

Neither Lokomat® nor Physiotherapy gait training seems to improve gait quality in subacute ambulatory subjects with stroke – A pilot study

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Introduction

- Repetitive task-specific robotic and conventional gait interventions have shown promising improvements in walking performance for hemiparetic patients.
- Still, no clear evidence is established for the effect of robotic gait training in recovery of subacute ambulatory patients.
- No studies have investigated differences in gait quality between robotic training and physiotherapy.

Aim

- We wished to compare the effect of the Lokomat® to physiotherapy (PT) gait training evaluated with the outcome measures (1) gait asymmetry, (2) single support stance time in impaired extremity and (3) walking speed.

Table 1. Subject characteristics at baseline

	Lokomat - Physiotherapy (n=7) (median (range))	Physiotherapy - Lokomat (n=6) (median (range))	<i>p</i>
Gender (M/F)	5/2	4/2	1.00
Age (years)	61 (38-71)	59 (38-64)	.52
Days post stroke	56 (20-79)	21 (9-39)	.05
Hemiparetic lower extremity (L/R)	2/5	5/1	.10
FIM (min. 18 - max. 126)	88 (59-109)	96 (59-113)	.57

Abbreviations: M, Male; F, Female; L, Left; R, Right; FIM, Functional Independence Scale.

Table 2. Step length ratio, swing time ratio, single support stance time and walking speed determined at baseline and changes in outcomes determined after three and six weeks of intervention

	Lokomat - Physiotherapy (n=7) (median (range))	<i>p</i> (within group)	Physiotherapy - Lokomat (n=6) (median (range))	<i>p</i> (within group)	<i>p</i> (between group)
SLR					
Baseline	0.19 (0.04;1.40)		0.31 (0.03;2.25)		.89
ΔThree weeks	0.04 (-0.73;0.18)	.61	-0.05 (-2.07;0.11)	.35	.57
ΔSix weeks	-0.10 (-0.41;0.11)	.13	-0.04 (-0.22;0.2)	.46	.25
STR					
Baseline	1.99 (1.20;6.60)		1.65 (1.20;2.44)		.67
ΔThree weeks	-0.05 (-3.17;0.23)	.18	-0.56 (-0.99;0.07)	.028	.39
ΔSix weeks	-0.01 (-1.56;0.21)	.31	-0.03 (-0.12;0.34)	.75	.39
SSS (%)					
Baseline	20.6 (5.2;28.3)		23.2 (10.6;25.9)		.25
ΔThree weeks	4.1 (-0.2;11.5)	.05	9.6 (5.1;13.0)	.028	.028
ΔSix weeks	1.3 (-0.7;6.4)	.13	0.85 (-6.3;2.5)	.46	.77
SWS (m/s)					
Baseline	0.24 (0.06;0.47)		0.33 (0.15;0.53)		.22
ΔThree weeks	0.08 (0.02;0.22)	.018*	0.26 (0.07;0.53)	.028*	.06
ΔSix weeks	0.10 (-0.01;0.31)	.028*	0.12 (0.03;0.22)	.028*	.39

Abbreviations: SLR, absolute step length ratio; STR, swing time ratio; SSS, single support stance in impaired extremity; SWS, self-selected walking speed; Δ Indicates change in outcome measure from baseline to three weeks (Three weeks-Baseline) and from three weeks to six weeks (Six weeks-Three weeks). * Significantly changes within and between intervention groups were set at $p < .017$ after a Bonferroni adjustment for primary outcomes (0.05/3) and at $p < .05$ for walking speed.

Results

- No differences were found in gait parameters between the two gait interventions, and primary outcomes showed no improvements in patients practising LGO or PT after three or six weeks of training.
- Walking speed showed significantly improvements in LGO (median: 0.08 m/s (range: 0.02;0.22); $p = .018$) and PT (median: 0.26 m/s (range: 0.07;0.53); $p = .028$) after three weeks and after six weeks of training (LGO: median: 0.12 (range: 0.03;0.22), $p = .028$; PT: median: 0.1 (range: -0.01;0.31), $p = .028$).

