

소아재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 16:17-16:21 Room G(3F)

P 2-33

Bone mass is related to muscle strength in adults with cerebral palsy

Se Hee Jung^{1**}

Seoul National University Boramae Medical Center, Department of Rehabilitation Medicine¹

Background

Cerebral palsy (CP) causes skeletal muscle atrophy and impaired muscle growth, and individuals with CP are prone to weight-bearing activity limitations. A lack of physical activity and poor muscle strength were found to be important risk factors for decreased bone health. However, there is no study to investigate the relationship between muscle strength and bone health in adults with CP.

Objective

To determine whether the bone mass and bone mineral density are associated with muscle strength and physical function in a selected group of adults with CP.

Design

Cross-sectional study.

Setting

University hospitals and communities for persons with disabilities.

Participants

A total of 99 adults with CP (58 men, mean age of 41.8±8.95 years, 72 bilateral CP) were included.

Method

For muscle strength measurement, we performed isometric muscle strength testing in lower extremities, hand grip strength measurement, and manual muscle strength testing (MMT). Information about physical activity and subjective discomfort in using limbs were also collected. Bone mass and bone mineral density were assessed using dual-energy x-ray absorptiometry.

Results

Leg bone mass was significantly associated with isometric knee extensor and knee flexor strength. It was significantly related to MMT and subjective discomfort in using the same

leg. Arm bone mass was significantly related to hand grip strength, MMT and subjective discomfort in using the same arm. The Gross Motor Function Classification System, the Manual Ability Classification System, and the Short Physical Performance Battery scores were related to leg bone mass but not to trunk bone mass. The correlation between muscle strength and leg bone mass and between physical function and bone mass was not observed in subjects with unilateral CP.

Conclusion

Appendicular bone mass of adults with CP was associated with the muscle strength of the limb and physical function. This correlation was observed only in bilateral CP.

Acknowledgment :This research was supported by the R&D grant of rehabilitation services by Korea National Rehabilitation Center Research Institute, Ministry of Health & Welfare.

Table 1. Correlation between muscle strength and bone mass

		Total CP		Bilateral CP		Unilateral CP	
		C.C.	p-value	C.C.	p-value	C.C.	p-value
Isometric muscle strength	R KE strength vs R leg bone mass	0.67**	<0.001				
	L KE strength vs L leg bone mass	0.73**	<0.001				
	R KF strength vs R leg BM	0.54**	<0.001				
	L KF strength vs L leg BM	0.63**	<0.001				
	KE strength in a stronger side vs B legs BM	0.65**	<0.001	0.77**	<0.001	0.25	0.3
	KF strength in a stronger side vs B legs BM	0.51**	<0.001	0.68**	<0.001	-0.41	0.1
	KE strength in a weaker side vs B legs BM	0.63**	<0.001	0.77**	<0.001	0.07	0.8
	KF strength in a weaker side vs B legs BM	0.50**	<0.001	0.66**	<0.001	0.09	0.7
	Mean KE strength vs B legs BM	0.62**	<0.001	0.77**	<0.001	0.19	0.5
	Mean KF strength vs B legs BM	0.50**	<0.001	0.68**	<0.001	-0.21	0.4
Hand grip strength	R hand grip strength vs R arm BM	0.37**	0.002				
	L hand grip strength vs L arm BM	0.45**	<0.001				
Manual muscle strength (MMT)	R shoulder abductor MMT vs R arm BM	0.26*	0.03				
	L shoulder abductor MMT vs L arm BM	0.35**	0.003				
	R KE MMT vs R leg BM	0.51**	<0.001				
	L KE MMT vs L leg BM	0.56**	<0.001				
	KE strength in a stronger side vs B legs BM			0.58**	<0.001	0.18	0.5
	KE strength in a weaker side vs B legs BM			0.58**	<0.001	0.29	0.3
Subjective discomfort in using limbs	Mean KE strength vs B legs BM			0.60**	<0.001	0.26	0.3
	R arm vs R arm BM	-0.22	0.06				
	L arm vs L arm BM	-0.33**	0.003				
	R leg vs R leg BM	-0.31**	0.006				
	L leg vs L leg BM	-0.34**	0.002				
	Discomfort of stronger leg vs B legs BM	-0.37**	0.001	-0.46**	<0.001	-0.18	0.5
	Discomfort of weaker leg vs B legs BM	-0.27*	0.02	-0.32*	0.02	-0.16	0.5
Mean discomfort vs B legs BM	-0.34**	0.002	-0.42**	0.001	-0.18	0.5	

CP, cerebral palsy; C.C., correlation coefficient; R, right; BM, bone mass; L, left; KE, knee extensor; KF, knee flexor; B, both

*, <0.05; **, <0.01.

Table 2. Correlation between physical function and bone mass

		Total CP		Bilateral CP		Unilateral CP	
		C.C.	p-value	C.C.	p-value	C.C.	p-value
Leg BM	GMFCS	-0.44**	<0.001	-0.5**	<0.001	-0.23	0.4
	MACS	-0.31**	0.006	-0.37**	0.006	0.02	0.9
	SPPB score	0.43**	0.001	0.60**	<0.001	0.2	0.6
Trunk BM	GMFCS	-0.19	0.1				
	MACS	-0.19	0.1				
	SPPB score	0.16	0.2				

CP, cerebral palsy; C.C., correlation coefficient; BM, bone mass; GMFCS, the Gross Motor Function Classification System; MACS, the Manual Ability Classification System; SPPB, the Short Physical Performance Battery.

*, <0.05; **, <0.01.