

## Functional training is effective in improving archery sport performance

Riccardo, Monzoni<sup>1</sup>; Francesco, Lucertini<sup>1</sup>; Carlo, Ferri Marini<sup>1</sup>; Ario, Federici<sup>1</sup>.

<sup>1</sup>*Department of Biomolecular Sciences – Division of Exercise and Health Sciences, University of Urbino Carlo Bo, Urbino, Italy.*

### Introduction

Archery is a sport that requires finesse and medium intensity muscular effort (Dal Monte, 1983). It is characterized by closed skill activities, i.e. movements already known and automated repeated many times as precise as possible (Tursi & Napolitano, 2014).

It is well accepted that the use of elastic bands, along with bodyweight exercises, in archery training may play an important role in improving the shooting technique (Kisik Lee & Robert De Bondt, 2005) because it allow to simulate the shooting action without bow and arrow. Indeed, Monzoni et al. (2015) recently demonstrated that athletes' performance and technique improved significantly more after a training program aimed at improving strength (using elastic bands and calisthenics) and balance (exercises performed using instable supports such as the BOSU<sup>®</sup>), compared to callisthenic training alone. Those results, however, were not obtained during official competitions. Therefore, the aim of this investigation was to compare, in high level archers, the effects of three different training programs on the performance during official archery competitions.

### Methods

24 male athletes (age  $22.8 \pm 2.1$ ; BMI  $23.7 \pm 2.1$ ) with a minimum of 4 years of archery experience were recruited. Participants were assigned to one experimental group (EG) and to two control groups (CG1; CG2) with a balanced random order. The performance (i.e. total score of the participant) of each group was recorded during official competitions that took place just before and after the 6-month training intervention. All groups underwent a specific technical training program (3 sessions per week, 90 minutes per session). In addition, the CG1 engaged in a resistance training program based on weight machines only (3 sessions per week, 90 minutes per session), whereas the EG performed a specific training program (3 sessions per week, 90 minutes per session) using elastic bands, calisthenics and the BOSU ball, with the aim of simulating the shooting technique.

In order to exclude the possible bias due to the differences of athletes' performance levels, the pre-training score differences among the groups were evaluated using the Kruskal-Wallis test. Thereafter, the delta scores (D) were calculated (i.e. the difference between post- and pre-training scores) for the three groups and analyzed using the Kruskal-Wallis test, followed by the U Mann-Whitney test for pairwise comparisons with the Bonferroni correction. An level of 0.05 was considered statistically significant.

### Results

No statistical differences were found among the pre-training scores of the three groups, whereas the Ds resulted significantly different ( $p < 0.05$ ). The D of EG increased significantly more ( $2.86 \pm 1.05\%$ ) than the D of CG1 ( $1.04 \pm 1.49\%$ ) and CG2 ( $0.15 \pm 1.22\%$ ), whereas no significant difference ( $p > 0.05$ ) was found between the CGs.

### Discussion & Conclusion

The results highlight that the use of unstable supports and elastic bands as tools to simulate the shooting technique within an additional specific archery training program is effective in improving athletes' performances during official competitions compared to both a specific technical training program alone and a non-specific additional resistance training. Therefore

unstable strength exercise simulating the shooting technique should be part of any archery training program.

### **References**

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