**Original Article**
Pretto CR, Silva RM, Tamiozzo J, Lenz FCD, Jacobi LF, Colet CF.
Metabolic parameters of emergency nursing professionals before and after Rosmarinus use: a quasi-experimental study.
Rev Gaúcha Enferm. 2026;47:e20250330.
https://doi.org/10.1590/1983-1447.2026.20250330.en

# Metabolic parameters of emergency nursing professionals before and after *Rosmarinus* use: a quasi-experimental study

Parâmetros metabólicos de profissionais de enfermagem de urgência antes e após uso de *Rosmarinus*: estudo quase-experimental

Parámetros metabólicos de los profesionales de enfermería de urgencias antes y después del uso de *Rosmarinus*: estudio cuasi-experimental

Carolina Renz Pretto[a] https://orcid.org/0000-0002-6925-7969
Rosângela Marion da Silva[b] https://orcid.org/0000-0003-3978-9654
Juliana Tamiozzo[b] https://orcid.org/0000-0003-3586-379X
Flávia Camef Dorneles Lenz[b] https://orcid.org/0000-0001-8820-7126
Luciane Flores Jacobi[c] https://orcid.org/0000-0003-4622-9292
Christiane de Fátima Colet[d] https://orcid.org/0000-0003-2023-5088

[a] Secretaria Municipal de Saúde de Ijuí, Serviço de Atendimento Móvel de Urgência, Ijuí, RS, Brasil.
[b] Universidade Federal de Santa Maria, Centro de Ciências da Saúde, Santa Maria, RS, Brasil.
[c] Universidade Federal de Santa Maria, Centro de Ciências Naturais e Exatas, Santa Maria, RS, Brasil.
[d] Universidade Regional do Noroeste do Estado do Rio Grande do Sul, Departamento de Ciências da Vida, Ijuí, RS, Brasil.

**How to cite this article:**
Pretto CR, Silva RM, Tamiozzo J, Lenz FCD, Jacobi LF, Colet CF. Metabolic parameters of emergency nursing professionals before and after Rosmarinus use: A quasi-experimental study. Rev Gaúcha Enferm. 2026;47:e20250330. https://doi.org/10.1590/1983-1447.2026.20250330.en

**ABSTRACT**

**Objective:** To evaluate the metabolic parameters of emergency nursing professionals before and after the use of *Rosmarinus officinalis* L.

**Method:** This is a quasi-experimental study conducted in urgency services in Southern Brazil. Estimated sample of 46 nursing professionals. It took place from August to November 2022 and used a socio-labor questionnaire, blood collection and anthropometric measurements. After collecting the parameters studied, participants received two bottles with 56 capsules of *Rosmarinus* dry extract (500 mg each) to be ingested twice a day (dose of 1 g/day), for 8 weeks, after the same parameters were collected. Data were analyzed with descriptive and inferential statistics.

**Results:** A total of 36 professionals participated. After the intervention, there was a reduction in triglyceride and total cholesterol parameters; high-density lipoprotein dosage decreased, with maintenance of the parameter within the normal range; there were no changes in blood glucose levels, body mass index or Low-density lipoprotein cholesterol.

**Conclusion:** After using *Rosmarinus*, there was a reduction in triglycerides and total cholesterol in nursing professionals.

**Descriptors:** Emergency nursing; Nursing; Rosmarinus; Complementary therapies; Lipid metabolism.

**RESUMO**

**Objetivo:** Avaliar os parâmetros metabólicos de profissionais de enfermagem de urgência antes e após o uso de *Rosmarinus officinalis L.*

**Método:** Estudo quase-experimental realizado em serviços de urgência do Sul do Brasil. Amostra estimada de 46 profissionais de enfermagem. Ocorreu de agosto a novembro de 2022 e utilizou-se questionário sociolaboral, coleta de sangue e medidas antropométricas. Após a coleta dos parâmetros estudados, os participantes receberam dois frascos com 56 cápsulas de extrato seco de *Rosmarinus*, 500 mg cada, para ingerir duas vezes ao dia (dose de 1 g/dia), por 8 semanas; posteriormente os mesmos parâmetros foram coletados. Análise de dados com estatística descritiva e inferencial.

**Resultados:** Participaram 36 profissionais. Após a intervenção houve redução dos parâmetros de triglicerídeos e colesterol total; a dosagem de colesterol da Lipoproteína de Alta Densidade diminuiu, com manutenção do parâmetro na faixa de normalidade; não houve alterações nos níveis de glicemia, índice de massa corporal e colesterol da Lipoproteína de Baixa Densidade.

**Conclusão:** Após o uso de *Rosmarinus* houve redução dos triglicerídeos e colesterol total dos profissionais de enfermagem.

**Descritores:** Enfermagem de emergência; Enfermagem; Rosmarinus; Terapias complementares; Metabolismo dos Lipídeos.

**RESUMEN**

**Objetivo:** Evaluar los parámetros metabólicos de los profesionales de enfermería de urgencias antes y después del uso de *Rosmarinus officinalis L*.

**Método:** Estudio cuasi-experimental, desarrollado en servicios de urgencias del sur de Brasil. Tamaño de muestra estimado de 46 profesionales de enfermería. Recolección de datos de agosto a noviembre de 2022 mediante un cuestionario sociolaboral, extracción de sangre y medidas antropométricas. Tras la recolección de los parámetros estudiados, se entregó a los participantes dos frascos con 56 cápsulas de extracto seco de *Rosmarinus*, de 500 mg cada una, para tomar dos veces al día (dosis de 1 g/día) durante ocho semanas. Posteriormente, se recopilaron los mismos parámetros. Análisis de datos con estadística descriptiva e inferencial.

**Resultados:** Lo participaron 36 profesionales. Después de la intervención hubo reducción de los parámetros de triglicéridos y colesterol total; la dosis de colesterol de lipoproteínas de baja densidad disminuyó, manteniéndose el parámetro dentro del rango normal; no hubo cambios en los niveles de glucosa en sangre, índice de masa corporal y colesterol de lipoproteínas de baja densidad.
**Conclusión:** Después del uso de *Rosmarinus* hubo reducción de los triglicéridos y el colesterol total de los profesionales de enfermería.
**Descriptores:** Enfermería de Urgencia; Enfermería; Rosmarinus; Terapias Complementarias; Metabolismo de los Lípidos.

