

RHODIOLA ROSEA

An overview of its versatility, effectiveness
and indications



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Background and Uses

Rhodiola rosea has become one of the most important adaptogenic plants used in modern alternative clinical practices. Historically, Rhodiola rosea, or “golden root”, has been used in Eastern Europe, Scandinavia and Asia. It has remained largely unknown in the West, until the last decade or so. Traditionally, Rhodiola rosea was used in folk medicine with a reputation to increase physical endurance, productivity, longevity, resistance to high altitude sickness, fatigue, depression, anemia, impotence, gastrointestinal ailments, infections and disorders of the nervous system.¹ The roots were used as bouquets to enhance fertility in young Siberian couples prior to their marriage. The tea was used for colds and flues during the hard winters in Asian. Rhodiola was highly coveted as a trade item by outsiders, and in exchange, they gave up their fine wines, fruits and honey.

The Vikings of Scandinavia used the herb to enhance their physical strength and endurance - something they came to be famous for. All of this folklore first led to investigations of its phytochemistry in the early 1960s that identified adaptogenic compounds in the roots of the plant. These adaptogens, as well as the later discovered antioxidant and stimulating compounds in Rhodiola rosea, are responsible for its medicinal properties.

Active Constituents

The root of Rhodiola rosea has six distinct groups of chemical compounds:

- Phenylpropanoids: rosavin, rosin, rosarin
- Phenyylethanol derivatives: salidroside (rhodiololide), tyrosol
- Flavonoids: rodionin, rodiosin, acetylrodalgin, triclin
- Monoterpenes: rosiridol, rosaridin
- Triterpenes: daucosterol, beta-sitosterol
- Phenolic acids: chlorogenic and hydroxycinnamic, gallic acids.

Standardized extracts that are currently available in the U.S. are most commonly standardized for rosavin and/or rhodiololide.

Mechanism of Action

The properties of Rhodiola rosea to influence the cardiopulmonary system, central nervous system, and improve the ability to adapt to stressors have been attributed primarily to its influence on the levels and activity of serotonin, dopamine, and norepinephrine in different structures in the brain. It may be that the plant inhibits the breakdown of these chemicals and facilitates the neurotransmitter transport within the brain.² In addition to these effects on the central nervous system, Rhodiola has been reported to increase the chemicals that provide energy to the muscle of the heart and to prevent the depletion of adrenal catecholamines induced by acute stress.³ Furthermore, Rhodiola has been observed to prevent the stress-induced increase of cortisol,⁴ which may account for its anti-stress effect, but might also be associated with increased attention, anti-fatigue effect as well as the antidepressant effect.

Central Nervous System Effects

Historically, Rhodiola was observed to act in humans as a tonic, increase attention span, memory and work performance. Two human studies were able to show that individuals with fatigue, irritability, insomnia and decline in work capacity responded favorably to a Rhodiola dose of 50 mg three times a day.^{5,6}

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In study of 60 men and women ages 20-55, who were experiencing symptoms equivalent to “chronic fatigue syndrome”, groups were randomized to receive either four tablets of Rhodiola extract or placebo for 28 days.⁷ Each tablet contained 144 mg of proprietary Rhodiola extract SHR-5 (herb extract ratio 4:1; extraction solvent 70% ethanol).

In a study of 56 young, healthy men and women physicians exposed to long hours, on call night duty and long term sleep disturbances, students, physicians and scientists, Rhodiola extract or placebo was given for 2 weeks, followed by a washout and then switching to the other treatment for 2 weeks.⁸ A low dose Rhodiola extract of SHR-5 was given, containing 170 mg Rhodiola extract with 4.5 mg salidroside per day). Testing measurements were taken at baseline and on a daily basis prior to and following night duty. A statistically significant change in performance of about 20% was observed for participants in the Rhodiola group after the first two weeks.

Another clinical trial studied the efficacy of a Rhodiola extract in patients suffering from mild-moderate depression.⁹ This randomized double-blind placebo-controlled study took place over 6 weeks. A total of 91 men and women ages 18-70 were divided into 3 groups: 1) Two tablets per day of SHR-5 (1 tablet=400 mg with 170 mg of SHR-5 for a total extract of 340 mg/day) or 2) two tablets twice per day (an total extract dose of 680 mg/day) or 3) placebo. Both doses of Rhodiola extract had improvements in overall depression, together with insomnia, emotional instability and somatization with no effects in the placebo group. Self-esteem did not improve in the low dose and the placebo group, but did demonstrate significant improvement in the higher dose Rhodiola extract.

