

# Effects of Pulsed Electromagnetic Field on Peripheral Blood Flow in People with Diabetes

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## Objective of the Study

Pulsed electromagnetic field (PEMF) has shown to be effective in increasing blood circulation in some clinical conditions. However, very few studies have examined the effects of PEMF on the peripheral hemodynamic response in people with diabetes. The present study aimed to compare the effects of active PEMF and sham PEMF on blood flow velocity and diameter of small veins, and microcirculation of skin at the dorsal aspect of foot for subjects with diabetes.

## Methods

22 people with type 2 diabetes were recruited and randomly allocated to receive either active (mean age:  $65.2 \pm 9.2$  years) or sham ( $65.9 \pm 7.8$  years) PEMF. PEMF was delivered at 5 Gauss and 12 Hz for 30 minutes. Four outcome measures were recorded before and immediately after intervention including the blood flow velocity and diameter of the smallest observable vein located in the skin over the base of 1st metatarsal bone as measured by ultrasound biomicroscopy; and blood flow in microcirculation at the skin over the base of the 1st metatarsal bone (Flux1) and the distal 1st phalanges' bone (Flux2) by Laser Doppler Flowmetry. The change in outcomes made before and after intervention were computed and compared between the active and sham PEMF groups.

## Results

1. The active PEMF group demonstrated significantly greater increase in blood flow velocity of the smallest observable veins than did the sham PEMF group ( $1.03 \pm 0.99$  mm/s vs.  $0.15 \pm 1.28$  mm/s,  $P = 0.024$ ).

