

Relationship between ground reaction forces during walking and physical activity in postmenopausal women

João Fonseca (1), Ronaldo Gabriel (2), João Manuel R. S. Tavares (3), Florbela Aragão (4), Adriana Leite (5), José Aurélio Faria (6), Maria Helena Moreira (7).

(1)Faculdade de Engenharia, Universidade do Porto, Portugal; (2) Universidade de Trás-os-Montes e Alto Douro, CITAB, Portugal; (3) Faculdade de Engenharia, Universidade do Porto, Portugal; (4) CIDESD, Portugal; (5) Faculdade de Educação Física e Desporto, Universidade Federal de Juiz de Fora, Brasil; (6) Universidade da Beira Interior, CIDESD, Portugal, (7) Universidade de Trás-os-Montes e Alto Douro, CIDESD, Portugal

Abstract: The menopause triggers an increase in fat mass and visceral fat mass and a reduction in muscle mass of the lower limbs, limiting mobility and functional autonomy of women (Stergiou et al. 2002). The ground reaction forces (GRF) show the magnitude and duration of the charge applied when the foot is in contact with the ground (Saad et al. 2011). The study of this association becomes relevant to prevent musculoskeletal injury and promoting a healthy lifestyle in this type of woman.

The objective of this study has been the analysis of GRF components vertical and antero-posterior during walking in postmenopausal women, according to the levels of physical activity. The sample studied included 53 postmenopausal women aged between 48 and 69 year. The GRF data was collected using a force platform Kistler 9281B, and adopting the 3 steps protocol (Bus et al. 2005).

The physical activity was measured using an Actigraph GT1M accelerometer and the assessment was done in 4 days, including 2 weekend days. The association of variables was studied using the R Pearson correlation coefficient, and step-wise regression models were developed. A statistical level of significance equal to 5% was adopted.

The time of moderate-vigorous physical activity (TMVPA) revealed one predictor ($p \leq 0.05$) independent of the minimum force peak during the support phase ($Fz2$) ($\beta = -0.29$). The braking peak ($\beta = -0.32$) and the impulse until $Fy1$ ($\beta = -0.36$) explains 8.7% and 10.9% of variation of the latter ($EPE=0.02$ N.s/kg). The maximum vertical peak during the loading phase of walking cycle ($Fz1$) ($\beta=0.34$) is influenced in 11,1% by the ageing. The time of menopause (TM) has influence the $Fz1$ loading rate ($\beta=0.28$) and the rating $Fz2/Fz1$ ($\beta=-0.31$).

The results suggest that the TMVPA, age and TM, influence the behavior of ground support, causing differences in the accommodation of the external load

during the walking cycle, and therefore should be considered in the prevention of musculoskeletal disorders.

Key-words: Gait analysis, Functional Autonomy, Force Plat-form, Walking, Amenorrhea.

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