.

## INTRODUCTION

The use of medicinal plants for therapeutic purposes has accompanied human evolution, and current various disciplines and research have enabled the discovery of bioactive chemical products which have been used in the synthesis of medicines[1]. Medicinal plants occupy a prominent position in health practices in many cultures, whether due to ease of access, low cost, symbolizing safety, or being the only available therapy[1], being recognized in healthcare and recommended in formulating policies and regulations for incorporating these remedies of proven efficacy in healthcare[2]. The National Policy on Integrative and Complementary Practices (*Política Nacional de Práticas Integrativas e Complementares* - *PNPIC*) in the Brazilian Unified Health System (*Sistema Único de Saúde – SUS*) and the National Policy on Medicinal Plants and Phytotherapeutic Products (*Política Nacional de Plantas Medicinais e Fitoterápicos* - *PNPMF*) in Brazil, implemented in 2006, have expanded the use, access, and stimulated research in the area[3].

Plants rich in alkaloids, flavonoids, terpenoids, and polyphenols have been the subject of research for their therapeutic properties[1]. *Rosmarinus officinalis* L. (rosemary) is rich in flavonoids and triterpenic acids, and research focused on exploring its antimicrobial, anti-inflammatory, and antioxidant potential is on the rise in Brazil[4]. Human research around the world has shown the beneficial potential of rosemary for health in terms of metabolic parameters, such as controlling dyslipidemia and hyperglycemia[5], treating type 2 diabetes mellitus[6], and helping to control obesity[7]. However, the evidence is still limited and produced from studies of populations with specific health conditions, such as diabetics or healthy individuals[5-7], and no research involving nursing professionals was identified, representing a knowledge gap.

Nursing professionals working in emergency services constitute a complex population with unique characteristics, particularly related to work organization and processes, which impact individual health. Shift work, long work hours, overload, stress, anxiety, depression,

sleep deprivation, and sleep disorders are common among these professionals[8-10]. These conditions can be linked to cardiometabolic and digestive disorders, immunological and neuropsychiatric disorders, and cancers[11].

In this regard, a study of nursing workers showed a prevalence of increased waist circumference, overweight, obesity, elevated low-density lipoprotein cholesterol (LDL-C), and systemic arterial hypertension[12]. A Chinese cohort study showed that a moderately increasing and persistent trajectory of occupational stress increases the risk of steatotic liver disease associated with metabolic dysfunction, a clinical condition characterized by insulin resistance, abdominal obesity, dyslipidemia, and glycemic alterations. This was compared to a moderately stable trajectory, where stress levels show small increases[13]. Contributing to this, a study in Iran showed a relationship between shift work and an increase in blood pressure, total cholesterol, and Body Mass Index (BMI)[14].

Investigating changes in metabolic parameters after the use of rosemary in this population can contribute to the health and well-being of these workers. In addition, it can expand the evidence on the plant, reinforcing popular knowledge regarding the use of the herb, and collaborate with public policies related to medicinal and phytotherapeutic plants, with implications for healthcare. Therefore, the objective of this study was to evaluate the metabolic parameters of emergency nursing professionals before and after the use of *Rosmarinus officinalis L.*

## METHOD

This is a quasi-experimental study with a single pre- and post-test group, which followed the recommendations of the Consolidated Standards of Reporting Trials (CONSORT). The study was conducted with nursing professionals from an Emergency Care Unit and from a Hospital Emergency Room that operates in the urgent care and emergency room located 400 km from the capital of Rio Grande do Sul, Brazil, which is a reference in terms of university and hospitals in the macroregion.

The Urgent Care Unit had 43 nursing professionals during the data collection period. It is a public service which provides healthcare of intermediate complexity in clinical, traumatic, surgical, psychiatric, and other areas. It resolves low-complexity cases, stabilizes serious cases, and, if necessary, refers patients to more complex services. A total of 57 nursing professionals worked in the emergency room of the Hospital Emergency Department, part of a philanthropic institution; this service is the entry point for seriously ill patients referred from

the Urgent Care Unit and from 20 municipalities in the region, receiving care from various specialties.

The study population comprised a total of 100 professionals, including nurses and nursing technicians from de aforementioned services, under any type of employment contract. All professionals were invited, regardless of their clinical condition, and based on interest, we excluded those with hypersensitivity to rosemary or components of the herbal formulation, pregnant or lactating women, epileptics, professionals undergoing treatment for dyslipidemia, those diagnosed with diabetes mellitus, biliary or liver dysfunction, prostate disease, or gastroenteritis, and those on leave from work during data collection. These sampling criteria were established in compliance with the recommendations of the National Health Surveillance Agency on the use of Rosemary (*Agência Nacional de Vigilância Sanitária sobre o uso de Alecrim*)[15] and to avoid confusion between the results of treatments for pre-existing diseases with the changes related to the use of rosemary on the outcomes analyzed.

**Data collection**

Data collection took place from August to November 2022 and was conducted at the participants' workplace. The professionals were approached individually during their work shift, in a private room, and completed a socio-occupational questionnaire, had blood drawn, and anthropometric measurements taken: weight (in kg) and height (in cm). Data were collected regarding age, biological sex, education, work shift, workload, and use of medicinal plants (tea and/or self-reported herbal remedies).

For the purposes of this study, phytotherapeutic products were considered to be products obtained from medicinal plants, or their derivatives, except for isolated substances, with a prophylactic, curative or palliative purpose; teas included preparations with boiling water using leaves, flowers, inflorescences and fruits, or plant parts containing volatile active substances[15]. "Use" was considered when the participant used it daily or frequently (≥ 4 times a week).

Participants were weighed on a body scale with bioimpedance (Techline TEC-117 smart), with a maximum capacity of 180 kg, barefoot and wearing light clothing. Height was assessed using a compact stadiometer (Slim Fit), with a capacity of 2.10 cm/0.1 cm, affixed to a wall, with the participant barefoot. The participants' BMI was calculated using this information, with those being classified as eutrophic with BMI <25.0 $Kg/m^2$ and as overweight/obese when BMI ≥ 25 $Kg/m^2$[16].

