19. 日本人中学生の歩行の経済スピードと境界スピード

CRITICAL SPEEDS OF WALKING IN JAPANESE CHILDREN AGED 12 TO 13 YEARS

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Walking

Critical speeds

Stride

PURPOSE: The purpose of the present study was to determine the optimal walking speed and the metabolic intersection speed of walking and running in Japanese boys and girls aged from 12 to 13 years and compare the results with those of young adults. This study was also concerned with relationship between these critical speeds and stride during walking.

METHODS: Seventeen children and twenty-one university students volunteered as subjects in the present study. Their physical characteristics are shown in Table 1 with the results of the study. For the determination of the critical speeds of walking, Kagaya's procedure(1983) was used, in which the critical speeds of walking were obtained from the relation between speed and stride during walking at different speeds without the measurement of energy expenditure of subject. This procedure was shown in Figure 1.

RESULTS: The critical speeds of walking and, the frequency and length of step during walking at these critical speeds were presented in Table 1. The critical speeds of children were slower than adults. Although the step frequency and step length during walking were smaller for children than for adult subjects, the values of step length per body height were similar for both groups.

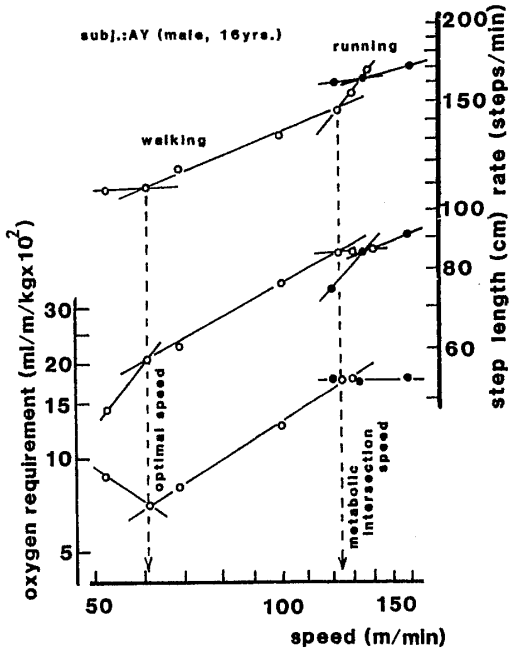

Figure 1. The critical speeds of walking. This figure presents the relationship between stride and oxygen requirement as walking speed increases in logarithmic scale. The lines relating oxygen requirement, step frequency and step length intersect at walking speeds of 62 m/min and 123 m/min which are critical speeds of this subject.(Kagaya,H.: Speed-stride relation during level walking. In Kerelink,S.(Ed.):Proceeding of the FISU Conference-Universiade '83,944-957,1983)

Optimal speed	N	Age (yrs)	Height (cm)	Weight (kg)	Speed (m/min)	Sf (f/min)	Sl (cm)	Sl/H (%)
Male adults	8	21.2	171.6	63.5	74.8	113.5	65.9	38.4
Boys	10	13.0	152.2	44.9	60.7	102.2	59.1	38.9
Female adults	13	21.2	157.6	52.2	64.1	108.5	59.7	37.9
Girls	7	13.2	153.1	44.4	57.2	98.9	56.7	37.1
Metabolic intersection speed								
Male adults	8	21.2	171.6	63.5	121.5	140.5	86.4	50.3
Boys	10	13.0	152.2	44.9	111.9	135.7	81.8	53.7
Female adults	13	21.2	157.6	52.2	111.2	141.3	78.7	49.9
Girls	7	13.2	153.1	44.4	110.3	133.8	80.1	52.4

Sf:Step frequency Sl:Step length Sl/H:Step length/Height

Table 1. Physical characteristics and critical speeds of subjects.