

# Effect of a selected adaptogen ergogenic aid on dynamic and static visual reaction time: a preliminary study

## Abstract

Rhodiola rosea (*R. rosea*) is an herb found in the mountain regions in Asia and Europe with a long history of use as a traditional medicine. *R. rosea* has been proposed to be an adaptogen associated with increasing performance, focus and simple and choice reaction time. The means by which *R. Rosea* is associated with these attributes is not fully understood, but it may be related to the hypothalamic-pituitary-adrenal axis by stimulating neurotransmitters. The aim of this study was to determine if *R. Rosea* has an effect on dynamic (Dyn) and static (Sta) visual reaction time. The Dyn task placed the participant in a virtual computer generated driver's seat of a moving vehicle. At random intervals a stop sign flashed and the participant was to tap the space bar as quickly as possible. The Sta task represented a traffic light. The participant was to click the mouse the instance the green light changed to red. Each assessment required five attempts which were averaged in msec. Following pre-testing of the aforementioned assessments, participants were randomly given a seven-day supply of *R. Rosea* or placebo. After one week participants reported to the lab for post testing. For the Dyn reaction assessment the *R. rosea* group a slight, but not significant pre- to posttest improvement over the placebo. The placebo group recorded 0.364 ms and 0.338 ms for pre- and posttest respectively (0.015ms and 0.026ms respectively). The Sta reaction module yielded a slight but non-significant improvement ( $p>0.05$ ) between groups with the *R.rosea* improving by 0.068ms from pre- and posttest and the placebo group only improving 0.008ms. Suggestions for further study included longer supplementation periods and increases in dosage.

**Keywords:** reaction time, vision, supplement, *Rhodiola rosea*

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**Bert H Jacobson, Steve Azzaro**

Kinesiology and Applied Health, Oklahoma State University, USA

**Correspondence:** Bert H Jacobson, Health and Human Performance, School of Kinesiology, Applied Health, and Recreation, College of Education and Human Science, Oklahoma State University, Stillwater, Oklahoma, USA

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## Introduction

Nutritional supplements have been always had a niche throughout history in hopes that certain herbs or botanicals can provide, wisdom, health, libido among other impactful attributes. *R. Rosea*, also known as golden root is an herb found in the mountain regions in North America, Asia, and Europe, and has a long history of use as a traditional medicine for the purpose of increasing performance, mood, and cognition. With respect to chemical constituents, about 140 chemical compounds such as phenols, rosavin, organic acids, terpenoids, and phenolic acid along with their derivatives make up the components of *R. Rosea*. Minimal side effects are associated with standardized doses such as dry mouth or excess saliva. However, those using prescribed medications such as autoimmune, diabetic, antihypertensive, and sedative medications should use a degree of caution.

The mechanism by which *R. rosea* works is not fully understood, but it appears to be associated with the hypothalamic-pituitary-adrenal axis that modulates the response to stress.<sup>1</sup> *R. Rosea* has been projected to be an adaptogen, which is associated with properties that increase mental resources, which may enable better performance particularly in situations consisting of multiple tasks.<sup>2</sup> For instance, in a study by Koop, et al.,<sup>3</sup> results of a 12 week, 2x200mg *R.rosea* protocol, they found improvement in the a dual task protocol requiring the participant to react to specified target stimuli and simultaneously withhold reactions to a similar non-target stimuli.

Nutritional ergogenic aids have been investigated to determine if selected supplements have the ability to improve mental and

physical performance. *Rhodiola rosea* (*R. rosea*) has been associated with enhanced performance, improved focus<sup>4</sup> movement speed<sup>5</sup> and quicker reaction time.<sup>6</sup>

Previous research has suggested also that *R.rosea* improves endurance exercise capacity<sup>7,8</sup> as well as anaerobic performance.<sup>9</sup> Others have found that *R.rosea* can reduce both lactate levels and skeletal muscle damage after intense exercise.<sup>10</sup> In contrast, one study did not find that *R.rosea* affected 2,000-m rowing time<sup>11</sup> and other studies found no benefit in *R.rosea* supplementation on 5-km performance<sup>12</sup> or treadmill walk to exhaustion.<sup>13</sup> With respect to power and resistance training following *R.rosea* supplementation, the limited clinical research that is available seems to be positive. For instance in one study, Liu et al.,<sup>14</sup> found that chronic (30d) supplementation prior to exercise assessment resulted in improved performance in the bench press, squat, and knee extension. Another study employing acute supplementation<sup>15</sup> found that *R.rosea* supplementation led to an 8% increase in mean concentric velocity in the bench press.

