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The Result of Gait Analysis of Hemiplegic Patients with the Newly Developed Three Dimensional Electrogoniometer Domotion

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Background: The purpose of this study is to evaluate the difference between the hemiplegic patients and controls with the newly developed three dimensional electrogoniometer gait analysis program.

Methods: The basic kinematic data of hip, knee and ankle joints on the sagittal plane and of temporospatial gait parameters were obtained from 25 hemiplegic patients and 25 healthy adults with three-dimensional electrogoniometer Domotion

Results: Significant difference were observed between patients and controls in kinematic parameters. Mean maximal hip flexion of healthy adults and hemiplegic limb of patient was $32.89 \pm 1.8^\circ$ and $18.24 \pm 4.8^\circ$; maximal knee flexion was $50.32 \pm 2.4^\circ$ and $34.98 \pm 10.4^\circ$; maximal ankle dorsiflexion was $5.34 \pm 1.2^\circ$ and $1.22 \pm 2.8^\circ$; and maximal ankle plantar flexion was $15.63 \pm 2.0^\circ$ and $8.46 \pm 3.2^\circ$ ($p < 0.05$). Mean maximal hip flexion of healthy adults and unaffected limb of hemiplegic patient was $32.89 \pm 1.8^\circ$ and $28.36 \pm 6.6^\circ$; and maximal ankle plantar flexion was $15.63 \pm 2.0^\circ$ and $8.62 \pm 3.7^\circ$, respectively ($p < 0.05$).

Conclusions: The gait parameters of hemiplegic patients showed significant differences as compared with normal gait parameters with the using of three dimensional gait analysis with electrogoniometer.

Key words: Difference, Gait analysis program, Hemiplegic patients, Electrogoniometer

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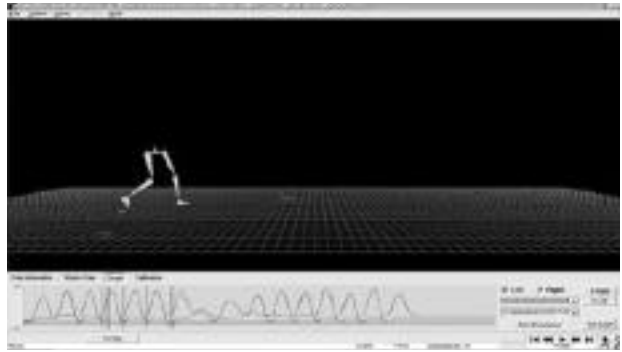


Figure 1. Domotion Motion Analysis Program which Recorded the Kinematic Data of Three Joints. The upper figure showed the simulation of the leg with the multiple joints. In lower figure, blue line represented the gait curve of Rt. low leg, and red line showed the curve of Lt. low leg.

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 Perry⁶
 , Anderson¹⁰
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 25
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 28.4 (25 36) 가14 , 가11
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 15 (60%), 9
 (36%), 1 (4%) . FIM (Function
 al independent measure)
 score
 92.2 mobility score 13.1 , locomotion score
 8.7 (Table 1).
 2.
 가
 Motion analyzer 32.89°, 18.24 ° , 50.32°, 34.98 ;

IBM - PC
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 10 meter
 (Fig. 1),
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ANOVA test
 p - value가 0.05

Table 1. Clinical characteristics of subjects.

Group	Control	Hemiplegia
Sex (Male/Female)	14/11	15/10
Age (years)	28.4	52.7
Hemiplegia (L/R)	-	11/14
FIM score	-	92.2
Duration of morbidity (months)	-	20.6

Hemiplegia (L); Lt.extremities motor weakness due to Rt.brain lesion,
Hemiplegia (R); Rt.extremities motor weakness due to Lt.brain lesion,
FIM; functional independent measure representing the functional, outcome of patients after stroke

Table 2. Kinematic data of hip, knee and ankle joints on sagittal plane

		Control	Unaffected limb	Affected limb
Hip	maximal flexion	32.89 °± 1.8 °	28.36 °± 6.6 *	18.24 °± 4.8 †
	maximal extension	6.40 °± 2.2 °	4.78 °± 3.8 °	3.7 °± 6.53 °
Knee	maximal flexion	50.32 °± 2.4 °	53.64 °± 14.3 °	34.98 °± 10.4 †
	maximal extension	4.95 °± 0.8 °	5.30 °± 2.7 °	3.13 °± 4.6 °
Ankle	maximal dorsiflexion	5.34 °± 1.2 °	4.43 °± 2.6 °	1.22 °± 2.8 †
	maximal plantar flexion	15.63 °± 2.0 °	8.62 °± 3.7 *	8.46 °± 3.2 †

Values are mean ± S.D.

* indicates difference (P<0.05) between control and unaffected limb

† indicates difference (P<0.05) between control and affected limb

Table 3. Relative position of maximal joint angle in gait cycle

		Control	Unaffected limb	Affected limb
Knee	maximal flexion	75.9% ± 3.1%	74.8% ± 4.7%	73.7% ± 3.8%
Ankle	maximal dorsiflexion	43.4% ± 4.0%	43.1% ± 3.1%	41.6% ± 2.1%
	maximal plantar flexion	68.1% ± 4.0%	67.9% ± 3.6 °	63.9% ± 3.9%*

Values are mean ± S.D.

* indicates difference (P<0.05) between control and affected limb

5.34°, 1.22 °; 15.63°, 가
8.46° (p<0.05),
6.40°, 3.70 °; 4.95°, 3.13 °
(p>0.05).
32.89 °, 가
28.36°, 15.63°, 8.62°
(p<0.05),
가 (Table 2).
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68.1% 63.9%
가 (Table 3). 가 가
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