Efficacy of Standardized *Rhodiola rosea* Dry Extract in Managing Stress Levels Among Healthcare Professionals

ABSTRACT

Aims: The objective was to evaluate the effect of using a standardized dry extract of Rhodiolarosea in stress management.
Study design:
Place and Duration of Study:
Methodology: The study was a randomized, placebo-controlled clinical trial. It was conducted at a hospital in Palmas, Tocantins, Brazil. It was conducted with 25 healthcare professionals, divided into control and placebo groups, where a dose of 210mg of *Rhodiolarosea* was used for 15 days in the control group. A perceived stress scale was applied, anthropometric measurements were taken, and laboratory samples were collected.
Results: The sample, predominantly female (88%), was composed of professionals in various healthcare roles, most working in a 12-hour shift system. The findings indicated that a significant portion of participants (52%) felt dissatisfied with their body weight, with 36% categorized as overweight or obese based on BMI. Additionally, 48% had waist circumference values indicating an increased risk for chronic diseases. The stress level assessment using the Perceived Stress Scale showed no statistical difference between those using Rhodiolarosea extract and the placebo, despite previous studies suggesting Rhodiola's efficacy in stress reduction. The lack of significant results in this study contrasts with other research that demonstrated the effectiveness of Rhodiolarosea in improving stress-related symptoms.
Conclusion: The results showed no significant difference between the use of the herbal medicine and the placebo in improving stress.

Keywords: *Rhodiolarosea, Herbal Medicine, Stress, overweight, BMI*

1. INTRODUCTION

Stress has been recognized as an occupational disease by Brazilian social security legislation since 1999 (Law No. 3048, 06/05/1999). It is defined as a process in which individuals perceive demands in their work environment as stress-inducing factors that exceed their coping abilities, thereby triggering negative physiological and psychological reactions (BANDEIRA, 2017). This condition predominantly affects healthcare professionals, including nurses, nursing technicians, physicians, and other medical staff (ALMEIDA et al., 2016; SANTOS et al., 2017; ZORZAL, 2020).

According to the *Quarterly Bulletin on Disability Benefits* (2017), published by the Social Security Secretariat of the Ministry of Finance in collaboration with the Ministry of Labor, reactions to severe stress and adjustment disorders played a significant role in work-related leave between 2010 and 2016. These disorders were identified as the primary causes of mental health-related leave, both for accident-related sickness benefits and disability retirement of the same nature (BRAZIL, 2017).

Stress management strategies may be pharmacological, focusing on treatments such as antidepressants, selective serotonin reuptake inhibitors (SSRIs), anxiolytics, mood stabilizers, and others (BERNIK et al., 2003). Additionally, medicinal plants, such as *Rhodiolarosea* L., have shown potential in preventing and alleviating stress-related reactions (STOJCHEVA & QUINTELA, 2022). Non-pharmacological approaches, including psychotherapy and integrative and complementary therapies, also play a crucial role in managing stress (NASCIMENTO et al., 2022).

Nutrition is another key factor in stress management, as the consumption of a healthy diet can positively influence mental health (GLABSKA et al., 2020). Furthermore, chronic stress poses a threat to the immune system's balance (DEAK et al., 2015), which can exacerbate or trigger various diseases and contribute to weight gain and obesity (ABESO, 2016; LIU et al., 2017).Therefore, this study aims to evaluate the efficacy of a standardized dry extract of *R. rosea* in managing stress levels.

2. MATERIAL AND METHODS

A double-blind, randomized, controlled clinical trial was conducted to evaluate the effect of nutritional support combined with a standardized dry extract of *Rhodiola rosea* compared to a placebo control in 24 healthcare professionals. Participants included individuals of both sexes, with 21 working in a 12-hour shift system followed by 36 hours of rest, and 4 following regular office hours of 8 hours per day. The trial took place at a private hospital in Palmas, Tocantins, and participants used the intervention as part of their routine activities, without hospitalization, to assess the efficacy of *R. rosea* extract and nutritional support in stress management.The study was conducted at a hospital employing approximately 400 staff members, including physicians, nurses, nursing technicians, physiotherapists, nutritionists, psychologists, speech therapists, as well as administrative, cleaning, and kitchen personnel.

