

KINETIC CHARACTERISTICS OF THE GAIT IN CHILDREN, ADULTS AND ELDERLY

Jansen Atier Estrázulas, Roberta Pires, Diego Murilo dos Santos, Lígia Raquel O. G. Stolt and Sebastião Iberes Lopes Melo.
Santa Catarina University State – UDESC – Brazil – email: jansenef@hotmail.com

INTRODUCTION

The gait is a simple activity of daily life and one of the main abilities of the human, that starts to develop the gait in the first years of life, and in agreement with Delisa (1992), the bipede gait standard is acquired in infancy for around 7 or 8 years old, where the sensory-motor system becomes suitable automatically to generate a repetitive set of motor control commands to allow a person to walk without conscientious effort. In adults, for being a daily movement, the gait pattern is characteristic of each person and well defined. In the elderly, in general way, one of the biggest functional limitations is the fall, or the fear of it, that implies in diminished levels of activities with subsequent loss of the muscular function, joint tissue and information processing.

Studies have been carried through in the search for characterizing the gait in these cited populations above, however, one can find little comparison between them. Thus, the search for a bigger understanding of kinetic characteristics of the gait was objectified in this study comparing children, adults and elders, trying to identify a possible difference between these populations.

METHODS

This diagnostic descriptive study was carried through in the Laboratory of Biomechanics of the Center of Physical Education, Physiotherapy and Sports of UDESC. There were as population children, adults and elders of the city of Florianópolis – SC - Brazil.

The sample was constituted by individuals of the feminine sex, being 34 children (G1) with age between 10 and 12 years old, 24 adults (G2) with age between 18 and 41 years old, and 12 elders (G3), with age between 64 and 74 years old. The sample was intentional type. One selected only subjects that had not presented any type of pathology or disfunction.

As measure instrument one used an ergometric treadmill Kistler-Gaitway 9810SI, with two force platforms of piezoelectric crystals connected to their bases that register the ground reaction force. The data processing was made through the instrument software.

For data collection, it was initially did a period of adaptation to the equipment and weightning for the data normalization by the corporal weight (CW). Finally, one collected data with sampling frequency of 600 Hz and acquisition with 12s, speed average for the citizens of 4,0km/h. The average value of both sides of the sample was used. One used descriptive statistics in the characterization of the variáveis (média and standard deviation) and to comparison used ANOVA One-Way and the Scheffe Post Hoc test. The level of significance adopted was of 95%.

In this study some kinetic variables related to the vertical component of the ground reaction force had been analyzed: First Force Peak (FFP), Second Force Peak (SFP), Force of Medium Support (FMS), Tax of Weight Acceptance (TWA).

RESULTS AND DISCUSSION

The results show that the groups that had participated of this study had presented the First Force Peak with a statistically significant difference between the groups, and when applied the Scheffe Post-hoc test one did not find where this difference occurred, being able to have been influenced by the size of the sample. However, analyzing the results, it can be verified that the average value for the G1 (1,08CW), was greater than the average values of G2 and G3 (1,05 CW).

The variable Second Force Peak occurs in the phase of propulsion of the foot to stimulate it for the following step during the gait. The groups of this study had differed in this variable, having the G3 the lesser value (1,00 CW) and the G1 the greater (1.11 CW).

The Medium Support Force was the only kinetic variable that did not present significant difference statistically. This can be explained by this variable occur in the phase of transition of the weight of the citizen on the support foot, not happening many variations from a citizen to the other.

The Tax of Weight Acceptance consists in the form the citizen is cushioning the first impact in the phase of weight reception. In this study, the citizens of G2 had differed from G1 and G3, presenting lesser values for this variable, what demonstrates a less harmful gait for health.

CONCLUSIONS

With results and the theoretical referencial this study conclude that: The FFP was bigger for the children, what it demonstrates the lack of maturation for the protection of the locomotive device during walking of this group. The SFP was lesser for the elderly, that it tells to the lesser force used for this population for the translation of the step. The children and the elderly group had presented a bigger TWA compared with the adults. The two groups execute the gait with lesser protection of the locomotive device, for the lack of maturation (children) and degenerative deficiency of the advanced age (elderly). For in such a way, it can even be concluded that these groups possess distinct characteristics of locomotion, although some variables present similarities.

REFERENCES

- DAVID, A.C. Aspectos biomecânicos do andar em crianças: cinemática e cinética. Tese de Doutorado. UFSM, 2000.
- DELISA, J. A. Medicina de Reabilitação Princípios e Prática. São Paulo, Ed. Manole, 1992. vol. 2.
- McCRORY, J. L.; WHITE, S.C. and LIFESO, R. M. Vertical ground reaction forces: objective measures of gait following hip arthroplasty. Gait and Posture, Oxford, Reino Unido. n. 14, pag 104-109, 2001.
- SUTHERLAND, D.H.; OLSHEN, R.A.; BIDEN, E.N. & WYATT, M.P. The development of mature walking. London: MacKeith Press, 1988.
- WINTER, D.A. The biomechanics and motor control of human gait: normal, elderly and pathological. Canadá: University of Waterloo Press, 1991.