Blood samples were collected to measure fasting blood glucose (FBG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-c), low-density lipoprotein

cholesterol (LDL-c), and triglycerides (TG). Fasting values of FBG <100 mg/dL, TC <190 mg/dL, HDL-c >40 mg/dL, LDL-c < 115 mg/dL, and TG <150 mg/dL were considered desirable[17].

Participants were instructed via messaging app to fast for 12 hours the day before blood collection, considering that TG measurement is the one most susceptible to alteration if performed without fasting[17]. A trained professional from the contracted laboratory collected 5 mL of blood from the brachial vein. This blood was transferred to a vacutainer tube without anticoagulant for analysis of biochemical parameters and then submitted to a Cobas Integra 400 automation system with Roche supplies.

**Intervention**

The intervention took place after the first blood collection and self-completion of the data collection instruments. Participants were given two bottles containing 56 capsules of dry rosemary extract, 500 mg each, to be self-administered twice a day (daily dose of 1 g), for 8 weeks. The period was considered according to previous studies[18-19]; however, since there is no consensus on the dose used, it was decided to use 1 g/day. They were recommended to take the first capsule in the morning, 30 minutes after breakfast, and the second, 12 hours after the first, with water. Participants who reported not eating in the morning were instructed to self-administer the capsules 30 minutes after waking up.

The capsules were prepared by a teaching pharmacy using *Rosmarinus officinalis* L. dry extract P.S. 0.03%, composed of pinene, camphene, cineole, borneol, bornyl acetate, camphor, diterpenes, saponin, trace alkaloids, bitter principles, and tannins. The dry extract originated from the leaves of the plant with the appearance of a fine hygroscopic powder, greenish-beige color, characteristic odor and flavor, density between 0.300 and 0.600, pH between 4.0 and 8.0, humidity less than 10.0%, active flavonoid content greater than 0.03, aerobic bacteria count less than 10,000, fungi or yeast less than 1,000 and enterobacteria less than 1,000. The capsules were produced with gelatin, odorless and flavorless, filled with 500 mg of dry rosemary extract and starch (in case it was necessary to complete the filling).

The participants were asked to record the times of self-administered doses, missed or late doses, and possible reactions during the intervention period in a specially-designed mini-diary in order to achieve greater safety and control over adherence to the proposed treatment and to identify adverse events. An infographic was also made available with recommendations on maintaining routine medication use, dietary habits, and physical activity, along with information on the self-administration doses and times of the herbal medicine,

what to do in the event of a missed dose or adverse reaction, storage precautions, and contact information for the researchers. Participants were instructed to save any capsules missed due to forgetting and return them to the researchers at the end of the intervention period as a way to track the doses ingested.

The team responsible for data collection included a doctoral-level postgraduate student and an undergraduate student (a scientific initiation scholarship holder), both trained for this purpose. They contacted participants weekly via messaging application to monitor the intervention, encourage the use of herbal medicine and maintain routine treatments.

**Sample size**

A 5-point difference between the pre- and post-intervention metabolic parameter values, a test power of 80% (20% chance of type II error), a 5% significance level, and a standard deviation of 11 based on the values presented in the study were considered to establish the sample size[5]. However, 15% was added to the minimum sample size due to possible losses. Thus, the established sample size was 46 participants.

Participants who withdrew from the study before completing eight weeks of the intervention and those who refused to undergo laboratory tests even after completing the dosing regimen were considered as follow-up losses.

**Statistical methods**

The collected data were compiled into a Microsoft Excel® database created through independent double entry and analyzed using SPSS software, version 21.0, and Jamovi software, version 2.3.26.

Qualitative variables were presented as absolute and relative frequencies; quantitative variables were expressed as mean and standard deviation in the presence of a normal distribution, or median and interquartile range in the presence of an asymmetric distribution. The Shapiro-Wilk test was used to verify data normality. Quantitative variables were compared before and after the intervention using the Student's t-test for paired samples, assuming a normal distribution, or the Wilcoxon test in the case of an asymmetric distribution. P-values $< 0.05$ were considered statistically significant.

Cohen's d (d) was used in conjunction with the Student's t-test for paired samples or biserial correlation as measures of effect size, combined with the Wilcoxon test. Cohen's d values of 0.2 were classified as small effects; medium when d=0.5; and large when d=0.8. In turn, small, medium, and large effects were considered for biserial correlation, with values of 0.10, 0.24, and 0.37, respectively[20].

Mixed-effects analysis of variance (mixed ANOVA) was used to compare differences between paired groups based on unpaired categories. The effect size was measured using generalized eta-squared ($n^2G$), for which values equal to 0.01 are classified as small, 0.06 as medium, and 0.140 as large[20]. The Tukey's post hoc test was used after mixed ANOVA.