The *Rhodiola rosea* extract samples were sourced from a compounding pharmacy in Palmas, Tocantins, duly registered with the appropriate health authorities. Both the *R. rosea* extract and the placebo were prepared at the same pharmacy and encapsulated in identical gelatin capsules, labeled as A and B. To ensure the integrity of the double-blind design, neither the researchers nor the participants were aware of which treatment was being

administered.The capsules were distributed to participants, who self-administered them at home each morning throughout the treatment period.

Healthcare professionals were invited to participate in the study. Those expressing interest were asked to complete an online questionnaire, which was followed by a screening process to assess eligibility based on the inclusion and exclusion criteria.A total of 40 healthcare professionals, of both sexes, initially met the eligibility criteria and were selected. Subsequently, these individuals were invited to attend an initial meeting, but only 25 were present. During this meeting, participants were thoroughly informed about the experimental protocol and were required to provide written consent by signing the informed consent form (Figure 1).

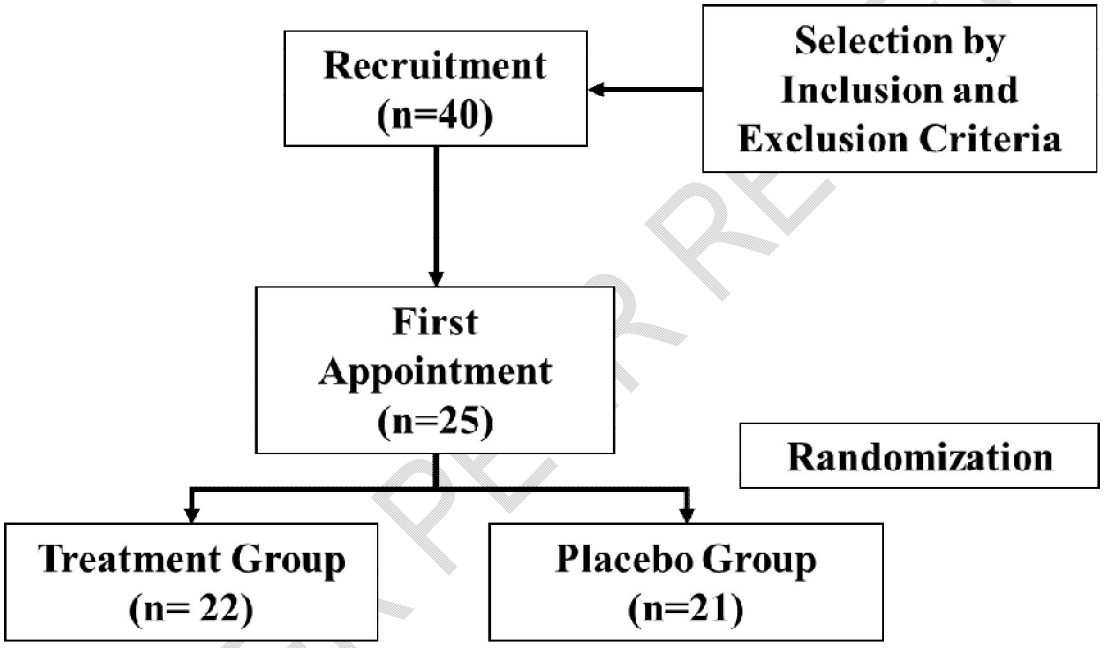

Figure 1. Flowchart of Volunteer Selection Process.

