



6th International IPWSO Conference
Cluj-Napoca 21.06.07 - 24.06.07
"Coming here, you will discover yourself, discovering others"
Romanian Prader-Willi Association

ASOCIACIÓN MADRILEÑA
PARA EL SÍNDROME DE
PRADER-WILLI



GAIT ANALYSIS IN ADULT PATIENTS WITH PRADER- WILLI SYNDROME: A CROSS-SECTIONAL COMPARATIVE STUDY

Luca Vismara,¹⁻⁴ Marianna Romei³, Manuela Galli³, Angelo Montesano, MD¹, Gabriele Baccalaro, MD¹,
Marcello Crivellini³, Graziano Grugni, MD²

¹Physical Medicine and Rehabilitation Unit and ²Department of Auxology, Italian Auxological Institute, Verbania, Italy; ³Bioengineering Department, Politecnico di Milano, Italy; ⁴SOMA - School of Osteopathic Manipulation, Milano, Italy.

INTRODUCTION: Obesity is a pathological condition associated with an impairment in skeletal statics and dynamics. Excess weight is able to induce negative effects on several common daily movements, such as standing up, bending, walking and running. As far as obese adult patients are concerned, obese males display a gait pattern similar to healthy subjects but some of the temporal and angular components seem different from those observed in non obese individuals, mainly because of the excessive adipose tissue inside their thighs [Spyropoulos et al, Arch Phys Med Rehabil 1991; 72:1065-1070]. Severe overweight is a distinctive clinical feature of Prader-Willi Syndrome (PWS). Other typical PWS characteristics that may interfere with gait pattern include muscular hypotonia, short stature, small hands and/or feet and scoliosis. Hypotonia is nearly uniformly present and gradually improves with age. Nevertheless, adults remain mildly hypotonic with decreased fat free mass. Taking into consideration the peculiar clinical picture of patients with PWS, the aim of our study was to characterize the gait pattern of these subjects by using 3D-Gait Analysis. The results were compared with those obtained in a group of healthy obese patients (OB) and in a group of healthy subjects (HS).

PATIENTS AND METHODS: Nineteen patients with PWS (11M/8F, 13 del15/6 UPD15, age 25.7±6.1 yrs, BMI: 41.3±6.0 kg/m², mean±SD), 14 OB (5M/9F, age 29.4±7.9 yrs, BMI: 39.2±3.25 kg/m²) and 20 HS (10M/10F, age 30.2±5.2 yrs, BMI: 21.4± 2.2 kg/m²) were admitted to the study. All the subjects performed a three-dimensional Gait Analysis (GA) assessment. Kinematic and kinetic parameters were assessed by an optoelectronic system with 6 cameras (460 Vicon, UK) working at 100 Hz and two force platforms (Kistler, CH). Twenty-three passive markers were placed on the subject's body according to the Davis protocol [Davis RB et al, Hum Mov Sci 1991; 10: 575-587].

RESULTS: PWS subjects walked with a 5% reduced cadence, with a 6.3% longer stance phase duration, a 10% reduced single support phase, with a 16.25% shorter normalized stride length and at a 19% slower normalized velocity, compared to HS. Moreover, PWS patients had a 3% reduced cadence, their stance phase lasted 2% more, their single support was 5% reduced, the normalized stride length was 11.8% shorter and normalized walking speed was 14% reduced, compared to OB. Furthermore, cadence of OB was 1.9% lower than that of normal, stance duration lasted 3.6% more than normal, the reduction of normalized stride length was 5% and they walked with a 6.4% reduced normalized velocity, compared to HS. Joint kinematic parameters revealed significant differences between PWS patients and control groups in Range of Motion (ROM) at knee and ankle parameters, with the exception of ROM at hip. In particular, PWS patients showed statistically significant reduced sagittal plane ROM at knee and ankle in comparison both with OB and HS (knee: PWS 56.11°±8.24° vs



6th International IPWSO Conference
Cluj-Napoca 21.06.07 - 24.06.07
"Coming here, you will discover yourself, discovering others"
Romanian Prader-Willi Association

ASOCIACIÓN MADRILEÑA
PARA EL SÍNDROME DE
PRADER-WILLI



OB $60.12^{\circ} \pm 6.10^{\circ}$ vs HS $61.23^{\circ} \pm 4.02^{\circ}$; $p < 0.0001$; ankle: PWS $25.06^{\circ} \pm 3.65^{\circ}$ vs OB $29.81^{\circ} \pm 6.88^{\circ}$ vs HS $31.90^{\circ} \pm 4.81^{\circ}$; $p < 0.001$).

CONCLUSIONS: PWS gait pattern is significantly different from obese patients, despite both groups having similar BMI. We suggest that PWS gait alterations may be related to the abnormalities in the development of motor skills in childhood, due to precocious obesity. A tailored rehabilitation program is needed to start in early childhood of PWS patients in order to prevent gait pattern changes.