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Relationship of pull-up repetitions to maximal and relative lat-pull strength in trained athletes.

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INTRODUCTION

Two of the most common exercises used to strengthen the muscles in the shoulder region are the latissimus dorsi pull (lat-pull) and the pull-up. The purpose of this study was to determinate the relationships between lat-pull and pull-up exercises to both relative lat-pull and pull-up performance to body mass in a group of trained athletes in both exercises. A second purpose was to determine the effect of various anthropometric dimensions on each exercise.

METHODS

Twenty five firefighters or policeman candidates volunteered to take part in this study. All subjects were evaluated for their ability to perform a maximum number of free-hanging pull-ups, 1RM lat-pull and lat-pull repetitions at body mass (lat-pull reps BM). Anthropometric dimensions included lean body mass (LBM), muscle mass (MM), and fat mass (FM) estimated from skinfold measurements.

Table 1. Physical and performance characteristics of trained male (n=25)

Variable	Mean ± SD	IC 95%	Correlation with: pull-ups	1RM lat-pull	Lat-pull reps BM
Age (years)	27.1 ± 5.5	24.9-29.3	-0.22	0.02	0.32
Height (cm)	177.3 ± 7.3	174.3-180.3	-0.21	0.45*	-0.40*
Body mass (kg)	74.8 ± 8.5	71.3-78.3	-0.55†	0.55†	-0.61†
LBM (kg)	65.6 ± 7.1	62.7-68.6	-0.50*	0.55†	-0.57†
FM (kg)	9.2 ± 2.1	8.3-10.0	-0.52†	0.36	-0.53†
MM (kg)	36.2 ± 3.8	34.6-37-8	-0.51†	0.54*	-0.56†
1RM lat-pull (kg)	165.0 ± 26.3	154.1-175.9	0.09		0.00
Lat-pull reps BM	37.4 ± 4.3	33.1-41.3	0.62†	0.00	
Pull-ups	15.8 ± 3.4	14.4-17.2		0.09	0.62†

LBM = lean body mass (kg); FM = fat mass (kg); MM = muscle mass.

* p<0.05; † p<0.01

RESULTS

Pull-ups were significantly related to lat-pull reps BM (figure 1) but not to 1RM lat-pull (figure 2). No relationship were observed between lat-pull reps to BM and 1RM lat-pull. Body mass, LBM and muscle mass were significantly related to pull-up performance, to 1RM lat-pull and to lat-pull reps BM. Absolute body fat was significantly related to pull-ups and lat-pull reps BM (table 1).

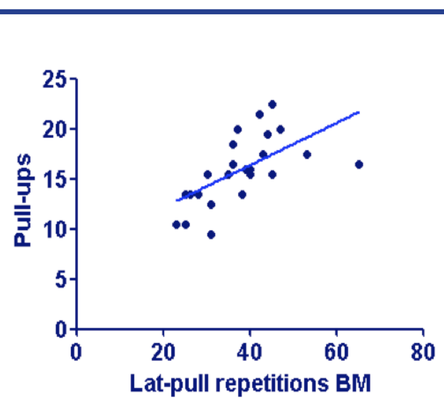

Fig 1. Lineal relationships between pull-ups and lat-pull repetitions BM in trained athletes (n=25)

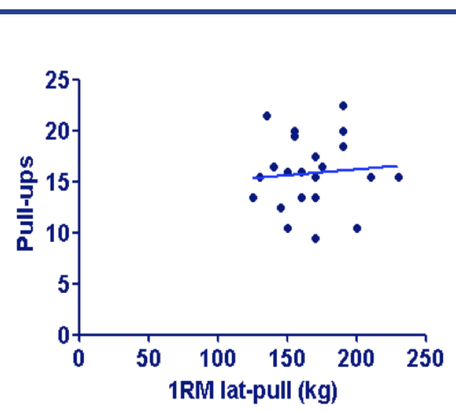

Fig 2. Lineal relationships between pull-ups and 1RM lat-pull in trained athletes (n=25)