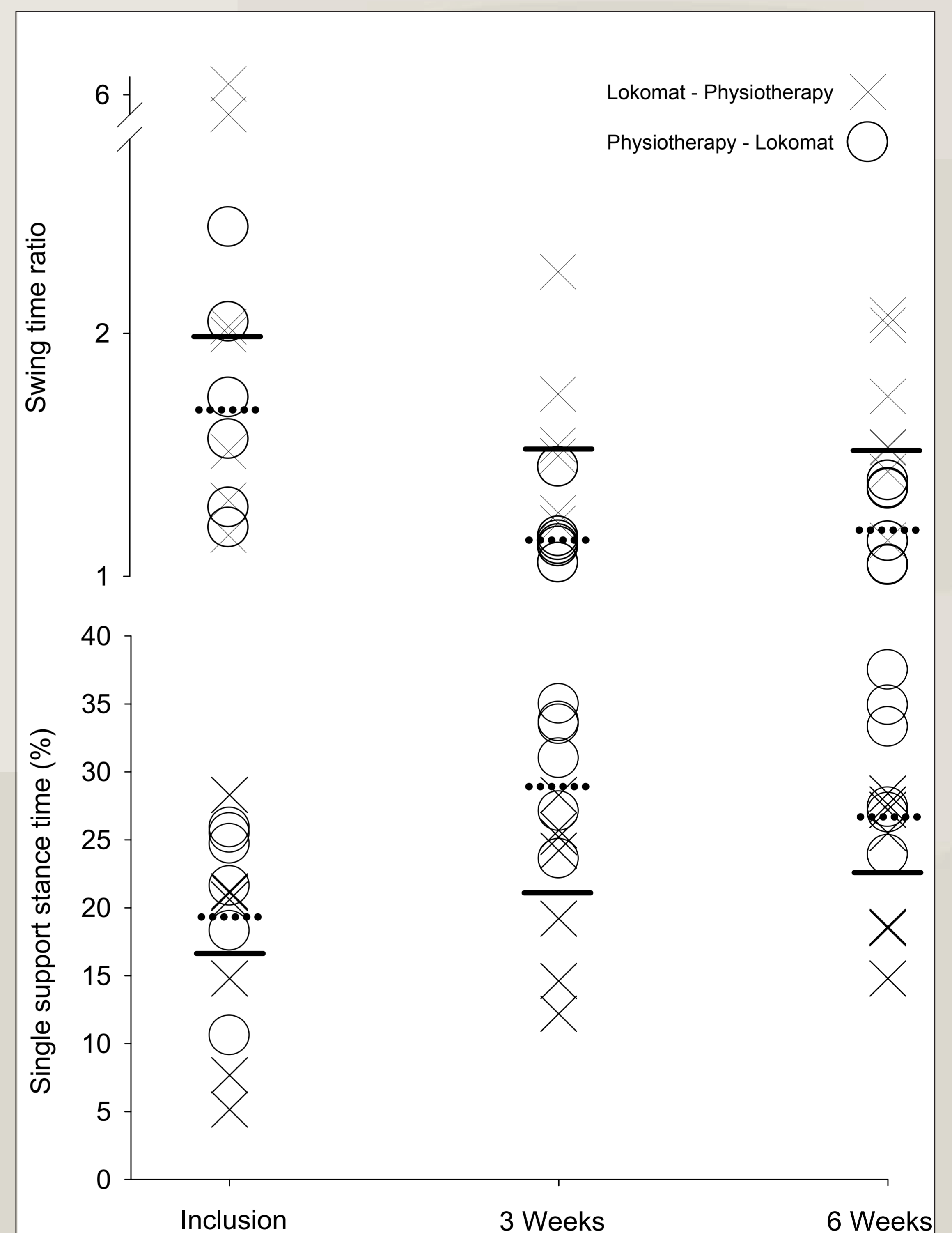


Figure legend.
Figure 1. Single support stance time in impaired extremity and swing time ratio (STR) at baseline, after three weeks and after six weeks are pictured. Horizontal black thick line represent median for intervention group lokomat-physiotherapy and horizontal black dotted line represent median for intervention group physiotherapy-lokomat.

Materials and Method

- Thirteen ambulatory subacute subjects with stroke were randomised to Lokomat (LGO) and physiotherapy (PT) in a cross-over study.
- Intervention consisted of three weeks of LGO and three weeks of PT.
- Gait parameters were collected in a 3D motion analysis system.
- Primary outcome measures were single support stance time in impaired extremity and gait asymmetry expressed as absolute step length ratio ($[1 - (\text{step length in impaired extremity} / \text{step length in unimpaired extremity})]$) and swing time ratio (swing time in impaired extremity / swing time in unimpaired extremity).
- Secondary outcome was walking speed.

Conclusion

- No differences in gait parameters were found between gait interventions, and no improvements in gait qualities were detected in either interventions (within groups) although, LGO and PT improved walking speed.
- Studies are warranted to establish whether there are additional benefits of robotic gait training in stroke rehabilitation.