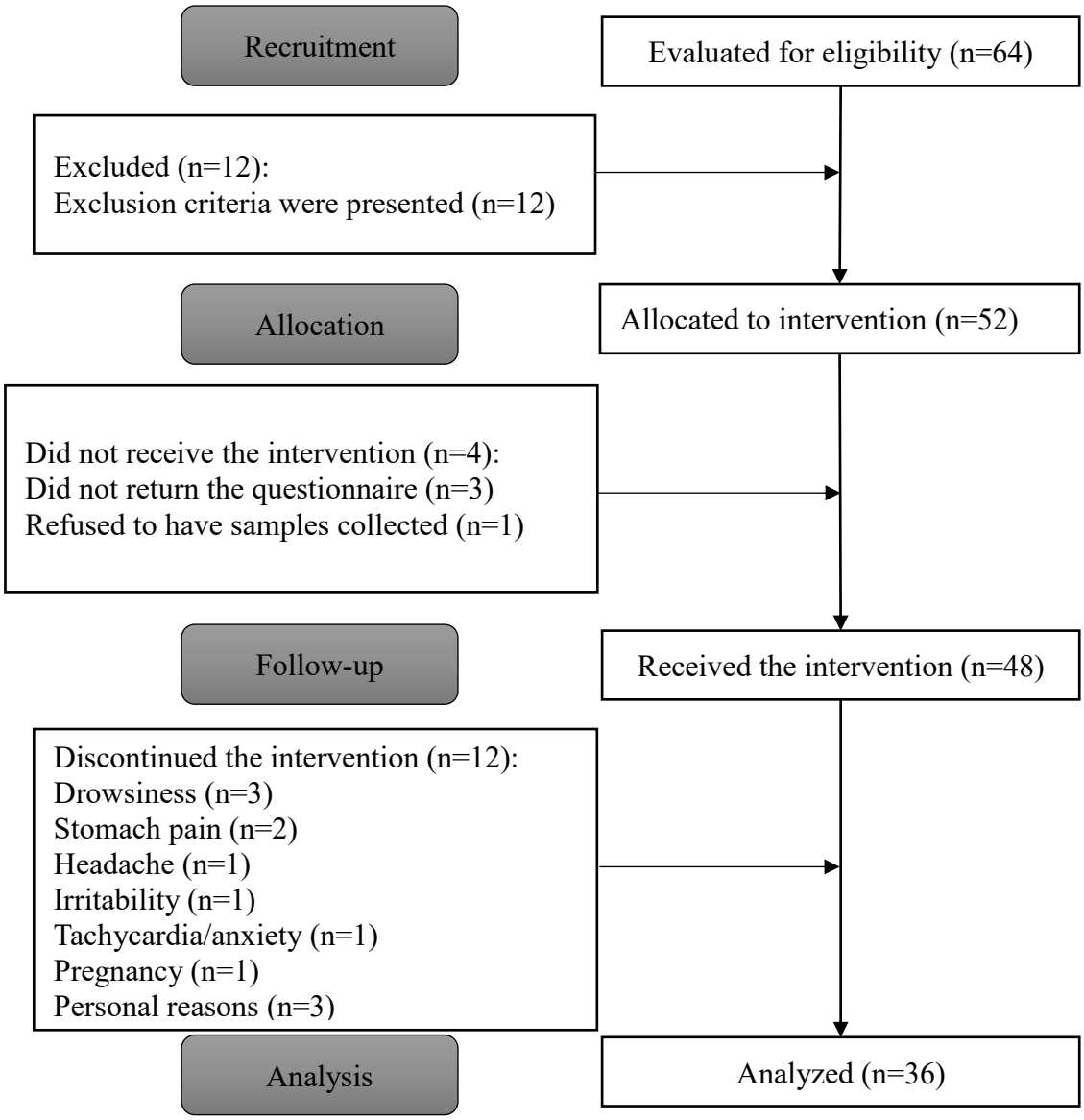
**Ethical aspects**

The premises of the 1984 Declaration of Helsinki and Resolution No. 466/2012, which regulate research involving human subjects in Brazil, were respected. The research project was approved by the Research Ethics Committee of the Federal University of Santa Maria under opinion No. 5,197,916 and was registered in the Brazilian Registry of Clinical Trials – Rebec, No. RBR 88hrnnw. Informed consent was obtained in both the first and second data collection stages.

**RESULTS**

A total of 64 professionals from the study population were interested in participating in the study, but 12 were excluded due to the selection criteria. In addition, three did not return the questionnaires shortly after data collection began, and one refused to submit to tests. After the intervention began, 12 participants discontinued using the herbal medicine, so data from 36 nursing professionals were analyzed, as shown in Figure 1.

**Figure 1** - Flowchart of study sample constitution, Rio Grande do Sul, Brazil, 2023.




Source: Adapted from the CONSORT 2010 Flow Diagram.

Of the 36 participants, 83.3% were women, 61.1% were ≤40 years old (mean 40.72 ± 7.75 years), 69.9% had a college or postgraduate degree, 25% worked regular shifts, and 83.3% worked more than 44 hours per week.

The clinical variables (Table 1) showed that 30.6% of the professionals frequently or daily used some medicinal plant (≥4 times a week) in the form of tea or herbal medicine, 63.9% were overweight or obese, 61.1% had elevated total cholesterol levels, and 47.2% had elevated triglycerides.

**Table 1** – Tea or phytotherapeutic use and clinical condition of nursing professionals working in urgency services (n=36). Rio Grande do Sul, Brazil, 2023

| Clinical variables | Frequency | |
|---|---|---|
| | N | % |
| **Tea or phytotherapeutic use** | | |
| < 4 times per week | 25 | 69.4 |
| ≥ 4 times per week | 11 | 30.6 |
| **BMI*** | | |
| Normal (Eutrophic) | 13 | 36.1 |
| Overweight or obese | 23 | 63.9 |
| **Glycemia** | | |
| Normal (< 100 mg/dL) | 29 | 80.6 |
| Dysglycemia (≥100 mg/dL) | 7 | 19.4 |
| **Blood lipids** | | |
| **Total cholesterol** | | |
| Desirable (< 190 mg/dL)** | 14 | 38.9 |
| Elevated (≥ 190 mg/dL) | 22 | 61.1 |
| **LDL-c[a] (n = 34)** | | |
| Desirable (< 115 mg/dL)** | 28 | 82.4 |
| Elevated (≥ 115 mg/dL) | 6 | 17.6 |
| **Triglycerides** | | |
| Desirable (< 150 mg/dL)** | 19 | 52.8 |
| Elevated (≥ 150 mg/dL) | 17 | 47.2 |
| **HDL-c[b]** | | |
| Desirable (> 40 mg/dL)** | 32 | 88.9 |
| Low (≤ 40 mg/dL) | 4 | 11.1 |
| **Total** | 36 | 100.0 |

Notes: *BMI: Body Mass Index; [a]LDL-c - Low-Density Lipoprotein Cholesterol; [b]High-Density Lipoprotein Cholesterol. **Desirable - nomenclature based on the Brazilian Guideline for Dyslipidemia and Atherosclerosis Prevention -2025.

The considerable number of participants who used tea or herbal remedies, mainly: chamomile (*Matricaria chamomilla* L.), anise (*Pimpinella anisum* L.), green tea (*Camellia sinensis*), peppermint (*Mentha spicata*), ginger (*Zingiber officinale*), lemon balm (*Cymbopogon citratus*), passion fruit (*Passiflora edulis* Sims) and maca (*Lepidium meyenii* Walp.), daily or with a frequency ≥ 4 times a week, meant that this variable was taken into account in the comparison between the intervention periods (along with rosemary) regarding the outcomes. As shown in Table 2, no significant difference was identified between the observation times in BMI values, although 63.9% of the professionals showed a decrease. There was also no significant change regarding glycemic parameters when comparing the intervention periods, but 36.1% (n=13) of the participants had some decrease and 63.9% (n=23) some increase in blood glucose after the intervention.