The study included male and female participants aged between 20 and 40 years, who worked either in a 12-hour shift system (12x36) or regular office hours of 8 hours per day.Exclusion criteria included smokers and pregnant women. Chronic smoking is known to contribute to the development of adverse psychological symptoms and is associated with increased cortisol release, a key stress hormone (COHEN et al., 2019). Similarly, caution is necessary when using medicinal plants for therapeutic purposes, as their active compounds may pose risks during pregnancy, including embryotoxic, teratogenic, or abortive effects (PIRES et al., 2021).

Experimental Protocol

The experimental protocol was adapted from the studies by Noreen et al. (2013) and aligned with the *Technical Manual of the Ministry of Health* (BRASIL, 2008), titled *Operational*

Instructions: Necessary Information for Conducting Clinical Trials with Phytotherapeutics, as outlined in the table below(Table 1).

Table1. Overview of the Experimental Protocol.

Group	Phase 1 (15 Days)		Phase 2 (15 Days)
1	Sample A (Rhodiolarosea)	**Interval (7 Days)**	Sample B (Placebo)
2	Sample B (Placebo)		Sample A (Rhodiolarosea)

Each group was evaluated for the effects of placebo and treatment (*Rhodiola rosea*) over a 15-day period for each treatment, with a minimum seven-day washout period between treatments. The administered dosage followed the protocol outlined by Noreen et al. (2013), with participants receiving one 210 mg capsule of *Rhodiola rosea* per day. Sample A contained *Rhodiola rosea* (210 mg), while Sample B was the placebo (50 mg of *Boldo*).The experimental protocol included a total of four consultations, which are outlined in Figure 1.

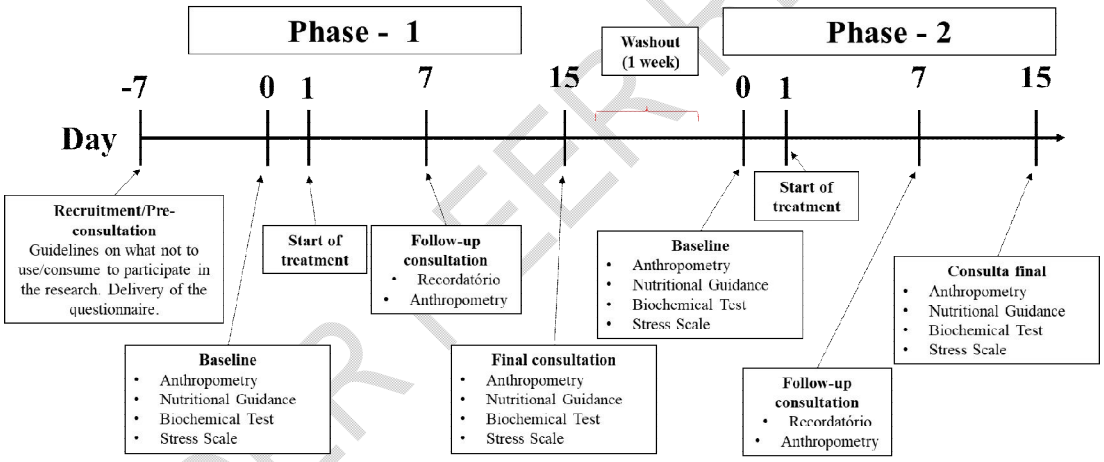

Figure2. Overview of the Consultations Conducted.

Evaluation of Stress Levels

To assess stress symptoms, the Perceived Stress Scale (PSS-10) was used (Cohen et al., 1983; Reis et al., 2010), in its validated and translated version into Portuguese (Figure 2). The PSS is a general scale applicable to various age groups, as it does not include questions specific to any particular context. It comprises 10 items designed to evaluate how unpredictable, uncontrollable, and overwhelming the participant perceives their life to be.

