ELECTROMYOGRAPHY ANALYSIS OF THREE DIFFERENT TYPES OF CHEST EXERCISES: INCLINED BENCH PRESS, INCLINED DUMBBELL PRESS AND INCLINED DUMBBELL FLY

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INTRODUCTION

Working out is a common practice for athletes as part of training and also nonathletes for health purposes. Some of the working out exercises use several joints; this complicates the identification of which specific muscle group is used for each exercise. Inclined Bench Press (IBP) is associated to chest training, and yet it recruits the muscles of the shoulder. The Surface Electromyography (EMGs) is used to determine the motor unit action potential of muscles (BASMAJIAN & DELUCA, 1985). The aim of this study is to analyze the activation of four muscles: Pectoralis Major (upper portion), Pectoralis Major (lower portion), Deltoideus Mediums and Deltoideus Anterior using EMGs during the three following chest exercises: IPB, Inclined Dumbbell Press (IDP) and Inclined Dumbbell Fly (IDF).

METHODS

The sample consists of four men aged between 20 and 30 years old, with at least one year of working out practices, and bodyfat percentage below 14%. The materials used in body composition assessment were professional stadiometer (Sanny®), digital scale (Plenna®), skinfold caliper (Lange®), anthropometric tape (2.0m; Sanny®), anthropometer (Sanny®) and anthropometric pencil. For the skin preparation, the hairs on the electrodes sites were removed. For data collection an electromyographer Miotool 400 (Miotec®), electrodes Meditrace™ 200 (Kendall®) and a notebook Vaio (Sony®) were used. For the exercises test were used: IBP (Equipment), inclined bench and dumbbells (12-30kg; Righetto®), free weights (20, 10, 2 and 1kg) e digital metronome DM – 11 (Seyko®) to control the rhythm of contractions. The muscles analyzed were: Deltoideus Mediums (DM), Deltoideus anterior (DA), Pectoralis Major upper portion (PMU) and Pectoralis Major lower portion (PML). Three different types of chest exercises were performed by the subjects: IBP, IDP and IDF, and the order of exercises was random. The loads were determined by a load test (BOMPA, 2001). For statistical analysis the software SPSS 11.5 for Windows was used. Firstly the Kolomogorov-Smirnov test ($p \leq 0.05$) was done. Secondly ANOVA for repeated samples with Bonferroni post hoc test ($p \leq 0.05$) was performed.

RESULTS AND DISCUSSION

Data analysis showed more activation of DM during IDP exercise and presents significant differences compared to inclined bench press, as seen in Figure 1. A minor activation of DA for inclined IDF exercise was identified in Figure 2, it also had a significant difference compared to other exercises.

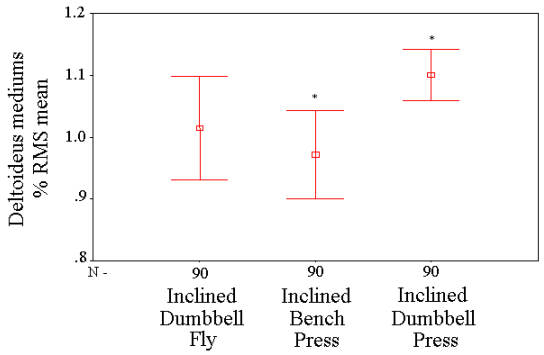

Figure 1: % RMS mean of DM in three exercises.

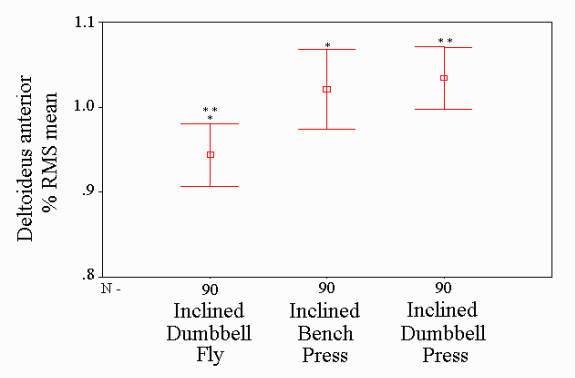

Figure 2: % RMS mean of DA in three exercises.

PML showed great variation and the IBP showed lower variation between the analyzed muscles, as seen in Figure 3. The IBP behavior was not as expected.

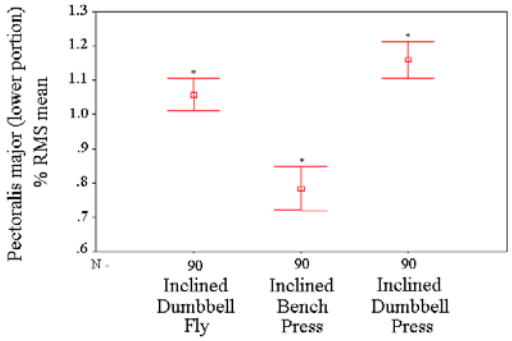

Figure 3: % RMS mean of PML in three exercises.

Figure 4 shows a greater PMU activation for IDP exercise with a significant difference compared to IBP. All muscles analyzed showed greater activation during IDP if compared to the other exercises in this study.

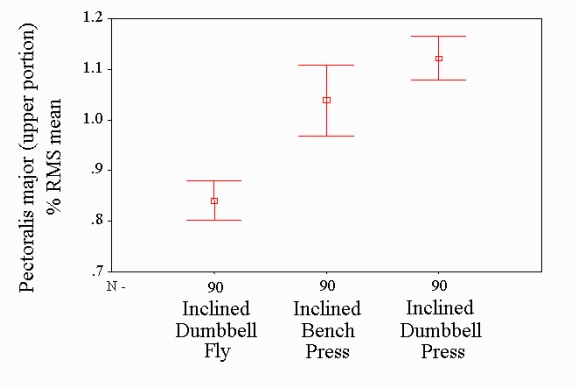

Figure 4: % RMS mean of PMU in three exercises.

This fact can be explained by movement mechanics because of triceps participation. It has been observed that free weights usage causes neighbor muscles to help the stabilization of upper limbs during movement (FLECK & JUNIOR, 2003).

SUMMARY/CONCLUSIONS

It was concluded that IDP exercise presents the greater activation for all muscles analyzed. However, further studies should be carried out with a greater number of significant samples for more faithful results.

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