, and to help set up a training plan for the individual.

A high amount of body fat with little lean mass is associated with various diseases like diabetes, hypertension, dyslipidemias, and other associated health problems. On the other hand, a person with a higher amount of lean body mass and a lower amount of fat is synonymous with health and good physical condition (Robergs and Roberts, 2002).

For many authors, strength training has been a loophole to help obese people improve their quality of life, since it is a type of training that can help in the fight against various pathologies (Fleck and Kraemer, 2006; Winett and Carpinelli, 2001).

This type of training is effective when the volume and intensity are prioritized (Tubino, 1984). There is great concern about how to treat obesity and other diseases. A very important factor for this is the diet, the diets that are being carried out in recent times are very rich in animal fat, mainly sugars and foods with increased carbohydrates (Monteiro, 1995).

Strength training is one of the most effective for fat loss, strength maintenance, hypertrophy and muscular endurance (Souza, 2007).

In order to have a decrease in body fat, a negative energy balance is required, i.e., energy expenditure greater than that consumed, the basal metabolic rate depends on the amount of body fat in the body, as well as lean mass (Francischi, Pereira and Lancha Junior, 2001).

Tomkinson and Olds (2007) reports that the addition of weight in the exercises and the increase of the intensity of the repetitions several times followed, with little time of rest, the improvement in the results are greater.

Tubino (1984) report that this type of training is a great success due to the volume of weight of the exercises and the quality that they are executed, that is, intensity, so that there is such a development depends on the other, will cause changes in intensity stimulation.

Obesity is the excess amount of adipose tissue in the individual, it is defined as a heterogeneous disorder, where the person ingests a greater amount of energy and has little or almost nothing, so is caused the accumulation of body fat. It is pointed out by some authors that when the child or young person has obesity in childhood it is likely that later in adulthood it may be obese (Silva Filho, 2013).

The accumulation of body fat is called obesity, thus dividing body weight in two ways the amount of lean mass present in the body, noting that lean mass with absence of fat, and body fat, thus being able to classify the individual with excess weight and obese individual, being able to work with each one in the necessary way.

It is noticed that people with large amounts of fat have greater amount of strength in the matter of anaerobic training, and a higher yield in 1RM for example, which may be due to the higher fat stock. Thus, the present work has as general objective: to analyze if there is influence of the amount of body fat on the force.

MATERIALS AND METHODS

Participants

For this research, a quantitative approach will be carried out, addressing 20 trained men, Group 1 (G1: 10 lean) and Group 2 (G2: 10 obese), aged between 18 and 40 years, who practice some type of physical activity, and men below or in normality with their weight who practice activity. Individuals

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less than 18 years of age and not practicing physical activity for at least one year will be excluded from the survey, participants who did not agree to participate in the study will also be excluded. All procedures in this study were approved by the Institutional Ethics Committee of State University of Midwest (protocol No. 1.729.296/2016).

Anthropometric evaluation

The body mass index (MC) was evaluated using a WELMY® clinical scale with a precision of 0.1 kg and stature in the stadiometer coupled to the scale, with a precision of 0.1 cm. Body mass index (BMI) was calculated by the equation: BMI = weight / height². The following skin folds were evaluated: supra iliac, triceps, subscapular, abdominal, thigh-medial, mid-axillary, pectoral. The body density will be estimated using the regression equation with seven skinfolds proposed by Jackson and Pollock (1998), while the fat percentage will be determined from the formula proposed by Siri (1961).

Max Force Test

To determine the load of the 1RM test, described by Brown (2001), referring to the highest load lifted in a movement with correct execution. To initiate the test all will perform a heating in the same apparatus, being two series of 10 repetitions with 30% of the load of the 1 RM. When the test was started, each repetition was added an amount of extra load to the exercise until it reached the maximum limit, in case of fatigue the weight of the last successful lifting, and that of fatigue was attempted, determined as 1RM at the level accuracy. The devices that were used in the tests are the leg press 45° and supine table.

Statistical analysis

The statistical analysis was descriptive and inferential using the statistical package SPSS version 20.0. The Pearson correlation test and Student's t-test were performed for independent samples. Statistical values were accepted as significant when p <0.05.

RESULTS

Figure 1 shows the values of weight, BMI and% Fat for the groups. There was a statistical difference for G1 in relation to weight (20%), BMI (33%) and% Fat (60%) in relation to G2 (p = 0.023, Student's t-test).