Each question includes response options ranging from zero to four:0 = Never; 1 = Almost never; 2 = Sometimes; 3 = Almost always; 4 = Always

The total score on the scale is the sum of responses to these 10 items, with scores ranging from 0 (minimum) to 40 (maximum). This scale enables an overall assessment of perceived stress, providing a simple yet reliable measure of how individuals evaluate the level of stress in their lives. It is widely utilized in both clinical and research settings due to its ease of use and established validity across various populations.

Statistical Analysis

The data were stored in spreadsheets and validated using GraphPad Prism 8.0 software. The following statistical tests were conducted to analyze the data: the Shapiro-Wilk and Kolmogorov-Smirnov tests were used to assess the normality of the data, with a significance level set at 0.01. The results indicated no significant deviation from normality, suggesting that the data followed a normal distribution. Initially, ANOVA (Analysis of Variance) was performed to compare the means between the treatment group (Rhodiolarosea) and the placebo group, with a significance level of 0.05. Following ANOVA, a Tukey post-hoc test was conducted to identify where the differences between the groups occurred. However, no significant differences were found between the groups at the 0.05 significance level. In summary, the statistical analysis revealed no significant differences in the perceived stress scores between the Rhodiolarosea and placebo groups, as indicated by both the normality tests and the ANOVA results.

3. RESULTS AND DISCUSSION

3.1 Participants' Profile

Table 2 presents the sociodemographic characteristics of the sample. The data includes information on gender, age, income, and body mass index (BMI). The sample comprised 25 participants, with a predominance of females (88%). The most common age range was 30 to 34 years, accounting for 52% of the participants. Regarding family income, 76% of participants earned less than four minimum wages.

Table2. Sociodemographic Characteristics of Healthcare Professionals from a Private Hospital in Palmas, Tocantins, Brazil(n=25).

Variables	**Participants (n)**	**%**
Gender		
Male	3	12
Female	22	88
Age		
20 - 24	2	8
25 - 29	2	8

30 - 34	13	52
35 - 39	8	32
40	0	0
Income		
1 – 2 Minimum wages	7	28
2 – 4 Minimum wages	12	48
4 – 10 Minimum wages	6	24

Artuzu et al. (2017) also reported a higher participation of female healthcare professionals (72.5%) and an average age of 33.21 years when analyzing the clinical and nutritional profile of 80 workers from a hospital unit according to their work shifts. Silva et al. (2020) found that 68% of nursing professionals earned less than four minimum wages.

In Table 3, participants were asked about their professional occupation, work shift, and whether they held more than one job. The highest participation was from healthcare professionals, with nurses (44%) and nursing technicians (32%) making up the largest groups. The remaining 24% were comprised of physiotherapists, nutritionists, pharmacy assistants, and occupational safety technicians. A total of 84% of participants worked in a 12-hour shift system, with 36 hours of rest. Of these, 44% worked the day shift, 24% worked the night shift, and 16% worked a double shift (both day and night). Additionally, 7 (28%) professionals held more than one job, with the majority being nursing technicians and nurses.

Table3. Descriptive Analysis of the Careers of Healthcare Professionals from a Private Hospital in Palmas, Tocantins, Brazil(n=25).

Variables	**Participants (n)**	**%**
Professional Occupation		
Nursing Technician	8	32
Occupational Safety Technician	1	4
Nurse	11	44
Physiotherapist	2	8
Pharmacy Assistant	1	4
Nutritionist	2	8

Work Shift		
Business hours(8h)	4	16
Day shift(12h)	11	44
Night shift(12h)	6	24
Day and night shift(12h)	4	16
Has more than one job?		
No	18	72
Yes	7	28

Regarding professional occupation, Lin et al. (2021) also found a higher participation among nurses (46.8%), followed by doctors (17.7%), nursing technicians (18.8%), and administrators (16.7%) when observing employees at a Medical University Hospital in China.

The work shifts in this study are consistent with those observed by Dalri (2013), who reported that 53% of nursing professionals in an emergency hospital unit worked the day shift, while 42% worked the night shift. The night shift work rhythm was positively associated with work-related personal wear and tear (Lin et al., 2021).