**Table 2** - Serum blood lipid levels and fasting blood glucose levels when comparing the period before and after intervention with rosemary according to the use of tea/herbal medicines (n=36). Rio Grande do Sul, Brazil, 2023

| **Variable** | **Intervention** | **Tea or phytotherapeutic** | | **Inter-subjects p-value ($n^2G$)*** | **Inter-vention p-value ($n^2G$)*** | **Intra-subject p-value ($n^2G$)*** |
|---|---|---|---|---|---|---|
| | | Use Mean±SD | Do not use Mean±SD | | | |
| BMI ($Kg/m^2$) | Before | 28.04±2.58 | 30.22±1.11 | 0.376 (0.023) | 0.065 (0.001) | 0.566 (0.00) |
| | After | 27.80±2.40 | 29.79±1.10 | | | |
| GLY (mg/dL)[a] | Before | 96.45±4.80 | 92.72±20.60 | 0.279 (0.025) | 0.582 (0.002) | 0.980 (0.000) |
| | After | 95.81±20.13 | 93.68±10.43 | | | |
| TG (mg/dL)[b] | Before | 117.72±47.08 | 226.52±183.54 | **0.022** (0.124) | **0.003** (0.046) | 0.939 (0.000) |
| | After | 85.63±39.13 | 172.28±140.16 | | | |
| TC (mg/dL; n=35) | Before | 184.81±30.02 | 207.87±27.43 | 0.151 (0.052) | **0.007** (0.041) | **0.021** (0.030) |
| | After | 183.00±22.45 | 186.29±27.04 | | | |
| LDL-c (mg/dL; n=34) | Before | 81.09±26.39 | 100.27±32.45 | 0.247 (0.033) | 0.074 (0.023) | 0.074 (0.023) |
| | After | 98.45±20.27 | 127.25±124.64 | | | |
| HDL-c (mg/dL) | Before | 80.18±17.39 | 67.96±25.96 | 0.090 (0.074) | **<0.001** (0.089) | 0.837 (0.00) |
| | After | 66.63±13.48 | 53.36±20.39 | | | |

Note: *Mixed-effects ANOVA and effect size - Generalized Eta-squared ($n^2G$); [a] Square-root transformed data; [b] Logarithm-transformed data

A reduction in triglyceride parameters was observed following the intervention with rosemary (p=0.003), ranging from small to moderate size ($n^2G$=0.046). A difference was also identified in the parameter between the group that used tea/herbal remedies and the group that did not (p=0.013), ranging from a large size ($n^2G$=0.124), but there was no significant interaction between the intervention and the use of tea/herbal remedies. Tukey's post-hoc test confirmed these findings. When comparing triglyceride values from the pre-intervention period with those after 8 weeks of intervention, 86.1% showed a decrease in triglycerides.

A statistically significant interaction was observed between rosemary and the use of tea/herbal remedies (p=0.021), with a small effect size ($\eta^2G$=0.030) for TC. The use of tea/herbal remedies in isolation did not promote a significant change (p=0.151) on the parameter. Tukey's post hoc test showed that the interaction between the intervention and tea/herbal medicine was due to the comparison before and after the intervention in those who did not regularly consume tea (p<0.001), indicating that tea can interfere with the activity of rosemary on total cholesterol.

Next, a significant reduction (p=0.007) in total cholesterol was observed in the second collection after the intervention with rosemary, with a small to moderate effect size ($n^2G$=0.041). It should be noted that serum TC levels decreased in 74.3% (n=26) of the professionals after the intervention and increased in 25.7% (n=9).

Serum LDL-c levels were not significantly altered when comparing the intervention periods. However, 67.3% (n=23) of the professionals showed an increase in this parameter when assessed after the intervention and 32.4% (n=11) showed a decrease. A significant change was observed before and after the rosemary intervention (p<0.001) regarding HDL-c, with a large size ($n^2G$=0.089). Tukey's Post Hoc Test showed a significant difference in HDL-c values when comparing before and after the intervention in those who used tea/herbal medicines (p=0.015) and also in those who did not use them (p<0.001); and between before the intervention of those who used and after the intervention of those who did not consume tea/herbal medicines (p=0.011). A decrease in HDL-c dosage was evidenced in 86.1% (n=31) among nursing professionals after the intervention, an increase in 11.1% (n=4), while 2.8% (n=1) maintained the constant parameter.

## DISCUSSION

The main results of this investigation evidenced that there was a decrease in the metabolic parameters of urgency nursing professionals after the use of *Rosmarinus Officinalis* L., especially TG, TC, and HDL-c. Although the reduction was small, the results appear to

have been beneficial to the health of the professionals, considering that a significant percentage of them presented elevated triglycerides and total cholesterol. The tea/herbal remedy favoured a prevalence of lower triglyceride values among the professionals, but may have interfered with the rosemary activity on total cholesterol.

It is important to consider that the study sample showed a predominance of rotating shift work (day and night), long workloads, dyslipidemia, and obesity, all factors which may be related to each other. In this sense, the study reinforces the link between work and health of professionals, showing an association between shift work and increased blood pressure, total cholesterol, and BMI[14]. A systematic review showed a strong relationship between work-related stressors, such as long hours, night work, and high tension, and an increased risk of cardiac and metabolic disorders[21]. It is understood that intense work dynamics and frequent shift rotations can cause dysregulation of sleep-wake and light-dark cycles, with changes in cortisol levels, mental, cardiovascular, immune, and metabolic status[11], predisposing to the development of risk factors and cardiovascular disease among these professionals.

The significant percentage of professionals who consumed tea or herbal medicine frequently or daily highlights the search for well-being through alternatives to conventional options. Similarly, a study conducted during the coronavirus pandemic with 34 nursing professionals, nurses and nursing technicians from an Emergency Care Unit in Brazil indicated that 61.8% of them used tea or herbal remedies[4]. Tea consumption may be associated with a reduction in the incidence of CVD and diabetes, particularly when consumption is greater than three to four cups per day, with evidence suggesting benefits from black and green tea[22]. A systematic review also suggests that green tea supplementation may lead to improvements in lipid and glycemic profiles in the long term[23].