The results related to the amount of fat present in the lower limbs in both groups are presented in table 1. A significant difference occurred, with larger values for G1 in relation to G2.

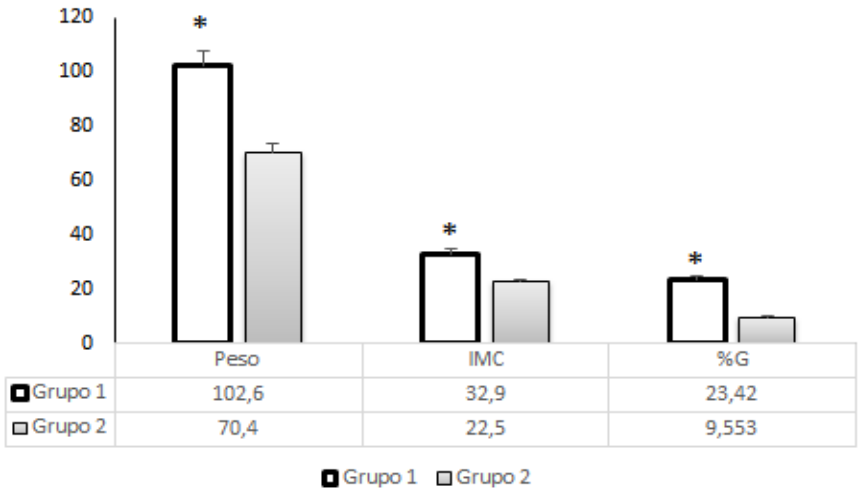

Figure 1 - Weight, BMI and% Fat of groups G1 and G2. Values are presented as mean ± SE. * p <0.05, Student's t-test.

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Table 1 - Amount of fat present in the lower limbs in both groups. Values are presented as mean ± SE.

GROUP	LEG	COUNT
G1	12.2 ± 3	19.5 ± 4*
G2	10.0 ± 2	10.0 ± 3

Legend: * p <0.05, Student's t-test.

The values related to the maximum strength test (1RM) are presented in figure 2. In the 1RM Leg Press test, significant differences were observed in the maximum strength of G1 in relation to the G2 group (23%; p = 0.01, Student's t-test).

The amount of lean mass present in the lower limbs of G1 and G2 is shown in figure 3. Significant differences were observed in the% of lean mass of G1 in relation to group G2 (43%; p = 0.01, Student's t-test).

The correlation between% Fat, Weight and BMI against maximum strength is presented in figure 4. Pearson's correlation showed a significant difference in body weight in relation to the maximum force in the Leg Press test (R2 = 0.37, p = 0.02, Pearson's Correlation), and the same happened for BMI in relation to the Leg Press test (R2 = 0.37; p = 0.03, Pearson's Correlation).

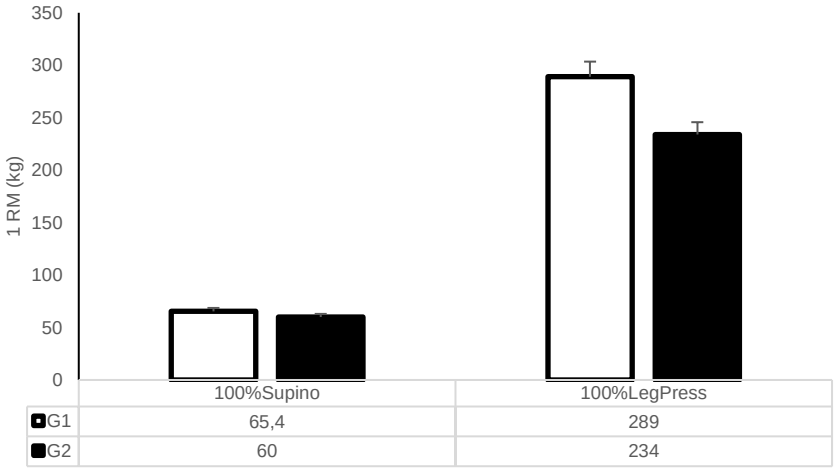

Figure 2 - 1RM in Supino and 1RM in Leg Press. Values are presented as mean ± SE. * p <0.05, Student's t-test.

