133 - COMPARISON OF EMG OF BICEPS FEMORIS AND GASTROCNEMIUS IN LEG CURL IN DORSIFLEXION AND PLANTAR FLEXION

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INTRODUCTION

The activities in academia won many fans in the last years, Novaes (2001), among several options for activities, we are against resistance training as one of the most used, through classes in bodybuilding and gymnastics located.

In the specific case of bodybuilding and gymnastics located, the physical exercises are of great importance to be achieved the goals of the practitioners of these methods, which become increasingly demanding.

Thus, the knowledge of physical exercises, became prime condition for the performance of professional, Physical Education that area.

This study will contribute the knowledge of the method of execution of the exercise known as table flexor, considering the use of it in programs for weight training and a lack of knowledge about some kinesiologic aspects involved in its various forms of execution, and that the search is continuity study by LIMA et al (2006), where it was found the strength and perception of the effort in the same year and positions.

It was used as instrumentation for the conduct of the search to electromyography (EMG), since studies with this type with this technological resource, have the condition to examine the electrical activity in muscle when moving or stopped Amadio & Duarte (1996).

Therefore, the research aimed to compare the activities mioelétricas the femoral biceps and

gastrocnêmios, in the exercise table flexor, when performed in positions of plantar flexion of the joints and dorsiflexion talocrurais.

METHODOLOGY

It is descriptive study, trial, held in the clinic of fitness Fit Well, Barra da Tijuca-RJ, with the population of people not gender male practitioners of bodybuilding. The sample was selected in a casual, containing 06 not subject practitioners of the year proposed to study, without the injury or illness and locomotor apparatus, with the average age of 23.7 ± 4.6 years, not obese, with availability of displacement for the local testing.

The subject of sample consenting their holdings, knowing that study was conducted within the guidelines and regulatory standards of research involving human beings, as resolution of the National Council of Health

It noted that the search was authorized by coordination of the course of Physical Education, and approved in the process of evaluation of PIBIC projects in the Faculties Integrated Mara Thereza, factors that constitute the release of the study about their ethics.

Before the collection pilot study was conducted in two subjects who were part of the sample and was held at the same place, table flexor and EMG used in the collection of data, to test the proposed procedures for the search.

Initially, participants performed two tests of ten repetitions maximum (RM) according to the ACSM (2003), in the exercise table flexor one in dorsiflexão and the other in plantar flexion of the talocrural member of the dominant lower, which was used in the collection of the EMG signal .

During the process of acquisition of EMG signal, was used by 80% the value determined in tests of 10 RM, in their positions.

The study used a EMG Brand Lynx, and the signal captured by the system AqDanalysis frequently acquisition of the 1980 Hz with bipolar electrodes Meditrace liabilities of the mark, the A / D with a frequency of 600 Hz acquisition The muscles involved in the study were the femoral biceps and gastrocnêmios medial and lateral, with the electrodes positioned in the middle point of womb muscle, as indicated by SENIAM, at a distance of approximately 2 cm, with the land away from them, positioned on the malleolus , so that not upsetting the collection of signals.

The lights were off of the environment, and used a brand nobreack SMS professional, to avoid interference in the signal. They were respected procedures for the isolation of the signal as discussed by Guirro; Forti; Bigaton (2005), and for the normalization of the signal peas; Duarte; Amadio (1998).

The analysis was performed by the signal system Bioinspector also the company's Lynx equipment.

Each participant took eight repetitions with the value determined, with a minimum interval of 5 minutes between the positions, discarding the first and last repetition, ensuring the quality of the signal, when the pattern of implementation of the movement.

The data received treatment descriptive and inferential, using the STATISTICA program. Through the Kolmogorov-Smirnov test verified that the data showed normal distribution, and thus to compare the two positions, was used one-way ANOVA with a post-hoc test of Tukey, with significance level of 0.05. The comparison (ANOVA) between the two positions was held in the values of RMS of each muscle.

