

STRETCHING EXERCISES USED TO WARM UP DO NOT IMPROVE 1-RM PERFORMANCE OF VOLLEYBALL PLAYERS

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INTRODUCTION: Volleyball is classified as high intensity and short duration sport. Stretching exercises are frequently included as preparatory activity for training and games. Kokkovonen et al. (1998) suggests that stretching exercises used before activities of maximum strength can decrease the performance, however Unick et al. (2005) suggests that stretching prior to a competition may not affect the performance negatively. Therefore, the purpose of this study was to verify if stretching exercises as preparatory activity for these athletes decrease the performance of the one repetition maximum (1-RM).

METHOD: Twelve elite female volleyball athletes with mean age, height, body mass (\pm SD) were $19,6 \pm 2,1$ years; $68,2 \pm 4,8$ Kg; $177 \pm 0,06$ cm, respectively, all the subjects signed an informed consent form. They performed 3-test sessions of 1-RM (interval of 48 h among all sessions). The first one was of familiarization and the other two were of experimentation, with and without stretching exercises. The squat exercise was selected and performed in a smith machine, by the proximity to the movement of volleyball jump. In the first experimental session (session 1) the athletes ran for 10 minutes in a self-selected velocity and performed stretching exercises (2 repetitions, 15 seconds stretch) for lower limbs muscles (passive static stretching exercises=maximum gluteus₍₁₎, hamstring₍₁₎ quadriceps₍₁₎ and calf₍₁₎, active static exercises=quadriceps₍₁₎, hamstring₍₁₎ and calf₍₁₎). Thereafter the athletes were submitted the 1-RM test. In the session 2 the athletes repeated the session 1 procedure, without the stretching exercises program. An alpha level of $p < 0,05$ was considered significant. The experimental sessions were randomized.

RESULTS: To compare the 1-RM performance between session 1 and 2 a paired *t*-test (Table 1) was used. Significant difference was not found in 1-RM ($p < 0,389$).

Table 1 - Descriptive results of the 1-RM test in both experimental sessions.

Session	Minimum	Maximum	Mean	SD
1 (stretching)	96	136	111,66	13,17
2 (no stretching)	96	140	112,66	13,22

DISCUSSION: The results are according with Unick et al. (2005) and suggests that stretching exercises prior to a maximum strength demand do not affect the performance of trained women. This result contradicts the findings of the Kokkovonen's study. One possible explanation for this difference could be the use of different stretching techniques. Other aspect was the use of single joint tests in Kokkovonen's study in contrast to the present study, which used a complex task, such as a squat exercise.

CONCLUSION: The stretching exercises have not negative influence in 1-RM performance of volleyball athletes.

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