Little has been done relative to the effect of *R. Rosea* supplementation and simple visual reaction time. One study seems to provide some evidence that *R. Rosea* may improve visual reaction time and total response time. For instance, Jówko and associates<sup>6</sup> using 200 mg. *R. Rosea*, suggested that the supplement “shortened reaction time and total response time”, and reduced mental fatigue. Another study,<sup>3</sup> determined that *R.rosea* improves mental speed and thus significantly ( $p<0.05$ ) improved reaction time as measured by computer assessment. The aim of this study was to investigate the effect of chronic *R. Rosea* supplementation on simple visual reaction time.

## Methods

### Participants

Thirty college aged males (n=13) and females (n=17) ranging in age from 18 to 23 years of age were recruited from a Midwestern American university for the study and each participant read and signed a university approved Institutional Review Board (IRB) consent form prior to participating. Exclusion criteria included astigmatism, eye infection or inflammation, blurred vision, retinal disorder, color blindness, a history of ocular disease, and the use of any vision enhancement supplement. Participants were free from any known musculoskeletal, metabolic, or cardiorespiratory disorders and were considered to be in good health.

### Procedures

Participants were asked to complete a study eligibility questionnaire form consisting of health history and eye health. Subsequently, qualifying participants were asked to complete two computer-generated assessments to measure simple visual reaction time (VRT). All participants were briefed and allowed two practice trials. One of the computerized assessments represents a dynamic task, which illustrated the participant's view from the automobile driver's perspective while in a forward moving car. This assessment was labeled as "Dyn". The screen illustrated moving down a country road and at a random time, a red stop sign would appear on the screen and the participant's task was to left click the mouse as quickly as possible, and time was recorded in 1/1000s. The task consisted of five separate trials that were assessed and averaged. The other assessment consisted of a static task illustrating a traffic light with a green light, a yellow light and a red light. Once the participant clicks the start button the light will change from green to red at a random time. At that instance, the participant clicks the space bar and the time was recorded in 1/1000s. This assessment was labeled "Sta". Five trials were completed and averaged. Participants were seated in a chair adjusted to the participant's height to eye level and a comfortable distance from the computer screen.

### Supplementation

Supplementation of followed a double-blind placebo controlled design. Participants reported to the lab and were provided instructions and allowed two practice trials on each of the two assessments. Following the pre-assessment scores, the participants were randomly divided into two supplementation groups consisting of 250 mg. R. rosea or placebo. Each participant was given a seven-day supply of one of the supplements, provided directions on how to take the supplement, and given a log to complete in order to remind them to take the supplement/placebo each day. Following the seven days of supplementation, the participants returned to the lab and completed the same visual assessments. While in the supplement phase participants were instructed to report any adverse reactions from supplementation contributed to the supplement. If participants missed a day of supplementation, they were instructed to take the missed dosage as soon as possible.

## Results

Results are expressed as means and standard deviation (SD). Statistical analysis consisted of separate repeated measures ANOVAs with an alpha level set at  $\alpha=0.05$ . The Sta reaction module yielded a slight but not significant improvement ( $p>0.05$ ) between groups with the R. Rosea registering 0.348 ms and 0.280 ms on (-.068ms) pre- and posttest respectively and the placebo registering 0.401 ms pre-test and

0.393 ms (-0.008ms) posttest receptively (Figure 1). Results for the Dyn reaction assessment yielded no significant group differences. The placebo group recorded 0.364 ms and 0.338 ms for pre- and posttest respectively (0.026ms difference between pre- and posttests) and the experimental group recorded 0.350ms and 0.331 ms for pre- and posttest respectively (0.015ms difference between pre- and posttests) (Figure 2).

