



# Salidroside Ingestion Enhances Oxygen Uptake During High-Intensity Exercise In Healthy, Young Adults

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## INTRO / BACKGROUND

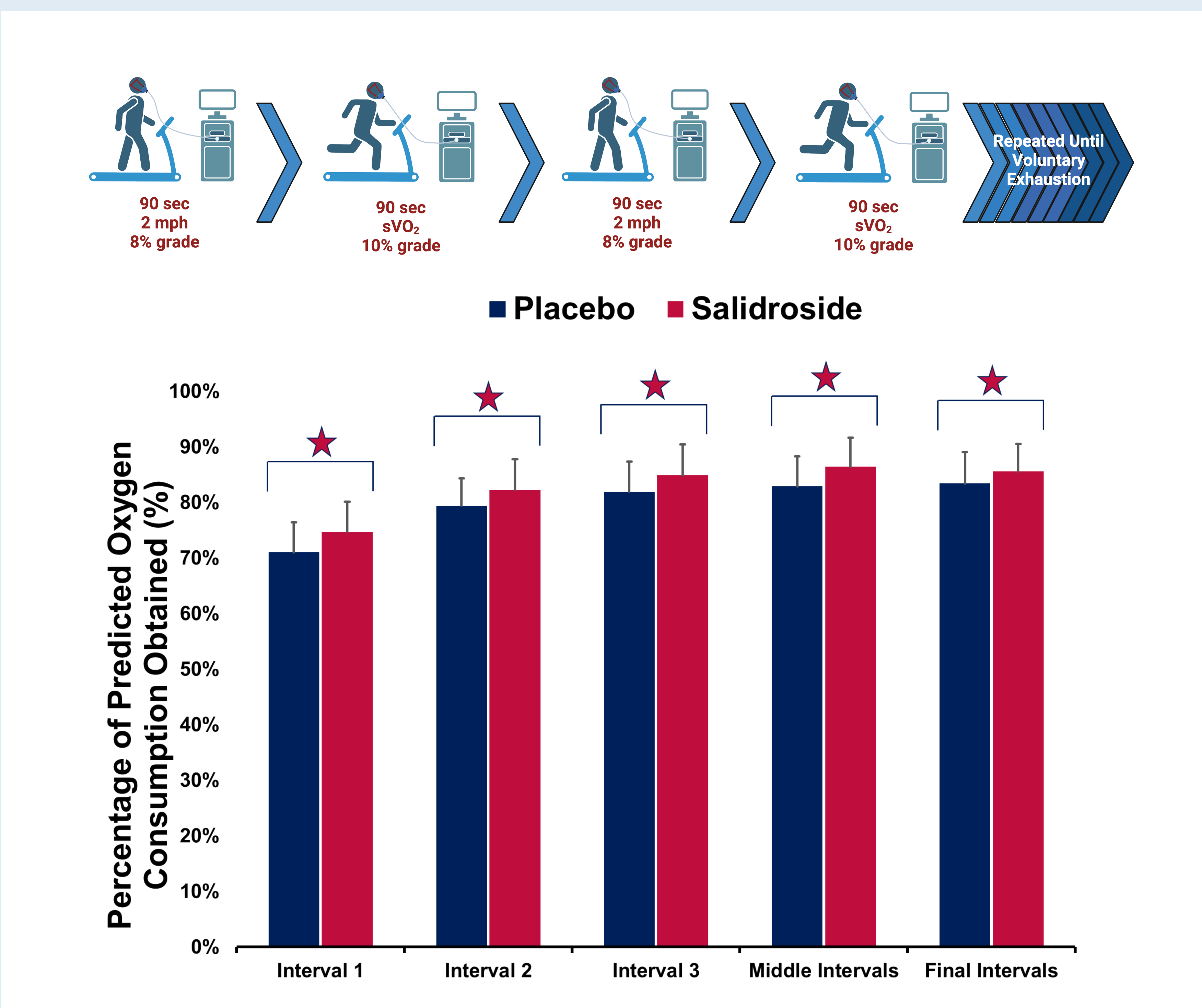
The purpose of this study was to examine the effects of salidroside ingestion on oxygen uptake in healthy, young adults. Salidroside is a component of the *Rhodiola rosea* plant purported to have many benefits for metabolic function and stress resistance. Typically, salidroside is ingested as a *Rhodiola rosea* plant extract. The salidroside used in this study was produced through biosynthetic means, thus the product consisted of 100% salidroside.