A randomized, double-blind, placebo-controlled clinical study was done on capacity for mental work in a population of 161 fatigued and stressed cadets ages 19-21.¹⁰ Groups were given either one capsule of Rhodiola extract (SHR-5 at 185 mg per capsule), or two capsules, or placebo, or no treatment. The test given was used to evaluate the effect of fatigue on the short term memory. The results showed a pronounced statistically significant anti-fatigue effect similar with both doses of Rhodiola and no significant effect in the placebo or control group.

A low dose of Rhodiola rosea SHR-5 extract or placebo was also given several days before intense intellectual work such as final exams in a double-blind, randomized and placebo-controlled trial of foreign students.¹¹ Each tablet contained 50 mg of SHR-5 and dosing was one tablet twice daily for 20 days. The extract improved the amount and quality of work and prevented decreased performance due to fatigue.

In an open study of healthy students, physicians and scientists, 10 drops of Rhodiola tincture equivalent to 100-150 mg of extract was given 1-2 times per day for 2-3 weeks before final exams.¹² The amount and quality of the work improved in all cases as well as alleviating fatigue.

Cardioprotective Effects and Effects of Work Capacity

Rhodiola appears to have some cardioprotective effects, including prevention of stress induced cardiac damage, a decrease of myocardial catecholamines and cyclic adenosine monophosphate, and a reduction in adrenal catecholamine release.^{13, 14}

Several studies have shown that Rhodiola increased physical work capacity and significantly shortened the recovery time between bouts of intense exercise. In one study, work capacity was increased by 9 percent and the pulse slowed to normal much more quickly.¹⁵ Biathlon athletes given Rhodiola also have shown statistically significant increased shooting accuracy, less arm tremor and better coordination. Improved recovery time, strength, endurance and cardiovascular measures were also significantly better in those who took Rhodiola.¹⁵

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Another study investigated the effect of acute and 4 week Rhodiola rosea intake on muscle strength, speed of limb movement, reaction time, physical capacity and attention.¹⁶ This was a double blind placebo-controlled randomized trial in 24 healthy men, in which there was an acute phase, whereby measurements were taken after one hour of ingesting a 200 mg Rhodiola extract containing 3% rosavin plus 1% salidroside or placebo on two different days. Phase II occurred when subjects underwent the first two doses as in phase I, but then took Rhodiola for 4 weeks and repeated the same process. Compared with placebo, acute Rhodiola intake during phase I increased the time to exhaustion by about 3% and was accompanied by a small increased oxygen uptake and cardiac output. Peak lactic acid concentration was the same for treatment and placebo. This response did not improve after 4 weeks of daily intake of Rhodiola.

Endocrine System

Animal studies looking at the effect of Rhodiola on thyroid function, adrenal function and ovarian egg maturation, has raised interest in Rhodiola for endocrine problems in humans. 40 women suffering from amenorrhea (loss of menstrual cycles) were given 100 mg of Rhodiola twice daily for 2 weeks or an injection for 10 days. In some women, the regimen was repeated 2-4 times. Remarkably, normal menses were restored in 25 women, 11 of whom became pregnant.¹⁷ Physicians have reported cases of women who had failed to conceive with standard fertility drugs, who then became pregnant within several months of beginning Rhodiola rosea extract. This would be truly a remarkable contribution to women's health, if follow-up controlled clinical trials confirmed these findings. For men, 26 out of 35 with erectile dysfunction and/or premature ejaculation responded to Rhodiola rosea (150-200 mg/day for 3 months) with significantly improved sexual function.¹⁸

Research Summary

Modern research is probably best and most simply understood with a summary overview of the effects of Rhodiola on different systems. Much of this research is still only published in foreign languages but details of these studies can be obtained from an excellent overview article on Rhodiola rosea.¹⁹ The research summarized here is a mixture of laboratory, animal and human studies.