In turn, no reduction in BMI was observed in the analysis before and after the intervention with rosemary on the clinical characteristics between the professionals who used or did not use tea/herbal remedies. In parallel, a clinical trial compared rosemary and placebo, both associated with diet and exercise in patients with fatty liver disease, and found no benefits from the herb[24]. Despite this, these data diverge from intervention research conducted with obese women which involved ingesting capsules with rosemary oil at a dose of 380 mg/day for six weeks combined with diet and showed positive results, with a decrease in BMI and waist-to-hip ratio[7]. This indicates the need for further research on the plant's potential to aid in obesity control. Regarding the glucose profile of nursing professionals, no statistically significant difference was identified between the intervention periods in fasting

glucose levels. This is in contrast to a study conducted with individuals not taking medication to treat hyperglycemia/diabetes which identified a decrease in glucose levels with doses of 3, 6, and 10 g/day of rosemary powder for 8 weeks, with a greater effect related to the increase in dose[18].

Rosemary extract can exert a hypoglycemic effect[24], while its pharmacological activities and its active components (such as rosmarinic acid, carnosic acid and carnosol) also stand out for improving insulin sensitivity, lipid metabolism, obesity and blood pressure regulation[25]. However, investigations with longer intervention times or with different doses than those researched are needed to establish an optimal dose capable of producing beneficial and significant results on blood glucose levels.

Regarding blood lipids, a reduction in triglyceride parameters was observed after 8 weeks of intervention, being similar to a study conducted with people with diabetes mellitus and healthy individuals that showed a reduction in triglycerides and other blood lipids with the use of 3 g/day of encapsulated rosemary powder for 4 weeks[5]. These results, combined with rosemary's antioxidant and anti-inflammatory properties, indicate its potential for cardiovascular protection.

Regular use of tea/herbal remedies by study participants suggests lower triglyceride levels. In this regard, it is evident that many plants, such as *Ocimum basilicum* (basil), *Salvia officinalis* (sage), *Melissa officinalis* (lemon balm), *Coleus forskohlii* (boldo), and *Satureja hortensis* (savory), can reduce blood lipid levels, including by performing antioxidant and anti-inflammatory activity[26], as does rosemary.

Total cholesterol levels also decreased between the first and second collection, particularly in professionals who did not use tea/herbal remedies. This result for cholesterol was also observed in a previous study[19], which used rosemary powder at doses of 5 and 10 g/day for 8 weeks in people who were not undergoing any medication treatment. Rosemary can reduce blood pressure by inhibiting the renin-angiotensin-aldosterone system and the vascular endothelium, and combats atherosclerosis through multiple mechanisms, including promoting fat excretion, increasing hepatic uptake, preventing fat accumulation in blood vessels, and stimulating fat oxidation[27]. These considerations reinforce the evidence regarding the plant's potential for vascular health. Furthermore, rosemary may influence cholesterol's role in atherosclerotic processes related to the body's ability to absorb cholesterol, the type of absorption, the composition and quality of LDL-c particles, and its elimination[28].

In addition, the data from this study indicate the existence of an interaction between the use of tea/herbal medicines and rosemary regarding cholesterol, with a possible reduction in the plant's activity on total cholesterol. It is similar to the interaction between herbal remedies and allopathic medications, which can modify absorption, distribution, metabolism, excretion, activity, and side effects[29]. It was observed that the compounds present in one medicinal plant can interact in the pharmacokinetics and pharmacodynamics of another, interfering with its effect on the body. This result highlights the rational use of medicinal plants considering their multiple constituents and unknown potential action.

In turn, no statistically significant difference was found between serum LDL-c values before and after the intervention in this study, which is consistent with a study in a healthy population that used a daily dose of 2 g of rosemary powder for 8 weeks[26], and another with people with diabetes mellitus in which rosemary tea was used at a dose of 2 g/day for 12 weeks[6]. On the other hand, doses of 3 g/day of rosemary powder from 4 weeks onwards in people with diabetes mellitus[5], and 5 g/day for 8 weeks in people not treated with medication, reduced the parameters of this outcome[19]. Considering the close relationship between plasma cholesterol and LDL-c and the results of previous investigations, this result allows us to reflect on the intervention duration with the herbal medicine and the dosage, which in this case could be increased.

This study also showed a significant decrease in the HDL-c parameter, although it was identified as remaining within the normal range. This is contrary to what was observed in a study using 5g/day of rosemary, in which the HDL-c levels increased[26]. Studies have suggested that high HDL-c levels before menopause are cardioprotective for women. However, this does not occur in women transitioning to menopause. The protective effect of high HDL-c levels is currently being questioned, particularly in specific conditions such as the transition to menopause. The existence of dysfunctional particles during this period related to their composition and size is suggested, comprising larger particles rich in cholesterol esters[30].

The reduction in HDL-c in the second data collection suggested a benefit for the nursing professionals investigated, particularly because they presented high HDL-c levels and the parameter remained within the appropriate range, even with the reduction. A study of Chinese adults showed a U-shaped association between HDL-C and mortality from all causes, CVD, and cancer. It was shown that one in 30 deaths from all causes can be attributed to high and low HDL-C levels, and that values between 50 and 79 mg/dL represent a lower risk of mortality from all causes and CVD. High and low HDL-C levels were associated with

increased mortality from ischemic heart disease and ischemic cerebrovascular disease. The authors also point to the inflammatory and atherogenic potential of the molecule when its protein composition changes and it becomes dysfunctional[31].

The results of this study regarding the use of rosemary to improve metabolic parameters are promising; however, it is important to generalize the results with caution, considering the limitations. The final sample size, smaller than estimated in the previous calculation, increases the risk of type II error, so the absence of statistically significant differences cannot be interpreted as evidence of the non-existence of a relationship between the variables. The sample was also insufficient to perform multivariate analyses.