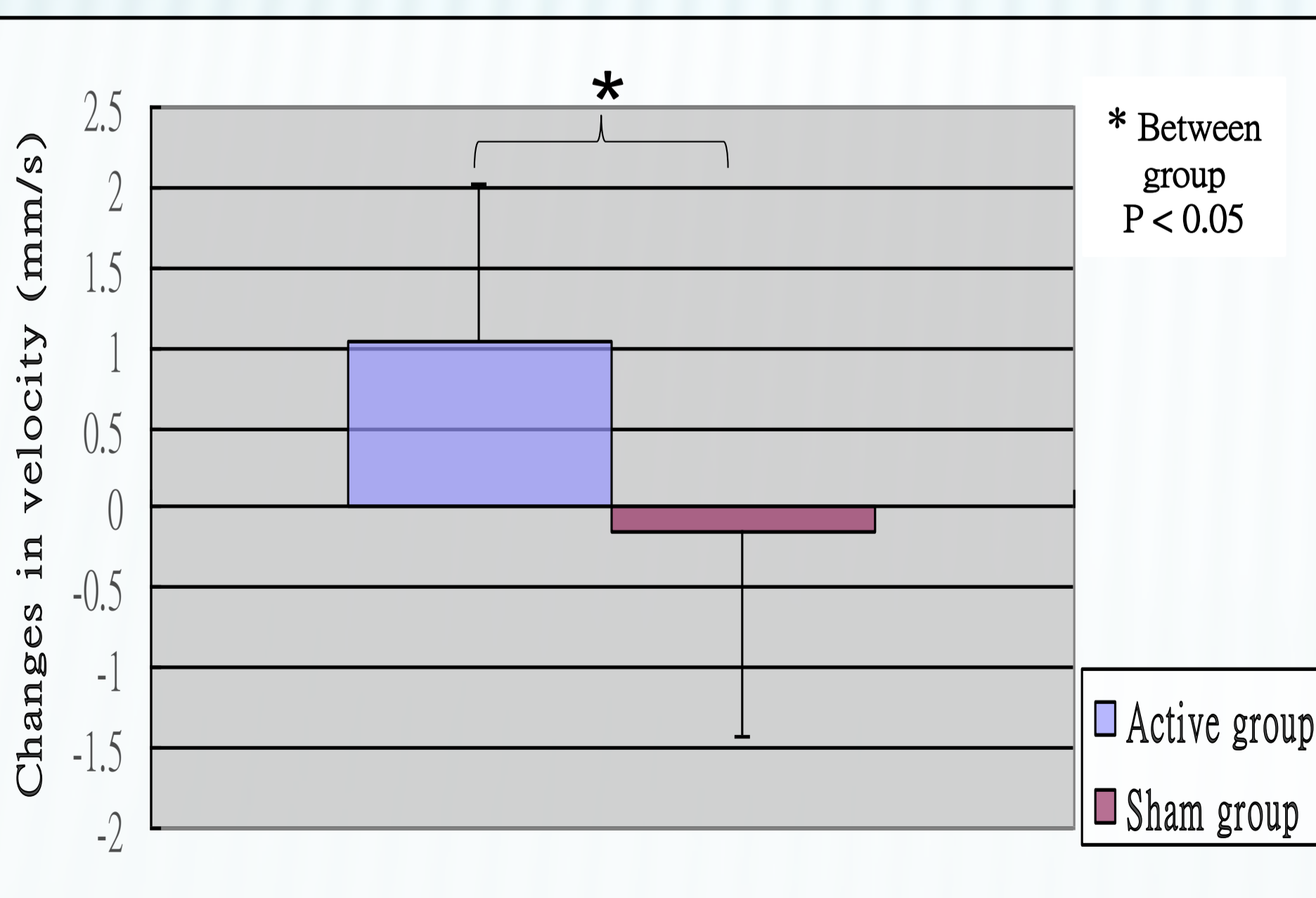


Fig 1. Changes in blood flow velocity of small vein before and after intervention

2. No significant difference in the change of diameter in small vein was found between the groups ( $P > 0.05$ ).

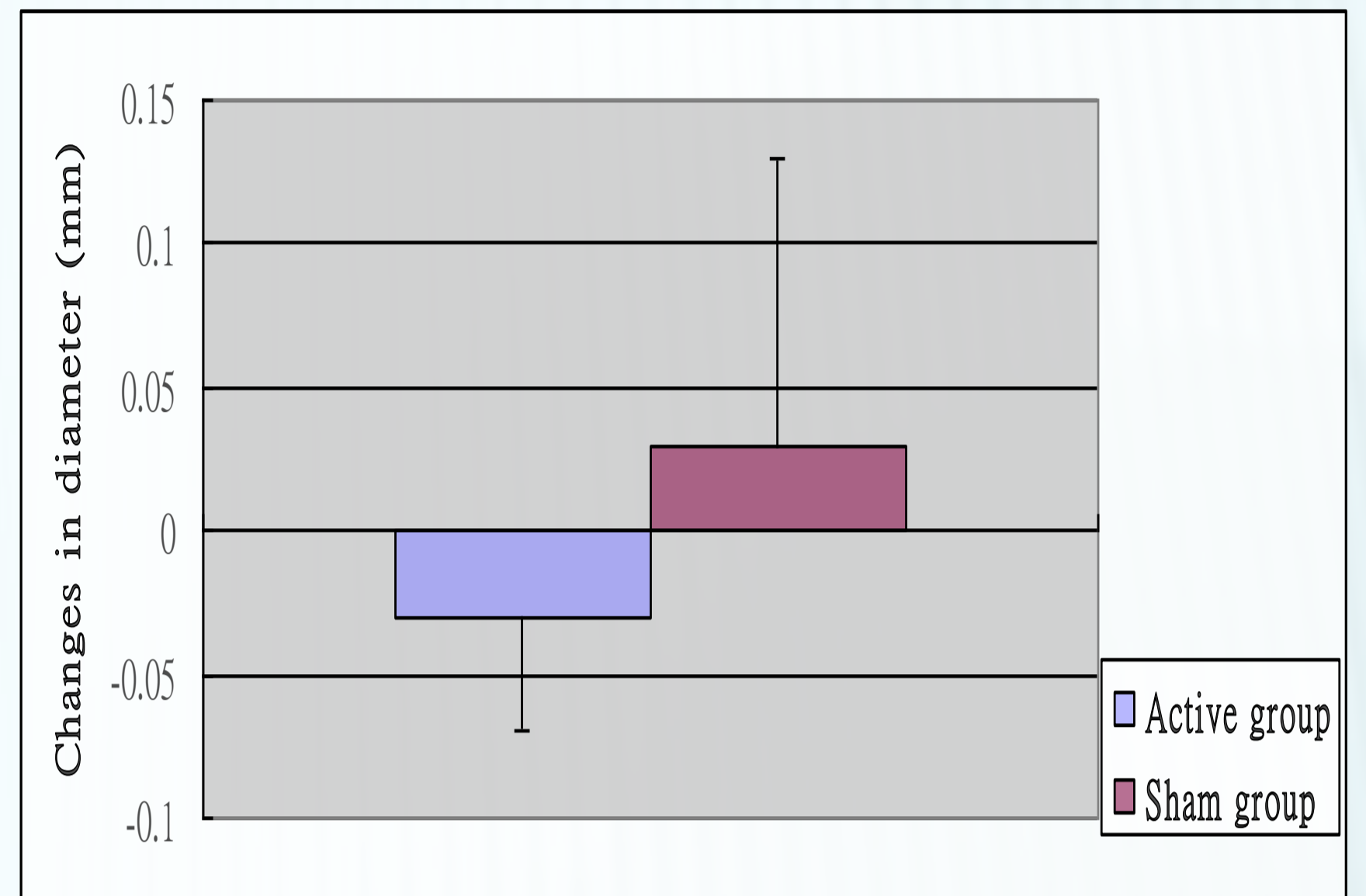


Fig 2. Comparisons of change in diameter of small vein before and after intervention

3. No significant difference in the changes of Flux1 or Flux2 was found between the active and sham PEMF group (all  $P > 0.05$ ).