Regarding additional employment, Bohrer (2020) found that 75% of nursing professionals at a hospital in the interior of Rio Grande do Sul held only one employment contract, a finding similar to that of the present study.

The dual work shift among healthcare professionals is more commonly associated with nurses, who often work uninterrupted hours to secure higher pay (Baldoino & Santos, 2020). This routine can lead to health issues such as stress, sleep disorders, pain, physical and psychological wear and tear, fatigue, and nutritional damage, all of which negatively impact the quality of life of these professionals and, consequently, influence the quality and safety of patient care (Coelho et al., 2014).

3.2 Nutritional status of the participants

Table 4 presents body perception and nutritional status based on body mass index (BMI) and waist-to-hip ratio. Regarding body perception, participants were asked about how they felt about their current weight and overall body satisfaction. It was found that 52% of the participants considered themselves overweight and, as a result, were dissatisfied with their bodies.

In terms of BMI, calculated from weight and height, it was observed that approximately 60% of participants (15 individuals) had a normal weight classification, while 36% (9 participants) had a BMI of 25 kg/m² or greater, classified as overweight or obese. Among these 9 participants, 7 worked in a 12x36 shift system.

To complement the BMI assessment, waist circumference was measured, and the waist-to-hip ratio was calculated. It was found that 48% of participants had waist circumference values above the reference threshold, and 36% had waist-to-hip ratios indicating an increased risk for chronic diseases (WHO, 1998).

Blake et al. (2021) reported body dissatisfaction in over half (58.4%) of 310 nursing professionals in the United Kingdom. This dissatisfaction with weight was also negatively correlated with BMI, as participants with higher BMIs were less satisfied with their body weight.

Obesity is a global health concern, with an increased risk of developing comorbidities such as type 2 diabetes, coronary artery disease, hypertension, pulmonary embolism, stroke, asthma, joint problems, and various types of cancer. This contributes to higher mortality rates among affected individuals (Roff & Jappy, 2017; Nimptsch et al., 2019).

Table4. Body Perception and Nutritional Status of Healthcare Professionals from a Private Hospital in Palmas, Tocantins, Brazil. (n = 25).

Variables	**Participants (n)**	**%**
feelings about current weight		
Thin	3	12
Normal	9	36
Slightly overweight	5	20
Overweight	5	20
Obese	3	12
body satisfaction		
Yes	12	48
No	13	52
BMI*		
Underweight	1	4
Healthy weight	15	60
Overweight but not obese	5	20
Obese class I	4	16
WC**		

Increased risk	6	24
Greatly increased risk	6	24
WHR* **		
No risk	16	64
Greatly increased risk	9	36

*BMI: Body Mass Index**WC: Waist circumference***WHR: Waist-to-hip ratio

According to IBGE data, in Brazil, the percentage of adults (≥18 years) with excess weight in 2019 was 62.6% for women and 57.5% for men (IBGE, 2019). Fracalossi & Antunes (2020) observed an average BMI of 26.9 ± 4.6 kg/m², which is classified as overweight, when analyzing 446 hospital staff members. The prevalence of overweight and obesity is notably high among nursing professionals, who are exposed to various risk factors for nutritional disorders, such as poor sleep quality (COELHO et al., 2014).

Working in shifts may increase the risk of overweight and obesity due to disruptions in eating habits, including the consumption of high-calorie foods, along with physical inactivity and sleep deprivation. Liu et al. (2018) highlighted these risks in a systematic review and meta-analysis involving 27 independent studies and a total of 311,334 participants, where 10,473 cases of overweight and 51,024 cases of obesity were identified among shift workers.

Pazza et al. (2014) observed an increased waist circumference in 36% of nursing technicians working the night shift at a public hospital, suggesting an elevated risk for cardiovascular diseases. Similarly, Almeida et al. (2006) found an increased waist-to-hip ratio in 27% of healthcare workers at a hospital in Fortaleza.

