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## Short Communication

## Effect of topical rosemary essential oil on Raynaud phenomenon in systemic sclerosis

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## ARTICLE INFO

## Keywords:

Systemic sclerosis

Scleroderma

Raynaud phenomenon

*Rosmarinus officinalis*

## ABSTRACT

**Introduction:** Raynaud's phenomenon is the earliest manifestation of systemic sclerosis. Nitroglycerin gel is the only proven topical therapy.

**Methods:** A 53-year-old woman with systemic sclerosis had topical *Rosmarinus officinalis* (rosemary) oil, often used in anthroposophic medicine, applied to her hands over 3 days and then, separately, olive oil.

**Results:** Thermography images showed significant warming of fingers after rosemary oil, but not after olive oil, coinciding with the patient's subjective experience.

**Conclusions:** Topical *Rosmarinus officinalis* oil had a vasodilator and warming effect in a patient with systemic sclerosis and Raynaud's phenomenon.

## 1. Introduction

Symptoms from Raynaud, the most common and earliest manifestation of systemic sclerosis (SSc) are challenging for patients and nitroglycerin gel is the only proven topical treatment available.<sup>1</sup>

*Rosmarinus officinalis* L. (rosemary) essential oil has anti-nociceptive, anti-inflammatory, anti-spasmodic, anti-oxidant and other properties.<sup>2–4</sup> Rosemary oil acts as a smooth muscle relaxant via a papaverine-like effect on muscle and via an agonistic alpha-2 adrenergic effect.<sup>5</sup> Vasodilation from rosemary oil, or its component 1,8-cineole, has been reported in rats,<sup>2,6</sup> and improved arterial endothelial function has been reported in human beings.<sup>7</sup> Rosemary essential oil is used for various indications in anthroposophic nursing (<http://www.pflegevademecum.de/rosmarinoel.php> [accessed September 28, 2017]).<sup>8–10</sup>

We report a case where rosemary essential oil, as compared to olive oil, produced replicable warming of the hand in a patient with systemic sclerosis and Raynaud.

## 2. Methods

A 53-year-old woman with systemic sclerosis was in recovery from

subtotal colectomy for scleroderma related ileus in a hospital practicing integrative, anthroposophic medicine. Her nurse massaged her cold hands with rosemary oil based on clinical experience of its warming properties and was curious to measure the effect by thermography.

The woman was diagnosed 6 years earlier with limited cutaneous systemic sclerosis, without classical antibody constellation (anti-nuclear antibody [ANA] and nRNP/Smith[Sm] antibody positive; Scl-70 and centromere antibody negative) but with Raynaud's phenomenon; previous digital ulcers; skin sclerosis of fingers, hands, lower legs and feet (current Modified Rodnan Skin Score 15, on a 0–51 scale), early pulmonary fibrosis and gastro-intestinal involvement. 12 years earlier the patient had suffered from bilateral carpal tunnel syndrome, but had only consented to surgery on the right hand; the left hand was now more cyanotic and colder but electrodiagnostic testing for carpal tunnel syndrome had not been repeated. The patient was not on any immunosuppressive or vasodilator treatment.

Rosemary essential oil (*Rosmarinus officinalis* L., oleum aethereum 10%; Wala Heilmittel GmbH, Bad Boll, Germany) prepared from rosemary meeting the specifications for Tunisian/Moroccan rosemary oil,<sup>11</sup> dissolved in 90% olive oil was applied to the patient's dorsal and palmar side of the hand simultaneously, moving from carpe to finger-

