

Short Term Cutaneous Vascular Responses to Cold Water Immersion in a Patient with Distal Radius Fracture (DRF) and Cold Urticaria

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Abstract

We present a case of a 36 year old female working in fisheries lab with Distal Radius Fracture (DRF) and cold urticaria referred for hand therapy after the cast removal. Cutaneous vascular responses were observed before and after 5 minutes of cold water immersion (at 12 °C) in the injured hand. Hives were observed on volar aspect of her forearm and dorsal aspect of her hand around 5 minutes after the period of immersion and did not subside till 10 minutes after immersion.

Introduction

Cold induced urticaria is a form of physical urticaria. It can present in the form of mild, localized urticaria and /or angio-oedema or generalized urticaria. In some a more severe systemic form can occur leading to death of the person [1]. Cold exposure/ test is used to assess cold sensitivity. Cold is used as therapeutic agent to reduce pain and swelling [2]. There is also a scarcity of reports that have looked at the impact of cold exposure in patients with DRF and cold urticaria. The aim of this paper was to show cutaneous vascular responses before and after cold water immersion in the forearms of an individual with distal radius fracture and cold urticaria.

Case Report

In this report we are showing images of a 36 year-old female with cold urticaria and Distal Radius Fracture (DRF) who was referred for hand therapy 6 weeks after the cast removal. She is employed in a fisheries lab and her work involves handling cold specimen on a daily basis. She has a 12 year history of recurrent hives (idiopathic cold urticaria). After explaining the protocol and taking consent, her injured hand was immersed in cold water up-to mid-forearm at a temperature of 12 °C for a period of 5 minutes. Cutaneous vascular responses were observed on the Tissue Viability Imaging system (TiVi camera) before and immediately after cold water immersion (at 1 second, 30 seconds, 1 minute, 5 minutes, and 10 minutes) [2]. Wheals or hives started to appear on the volar aspect of her forearm (Figures 1-6) and dorsal aspect of the hand at approximately 5 minutes after the period of immersion. These hives stayed the same until 10 minutes after the period of immersion. She reported that the hives are very common and usually start to appear around 5 minutes after

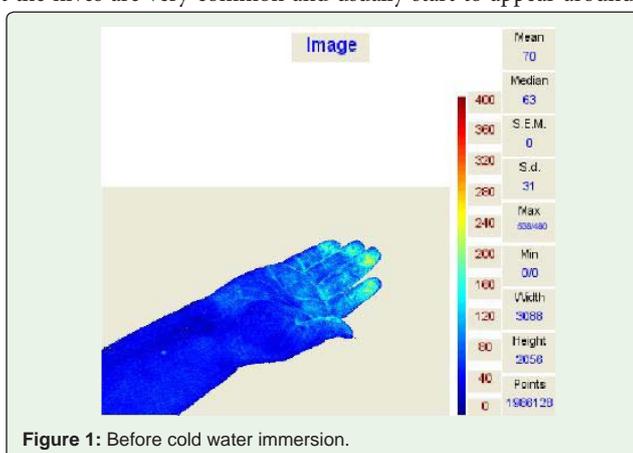


Figure 1: Before cold water immersion.

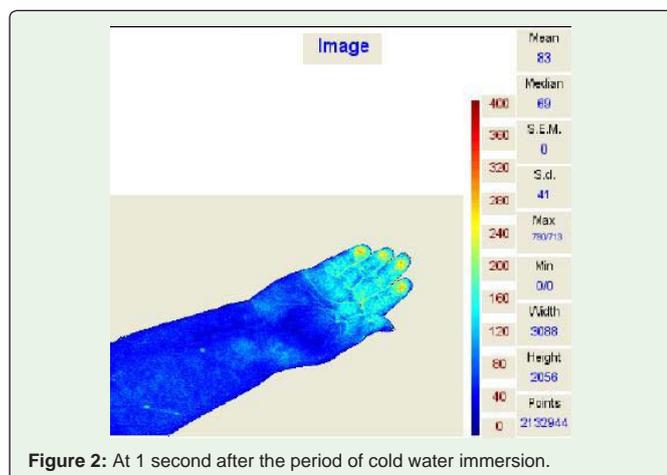


Figure 2: At 1 second after the period of cold water immersion.

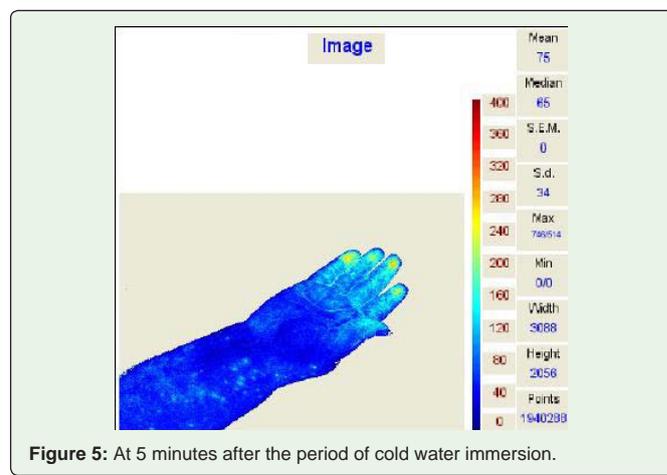


Figure 5: At 5 minutes after the period of cold water immersion.