## METHODS

Fifty subjects (30M, 20F; Mean ± SD; Age: 21 ± 4 y) completed this double-blind, placebo-controlled study. Subjects were randomized to a Salidroside (SAL; 30 mg/2x/day of SAL) or Placebo (PLA; 30 mg/2x/day of rice flour) group. Subjects completed an entry session followed by pre- (PRE) and post-testing (POST), which were 14 days apart and consisted of 3 visits at each timepoint. During the entry session, demographic information was collected and informed consent was obtained. Testing session 1 consisted of a treadmill test to determine peak oxygen consumption (VO<sub>2</sub> peak). Subjects began ingesting their supplement the following day (Day 2). During testing session 2 (Day 3), subjects returned to perform a time-to-exhaustion (TTE) test on a treadmill having consumed their supplement 30 min prior. During the TTE test, subjects had their oxygen consumption measured during a protocol that consisted of 1.5-min work bouts at the speed associated with their VO<sub>2</sub> peak at 10% grade followed by active recovery for 1.5 min at 2 mph at 8% grade. Intervals were completed until volitional exhaustion. After the conclusion of testing session 2 of pre-testing subjects continued supplementation throughout the remainder of the study. Subjects returned to the lab for post-testing 14 days after their first testing session of PRE. All procedures were repeated at POST, however, subjects consumed their supplement 30 min prior to each of their testing sessions. During the TTE tests, the percentage of predicted VO<sub>2</sub> peak that was achieved during the trial was recorded. Every subject was able to complete at least three intervals, thus the first three intervals were compared individually between groups. Beyond that, subjects completing 5 or more intervals had their remaining intervals split in half and averaged as middle intervals and final intervals for analyses.

## PRACTICAL APPLICATIONS

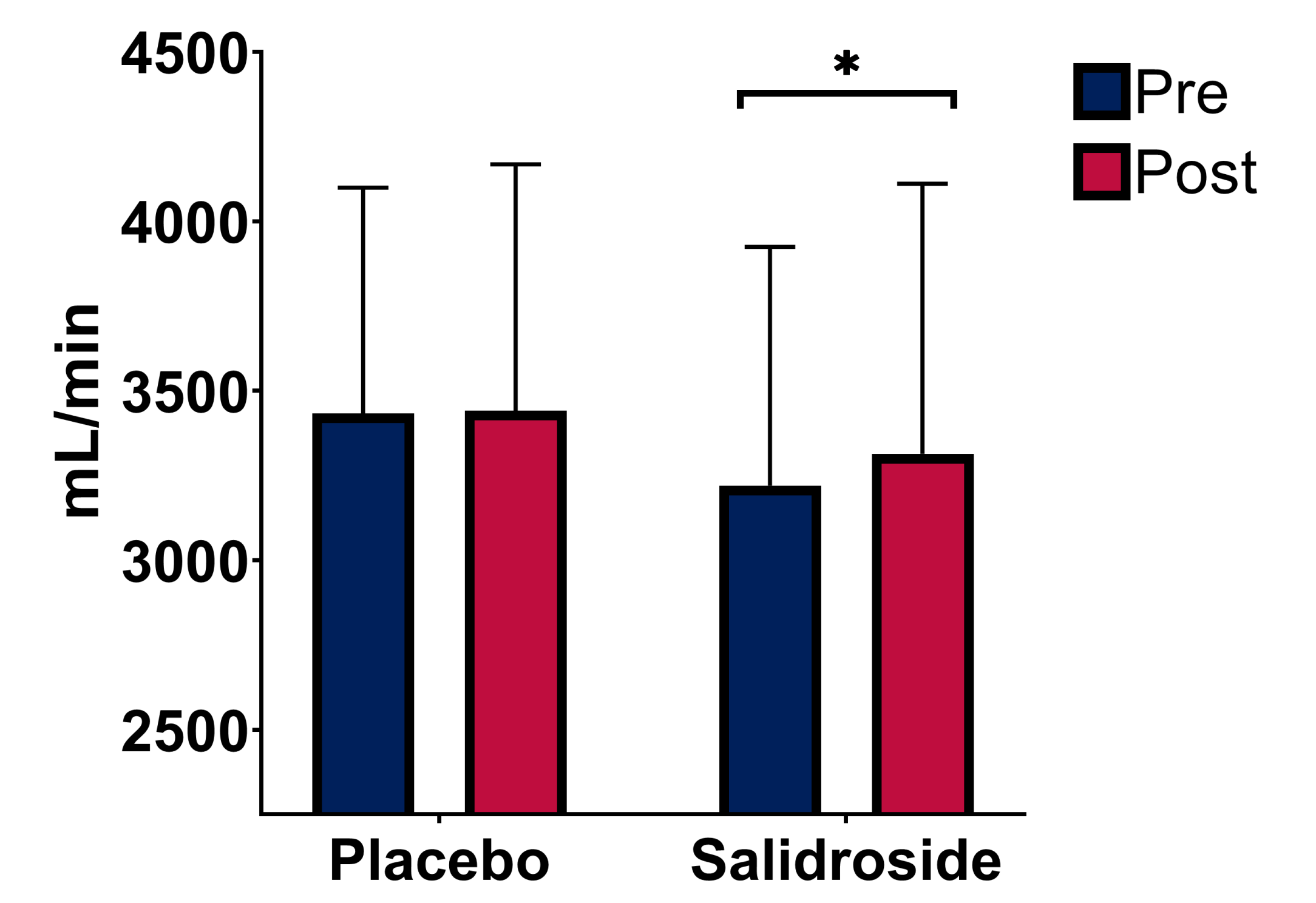
**Acute salidroside supplementation may be beneficial for athletes looking to enhance oxygen uptake during high-intensity exercise.**