In presenting the results, the average of the values of RMS of each muscle was expressed as the percentage of activation for the total electrical activity of 3 muscles tested in each position. Through the t test with significance level of 0.05, verified the existence of significant differences in the percentage of activation of the muscles studied.

RESULTS

The results of the activities of EMG femoral biceps muscles, lateral and medial gastrocnemius, showed variation in the responses of the same when analyzed in the same year and between years, as shown in the table below.

Tabela 1 - Percent of activation (mean ± SD) in each muscle during the conduct of the exercises analyzed.

Muscles	Dorsiflexão plantar	flexion plantar
BF	41,23 ± 7,42*	29.01 ± 5.71
GM	28,98 ± 8,23	34,11 ± 7.12**
GL	29,79 ± 6,61	36,88 ± 6,59**

BF - Bíceps femoris , MG- Medial gastrocnemius, LG - Lateral gastrocnemius

* Significant differences between the values of RMS BF and the other muscles ($p < 0.05$).
**Significant differences in the values of RMS gastrocnemius for BF ($p < 0.05$).

The values of BF at the completion of the exercise in dorsiflexion, showed significant amounts in relation to the muscles gastrocnêmios and fram significant differences between gastrocnemius to the BF in plantar flexion. There was no significant difference between the two conditions of gastrocnemius positions.

DISCUSSION

The results of the study comply with LIMA et al (2006), the result of which showed greater strength maxima and greater sense of achievement in the effort when dorsiflexion.

The procedures proposed methodology for the study are correct, and the acquisition of the signal have better control when the possible interference of electric current.

We suggest as a solution to this problem, use of battery, since we would not have more the use of electric current place of the collection, as a source of energy for the EMG and computer.

CONCLUSIONS

The results responded to the objective of the study, which was to compare the activities of the Electrical biceps femoris and gastrocnemius flexor table in the exercise held in plantar flexion and dorsiflexion.

The fact of the highest activity of gastrocnemius have occurred in the position of plantar flexion can be justified by those muscles biarticulars and are involved in maintaining the position of plantar flexion and movement of knee bending.

When the realization in dorsiflexion, we can consider how a position of pre-stretching of gastrocnemius promoting its production of the joint force components contractile and elastic, which justify a fall proportional the electrical activity of muscles and proportional greater activity of the biceps femoris.

Finally the study allows the interpretation that, the position of dorsiflexion and plantar flexion amending the participation of the flexor muscles of the knee, and may the position of plantar flexion be a variation of work for the gastrocnemius.

With this result, we are doing again the study with a sample n greater, thus to increase the reliability of data found.

REFERENCES

AMADIO, A.C.; Duarte M. **Fundamentos Biomecânicos para a Análise do Movimento**. São Paulo: EEFUSP, 1996.

American College of Sports Medicine**. Diretrizes do ACSM para os teste de esforço e sua prescrição**. Rio de janeiro: Guanabara koogan, 2003.

ERVILHA,U.F.;Duarte M.; Amadio AC. **Estudo sobre procedimentos de normalização do sinal eletromiográfico durante o movimento humano**. Rev. Bras. de Fisioterapia.,1998 3(1), 15-20.

GUIRRO, R. R. J.; FORTI, F.;BIGATON, D. R.. **Proposta de isolamento do módulo de aquisição de sinais**.11th Congresso. Brasileiro de Biomecânica.2005, p. 35-42.

LIMA, V.P. et al. Variações **nas respostas do teste de 1 RM e na percepção da atividade muscular, quando da realização do exercício mesa flexora em dorsiflexão e flexão plantar.** Boletin da Federação Internacional de Educação Física. V6, 2006,p.132..

NOVAES, J.S**. Estética: o corpo na academia**. Rio de janeiro: Shape, 2001.