Additional weaknesses include the lack of randomization, which makes it impossible to know whether the improvement came from the rosemary or from the change in lifestyle; the Hawthorne Effect, in which people change their behavior because they know they are being monitored; and the difficulty in controlling confounding factors, such as routine medication use, changes in participants' habits during the intervention, consumption of yerba mate (*Ilex paraguariensis*), and the interaction of rosemary with continuous medications. Data collection between August and September may have a seasonal influence on the results considering the dietary and physical changes in preparation for summer. Furthermore, the lack of prior evidence regarding the treatment dose and duration required to produce any change in the evaluated parameters may have influenced the findings.

The study encourages nursing's protagonism in research on the use of herbal medicines for human health, and reinforces its important role in human care and in the production of evidence capable of impacting public policies, such as the National Policy on Workers' Health and Integrative and Complementary Practices.

## FINAL CONSIDERATIONS

There was a decrease in metabolic parameters, such as TG, CT, and HDL-c, in urgency nursing professionals after the use of *Rosmarinus Officinalis L.* The results expand the evidence on the use of this plant in treating or controlling risk factors for atherosclerosis and cardiovascular disease; however, further research on the topic is suggested, which will help establish an optimal dose of *Rosmarinus officinalis* L., a minimum intervention period, and a diverse target population.

## REFERENCES


1. Chaachouay N, Zidane L. Plant-derived natural products: a source for drug discovery and development. Drugs Drug Candidates. 2024;3(1):184-207. https://doi.org/10.3390/ddc3010011

2. Silva GKF, Sousa IMC, Cabral MEGS, Bezerra AFB, Guimarães MBL. Política Nacional de Práticas Integrativas e Complementares: trajetória e desafios em 30 anos do SUS. Physis Rev Saude Coletiva. 2020;30(1):e300110. https://doi.org/10.1590/S0103-73312020300110

3. Ministério da Saúde (BR). Política e Programa Nacional de Plantas Medicinais e Fitoterápicos [Internet]. Brasília: Ministério da Saúde; 2016[cited 2025 Jul 28]. 190 p. https://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Decreto/D5813.html

4. Pretto CR, Silva RM, Lenz FC, Müller FE, Jacobi LF, Matias NF. Sleep, Stress, Cardiovascular Risk and Ancillary Therapy in Nursing Professional from the Emergency Department. Revista Cubana de Enfermería [Internet]. 2022;38(3):e4874. Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-03192022000300013&lng=en

5. Jamal A. Effect of rosemary (Rosmarinus officinalis) on lipid profiles and blood glucose in human diabetic patients (type-2). Afr J Biochem Res. 2014;8(8):147-50. https://doi.org/10.5897/AJBR2014.0765

6. Quirarte-Báez SM, Zamora-Perez AL, Reyes-Estrada CA, Gutiérrez-Hernández R, Sosa-Macías M, Galaviz-Hernández C, et al. A shortened treatment with rosemary tea (Rosmarinus officinalis) instead of powder decreases insulin resistance and serum glucose in patients with diabetes mellitus type 2 (T2D). J Popul Ther Clin Pharmacol. 2019;26(4):e18-28. https://doi.org/10.15586/jptcp.v26i4.634

7. Nisar A, Khalil HN, Siddique M, Ahmed T, Zeeshan M, Usman M. Investigating the therapeutic power of rosemary oil extraction for the reduction in body mass index and waist-to-hip ratio for weight management in obese female subjects. Pak J Pharm Sci. 2023;36(1 Suppl):273-6. https://doi.org/10.36721/PJPS.2023.36.1.SP.273-276.1

8. García-Tudela Á, Simonelli-Muñoz AJ, Jiménez-Rodríguez D, Martínez Franco P, Rivera-Caravaca JM, Gallego-Gómez JI. Sleep analysis of hospital and out-of-hospital emergency professionals. Int Emerg Nurs. 2023;71:101352. https://doi.org/10.1016/j.ienj.2023.101352

9. Özden G, Ceviz A, Aslan B, Gönültaş M. The hidden cost of long working hours: occupational anxiety and argumentativeness in emergency nurses. J Emerg Nurs. 2025:S0099-1767(25)00336-8. https://doi.org/10.1016/j.jen.2025.10.004

10. Forthun I, Waage S, Pallesen S, Moen BE, Bjorvatn B. Sleep medication and melatonin use among Norwegian nurses: a cross-sectional study. Nurs Open. 2022;9:233-44. https://doi.org/10.1002/nop2.1057

11. Lee Y, Wisor JP. Multi-modal regulation of circadian physiology by interactive features of biological clocks. Biology (Basel). 2022;11(1):21. https://doi.org/10.3390/biology11010021

12. Ferreira PPE, Santos KBD, Griep RH, Motta VVD, Evangelista RA, Bueno AA, et al. Cardiovascular risk among nursing workers: a cross-sectional study. Rev Bras Enferm. 2022;75(4):e20210305. https://doi.org/10.1590/0034-7167-2021-0305

13. Luo H, Xing L, Fu T, Xiao S, Fan L. Occupational stress trajectories and metabolic dysfunction–associated steatotic liver disease among female nurses: a prospective cohort study. BMC Public Health. 2024;24:3188. https://doi.org/10.1186/s12889-024-20742-z

14. Solymanzadeh F, Rokhafroz D, Asadizaker M, Dastoorpoor M. Prediction of risk of coronary artery disease based on the Framingham risk score in association with shift work among nurses. Int J Occup Saf Ergon. 2023;29(1):56-61. https://doi.org/10.1080/10803548.2021.2024403

15. Agência Nacional de Vigilância Sanitária (BR). Formulário de fitoterápicos[Internet]. 2. ed. Brasília: Anvisa;. 2021[cited 2025 Jul 28]. Available from: https://www.gov.br/anvisa/pt-br/assuntos/farmacopeia/formulario-fitoterapico

16. Brandão AA, Rodrigues CIS, Bortolotto LA, Armstrong AC, Mulinari RA, Feitosa ADM, et al. Diretriz Brasileira de Hipertensão Arterial – 2025. Arq Bras Cardiol. 2025;122(9):e20250624. https://doi.org/10.36660/abc.20250624

17. Rached FH, Miname MH, Rocha VZ, Zimerman A, Cesena FHY, Sposito AC, et al. Diretriz Brasileira de Dislipidemias e Prevenção da Aterosclerose: 2025. Arq Bras Cardiol. 2025;122(9):e20250640. https://doi.org/10.36660/abc.20250640