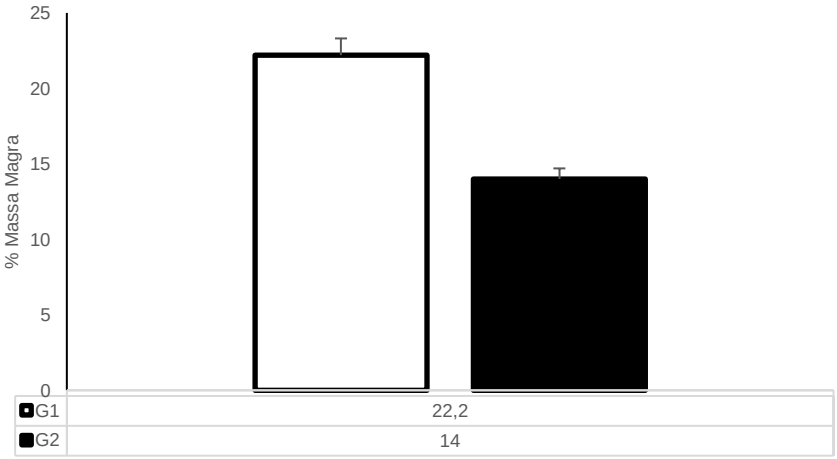

Figure 3 - Analysis of the amount of lean mass present in the lower limbs of G1 and G2. Values are presented as mean ± SE. * p <0.05, Student's T-test.

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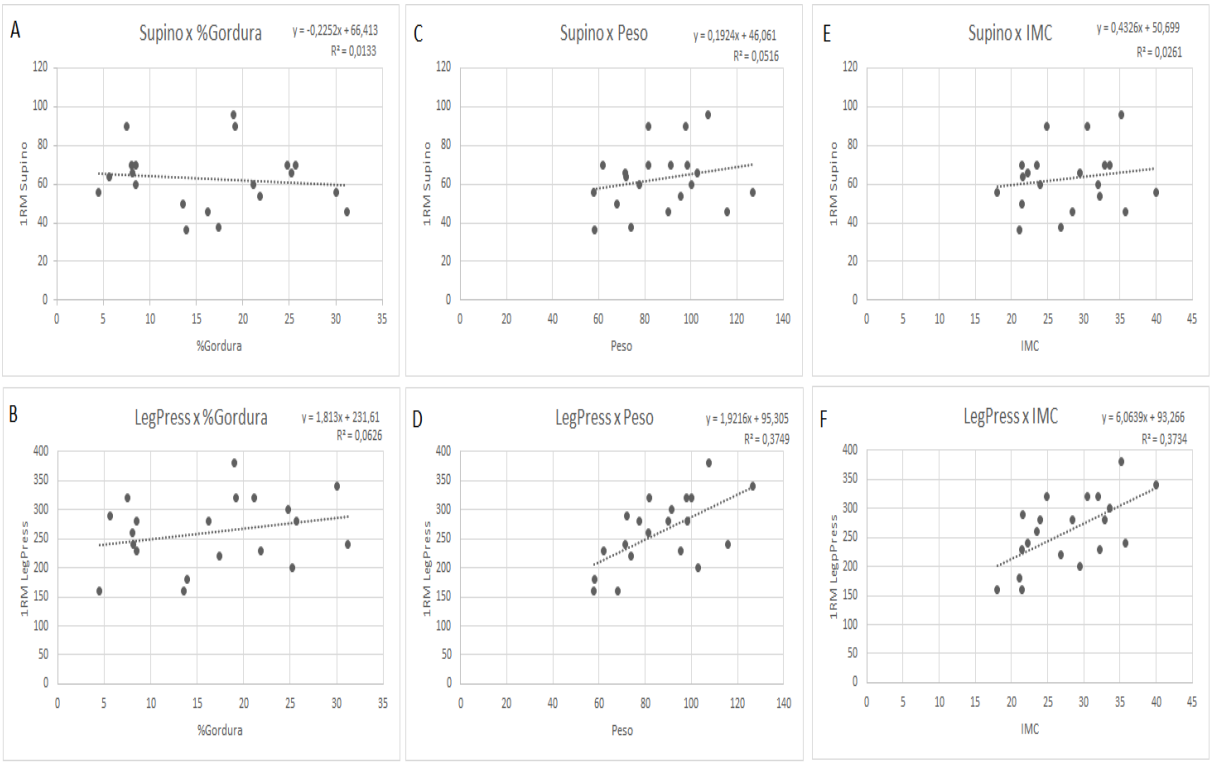

Figure 4 - Correlation between (A) 1RM Supine x% Fat, (B) 1RM Leg Press x% Gordura, (C) 1RM Supine x Weight, (D) 1RM Leg Press x Weight, (E) 1RM Supine x BMI and (F) 1RM Leg Press x IMC between groups G1 and G2. The values are plotted and evaluated in relation to R2 by the Pearson's Correlation.

