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Foot and ankle insufficiency fractures among postmenopausal sedentary women

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ABSTRACT

Introduction: Insufficiency fractures occur in bones with decreased elastic strength. In contrast to fatigue or stress fractures, which affect normal bones and have been extensively studied in the literature, foot and ankle insufficiency fractures have been poorly researched to date. The objective of this study was to identify behavioral, biomechanical and metabolic factors associated with the development of foot and ankle insufficiency fractures.

Methods: In total, 53 sedentary postmenopausal female patients who had foot and ankle insufficiency fractures and who were treated at the São Paulo State Civil Servant Hospital (*Hospital do Servidor Público do Estado de São Paulo*) were included in the treatment group, and 53 individuals were included in the control group. Data were collected on fracture site, body mass index (BMI), corticoid use, femoral and lumbar T-score measured by bone densitometry, and serum 25-hydroxyvitamin D level. The calcaneal angle, the angle between the first metatarsal and the talus and the metatarsus adductus angle were measured in radiographs.

Results: The fractures affected the metatarsal bones in 47 patients. Other fracture sites included the lateral malleolus, lateral cuneiform bone, cuboid bone, tibia and calcaneus. All metatarsal bones were affected, most frequently the 5th. The most common fracture was a 5th metatarsal base fracture in zone II. There was no significant difference in mean BMI, serum 25-hydroxyvitamin D levels, alcohol consumption or smoking between the groups. The development of fractures was significantly associated with corticoid use ($p < 0.0001$), low femur ($p = 0.028$) and lumbar spine ($p = 0.002$) bone mineral density and metatarsus adductus angle ($p = 0.02$). When analyzed separately, 4th and 5th metatarsal fractures were associated with smaller angles between the talus and the first metatarsal ($p = 0.01$).

Conclusion: Foot and ankle insufficiency fractures among sedentary postmenopausal women are associated with corticoid use, low bone mineral density and biomechanical characteristics, such as pes cavus and metatarsus adductus. The presence of such fractures may be the first sign of bone fragility and should be used as criteria for initiating adequate treatment to prevent other fractures.

Keywords: Fractures, stress; Osteoporosis; Metatarsal bone.