18. Tyagi A, KP. The effects of rosemary (Rosmarinus officinalis) leaves powder on glucose level. World J Pharm Res [Internet]. 2017[cited 2025 Jul 28];6(13):548-54. Available from: https://www.wjpr.net/abstract_file/8151

19. Labban L, Mustafa UE, Ibrahim YM. The effects of rosemary (Rosmarinus officinalis) leaves powder on glucose level, lipid profile and lipid peroxidation. Int J Clin Med. 2014;5(6):297-304. https://doi.org/10.4236/ijcm.2014.56044

20. Fritz CO, Morris PE, Richler JJ. Effect size estimates: current use, calculations, and interpretation. J Exp Psychol Gen. 2012;141(1):2-18. https://doi.org/10.1037/a0024338

21. Alhajaji R, Alfahmi MZ, Alshaikhi SA, Fairaq AM, Fudlaldeen Jan S, Aljuaid S, et al. The influence of workplace stressors on the risk of cardiovascular diseases among healthcare providers: a systematic review. Front Psychiatry. 2025;16:1461698. https://doi.org/10.3389/fpsyt.2025.1461698

22. Chopra AK. Dietary management of dyslipidemia. Indian Heart J. 2024;76 Suppl 1:S65-72. https://doi.org/10.1016/j.ihj.2023.12.005

23. Zamani M, Kelishadi MR, Ashtary-Larky D, Amirani N, Goudarzi K, Torki IA et al. The effects of green tea supplementation on cardiovascular risk factors: a systematic review

and meta-analysis. Front Nutr. 2023;9:1084455. https://doi.org/10.3389/fnut.2022.1084455

24. Akbari S, Sohouli MH, Ebrahimzadeh S, Ghanaei FM, Hosseini AF, Aryaeian N. Effect of rosemary leaf powder with weight loss diet on lipid profile, glycemic status, and liver enzymes in patients with nonalcoholic fatty liver disease: a randomized, double-blind clinical trial. Phytother Res. 2022;36(5):2186-96. https://doi.org/10.1002/ptr.7446

25. Rezvani Kakhki B, Vafadar Moradi E, Vossoughinia S, Yazdanpanah Z, Jalali J, Ghasemzadeh Rahbardar M. Exploring the therapeutic potential of rosemary in metabolic syndrome: from traditional use to modern research. Fitoterapia. 2025;186:106795. https://doi.org/10.1016/j.fitote.2025.106795

26. Hassanpour H, Mojtahed M, Fallah AA, Jafari T. Lamiaceae plants improve serum cholesterol, triglyceride, and LDL in patients with metabolic syndrome: a systematic review and meta-analysis of randomized clinical trials. Food Sci Nutr. 2024;12(11):8525-8539. https://doi.org/10.1002/fsn3.4451

27. Liang YC, Wan TJ, Wei TW, Zhang J, Li YF. Potential role of rosemary in cardiovascular disease therapies: progress and promise. Tradit Med Res. 2025;10(8):50. https://doi.org/10.53388/TMR20241005001

28. Simonen P, Öörni K, Sinisalo J, Strandberg TE, Wester I, Gylling H. High cholesterol absorption: a risk factor of atherosclerotic cardiovascular diseases? Atherosclerosis. 2023;376:53-62. https://doi.org/10.1016/j.atherosclerosis.2023.06.003

29. Czigle S, Nagy M, Mladěnka P, Tóth J. Pharmacokinetic and pharmacodynamic herb-drug interactions-part I: herbal medicines of the central nervous system. Peer J. 2023;11:e16149. https://doi.org/10.7717/peerj.16149

30. Dastmalchi LN, German CA, Taub PR. High density lipoprotein: when to rethink too much of a good thing. Am J Prev Cardiol. 2023;15:100511. https://doi.org/10.1016/j.ajpc.2023.100511

31. Lu J, Han G, Liu X, Chen B, Peng K, Shi Y. Association of high-density lipoprotein cholesterol with all-cause and cause-specific mortality in a Chinese population of 3.3 million adults: a prospective cohort study. Lancet Reg Health West Pac. 2023;42:e100874. https://doi.org/10.1016/j.lanwpc.2023.100874

## Data and materials availability

Access to the dataset may be obtained upon request from the corresponding author.

## Acknowledgments

This work was supported by National Council for Scientific and Technological Development – CNPq – Brazil (CNPq process: 404263/2021-6) and the Coordination for the Improvement of Higher Education Personnel – Brazil (CAPES) – Financing Code 001.

## Author Contributions

Conceptualization: Carolina Renz Pretto; Rosângela Marion da Silva.

Data curation: Carolina Renz Pretto; Rosângela Marion da Silva.

Formal analysis: Carolina Renz Pretto; Rosângela Marion da Silva; Juliana Tamiozzo; Luciane Flores Jacobi.

Funding acquisition: Carolina Renz Pretto; Rosângela Marion da Silva; Juliana Tamiozzo; Flávia Camef Dornelles Lenz; Luciane Flores Jacobi; Christiane de Fátima Colet.

Investigation: Carolina Renz Pretto; Juliana Tamiozzo; Flávia Camef Dornelles Lenz.

Methodology: Carolina Renz Pretto; Rosângela Marion da Silva; Luciane Flores Jacobi; Christiane de Fátima Colet.

Project administration; Rosângela Marion da Silva.

Supervision: Rosângela Marion da Silva; Luciane Flores Jacobi; Christiane de Fátima Colet.

Visualization: Carolina Renz Pretto; Juliana Tamiozzo; Flávia Camef Dornelles Lenz;

Writing – original draft: Carolina Renz Pretto; Rosângela Marion da Silva; Juliana Tamiozzo; Flávia Camef Dornelles Lenz; Luciane Flores Jacobi.

Writing – review & editing: Rosângela Marion da Silva; Luciane Flores Jacobi; Christiane de Fátima Colet.

The authors declare that there are no conflicts of interest.

**Corresponding author**:
Carolina Renz Pretto
carol.renzpretto@gmail.com

Received: 11.02.2025
Approved: 04.25.2026

**Associate Editor:**
Dagmar Elaine Kaiser

**Editor-in-chief:**
João Lucas Campos de Oliveira