

Infrared thermography reliable in assessing children with Raynaud's phenomenon

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Infrared thermography is both reliable and reproducible in identifying children with peripheral microvascular disturbances in Raynaud's phenomenon, according to data published in *Pediatric Rheumatology*.

"Infrared thermography (IRT) is a diagnostic imaging technique that can record a two-dimensional map of the cutaneous temperature distribution," **Giorgia Martini**, of the University of Padova, Italy, and colleagues wrote. "Since temperature of the skin depends on the local blood perfusion IRT provides important indirect information concerning local circulation."

"The functional evaluation of vascular reactivity in both basal conditions and in response to different stimuli can be also performed by IRT imaging," they added. "Therefore, IRT has been used for over 30 years in the assessment of Raynaud Phenomenon (RP) and other peripheral microvascular dysfunctions in adults but, to date, very little experience is available on its use in children for this purpose."

To analyze the reproducibility of thermographic examination following cold exposure, and to assess whether infrared thermography is reliable in diagnosing and differentiating various peripheral circulation issues in children, Martini and colleagues conducted a cross-sectional study of juveniles at a pediatric rheumatology outpatient clinic. The researchers recruited 44 patients aged younger than 16 years with finger discoloration upon cold exposure, who were also undergoing hand thermography.

Infrared Thermography in Children: Key Takeaways

1

Infrared thermography is both reliable and reproducible in identifying children with peripheral microvascular disturbances

2

Patients with primary and secondary Raynaud's phenomenon, as well as acrocyanosis, differ significantly in basal extremities temperature and in re-warming pattern after cold challenge

3

Infrared thermography can be an objective tool for diagnosis and monitoring



Infrared thermography is both reliable and reproducible in identifying children with peripheral microvascular disturbances in Raynaud's phenomenon, according to data.

Among the participants, 16 had secondary Raynaud's phenomenon, 14 had primary Raynaud's phenomenon and 14 demonstrated acrocyanosis. The researchers also included 15 age-matched control participants. All participants underwent sequential skin temperature measurements at the distal interphalangeal and metacarpophalangeal joints with infrared thermography, both at baseline and for 10 minutes after the cold challenge test.

The researchers then calculated the intraclass correlation coefficient for inter-rater reliability in infrared thermography interpretation. In addition, they analyzed temperature variations at the metacarpophalangeal and distal interphalangeal joints, as well as the distal-dorsal difference.

According to the researchers, the intraclass correlation coefficient demonstrated "excellent agreement" — greater than 0.93 — for distal interphalangeal and metacarpophalangeal joints in 192 measures for each participant. Patients with primary or secondary Raynaud's phenomenon, and those with acrocyanosis, demonstrated significantly slower recovery at metacarpophalangeal ($P < .05$) and at distal interphalangeal ($P < .001$) joints than control participants.

In addition, the researchers observed higher temperature at distal interphalangeal joints, and lower at metacarpophalangeal joints, at baseline in patients with primary compared with secondary Raynaud's phenomenon, with significantly lower distal-dorsal difference ($P < .001$). Compared with acrocyanosis, patients with either primary or secondary Raynaud's phenomenon experienced temperature gains at distal interphalangeal joints, paired with temperature reductions at metacarpophalangeal joints, after cold challenge.

Patients with primary, but not secondary, Raynaud's phenomenon returned to distal interphalangeal basal temperature by the end of the re-warming period. According to an analysis of the distal-dorsal difference, participants in all disease groups, and the control group, significantly differed in finger recovery pattern ($P<.05$).

"Our results, although with the limits of a small population, suggest that IRT appears as a reliable and reproducible method to evaluate children with abnormal peripheral circulation, particularly in cases without a clear-cut clinical picture or presentation," Martini and colleagues wrote. "In fact, in our study [primary] RP, [secondary] RP and [acrocyanosis] patients presented significant differences both at basal observation and during the re-warming phase."

"These results suggest that IRT can help clinicians to avoid complex diagnostic algorithms in RP-mimicking conditions," they added. "Moreover, as recently confirmed in adults, IRT can be suggested as an objective outcome measure to quantify the disease severity and to assess its evolution over time and in response to treatments." – *by Jason Laday*

Disclosure: The researchers report no relevant financial disclosures.



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