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Quantitative analysis of the effects of obesity and low back pain on gait in female patients

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1 Introduction

Obesity is associated with various musculoskeletal disorders, including low back pain (LBP). Gait can be also affected in these subjects but no quantitative data are today available.
Aim: to quantify parameters of gait in obese LBP subjects.

2 Methods

Population: 8 LBP obese female patients, (LBP; age: 40.5+10.1 years; BMI: 42.39+5.47 Kg/m2), 10 obese female subjects (OBE; age: 33.6+5.2 years; BMI: 39.26+2.39 Kg/m2) and 20 healthy females (CON; age: 33.4+9.6 years; BMI: 22.8+3.2 Kg/m2).
Exclusion criteria: secondary LBP, osteoporosis, osteoarthritis or disease precluding physical exercise.
Assessment: 3D-Gait Analysis using an optoelectronic system with 6 cameras (VICON) and two force platforms. Spatio-temporal, kinematic and kinetic parameters were measured to compare groups.
Statistical analysis: Kolmogorov-Smirnov test and post-hoc ($p < 0.05$).

3 Results

LBP showed longer stance duration and reduced step length (63%; 0.33 m) if compared to obese subjects (62%; 0.38) and CON (59%; 0.88; $p<0.05$). Hip flexion were increased in LBP and OBE with respect to CON (46° and 44° vs 27; $p<0.05$). LBP group showed reduced knee flexion during swing phase in comparison to obese and CON (55° vs 58° and 60°, $p<0.05$) (FIG. 1). LBP exhibited plantarflexed position at initial contact and a limited dorsiflexion during stance and swing phase than obese subjects (FIG. 2). Both LBP and obese group revealed a limited ankle power generation at push-off if compared to CON; hip exhibited high power generation during stance in both LBP and obese subjects, but LBP subjects revealed higher hip power peak than obese group.

FIG. 1: Knee kinematic

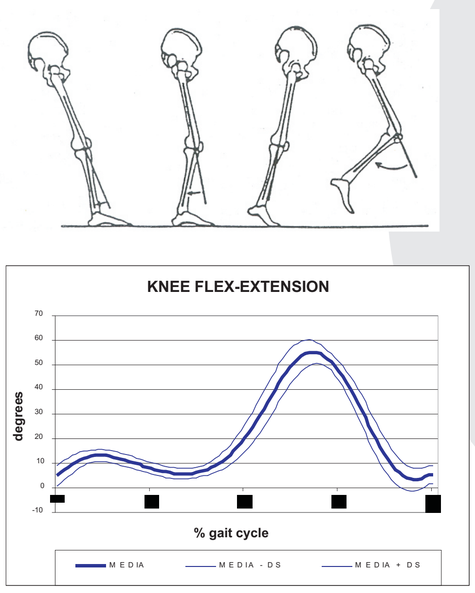
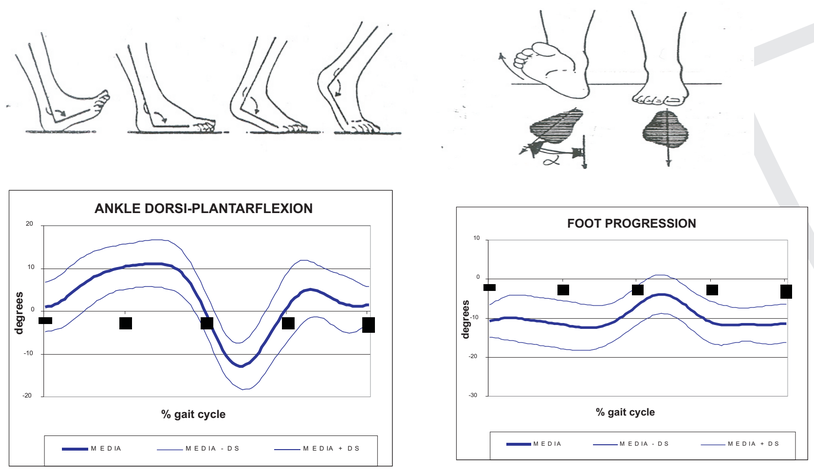


FIG. 2: Ankle and foot kinematic



4 Discussion

LBP and obese showed an abnormal gait pattern, more evident in LBP that showed a less stable gait and abnormal strategy at knee and in particular at ankle joint in terms of kinematics. This may be an antalgic strategy, but it's also related to overweight.

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