

MUSCLE STRENGTH, BALANCE AND FUNCTIONAL INDEPENDENCE IN PERSONS WITH STROKE



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Introduction

Cerebral vascular disease is one of the main causes of morbidity, disability and mortality in developed countries. Problems with movement control are frequent after stroke. Lower limb weakness and impaired balance are common problems that are related with the risk of falls and are likely to interfere with the ability to perform daily life activities. Physiotherapy intervention usually starts early after stroke and addresses impairments related to movement and posture in order to improve motor recovery and restore function.

Purpose

To investigate the relationship between knee muscle strength, balance and functional independence within the first month after stroke.

Participants

Subjects were recruited at Physiotherapy Department of Hospital Fernando Fonseca within the first month after stroke.

N=8 (all male)

Mean age 62,5±6,2y, with unilateral stroke (7 ischemic, 1 hemorrhagic) middle cerebral artery territory

Time since stroke: 15±7 days

Inclusion criteria

Single unilateral stroke in the middle cerebral artery territory

No cognitive impairment according to MiniMental State

No cardiac complications

No lower limb orthopedic problems

No other diseases that could interfere with balance

Inform consent to participate in the study

Methods

The test protocol includes assessment of strength, balance and functionality.

Knee muscle strength (extensors and flexors) was measured on the isokinetic dynamometer. Cybex 6000®.

Balance was assessed with the Berg Balance Scale (BBS)

Functional independence was assessed with the Modified Barthel Index (MBI).

The results were analyzed at the SPSS program version 17.0.

Descriptive statistics were used to characterize the participants.

A correlation analysis was performed using knee muscle strength, BBS and MBI. The significance level was set at $p < 0,05$.

Results

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
MBI	8	33	80	65,63	17,328
BBS	8	6	44	29,63	14,813
FAS	8	28	75	47,63	17,856
FNAS	8	60	103	76,00	15,510
EAS	8	43	119	87,13	22,592
ENAS	8	65	134	113,25	20,810
Valid N	8				

MBI – MODIFIED BARTHEL INDEX
 BBS – BERG BALANCE SCALE
 FAS – FLEXORS AFFECTED SIDE
 FNAS – FLEXORS NON AFFECTED SIDE
 EAS – EXTENSORS AFFECTED SIDE
 ENAS – EXTENSORS NON AFFECTED SIDE

Ratio Statistics for Flexors affected side / non affected side

Price Related Differential	1,024
Coefficient of Dispersion	,269
Coefficient of Variation	34,5%

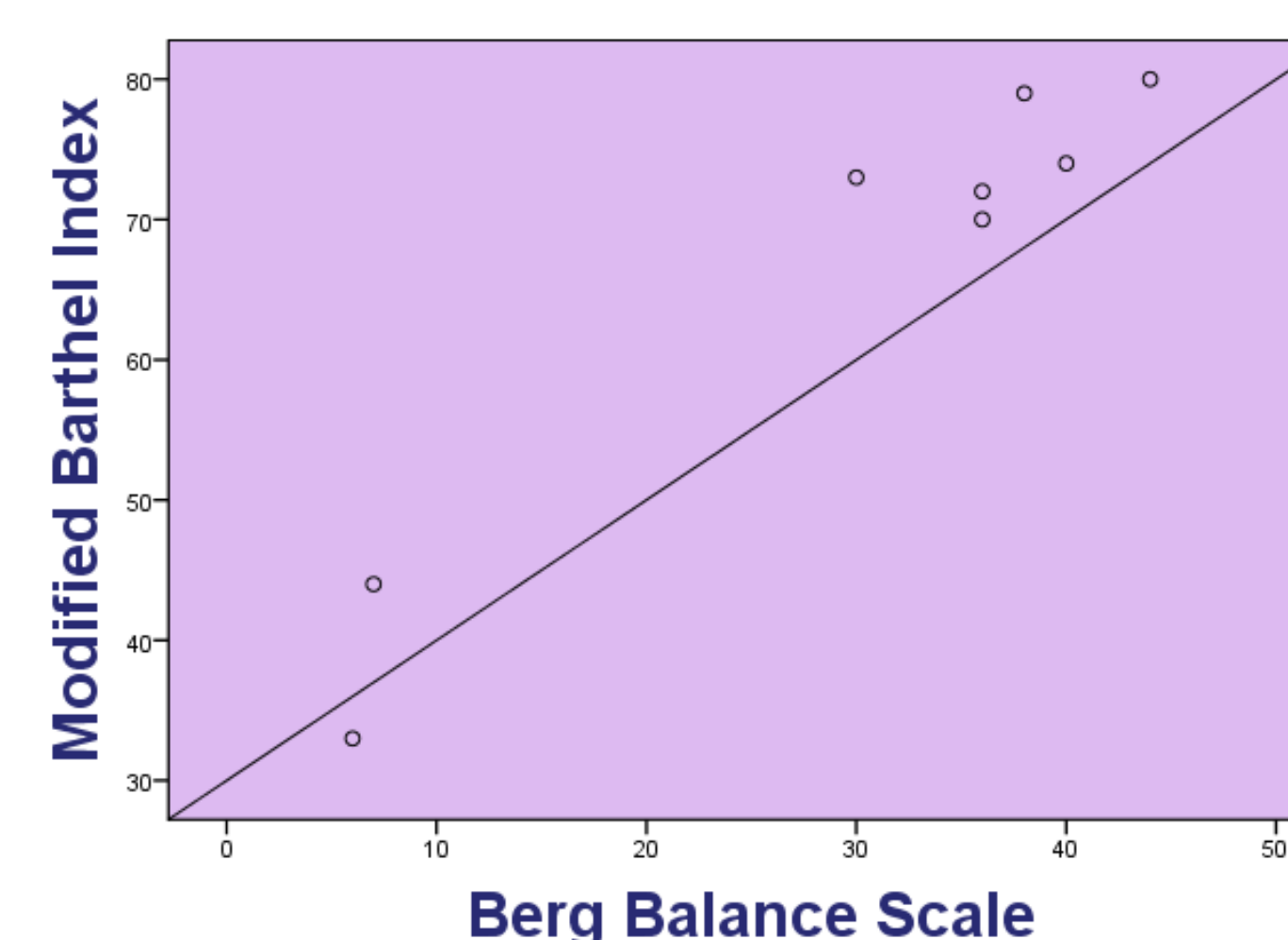
Knee flexors from the affected lower limb show a deficit of 34,5% regarding knee flexors from non affected lower limb

Ratio Statistics for Extensors affected side / non affected side

Price Related Differential	1,024
Coefficient of Dispersion	,172
Coefficient of Variation	26,6%

Knee extensors from the affected lower limb show a deficit of 26,6% regarding knee extensors from non affected lower limb

Spearman Correlation Coefficient



The scatterplot shows that as BBS score increases, MBI score also increases, which indicates a positive correlation between the two variables. Spearman correlation coefficient= 0,898, N =8, $p=0,002 < 0,01$

Discussion & Conclusions

After stroke knee strength from the affected lower limb is impaired. It appears to be important to improve knee muscle strength from the affected lower limb to reduce weakness. In addition persons with stroke have higher risk of falls and are functionally dependent. There is evidence that balance is an important feature for functional independence in persons with stroke.

Recommendations

Further research is needed to investigate the effect of knee muscle strength training on balance and function.

These results indicate that early physiotherapy is needed after stroke. Intervention must focus on strength and balance training in order to improve stability and help persons with stroke to become functionally independent .

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