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Bone mineral density in retired rugby players: initial findings from the UK Rugby Health project

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Introduction

Regular exercise that delivers impact forces to the skeleton are positively associated with bone strength. Athletes from high impact sports such as rugby have higher bone density than non-athletes (Hind et al., 2015). Engaging in regular impact exercise is widely suggested as a means for reducing the risk of osteoporosis in later life (Heinonen et al., 1996). However, to date there have been few studies of the bone density of retired athletes and none in retired rugby players.

Objective

To investigate bone mineral density (BMD) at the hip and spine, and the prevalence of low BMD, in a cohort of retired rugby players.

Methods

Retired rugby players (77 males; 25.8 years competitive rugby; 10.6 years since retirement; 36 former professional; 41 former amateur level) were separated into two groups: over 50 years of age (n = 27; 57.2 ± 7 years; 175.8 ± 7.6 cm; 94.9 ± 16.9 kg) and under 50 years (n = 50; 40.1 ± 6.2 years; 182.1 ± 6.4 cm; 101.9 ± 13.8 kg). Each participant received dual energy X-ray absorptiometry scans (Lunar iDXA™; GE Healthcare, WI; Encore software version 15.0) of the dual femur and the lumbar spine. BMD for the lumbar spine, femoral neck and total hip were derived. T-scores were evaluated for participants aged over 50 years, and Z-scores for those aged under 50 years (ISCD, 2015).

Results

Eight (30%) retired players aged over 50 years had osteopenia (T-score <-1.0) or osteoporosis (T-score ≤-2.5). One (2%) retired player aged under 50 years had low BMD (Z-score ≤-2.0) and seven (14%) had a Z-score < -1.0. The mean BMD and T or Z-scores are shown in the Table.

Conclusion

Our findings suggest that participation in high impact sports during young adulthood might not be sufficient to reduce the risk of osteoporosis in later life. Further research is needed to identify why some former rugby players have low BMD and others don't. This research would have the potential to inform assumptions on the role of exercise for bone health throughout the lifespan.

Bone mineral density, T-scores or Z-scores for male retired rugby players, mean, SD (range)

Retired rugby players aged <50 years

Femoral Neck BMD (g.cm^{-2}) n=50	Total Hip BMD (g.cm^{-2}) n=50	Lumbar Spine BMD (g.cm^{-2}) n=48†	Hip Z-score n=49*	Lumbar Spine Z-score n=47†*	Lowest Z-score n=49*
1.135 ± 0.146	1.192 ± 0.151	1.319 ± 0.139	0.3 ± 1.1	0.3 ± 1.2	-0.1 ± 1.0
(0.814 – 1.502)	(0.924 – 1.611)	(1.040 – 1.677)	(-1.7 – 3.5)	(-2.1 – 3.3)	(-2.1 – 3.5)

*no reference score for n=1 participant (non-white)

†n=2 lumbar spine scans unreportable due to <2 evaluable vertebrae

Bone mineral density, T-scores or Z-scores for male retired rugby players, mean, SD (range)

Retired rugby players aged <50 years

Retired rugby players aged >50 years

Femoral Neck BMD (g.cm^{-2}) n=27	Total Hip BMD (g.cm^{-2}) n=27	Lumbar Spine BMD (g.cm^{-2}) n=20‡	Hip T-score n=27	Lumbar Spine T-score n=20‡	Lowest T-score n=27
1.018 ± 0.180	1.099 ± 0.179	1.226 ± 0.164	-0.4 ± 1.4	0.1 ± 1.4	-0.6 ± 1.2
(0.650 – 1.421)	(0.699 – 1.459)	(0.822 – 1.512)	(-3.2 – 2.7)	(-3.2 – 2.4)	(-3.2 – 1.5)

‡n=7 lumbar spine scans unreportable due to <2 evaluable vertebrae