3.3 Stress level.

Figure 3 displays the stress levels of participants, as assessed by the Perceived Stress Scale,at the beginning and end of the treatment with Rhodiolarosea L. (210 mg) and placebo (50 mg of boldo). No statistically significant difference was observed between the treatments..

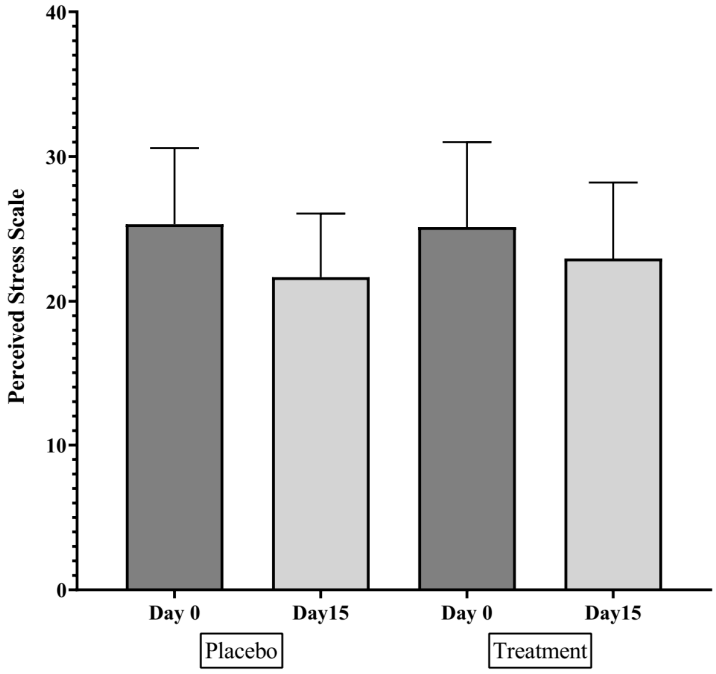

Figure3. Stress levels in healthcare professionals from a private hospital in Palmas, Tocantins State, based on the Perceived Stress Scale, following treatment with Rhodiolarosea L. and placebo (n = 22).

Contrary to the findings of the present study, Edwards et al. (2012), when investigating the therapeutic effects and safety of 200 mg of Rhodiolarosea extract administered twice daily for 4 weeks to 101 participants, found that the medication was both safe and effective in improving life stress symptoms to a clinically significant degree. Similarly, Lekomtseva et al. (2017) reported therapeutic effects, safety, and tolerability after administering 200 mg twice daily for 8 weeks to 10 individuals. At the study's conclusion, a significant improvement in symptoms of chronic or prolonged fatigue was noted, along with a favorable safety and tolerability profile. Furthermore, Kasper and Dienel (2017) observed relief from stress and burnout symptoms in a multicenter study of 118 patients with burnout, who received a daily dose of 400 mg of Rhodiolarosea extract for 12 weeks.

4. CONCLUSION

Therefore, despite the exhausting work routine, most of the healthcare professionals in the present study had an adequate nutritional status based on body mass index, waist circumference, and waist-to-hip ratio, but most felt overweight and consequently dissatisfied with their bodies. Although the participants' reports indicated improvement in work activity and sleep, the use of the herbal medicine Rhodiolarosea for 15 days at a dose of 210 mg did not achieve anxiolytic effects, suggesting that a higher dose and longer exposure to the medication may be necessary to observe significant effects on stress levels.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

The research project and the informed consent form (ICF) were approved by the Ethics Committee for Research with Human Beings at the Federal University of Tocantins, under CAAE number 50427521.9.0000.5519. This project adheres to the *Technical Manual of the Ministry of Health* (Brazil, 2008), titled *Operational Instructions: Necessary Information for Conducting Clinical Trials with Phytotherapies*.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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