**Figure 1:** Time-to-exhaustion (TTE) tests were performed with 90-sec work bouts at speed associated with maximal oxygen consumption at 10% grade with recovery bouts at 2 mph at 8% grade. Oxygen uptake was continuously measured and percentage of predicted maximal oxygen uptake for the correspondingly workload was recorded. No differences were observed between testing sessions for each group so data were collapsed for between group comparisons. Red stars indicate significantly greater percentage of predicted maximal oxygen uptake obtained for salidroside for each interval comparison. Amount of intervals performed varied so the intervals performed after the third interval were divided in half and grouped as middle and final intervals.

## RESULTS

Despite no significant interaction (TIME x GROUP;  $p = 0.19$ ), TIME ( $p = 0.12$ ), or GROUP ( $p = 0.41$ ) effect, analysis of simple main effects indicated a significant increase from PRE to POST in peak absolute VO<sub>2</sub> uptake for the SAL group ( $3220 \pm 705$  to  $3314 \pm 797$  mL/min;  $p = 0.43$ ), whereas no change was observed for the placebo group ( $3433 \pm 666$  to  $3441 \pm 727$  mL/min;  $p = 0.86$ ; Figure 2). There was no significant interaction (TIME x GROUP;  $p = 0.52$  to  $0.91$ ) or TIME ( $p = 0.17$  to  $0.98$ ) effect for Interval 1, Interval 2, Interval 3, Middle Intervals, or Final Intervals; therefore, the data were collapsed to compare groups. Group-wise comparisons revealed that SAL was able to reach a significantly higher percentage of VO<sub>2</sub> peak during all work intervals (SAL vs. PLA; Interval 1:  $74.7 \pm 5.5\%$  vs.  $71.0 \pm 5.4\%$ ,  $p < 0.001$ ; Interval 2:  $82.3 \pm 5.5\%$  vs.  $79.4 \pm 5.0\%$ ,  $p < 0.001$ ; Interval 3:  $84.9 \pm 5.6\%$  vs.  $81.9 \pm 5.4\%$ ,  $p = 0.001$ ; Middle Intervals:  $86.4 \pm 5.2\%$  vs.  $82.9 \pm 5.4\%$ ,  $p < 0.001$ ; Final Intervals:  $85.6 \pm 5.0\%$  vs.  $83.4 \pm 5.6\%$ ,  $p = 0.016$ ).



**Figure 2:** Absolute peak oxygen consumption (mL/min) for each group by time point. \* denotes significant increase from Pre to Post for Salidroside group.

## CONCLUSION

Salidroside supplementation may beneficially alter oxygen uptake in healthy, young adults performing high-intensity interval training.

**ACKNOWLEDGEMENT**  
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