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COMPARISON OF EMG OF BICEPS FEMORIS AND GASTROCNEMIUS IN LEG CURL IN DORSIFLEXION AND PLANTAR FLEXION

ABSTRACT

The activities in fitness centers won many fans in the last years, among the various choices of activities, we are against resistance training as one of the most sought through classes in bodybuilding and gymnastics located among others. These activities located the exercises are important tool for the preparation of the training programs. In this context arises from the surface electromyography as instrumentation that helps in the acquisition of knowledge of the exercises located, where possible to determine electrical activity of muscles investigated, having been chosen in this study to check the electrical activity of muscles gastrocnemius and biceps femoris in the performance leg curl, when held in plantar flexion and dorsiflexion. Part of the study 06 individuals the male gender, not practitioners of bodybuilding, chosen for convenience, without damage to the locomotor apparatus and or disease, with average age of 23.7 ± 4.6 years, not obese. The data received treatment descriptive and inferencial using the STATISTICA program. Through the Kolmogorov-Smirnov test verified that the data showed normal distribution, and thus to compare the two positions, was used one-way ANOVA with a post-hoc test of Tukey, with significance level of 0.05. The comparison (ANOVA) between the two positions was held in the values of RMS of each muscle. The results pointed out that the medial and lateral gastrocnemius showed higher activity EMG on condition of plantar flexion (34.11 ± 7.12; 36.88 ± 6.59, respectively) and the biceps femoris presented greater activity on condition dorsiflexion (41,23 ± 7,42).The values were obtained when compared the activities of the muscles involved in the study.

KEYWORDS: EMG, dorsiflexion and plantar flexion.

COMPARAISON DE L'ACTIVITE EMG DE LA HANCHE ET DU BICEPS FEMORALE ET GASTROCNEMIUS SUR LA TABLE FLECHISSEURS ET FLEXION DORSALE TENUE A LA FLEXION PLANTAIRE.

RESUME

Les activités dans les milieux universitaires a gagné de nombreux admirateurs au cours des dernières années, parmi les divers choix d'activités, nous sommes contre la résistance formation comme l'une des plus recherchées par le biais de cours de musculation et de gymnastique située entre autres. Ces activités sont situées les exercices outil important pour l'élaboration des programmes de formation. Dans ce contexte se pose de l'électromyographie de surface comme l'instrumentation qui contribue à l'acquisition de la connaissance des exercices situé, dans la mesure du possible de déterminer l'activité électrique des muscles enquête, après avoir été choisis dans cette étude pour vérifier l'activité électrique des muscles du biceps fémorale, gastrocnemius et en Le tableau des performances fléchisseurs, quand tenue à la flexion plantaire et flexion dorsale. Une partie de l'étude 06 individus le sexe masculin, et non pas les praticiens de musculation, choisis par commodité, sans dommage pour l'appareil locomoteur et / ou de la maladie, avec une moyenne d'âge de 23.7 ± 4.6 ans, ne pas être obèse. Les données descriptives et bénéficié d'un traitement

utilisant le inferencial STATISTICA programme. Par le biais du test de Kolmogorov-Smirnov vérifié que les données ont montré une distribution normale, et donc de comparer les deux positions, a été utilisé d'une manière ANOVA avec un post-hoc test de Tukey, avec seuil de signification de 0,05. La comparaison (ANOVA) entre les deux positions a eu lieu dans les valeurs de RMS de chacun des muscles. Les résultats ont fait observer que les gastrocnémiens médial et latéral a montré la hausse de l'activité EMG à condition de la flexion plantaire (34,11 ± 7,12; 36,88 ± 6,59, respectivement) et la plus grande du biceps femoris activité présenté à la condition la flexion dorsale (41,23 ± 7,42).Les valeurs ont été obtenues par rapport aux activités des muscles impliqués dans l'étude.

MOTS CLES: EMG, flexion dorsale et la flexion plantaire.

LA COMPARACIÓN DE LAS ACTIVIDADES ELETROMIOGRÁFICAS DE LOS BÍCEPS FEMORALES Y DE GASTROCNÊMIOS EN LA TABLA FLEXORA LLEVÓ A TRAVÉS EN FLEXIÓN DORSAL Y FLEXIÓN PLANTAR.