DISCUSSION

It can be analyzed in figure 1, three different moments where it shows the weight, the percentage of fat and the BMI. Regarding weight, we noticed an equivalence of G1 with respect to G2, G1 had 103% when G2 had 70%, so we can analyze that individuals with greater body weight had more strength. BMI was also analyzed, and it can be noted that BMI has some influence on the strength of the individual, where the G1 was highlighted with respect to G2, the higher individuals were stronger than the lower ones. Another point analyzed was the percentage of fat with respect to the strength of the individual, where the fat did not stand out in relation to the strength of the individual.

Table 1 shows the mean percentage of fat present in the lower limbs of the participants, it can be seen that the amount of fat present in the G1 participants has almost 10% more fat in the mmi than the G2 participants.

In figure 2 we can analyze the relevance of the 1 RM test where the G1 had a very great prominence in the mmi with respect to the G2. In the leg press the G1 had a great prominence with the average of 289 and the G2 234, we can analyze that the participants were easier to perform the leg press, however there was no big difference with respect to the bench press where the strength of the participants of G1 and G2 had little difference G1 65.4 and G2 60. One can note the difference when analyzed in figure 4 in table (C) and (E) it is noted that the mean is between 60 to 70%, with weight ratio and BMI, in table (A) it is stable R^2 between 0.1 and 0.5%.

Different from the bench press, it can be observed that the members of G1 were more relevant in the strength test of the mmi, in figure 4 in the tables (D) and (F) shows a greater relation of the force of mmi of the participants, it can be considered second the R^2 37% of relevance between BMI, weight and strength, already with respect to fat only 0.6%.

In contrast, Menegassi et al., (2017), reports a study with soccer players, that there was a certain relevance in the amount of strength of students with greater cross-section,

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ie, the ability of the nervous system to send neuromotor stimuli is more accurate. Another point reported by Menegassi and cols (2017), are the changes in muscle strength that can be compensated by training, since the improvement in capacity is with the experiences experienced in the sports career.

Analyzing Caromano (2010), he says that both the greater amount of weight and the smaller amount can affect the strength of the individual in the lower limbs because he is directly connected with the weight discharge, which can be greater or lesser, this can lead to in greater amount of force in the individual. Souza (2007) reports that weight training is the most effective way to maintain localized strength.

In this context, two trained individuals with the same height, 1.79 one weighing 100 kg and the other weighing 70 kg were analyzed, analyzing the amount of fat, bone mass, and muscles, according to the data collected the G1 participant had 30% body fat and the G2 14% participant, analyzing bone and residual muscle mass the difference was not very large.

Comparing the 1RM test between G1 and G2, by making an interconnection between Figure 4 and Figure 3, it is possible to analyze that the participants of the G1 are about the force in force in the mmi. amount of lean mass present in both groups, the folds, perimetry, and bone cavity were removed, as the participants of the two training groups failed to notice a great difference in the amount of muscles present, since the result obtained covers upper limbs, back, thorax and others.

When only the test area was isolated, the result was another, then the test was summarized only from the pelvis to the ankle, again removing the folds perimetry and bone cavity, to leave the test more reliable, and the mean of the result among the participants was of 22.2 of G1 against 14 of G2 (43%, $p < 0.01$, Student's T test).

For comparison, it is possible to analyze the figure 4, where the average between the development of the bench press and the Leg press was realized, it is noticed that in the bench press there is no difference between both groups. As for the supine G1 presented 5% more relevance, in Leg press 55% of equivalence, in the general average, in figure 3 shows the largest amount of lean mass present in the lower limbs of the individuals, thus showing that the greater amount of strength of the members of the G1, it is due to the greater amount of lean mass present in the lower limbs.

CONCLUSION

In this study it can be observed that a higher amount of body weight leads to a greater amount of lean body fat mass, which significantly influences the maximum force.

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