

# ORIGINAL RESEARCH

## AN ELECTROMYOGRAPHIC ANALYSIS OF THE SHOULDER COMPLEX MUSCULATURE WHILE PERFORMING EXERCISES USING THE BODYBLADE® CLASSIC AND BODYBLADE® PRO

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### ABSTRACT

**Background:** In spite of the bodyblade (BB®) being used in clinical settings during shoulder and trunk rehabilitation and training for 24 years, there are only five known scientific papers that have described muscle recruitment patterns using the BB®. Moreover, there are no known studies that have examined muscle activity differences between males and females (who both use the bodyblade in the clinic) or between different BB® devices.

**Hypothesis/Purpose:** The primary purposes of this investigation were to compare glenohumeral and scapular muscle activity between the Bodyblade® Pro (BB®P) and Bodyblade® Classic (BB®C) devices while performing a variety of exercises, as well as to compare muscle activity between males and females. It was hypothesized that glenohumeral and scapular muscle activity would be significantly greater in females compared to males, significantly greater while performing exercises with the BB®P compared to the BB®C, significantly different among various BB® exercises, and greater with two hand use compared to one hand use for the same exercise.

**Study Design:** Controlled laboratory study using a repeated-measures, counterbalanced design.

**Methods:** Twenty young adults, 10 males and 10 females, performed seven BB® exercises using the BB®C and BB®P, which are: 1) BB®1 - one hand, up and down motion, arm at side; 2) BB®2 - one hand, front to back motion, shoulder flexed 90°; 3) BB®3 - one hand, up and down motion, shoulder abducted 90°; 4) BB®4 - one hand, side to side motion, shoulder and elbow flexed 45°; 5) BB®5 - two hands, side to side motion, shoulders and elbows flexed 45°; 6) BB®6 - two hands, up and down motion, shoulders flexed 90°; and 7) BB®7 - two hands, front to back motion, shoulders flexed 90°. EMG data were collected from anterior and posterior deltoids, sternal pectoralis major, latissimus dorsi, infraspinatus, upper and lower trapezius, and serratus anterior during 10 sec of continuous motion for each exercise, and then normalized using maximum voluntary isometric contractions (MVIC). A two-factor repeated measures Analysis of Variance ( $p < 0.05$ ) was employed to assess differences in EMG activity between BB® devices (BB®C and BB®P) and genders.

**Results:** As hypothesized, for numerous exercises and muscles glenohumeral and scapular EMG activity was significantly greater in females compared to males and was significantly greater in the BB®P compared to BB®C. There were generally no significant interactions between BB® devices and gender. Overall glenohumeral and scapular muscle activity was significantly greater in BB®3 and BB®6 compared to the remaining exercises, but generally not significantly different between using one hand and using two hands.

**Conclusions:** It may be appropriate to employ BB® exercises during shoulder rehabilitation earlier for males compared to females and earlier for the BB®C compared to the BB®P given less overall muscle activation in males and BB®C compared to in females and BB®P. There was generally no difference in muscle activity between performing the BB® with one-hand or two-hands. Differences in muscle activity between exercises generally was the similar regardless if the BB®C or the BB®P was employed.

**Level of Evidence:** Level 2

**Key Words:** Electomyography, oscillation exercises, sports rehabilitation, vibration exercises

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