

MBT SHOES DECREASE PLANTAR PRESSURE IN THE DIABETIC FEET

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Abstract

Increased plantar pressure plays an important role in the development of diabetic neuropathic foot ulceration. Masai Barefoot Technique (MBT) shoes decrease walking speed and increase the center of pressure excursions. We tested MBT shoes in 7 patients with diabetes mellitus. Plantar pressures during walking were measured in the patient's regular shoes and in MBT shoes at baseline and six months later with F-scan (Tekscan Inc.). Immedi-

ately after fitting, MBT shoes decreased plantar pressures under the 3rd and 4th metatarsal head on both feet and under 5th metatarsal head on the right foot (all $p < 0.05$). A substantial, but statistically insignificant, decrease was observed also under 2nd metatarsal head on both sides and 5th on the left. One patient developed pressure ulcer. After six months, slight insignificant increase in plantar pressures was observed at all measurement points. MBT shoes can reduce plantar pressures in some areas on the diabetic foot.

INTRODUCTION

Foot ulceration affects up to 15 % of patients with diabetes mellitus at some point in their lives (1). If not treated properly it can deteriorate to gangrene and amputation of the affected extremity. Foot deformity and improper footwear cause increased plantar pressures which play an important role in the development of diabetic neuropathic foot ulceration (2). Plantar pressures, except on the lateral forefoot, increase at faster walking (3) and are decreased by rocker soles (4). Masai Barefoot Technique (MBT) shoes (Figure 1) decrease walking speed (5) and increase the center of pressure excursions (6). We sought to investigate whether MBT shoes can decrease plantar pressures in diabetic patients.



Figure 1: MBT shoes

METHODS AND SUBJECTS

Methods

Plantar pressures were recorded at baseline and six months later. Two measurements were done each time: in the patient's regular shoes and in MBT shoes.

Plantar pressures were measured during walking at the patients' most comfortable speed with F-scan (Tekscan Inc., Figure 2). *F-Scan*® is a measurement system that captures dynamic in-shoe pressure information revealing interaction between foot and footwear. It provides bipedal plantar pressures and force measurement using paper-thin sensors placed inside the shoe. Unlike traditional visual observation of foot function and gait, *F-Scan* quantifies contact pressure distribution and timing.



Figure 2: F-scan

The patients also filled in the Foot Function Index (FFI, 7) for walking in ordinary and MBT shoes.

The data were analysed by SPSS 14.0 for Windows. Descriptive statistics and paired t-test were used.

Subjects

7 type 2 diabetic patients (3 men, 4 women) of average age 53 years (20 - 77) with foot deformity and loss of protective sensation (unable to feel the standardized 10-g Semmes-Weinstein monofilament) entered the study. All study subjects had palpable pulses of pedal arteries. The patients with open foot ulceration were not recruited.

The patients were supplied one free pair of MBT shoes and clearly instructed about the potential balance problems.

The study was approved by the Ethics Committee, Medical Faculty, University of Ljubljana, Slovenia.

RESULTS

Immediately after the fitting, the MBT shoes decreased plantar pressures under the third and the fourth metatarsal head on both feet and under the fifth metatarsal head on the right foot (Figure 3). A substantial decrease was observed also under the second metatarsal head on both sides and the fifth on the left, but was not significant ($0.1 < p < .05$).

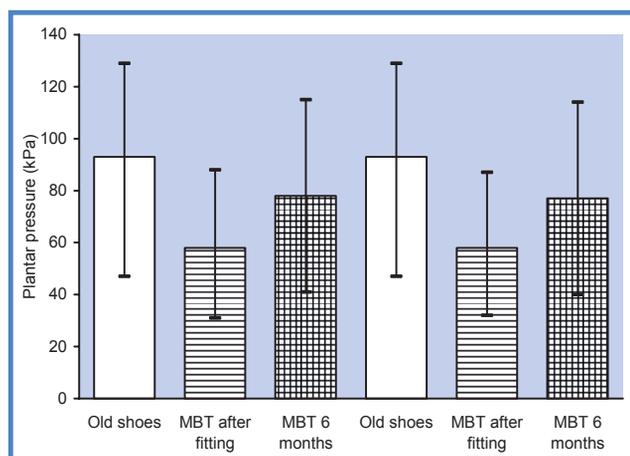


Figure 3: Plantar pressures

The patients wore the MBT shoes on average for 5 days per week (from 2 to 7 days), 2 hours per day (from 1 to 4 hours). Except for one patient, all had problems at the beginning, assessed with 5 points on the VAS scale on average. Four patients had additional balance problems assessed from 2 to 9 on the VAS. In one patient, the MBT shoes decreased the pain, in two patients the pain remained the same and in

four the pain increased from 1 to 5 points on the VAS. One patient developed a superficial foot ulceration which healed in one week.

After six months, a slight, insignificant increase in plantar pressures was observed at all the measurement points and no difference in the FFI with ordinary or MBT shoes.

DISCUSSION

In spite of the initial problems and no significant change in the FFI, the MBT shoes decreased plantar pressures under the second, third and fourth metatarsal heads. Except for the big toe, in all the measured areas plantar pressures were decreased in the MBT shoes. The pressures might have increased under other areas, or were lowered by slower walking, which was observed clinically but was not measured. All the findings are in concordance with other studies (3-5).

CONCLUSION

MBT shoes were found to decrease plantar pressures under some areas in all the included subjects. However, careful evaluation is required to determine that the pressures under the other areas are not excessive.

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