



## Photobiomodulation Delays the Onset of Skeletal Muscle Fatigue in a Dose-Dependent Manner

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**Abstract:** Photobiomodulation (PBM) therapy has been implicated as an effective ergogenic aid to delay the onset of muscle fatigue. The purpose of this study was to examine the dose-response ergogenic properties of PBM therapy and its ability to prolong time to task failure by enhancing muscle activity and delaying the onset of muscle fatigue using a static positioning task. Nine participants ( $24.3 \pm 4.9$  years) received three doses of near-infrared (NIR) light therapy randomly on three separate sessions (sham, 240, and 480 J). For the positioning task, participants held a 30 % one-repetition maximum (1-RM) load using the index finger until volitional fatigue. Surface electromyography (sEMG) of the first dorsal interosseous muscle was recorded for the length of the positioning task. Outcomes included time to task failure (TTF), muscle fatigue, movement accuracy, motor output variability, and muscle activity (sEMG). The 240-J dose significantly extended TTF by 26 % ( $p=0.032$ ) compared with the sham dose. TTF for the 240-J dose was strongly associated with a decrease in muscle fatigue ( $R^2=0.54$ ,  $p=0.024$ ). Our findings show that a 240-J dose of NIR light therapy is efficacious in delaying the onset and extent of muscle fatigue during submaximal isometric positioning tasks. Our findings suggest that NIR light therapy may be used as an ergogenic aid during functional tasks or post-injury rehabilitation.

**Key Words:** Ergogenic; Motor output variability; Near-infrared; Surface electromyography; Task failure

