

Ozone and maggot therapy acutely eliminate bacteria strains in patients with infected diabetic foot ulcers

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Background and aims: Previous studies showed that maggot debridement therapy (MDT) as an additional measure to antibiotic treatment acutely eliminated most of the Gram-positive and Gram-negative strains of bacteria in patients with infected diabetic foot ulcers (DFU). Another perspective method is ozone therapy, which may have similar effect on microbes as MDT. The aim of our study was to compare the acute antimicrobial effect of ozone therapy and MDT with standard local therapy in patients with infected DFU.

Patients and methods: In the present study, 90 patients with infected DFU (Texas 2-3; B and D) hospitalized in our Diabetes Department were enrolled between January 2010 and February 2012. All patients were treated with parenteral antibiotics appropriate to microbial findings and standard therapy (offloading, surgical intervention, etc.). In addition to standard treatment, 30 patients were treated by gaseous ozone once daily (ozone group) and 30 patients by sterile free-range larvae of the green bottle fly *Lucilia sericata* (MDT group). 30 patients received standard local therapy, mainly disinfectant solutions (Controls). There was no significant difference between groups in age, gender, type and duration of diabetes and diabetes control. Groups did not differ in C-reactive protein levels (ozone 34.9 ± 26.4 vs. maggots 34.7 ± 28.3 vs. Controls 35.7 ± 30.7 mg/l; NS), the frequency of Texas score and presence of osteomyelitis (26.7% vs. 23.3% vs. 26.7% respectively). Swabs or tissue specimens for culture were taken from deep structures of the wound after debridement immediately before and after ozone therapy, MDT or in comparable time in Controls. Groups did not differ in the mean therapy duration (ozone: 3.3 ± 1 vs. maggot: 3.6 ± 0.7 vs. Controls: 3.8 ± 0.6 days; NS). The individual bacterial species in positive swabs were determined by standard microbiological methods. **Results:** No significant difference between groups in the numbers of bacteria strains per specimen before treatment was seen. After the treatment, there were significant reductions in the numbers of bacteria strains in ozone group (before 2.3 ± 1.1 vs. after 0.7 ± 0.7 ; $p < 0.0001$) and in MDT group (2.6 ± 0.9 vs. 0.7 ± 0.5 ; $p < 0.0001$), but not significant in Controls (2.2 ± 0.9 vs. 1.9 ± 0.6). Moreover, both ozone and MDT significantly reduced the number of bacteria strains in comparison with Controls (both $p < 0.001$). Ozone was effective especially against *Enterococcus* and *Staphylococcus* sp. (both $p < 0.05$) and MDT against *Enterococcus* sp., *Escherichia coli* and *Proteus* sp. (all $p < 0.05$). **Conclusion:** Our study demonstrated that both ozone therapy and MDT added to standard DFU treatment may help influence polymicrobial infection in the DFU in comparison with standard local therapy. This study was supported by the grant MZO 00023001.