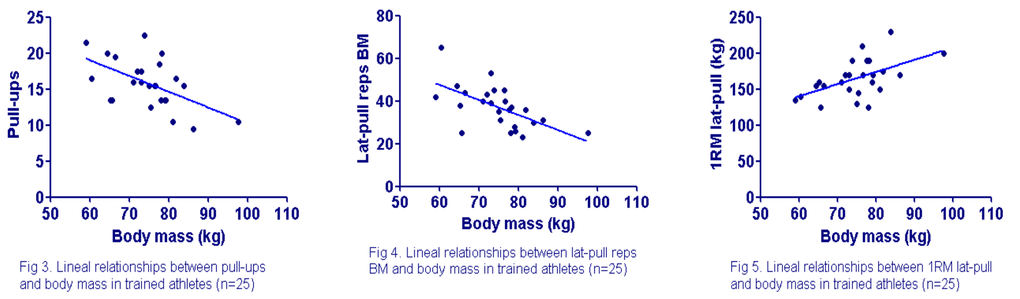

Fig 3. Lineal relationships between pull-ups and body mass in trained athletes (n=25)

Fig 4. Lineal relationships between lat-pull reps BM and body mass in trained athletes (n=25)

Fig 5. Lineal relationships between 1RM lat-pull and body mass in trained athletes (n=25)

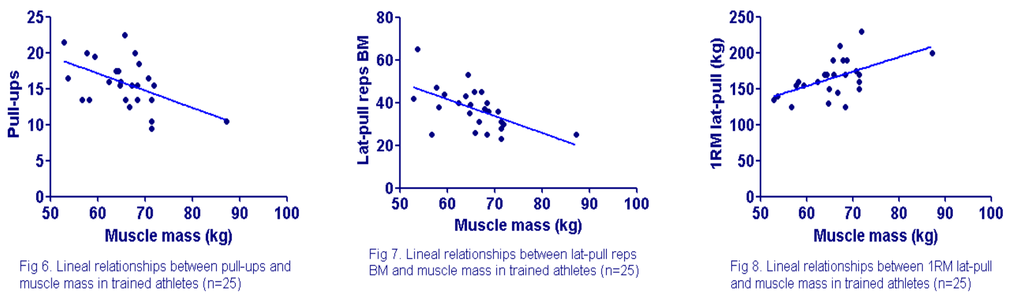

Fig 6. Lineal relationships between pull-ups and muscle mass in trained athletes (n=25)

Fig 7. Lineal relationships between lat-pull reps BM and muscle mass in trained athletes (n=25)

Fig 8. Lineal relationships between 1RM lat-pull and muscle mass in trained athletes (n=25)

DISCUSSION

In the current study, we found a moderate correlation between pull-ups and lat-pull reps BM. However, a lack of relationship was observed between pull-ups and 1RM lat-pull (figure 2). Similar results were observed by Doug et al (2) and Kristin et al (1). The latter research suggests that the lack of association might be partially explained by the manner in which the lat-pulls repetition test was conducted. 1RM lat-pull can be considered as an indicator of maximum strength whiles the pull-up repetitions as an indicator of relative strength to body weight. Therefore, when we compared similar indicators of strength, both exercises seems to have common elements.

We also have found a correlation between anthropometric dimensions and pull-ups repetitions, 1RM lat-pull and, lat-pull reps BM. These variables appeared to exert opposite effects on pull-ups, lat-pull reps to BM and 1RM lat-pull. Similar results to ours were observed by Kristin et al (1) and Doug el al (2). These results suggest that body composition seems to play an important role in the performances of these exercises.

PRACTICAL APPLICATIONS or CONCLUSION

- These results suggest that when we compare similar indicators of strength both exercises appear to be related.
- Body composition plays an important role in performance in both exercises, however, appear to affect performance differently in function to the manifestation of strength assessed.

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