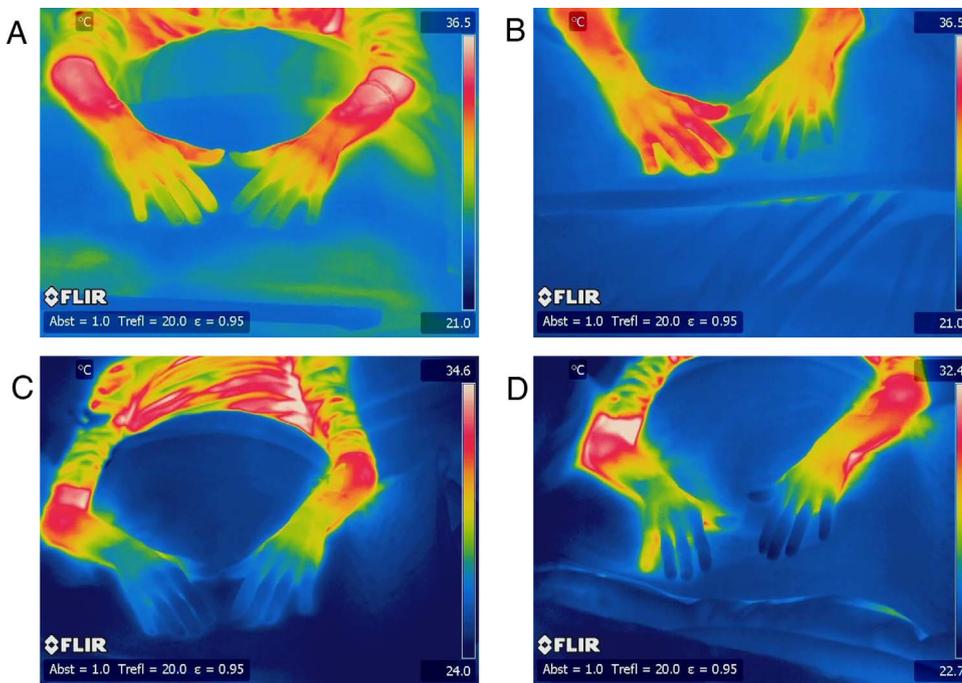
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<http://dx.doi.org/10.1016/j.ctim.2017.10.012>

Received 28 September 2017; Accepted 30 October 2017

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**Fig. 1.** Thermography images.

A. Before rosemary oil. B. 30 min after rosemary oil. C. Before olive oil. D. 30 min after olive oil.

tips for about 30 s. The room was draught-free, the curtains closed. The patient was in bed and placed her hands with the palms facing the blanket for 30 min after the treatment was completed. The treatment was repeated at the same time for 3 consecutive days, then over another 3 days with olive oil as a comparison.

Thermographical images of the dorsal surfaces of hands and forearms were taken with a high-sensitivity infrared camera (FLIR SC660; FLIR™ Systems, Wilsonville, USA) from 1-m distance. Imaging was done before treatment and 30 min after oil application. The temperature at the dorsal fingertip of the index finger of each hand was calculated and averaged over the three intervention days of rosemary and olive oil, respectively. Thermography is an established method for assessing hand circulation problems in systemic sclerosis.<sup>12</sup> Pre-post differences were analysed with one-way analysis of variance.

The patient read the final report and gave signed informed consent for its publication. Ethical approval was granted from the Ethics Review Board of Tübingen University.

### 3. Results

A warming of the right hand after rosemary oil application was visible on thermography images, but not visible after olive oil treatment (see Fig. 1). Mean temperature on the dorsal fingertip of the *right* index finger 30 min after rosemary oil increased from 28.5 °C to 30.6 °C. Temperature after olive oil decreased from 25.13 °C to 24.03 °C (Fig. 1A).

On the *left* (non-operated) hand the temperature after rosemary oil changed minimally from 26.67 to 26.43; and decreased after olive oil from 25.03 °C to 23.47 (Fig. 2B).

The patient confirmed comfortable warmth in the right hand – and to a limited degree in the left hand – after each rosemary oil application but not after olive oil. At approximately 30 min she felt heat in the entire body, particularly in the face. No side effects were noted. She

continued daily rosemary oil applications at home and 3 months later qualitatively reported good hand warmth.

### 4. Discussion

Rosemary essential oil, as compared to olive oil, produced a replicable vasodilation and warming effect of the hand in a patient with systemic sclerosis.

Warming of the right but not the left hand indicates that topical vasodilation cannot compensate for pressure on vasculature in the carpal tunnel. Cooling after olive oil might be explained from the extended static positioning of the hands. Room temperature differences between rosemary oil and olive oil treatment days (on average 25.7 °C and 24.9 °C, respectively) were unlikely to have affected results because temperature in any case was in a comfortable 23.5–26.3 °C range. Heat flushes of face and body suggest a systemic effect either from rosemary oil's odour<sup>13</sup> or topical absorption.

We are now conducting an open-label, crossover trial to estimate the effect size.

### Funding

TvSA received funding from the Mahle Foundation. The funder had no role at any stage of the manuscript preparation.

### Conflicts of interest

The authors declare that they have no conflicts of interest.

### Acknowledgement

Dr Sally Hargreaves (Imperial College) provided helpful comments on the manuscript.

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