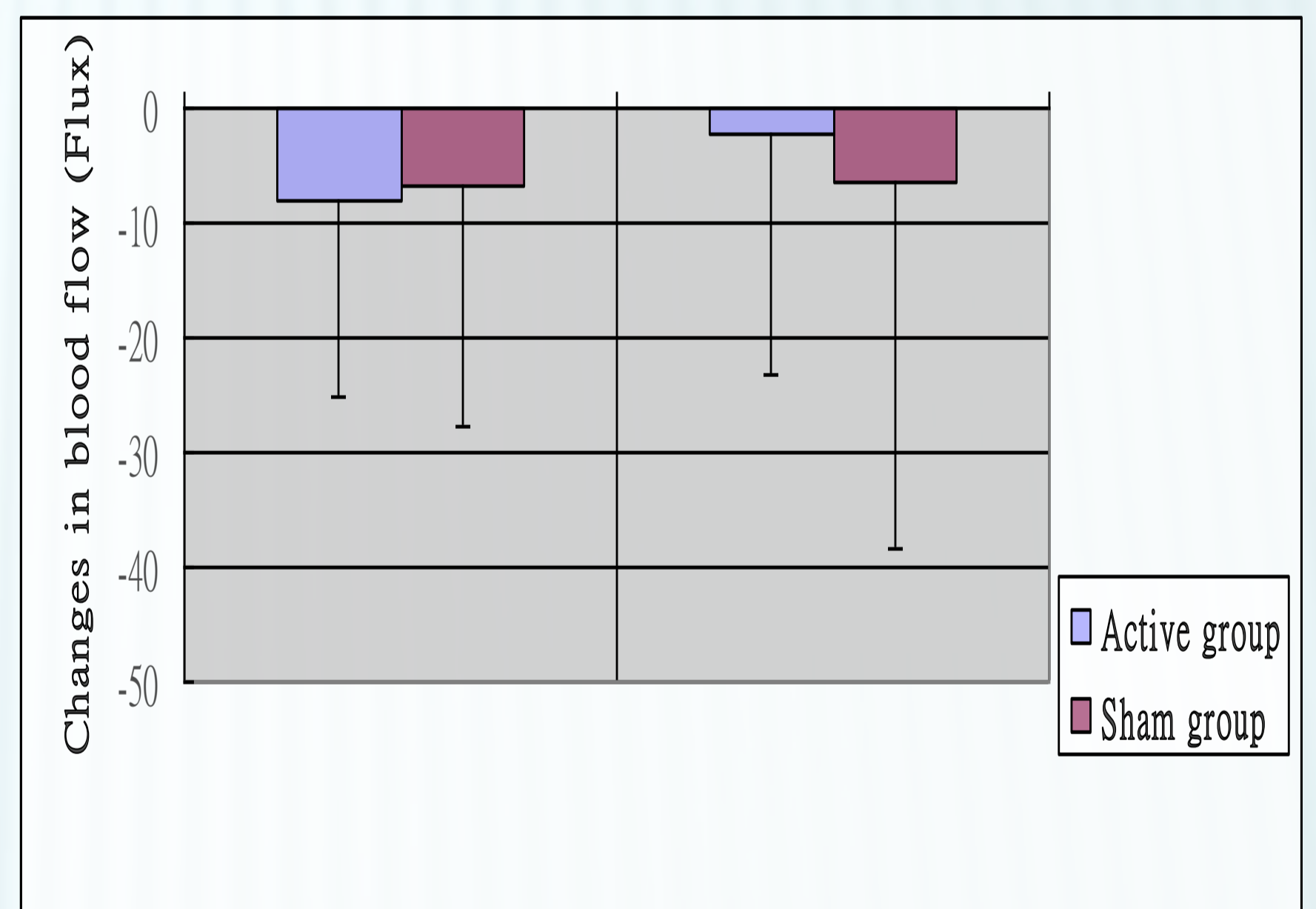


Fig 3. Comparisons of change in blood flow of skin microcirculation before and after intervention

## Conclusions & Discussions

PEMF is a potential intervention to improve the superficial skin circulation in the foot for people with diabetes by working on the small veins rather than the microcirculation. Future study with a larger sample size and with a course of PEMF treatment is recommended to confirm our findings.

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