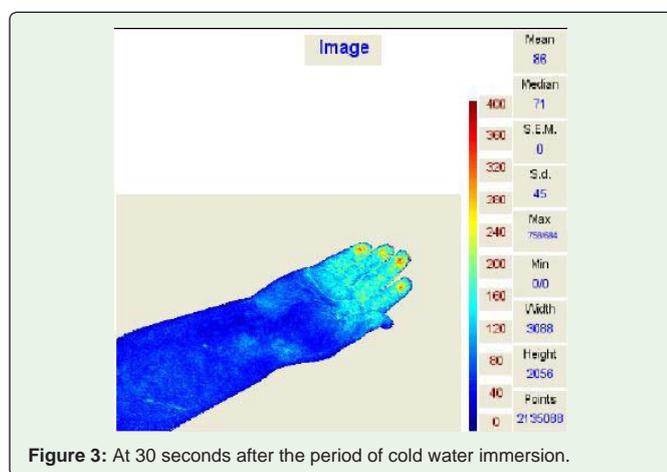


Figure 3: At 30 seconds after the period of cold water immersion.

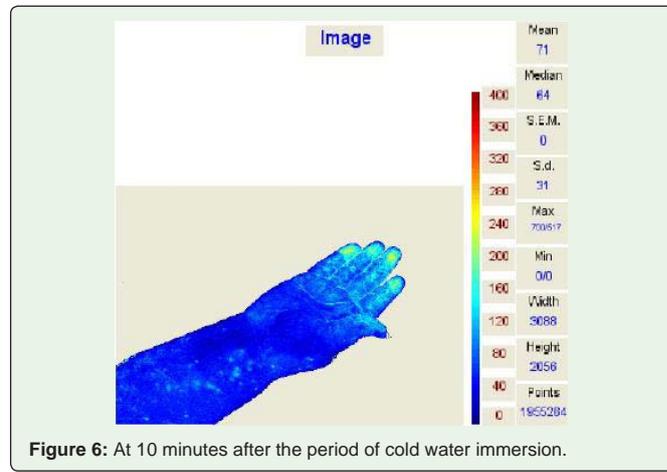


Figure 6: At 10 minutes after the period of cold water immersion.

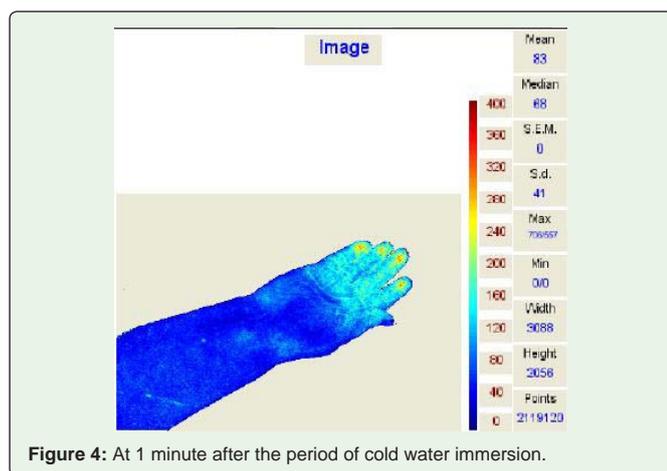


Figure 4: At 1 minute after the period of cold water immersion.

an initial contact with cold objects or cold water. Then they subside gradually within a period of 24 hours. As she is accustomed to this type of cold reaction and has not experienced any problems with quality of life, she did not seek any medical advice.

Discussion

We observed formation of hives only on the volar aspect of forearm and dorsal aspect of the hand. We did not observe them on the palmar aspect of hand and fingers (Figures 1-6). The vascular

responses observed in the palmar aspect of the injured hand and fingers immediately after the period of cold water immersion, and 10 minutes later were similar to the vascular responses reported in our previous study in patients with uncomplicated DRF [2]. Cold water immersion for five minutes at a temperature of 12 °C was safe in this patient with mild cold urticaria. However, the management strategies differ according to reaction severity, and clinician's should be aware of the different clinical presentation of cold urticaria [1]. Hence, we recommend monitoring the patients continuously and following proper precautions when assessing others with cold urticaria.

Figures Representation

Skin blood flow responses (Cold Urticaria) before and after 5 minutes of cold water immersion as seen on the Tissue Viability Imaging system (TiVi camera) over the volar aspect of the forearm in a patient with Distal Radius Fracture:

*Basal skin blood flow appears blue and as the blood flow increases the color changes from blue to green to yellow to red as shown on the scale (0-400 A.U) beside the images.

References

1. Elana Fay Hochstadter, Moshe Ben-Shoshan. Cold-induced urticaria: challenges in diagnosis and management. *BMJ Case Rep.* 2013; 2013: bcr2013010441.
2. Shaik SS, Macdermid JC, Birmingham T and Grewal R. Short Term Sensory and Cutaneous Vascular Responses to Cold Water Immersion in Patients with Distal Radius Fracture (DRF). *SM J Orthop.* 2015; 1: 1003.