

Repeatability of Infrared Plantar Thermography in Diabetes Patients: A Pilot Study

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Abstract

Objective:

Infrared (IR) thermography has been used as a complementary diagnostic method in several pathologies, including distal diabetic neuropathy, by tests that induce thermoregulatory responses, but nothing is known about the repeatability of these tests. This study aimed to assess the repeatability of the rewarming index in subjects with type 2 diabetes mellitus (T2DM) and nondiabetic control subjects.

Methods:

Using an IR camera, plantar IR images were collected at baseline (pre-) and 10 min after (post-) cold stress testing on two different days with 7 days interval. Plantar absolute average temperatures pre- and post-cold stress testing, the difference between them (ΔT), and the rewarming index were obtained and compared between days. Repeatability of the rewarming index after the cold stress test was assessed by Bland–Altman plot limits of agreement.

Results:

Ten T2DM subjects and ten nondiabetic subjects had both feet analyzed. Mean age did not differ between groups ($p = .080$). Absolute average temperatures of plantar region pre- ($p = .033$) and post-cold stress test ($p = .019$) differed between days in nondiabetic subjects, whereas they did not differ in T2DM subjects (pretest, $p = .329$; post-test, $p = .540$). ΔT and rewarming index did not differ between days for both groups, and the rewarming index presented a 100% agreement of day-to-day measurements from T2DM subjects and 95% with nondiabetic subjects.

Conclusions:

The rewarming index after cold stress testing presented good repeatability between two days a week in both groups. Despite T2DM subjects presenting no differences on absolute temperature values between days, ΔT or rewarming index after cold stress testing remain recommended beside absolute temperature values for clinical use.

J Diabetes Sci Technol 2013;7(5):1130–1137

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Abbreviations: (AV) arteriovenous, (IR) infrared, (MNSI) Michigan Neuropathy Score Instrument, (SD) standard deviation, (T2DM) type 2 diabetes mellitus

Keywords: body temperature regulation, diabetes, repeatability of tests, thermography

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