

# Efficacy of Maggot Debridement Therapy on Refractory Atypical Diabetic Foot Ulcers: An Open-Label Study

Mansour Siavash, MD<sup>1</sup> , Ali Najjarnezhad, MD<sup>1</sup>, Nader Mohseni, MD<sup>1</sup>, Seyed Mohammad Abtahi, PhD<sup>1</sup>, Azadeh Karimy, MSc<sup>2</sup>, and Mohammad Hosein Sabzevari, MA<sup>3</sup>

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## Abstract

Atypical or refractory diabetic foot ulcers (DFUs) are still a major health problem. Maggot debridement therapy (MDT) by larva of *Lucilia sericata* is an ancient and a modern option for wound healing. It works by debridement, stimulation of wound healing, and disinfection. In this study, we aimed to evaluate the efficacy of MDT for healing atypical and refractory DFUs. Patients with atypical DFUs were selected and further evaluated for some predefined differential diagnoses like atypical fungal, parasitic, or bacterial infections, malignancy, trauma, and so on. Multiple MDT sessions were carried out. Ulcer size was measured before every MDT session. Complete wound healing, time to heal, and adverse effects were recorded as well. Forty-two DFU patients (26 men, 16 women) with 42 nonhealing atypical ulcers participated in this study. Complete wound healing was achieved in 35 patients (83.3%) by MDT. Complete debridement and then healing of the wounds happened in less than  $1.79 \pm 0.8$  months. Four ulcers persisted, and 3 (7.1%) were eventually amputated. MDT may be considered as an effective treatment for atypical DFUs, which are unresponsive to conventional therapies.

## Keywords

diabetic foot ulcer, Maggot, *Lucilia sericata*, larva, MD

Diabetic foot ulcer (DFU) is a serious complication of diabetes mellitus. The frequency of DFUs is around 6% worldwide.<sup>1</sup> DFUs are usually characterized as chronic wounds incapable of progressing through normal phases of healing.<sup>2</sup> DFUs can lead to lower limb amputation. There are different types of DFUs, including chronic pressure ulcers (neuropathic), ischemic ulcers, primary infectious ulcers, acute traumatic, and, finally, atypical wounds. A brief description of these ulcer types is presented in Table 1. One of the most complicated and crucial classes of wounds are atypical DFUs, defined as diabetic wounds that have unexpected location, presentation, behavior, or response during conventional therapy. These atypical ulcers, if not properly evaluated or managed, may lead to nonhealing DFUs. Nonhealing DFUs pose a great impact on health care systems. They put a great burden on the economy, society, patients, and their families.<sup>1,3</sup>

For a wound to heal, there are 4 important requirements: (1) stop ongoing trauma (eg, offloading), (2) control the infection, (3) provide sufficient vascular supply, and (4) provide adequate debridement.<sup>4</sup> Debridement, the removal of necrotic tissues from the wound, is a mandatory and vital step in DFU management. Although debridement seems to be a simple procedure, it is not always easy and the best methods to do it are still unclear.<sup>5,6</sup>

Maggot debridement therapy (MDT)—the application of live maggot on wounds<sup>7</sup>—is a known method of selective debridement in chronic ulcers that has been used widely before the introduction of antibiotics.<sup>8</sup> The emergence of antibiotic resistance in recent years has put MDT in the spotlight again.<sup>9</sup> The Food and Drug Administration has approved MDT for debridement of nonhealing necrotic skin and soft tissue wounds, including pressure ulcer, venous stasis ulcer, neuropathic foot ulcers, and nonhealing traumatic or postsurgical wounds. Maggots perform in at least 3 areas including debridement, stimulation of wound healing by producing granulation tissue, and disinfection.<sup>10–12</sup> Despite the impact of nonhealing DFUs, recent improvement in wound care methods has not been satisfying.<sup>13</sup> MDT has been used for a long time all over the world, but it is considered a new treatment in Iran. In the present study,

<sup>1</sup>Isfahan University of Medical Sciences, Isfahan, Iran

<sup>2</sup>Islamic Azad University of Isfahan, Isfahan, Iran

<sup>3</sup>Islamic Azad University of Shahreza, Isfahan, Iran

## Corresponding Author:

Mansour Siavash, Isfahan Endocrine & Metabolism Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.

Email: siavash@med.mui.ac.ir