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Wheelchair Para-athletes may be protected from poor bone health by the degree of impact in their sport

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INTRODUCTION:

We have previously presented a higher prevalence of low bone mineral density (BMD; osteopenia, Z-score<-1.0) in the lumbar spine and hip in wheelchair-dependent (WC) para-athletes compared to their walking counterparts. Hence, WC non-athletes are assumed to be at an even higher risk of low BMD due to a lack of mechanical loading from exercise. In this international multi-center study, we aimed to compare the BMD of the lumbar spine and hip between WC para-athletes and WC non-athletes.

METHODS:

Lumbar spine, hip, and femoral neck BMD were measured by a dual-energy x-ray densitometry (DXA) scan. All participants filled in a background questionnaire on personal characteristics and training history. Explosive, rotational, and collision sports (WC rugby, tennis and basketball, and alpine sit-ski) were classified as high-impact sports (HIS), and static and one-dimensional sports (cross-country sit-ski, hand cycling, and others) were classified as low-impact sports (LIS). Data are presented as mean±SD. Where suitable, one-way ANOVA, two-sample t-tests, and Pearson correlation analyses were employed. Only valid DXA scans are utilized, as such, analysis n are provided where data are missing.

RESULTS:

Of 57 WC users (17-56 yrs; 48% female), 31 were classified as HIS, 13 as LIS, and 13 as non-athletes based on the criteria of sport participation>2 yrs. The overall mean BMD Z-scores were -0.2±1.4 for the lumbar spine (n=45; 31% Z-score<-1.0), -1.3±1.2 for the hip (n=54; 56% Z-score<-1.0), and -1.2±1.4 for the femoral neck (n=49; 51% Z-score<-1.0).

HIS athletes had significantly higher lumbar spine Z-scores (0.5±1.3; n=21) compared to LIS athletes (-1.5±0.9, adjusted P<0.001; n=11) and tended to be higher than non-athletes (-0.3±1.3, adjusted P=0.07). Furthermore, HIS athletes showed a higher hip Z-score (-0.8±1.0; n=28) than LIS athletes (-2.1±1.2, adjusted P<0.01), but not higher than non-athletes (-1.5±0.8, adjusted P=0.11). No significant differences were found between LIS and non-athletes for both lumbar spine and hip Z-scores (both adjusted P>0.05). No group effects were found for the femoral neck (P>0.05).

Overall, lean mass was significantly associated with lumbar spine BMD Z-score (r=0.36, P=0.02), tended to correlate with the femoral neck Z-score (r=0.24, P=0.09), but did not correlate with the hip Z-score (P>0.05). Nor was there any association between any of the BMD Z-scores and years at the national team level or habitual weekly training hours (all P>0.05). Participants with congenital diagnosis (n=26; age: 33±12 yrs) had significantly lower lumbar spine Z-scores (-0.6±1.4) compared to those with acquired diagnosis (n=19; age: 31±10 yrs; 0.3±1.5, P=0.04).

CONCLUSION:

This study shows that 31-56% of WC users present low BMD, depending on the site measured. The higher BMD seen in HIS athletes may indicate a positive effect of high-impact activities. Exercise programs for preventing and treating low BMD should therefore aim to include such activities achievable for WC users.

Topic: Disabilities

Presentation Oral

