

THE RELATIONSHIP OF BONE DENSITY, PHYSICAL ACTIVITY AND CONSUMPTION OF CALCIUM AND VITAMIN D IN PARAPLEGIC SPINAL CORD INJURED WHEELCHAIR USERS

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INTRODUCTION

Prevention and treatment of osteoporosis is an important measure to avoid additional functional impairment and increased costs due to long-term hospitalization. Nevertheless, it is not clear if physical activity, standing or vitamin D and calcium intake are helpful in patients with osteoporosis and therefore further investigations are essential. The aim of the present study was to determine bone mineral density (BMD) and physical activity, daily calcium and vitamin D intake and food habits among people living with spinal cord injury (SCI).

METHODS

23 subjects with paraplegia who used manual wheelchair as primary mode of mobility completed the Physical Activity Recall Assessment for people with SCI (PARA-SCI). Participants reported the activity type and duration of both ADL and leisure time physical activity (LTPA) and classified the intensity of each activity. All subjects underwent dual-energy x-ray absorptiometry (DXA) examinations as part of their medical evaluation to determine bone mineral density in femoral and forearm bone sites. Collected data also included daily calcium and vitamin D intake, patient reported food habits and frequency of standing.

RESULTS

The mean femoral neck T-score was -1.91 ± 1.01 and forearm T-score -0.23 ± 1.41 . We found positive correlation ($p < 0.01$) between above mentioned data. We didn't find significant relationships between physical activity, standing and BMD.

CONCLUSIONS

Paraplegic SCI wheelchair users' physical activity is low. Their calcium and vitamin D consumption is very low as is the time spent standing. Further investigations with bigger number of participants would hypothetically show that this has a relationship with osteoporosis.

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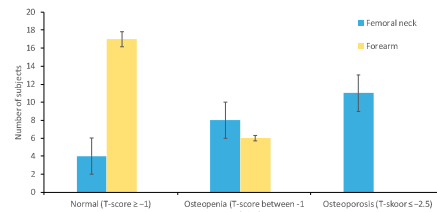


Figure 1. Number of paraplegic SCI wheelchair users' corresponding T-score results.

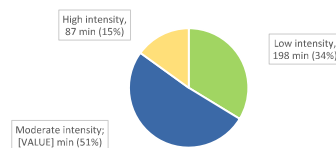


Figure 2. Paraplegic SCI wheelchair users' physical activity of three days. ADL and leisure time physical activity (LTPA).

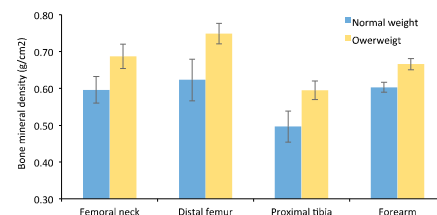


Figure 3. Paraplegic SCI wheelchair users' bone mineral density in different body segments of normal ($n=8$) and overweight/obese ($n=14$) subjects (mean \pm SE).

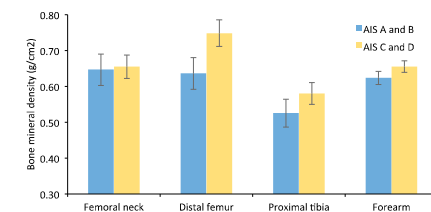


Figure 4. Paraplegic SCI wheelchair users' bone mineral density in different AIS grade. AIS A/B ($n=10$) and AIS C/D ($n=13$) (mean \pm SE).

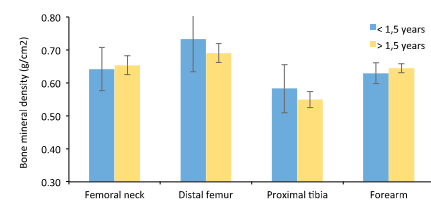


Figure 5. Paraplegic SCI wheelchair users' bone mineral density less than 1.5 years ($n=5$) and more than 1.5 years ($n=18$) after injury (mean \pm SE).

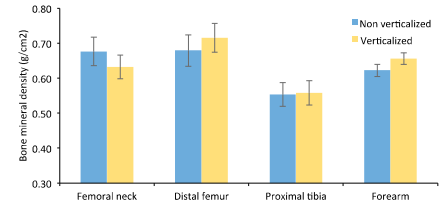


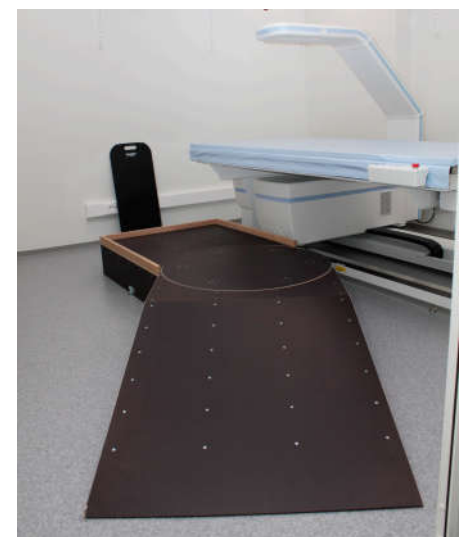
Figure 6. Paraplegic SCI wheelchair users' bone mineral density of daily basis verticalized ($n=13$) and non verticalized ($n=10$) persons (mean \pm SE).

Table 1. Description of subjects.

	Total	AISA/B	AISC/D
$n=$	23	10	13
Male (%)	82.6	80	84.6
Age (mean \pm SD)	40.6 \pm 11.8	42.5 \pm 14.5	39.1 \pm 9.6
min/max	24/67	25/67	24/56
Since injury			
< 1.5 years (n)	5	2	3
> 1.5 years (n)	18	8	10
BMI (mean \pm SD)	25.6 \pm 7.0	26.3 \pm 8.1	25.2 \pm 6.4
min/max	16.3/45.2	17.9/45.2	16.3/40.7

Table 2. Paraplegic SCI wheelchair users' bone mineral density and T-score parameters in different body segments (mean \pm SD).

	Bone mineral density (g/cm ³)	T-score
Femoral neck	0.651 \pm 0.124	-1.91 \pm 1.01
Distal femur	0.700 \pm 0.144	
Proximal tibia	0.556 \pm 0.116	
Forearm	0.641 \pm 0.059	-0.23 \pm 1.41



Photography 1. DXA device Hologic Horizon W and accession slope (Author: Veiko Võrklaev, Haapsalu NRC)

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