RESUMEN

Las actividades en academia había ganado a adeptos innumerables estos últimos años, entre las algunas opciones de actividades, tiene el entrenamiento contra resistencia como una del haber mirado, con lecciones del musculación y de la gimnasia situados entre otras. En estas actividades los ejercicios localizados, son herramienta importante para la elaboración de los programas de entrenamiento. En este contexto el EMG de superficie aparece como instrumentación que asista a la adquisición del conocimiento de los ejercicios localizados, cuando hace posible determinar la actividad eléctrica de los músculos investigados siendo elegido en este estudio verificar la actividad eléctrica de los músculos de los gastrocnêmios y del bíceps femorales en la tabla del flexora del ejercicio, cuando está llevado a través en el flexión plantar y flexión dorsal. Parte del estudio 06 personas el género masculino, no practicantes de culturismo, elegida por conveniencia, sin daños al aparato locomotor y / o enfermedad, con un promedio de edad 23.7 ± 4.6 años, no obesos. Los datos que se recibieran tratamiento descriptivo y inferencial utilizando el programa STATISTICA. Mediante la prueba de Kolmogorov-Smirnov comprobó que los datos mostraron que la distribución normal, y por lo tanto, para comparar las dos posiciones, se utilizó en un solo sentido con un ANOVA post hoc test de Tukey, con nivel de significación de 0.05. La comparación (ANOVA) entre las dos posiciones se celebró en el de los valores RMS de cada músculo. Los resultados señalaron que el medio y lateral gastrocnemios mostró una mayor actividad EMG con la condición de la flexión plantar (34,11 ± 7,12; 36,88 ± 6,59, respectivamente) y el bíceps femorales presentan una mayor actividad con la condición de la dorsiflexión (41 , 23 ± 7,42).Los valores habían sido conseguidos cuando estaban comparadas las actividades de los músculos implicados en el estudio.

PALABRAS CLAVE: EMG, flexión dorsal y flexión plantar.

COMPARAÇÃO DAS ATIVIDADES ELETROMIOGRÁFICAS DO BÍCEPS FEMORAL E GASTROCNÊMIOS NA MESA FLEXORA REALIZADA EM DORSIFLEXÃO E FLEXÃO PLANTAR.

RESUMO

As atividades em academia ganharam inúmeros adeptos nos últimos anos, dentre as várias opções de atividades, temos o treinamento contra resistência como um dos mais procurados, através de aulas de musculação e ginástica localizada entre outras. Nessas atividades os exercícios localizados, são importante ferramenta para a elaboração dos programas de treinamento. Nesse contexto surge a eletromiografia de superfície como instrumentação que auxilia na aquisição do conhecimento dos exercícios localizados, quando possibilita a determinar atividade elétrica dos músculos investigados, tendo sido escolhida neste estudo para verificar a atividade elétrica dos músculos gastrocnêmios e bíceps femoral no exercício mesa flexora, quando realizado em flexão plantar e dorsiflexão. Participaram do estudo seis sujeitos do gênero masculino, não praticantes de musculação, escolhidos por conveniência, sem lesão no aparelho locomotor e ou doença, com idade média de 23.7 ± 4.6 anos, não obesos. Os dados receberam tratamento descritivo e inferencial, utilizando o programa STATISTICA. Através do teste Kolmogorov-Smirnov verificou-se que os dados apresentaram distribuição normal, desta forma, para comparação das duas posições, foi utilizado ANOVA one-way, com o teste post-hoc de Tukey, com nível de significância de 0,05. A comparação (ANOVA) entre as duas posições foi realizada nos valores de RMS de cada músculo. Os resultados apontaram que os gastrocnêmios medial e lateral apresentaram maior atividade eletromiográfica na condição de flexão plantar(34,11 ± 7.12 ; 36,88 ± 6,59, respectivamente) e que o bíceps femoral apresentou maior atividade na condição dorsiflexão (41,23 ± 7,42). Os valores foram obtidos quando comparado as atividades dos músculos envolvidos no estudo.

PALAVRAS CHAVE: EMG, dorsiflexão e flexão plantar.