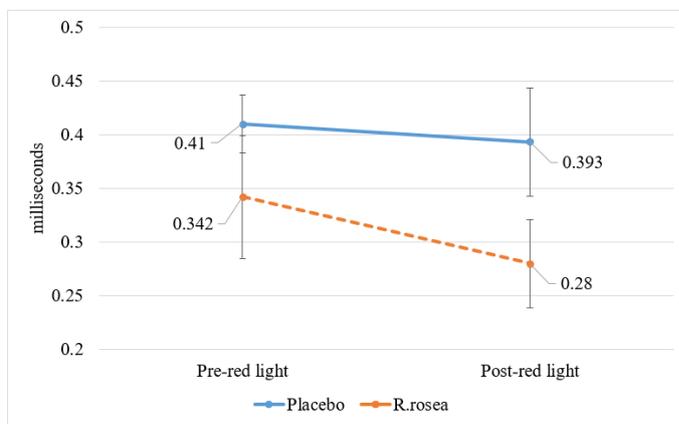


Figure 1 Pre- and posttest means and SD for red light reaction time by group.

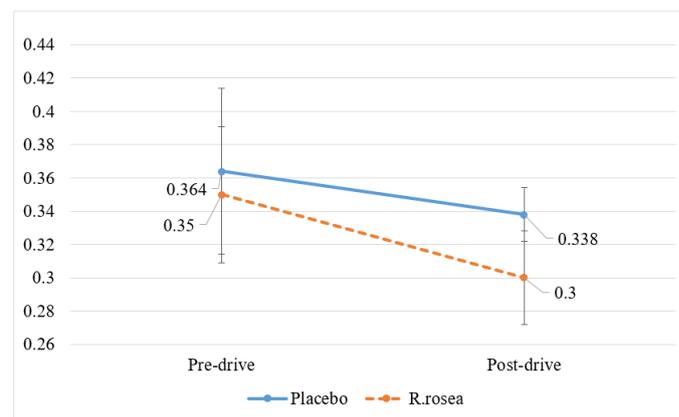


Figure 2 Pre- and posttest means and SD for drive reaction time by group.

## Discussion

Rhodiola Rosea (R. Rosea) is a botanical with bioactive components that may serve as an adaptogen, which can increase resistance to stress and improve resiliency.<sup>16</sup> Additionally, R.rosea has ergogenic properties that may modulate energy substrate use, reduce fatigue and muscle damage. Furthermore, R.rosea has been shown to improve resistance-training results.<sup>14</sup> Other studies have found that R.rosea may be applicable to sport performance such as movement speed and accuracy<sup>5</sup> and quicker simple reaction time and choice reaction time.<sup>6</sup> The work of Jówko et al.,<sup>6</sup> and associates notwithstanding, little has been done with respect to the impact of R.rosea and simple visual reaction time. R.rosea has shown a potential for eye health due to its antioxidant effects. For instance, R.rosea may protect the retina from damage caused by oxidative stress. The current study utilized a 7-day supplementation schedule with 250 mg of oral R.rosea and did not statistically support simple visual reaction time improvement. While the experimental group out- performed the placebo slightly, significance was not reached. Further studies may consider alternate doses of R.rosea in the assessment of visual reaction time and utilizing other visual coordinated assessments.

## Conclusion

The quest to improve physical, cognitive, healing and sexual functioning has had a long historical background dating back to over 60,000 years. Such attempts typically included utilizing a variety of plants and herbs presented in a variety of concoctions. Indeed, people of cultures such as the Chinese, Egyptians, and Indians used a variety of plants and herbs to achieve selected goals. Much of pharmacological contemporary science has its roots in the active ingredients in plants and herbs which have subsequently been synthetically manufactured. To that end, *R.rosea* has been touted to improve physical and cognitive performance, but all of the potential benefits may have yet to be investigated. The current study, while not fully reaching significance, does lean toward a beneficial outcome in selected visual factors and thus, warrants additional investigation.

## Acknowledgements

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## Conflicts of interest

The authors declare that there are no conflicts of interest.

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