- Effects on the Central Nervous System:
 - Stimulates norepinephrine, dopamine, serotonin
 - Increases the permeability of the blood brain barrier to precursors of dopamine and serotonin
 - Enhanced learning and memory in animal models
 - Enhanced attention, thinking, analyzing, evaluating, calculating and planning
 - May help to protect the nervous system from oxidative damage by free radicals
 - Improved fatigue, work capacity, sleep, appetite, irritability and headaches
 - Improved the amount and quality of work
 - Reduced fatigue in stressful situations
 - Improvements in general well-being, physical fitness, mental fatigue, final exam grades and coordination
 - Decrease in psychic fatigue and situational anxiety
- Effects on the Capacity for Physical Work
 - Increased work capacity
 - Shortened the recovery times between bouts of high-intensity exercise
 - Improved physical strength, endurance, and coordination
 - Increased essential energy metabolites, adenosine triphosphate (ATP) and creatine phosphate in the muscle and brain mitochondria
 - Increased the metabolism of fats
 - Improved muscle energy metabolism

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- **Adaptogenic and Neuroendocrine Effects**
 - Increased duration of time possible to tolerate stress
 - Reduced damage from stressors - muscular, environmental, emotional
 - Improvements in the neurological mechanisms of dealing with stress
 - Enhanced thyroid function without causing hyperthyroidism
 - Restored normal menstrual cycle
 - Improved sexual function in males
- **Cardioprotective Effects**
 - Prevention of stress induced cardiac damage
 - Reduced adrenal catecholamine release
 - Prevention of arrhythmias
 - Increase in physical work capacity - increased strength of heart muscle contractility
 - Increased cardiovascular reserves
 - Enhanced functions of the sympathetic and parasympathetic systems
- **Antioxidant and Anti-carcinogenic Effects**
 - Decreased toxicity from cyclophosphamide, rubomycin and adriamycin
 - Enhanced anticarcinogenic effects of those same chemotherapeutic medications
 - Inhibited tumor growth
 - Decreased metastasis

Side Effects, Practitioner Dosing, Toxicity and Contraindications

Rhodiola rosea has a very low level of toxicity in animal studies. The toxic dose is calculated in humans to be about 235 gm or 235,000 mg for a 70 kg man. The typical daily dose for chronic administration is 360-600 mg per day when standardized for 1% rosavin, 180-300 mg when standardized for 2% rosavin, or 100-170 mg when standardized for 2.6% rosavin. There are also products available that list the rosavins in milligrams; examples include 6 mg of rosavins per 120 mg of rhodiola root or 12 mg of rosavins per 240 mg of rhodiola root. These formulations are an even more robust 5% rosavin content yet still, all of these provide a large margin of safety. Yet again other products might be standardized to the salidroside content although those seem to be less prevalent in the U.S. market.

Overall, there are very few side effects with Rhodiola. Some anxious individuals may be over activated and become agitated. Rhodiola rosea may also interfere with sleep in some individuals and should be taken early in the day. It should be avoided in individuals with bipolar disorder who have a history of manic episodes when given antidepressants or stimulants and should be used with caution in general, in those with bipolar disorder. If use is desired just prior to an academic exam or an athletic competition, the suggested dose is three times the dose for daily consumption for one dose. Safety issues are not available for pregnancy and lactation and should therefore be avoided.

Conclusion

Rhodiola rosea is most surprising in its versatility with its ability to affect the nervous system, cardiovascular system, endocrine system, immune system and musculoskeletal system. This is a remarkable range of therapeutic benefit from one simple plant. In this time of increasing emotional stress, increased pressures, demands and work loads, increased exposure to environmental stressors, and increased expense of our health care, a flexible and diverse herb that is not expensive, with a great safety profile, is more than appealing. Most individuals will see an improvement in their mood, energy level, mental capacity, memory, stamina and/or endurance within 2-6 weeks. Future research will likely explore the use of Rhodiola rosea in areas such as dementia, infertility, menstrual abnormalities, fibromyalgia, chronic fatigue syndrome, post traumatic stress disorder, attention deficit disorder, brain injuries, cancer, and sports performance.

About the Author

Dr. Tori Hudson, Naturopathic Physician, graduated from the National College of Naturopathic Medicine (NCNM) in 1984 and has served the college in several capacities, including: Medical Director, Associate Academic Dean, and Academic Dean. She is currently a clinical professor at NCNM, Southwest College of Naturopathic Medicine and Bastyr University, has been in practice for 27+ years, is the medical director of her clinic, "A Woman's Time" in Portland, Oregon, and director of product research and education for Vitanica.

Dr. Hudson was awarded the 1990 President's award from the American Association of Naturopathic Physicians for her research in women's health, the 1999 prestigious Naturopathic Physician of the Year award, the 2003 NCNM Alumni Pioneer Award and the 2009 Natural Products Association Pioneer Award.

She is a nationally recognized author (book: Women's Encyclopedia of Natural Medicine second edition, McGraw Hill 2008), speaker, educator, researcher, and clinician. Dr. Hudson serves on several editorial boards, advisory panels and as a consultant to the natural products industry.

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