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The clinical factors associated with bone density of post-stroke hemiplegic male patients

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Objective
Osteoporosis and the accompanying fractures are the important and common complications for stroke patients. Fracture could have profound effect on rehabilitation and recovery. So, early prevention and treatment of osteoporosis are very important for stroke patients. Previous studies have investigated factors related to osteoporosis in stroke patients, but those studies did not consider the effects of menopause or aging. The aim of this study is to investigate the factors that could affect bone mineral density (BMD) for post-stroke hemiplegic male patients, excluding the effects of menopause and aging.

Method
Patients who had first cerebral hemorrhage or infarction were recruited for this study. To exclude the effects of menopause or aging, only male patients younger than 65 years were included. Exclusion criteria were as follow: 1) previously diagnosed with osteoporosis; 2) underwent hip replacement surgery; 3) had other musculoskeletal or neurologic disorders that may influence their functional level. When patients were admitted or transferred to the department of rehabilitation medicine at acute stage of stroke, Berg Balance Scale (BBS), Trunk Impairment Scale (TIS) and Modified Barthel Index (MBI) were evaluated. Between 3 and 4 months after stroke, they underwent follow up evaluation and BMD test for bilateral femur necks and lumbar spine. The authors investigated the relationship between the clinical factors (BBS, TIS and MBI) and the result of BMD test.

Results
There was no difference between the BMD after 3-4 months of stroke for hemiplegic side of femoral neck and unaffected side of the femoral neck in both T-score and absolute BMD (Table 2). Follow up TIS showed a significant correlation with the T score and absolute BMD of the lumbar spine and hemiplegic side of the femoral neck, (Tables 3, 4). However, parameters of BMD had no association with the baseline BBS, TIS, MBI and the changes in

BBS, TIS, MBI. This result suggests that functional loss of trunk movement, referred as follow up TIS, in stroke patients might reduce the BMD after 3-4 months of stroke.

Conclusion

In post-stroke hemiplegic male patients, the better functional mobility of trunk after 3-4 months of stroke, the lower possibility of low BMD. This study showed that BMD monitoring should be considered in stroke patients with low scores on follow up TIS.

Table 1. Demographics and characteristics of patients

Demographic and clinical characteristics		Value
Age(year)		55.4±4.1
Etiology	Infarction	6
	Hemorrhage	5
Side of weakness	Right	7
	Left	4
Stroke duration(day)		99.8±13.3

Data were presented as mean±standard deviation(SD).

Table 2. Comparison of T-score and absolute BMD (g/cm2) in bilateral femur neck

	Hemiplegic side	Unaffected side	P-value
T-score	-0.45±0.78	-0.60±0.68	0.304
Absolute BMD(g/cm^2)	0.79±0.10	0.77±0.08	0.306

BMD=Bone Mineral Density

Table 3. Correlation between T-scores/absolute BMD (g/cm2) and clinical parameters (N=11)

Variable	Time	L-spine		Femur neck (Hemiplegic side)		Femur neck (Unaffected side)	
		r	P-value	r	P-value	r	P-value
T-score							
BBS	A	0.233	0.490	0.230	0.496	0.506	0.113
	B	0.394	0.231	0.079	0.817	0.221	0.513
	Δ	-0.301	0.368	-0.339	0.307	-0.573	0.066
TIS	A	0.591	0.055	0.172	0.614	0.230	0.496
	B	0.700	0.016*	0.613	0.045*	0.449	0.166
	Δ	-0.432	0.184	-0.046	0.893	-0.211	0.534
MBI	A	-0.114	0.738	-0.165	0.627	-0.036	0.915
	B	0.377	0.253	0.234	0.489	0.213	0.529
	Δ	0.142	0.678	0.138	0.687	-0.009	0.979
Absolute BMD							
BBS	A	0.223	0.509	0.210	0.536	0.506	0.113
	B	0.378	0.252	0.055	0.872	0.221	0.513
	Δ	-0.300	0.370	-0.327	0.326	-0.573	0.066
TIS	A	0.598	0.052	0.216	0.523	0.230	0.496
	B	0.718	0.013*	0.681	0.021*	0.449	0.166
	Δ	-0.439	0.176	-0.078	0.820	-0.211	0.534
MBI	A	-0.082	0.811	-0.191	0.574	-0.036	0.915
	B	0.398	0.225	0.250	0.458	0.213	0.529
	Δ	0.109	0.750	0.173	0.612	-0.009	0.979

BMD=Bone Mineral Density; BBS=Berg Balance Scale; TIS=Trunk Impairment Scale; MBI=Modified Barthel Index; A=Baseline; B=Follow up; Δ=(B-A); r=correlation coefficient