3-D KINETIC CHARACTERISTICS OF OBESE CHILDREN AND NORMAL WEIGHT CHILDREN DURING NORMAL WALKING

Dandan Xiao[1] and Yuan Gao[2]
[1]P.E. department, Shanghai University, Shanghai, China
[2]P.E. department, Shenyang University, Shenyang, China

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INTRODUCTION: Previous researches on obese children walking gait have been mainly focused on the kinematic characteristics, and little focused on the kinetic characteristics. The aim of this study is to identify and compare the kinetic characteristics of the walking gait of obese children with those of normal weight children.

METHODS: The subjects (11.2 ± 0.7 y) were divided into two groups: the obese children group (9 volunteers) and the normal weight children (11 volunteers). The average body mass index (BMI) of the former was 26.03, and that of the latter was 18.89. The KISTLER 3-D force platform was employed. During the experiment, the subjects were required to walk as normal and to make the right foot step on the centre of the force platform.

RESULTS: Listed in Table 1~3 were the major 3-D kinetic parameters results (the maximum, the minimum of GRF, and the time when GRF reached the extremum) during a stance phase of the gait. The tables showed the differences between obese children and normal children. The unit of force (F1~F10) was BW, which equalled the real GRF divided by body weight. The unit of time (T1~T6) was percent, which meant the time divided by the whole time of the stance phase.

Table 1 The perpendicular GRF.

	Obese (M ± SD)	Normal (M ± SD)
F1 (BW)	1.20 ± 0.12	1.22 ± 0.13
T1 (%)	20.42 ± 2.16	18.57 ± 3.02*
F2 (BW)	0.65 ± 0.05	0.61 ± 0.17
T2 (%)	49.07 ± 4.21	50.64 ± 4.82
F3 (BW)	1.11 ± 0.06	1.16 ± 0.10
T3 (%)	79.47 ± 2.13	81.64 ± 2.25*

Table 2 The arrowy GRF.

	Obese (M ± SD)	Normal (M ± SD)	Mean (M ± SD)
F4 (BW)	-0.04 ± 0.02	-0.06 ± 0.03	-0.05 ± 0.05
T4 (%)	16.56 ± 3.81	15.26 ± 2.87	15.97 ±3.49
F5 (BW)	0.22 ± 0.04	0.23 ± 0.04	0.23 ± 0.04
T5 (%)	46.67 ± 6.55	49.04 ± 7.82	47.54 ± 8.97
F6 (BW)	-0.28 ± 0.03	-0.29 ± 0.03	-0.29 ± 0.03
T6 (%)	77.97 ± 7.56	83.26 ± 5.25	80.53 ± 8.46

Table 3 The level GRF.

	Obese (M ± SD)	Normal (M ± SD)
F7（BW）	-0.052 ± 0.021	-0.035 ± 0.012*
F8（BW）	0.076 ± 0.013	0.054 ± 0.017*
F9（BW）	0.068 ± 0.015	0.048 ± 0.017*
F10（BW）	-0.015 ± 0.008	-0.013 ± 0.006

*p < 0.05

CONCLUSIONS: (1) There were no significant differences between the obese children and the normal weight children in the perpendicular and arrowy GRF. Perhaps it could be concluded that the relative force of the obese children was not higher than that of the normal weight children. (2) The results of 3-D GRF showed that the maximum and the minimum of the level GRF of obese children were higher than those of the normal weight children, which suggested that the obese children had a wider range of swing on left and right direction.

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