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The Effects of Cycling on Bone Health in Senior Athletes

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Background

Fewer than 25% of older adults meet general activity recommendations each week. The combination of aging and sedentary lifestyles can lead to a decline in overall health and a reduction in bone mass. Some of this decline can be combated with regular physical activity. More than 10,000 seniors compete in the National Senior Games biennial competition. Our study focuses on competitive senior athlete cyclists. The low-impact nature of cycling may allow for longer participation but has been shown to negatively impact bone health in male cyclists (age 25-60). To our knowledge, no larger investigation exists looking at bone density trends in both male and female competitive cyclists age 50 and older.

Purpose

The purpose of this study was to (1) identify prevalence of osteoporosis and osteopenia in competitive senior athlete cyclists and compare that prevalence to senior athletes who compete in other sports as well as the general population, (2) determine any relationship between exercise volume or frequency and the prevalence of osteoporosis or osteopenia in these cyclists and (3) compare grip strength values of cyclists with osteoporosis or osteopenia to cyclists without these diagnoses and to senior athletes engaged in other sports.

Methods

Participants: N=2998 (74 cyclists, 2,924 senior athletes) Participants completed a health and sport history interview and grip strength dynamometry as part of a larger study. Inclusion criteria were 1) age 50 or older and 2) registration to compete in the National Senior Games between 2011 and 2019. Athletes were designated as cyclists if they were registered for only cycling events. All other athletes were designated as non-cyclists. During the health and sport history, athletes were asked if they had ever been diagnosed with osteoporosis or osteopenia. If they answered yes to either, they were categorized as having low bone health for the purpose of this study. General population comparisons were made from current publications of prevalence.

Data Analysis

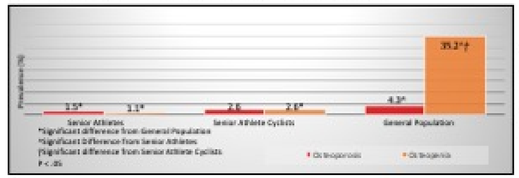
SPSS version 25 was used for all data analyses. Descriptive statistics were applied to health and sport history data. Chi Square analyses and independent samples t-tests were used to compare between-group differences. Prevalence of low bone health in senior athletes and senior athlete cyclists were compared to the general population with binomial approximation to the normal. Alpha was set at .05 for statistical significance.

National Senior Games Association - Sports

- Archery
- Badminton
- Basketball
- Bowling
- Cycling
- Field Events Only
- Golf
- Horseshoes
- Pickleball
- Racewalking
- Racquetball
- Road Race
- Shuffleboard
- Softball
- Swimming
- Table Tennis
- Tennis
- Track & Field
- Triathlon
- Volleyball

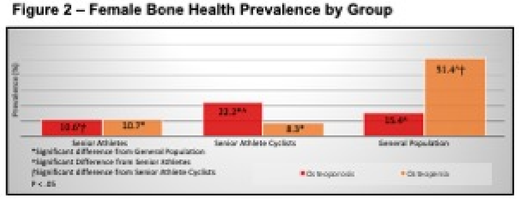
Results

Figure 1 – Male Bone Health Prevalence by Group



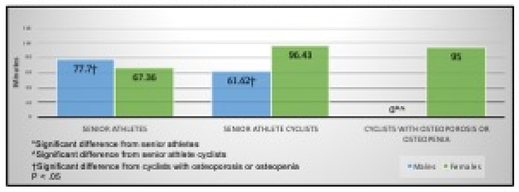
The males in the general population show significantly higher prevalence in osteopenia and total low bone health compared to senior athletes and senior athlete cyclists.

Figure 2 – Female Bone Health Prevalence by Group



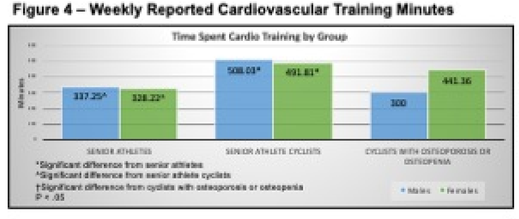
Female senior athlete cyclists were found to have a significantly higher prevalence of osteoporosis than other senior athletes or the general population.

Figure 3 – Weekly Reported Strength Training Minutes



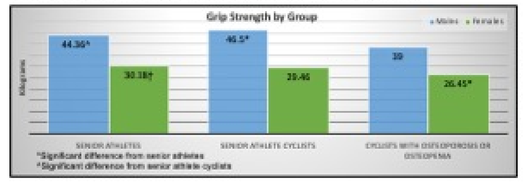
Male senior athlete cyclists with osteoporosis or osteopenia reported significantly less time spent strength training than healthy male senior athlete cyclists or other male senior athletes. Female senior athlete cyclists had a trend toward more strength training though this trend was not significant.

Figure 4 – Weekly Reported Cardiovascular Training Minutes

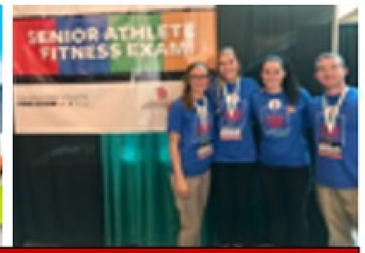


The minutes per week spent cardiovascular training ranged from 5 hours and 8.5 hours.
Healthy female and male senior athlete cyclists spent significantly more time on cardiovascular training than other athletes and more time than cyclists with osteoporosis or osteopenia.

Figure 5 – Grip Strength via Dynamometry by group (kg)



Female senior athlete cyclists with osteoporosis or osteopenia demonstrated significantly lower grip strength than other female senior athletes.
Male senior athlete cyclists had a significantly higher grip strength than other senior athletes.



Discussion & Conclusions

Bone health risk varies by NSG participation, gender, exercise habits, and grip strength

- Prevalence of osteoporosis and osteopenia, as expected, was higher in the general population than in senior athletes. This may be related to the high exercise volume reported by senior athletes.
- The high prevalence of osteoporosis in female senior athletes may be related to their choice of activity. However, due to a small sample size this finding should be viewed with caution.
- Decreased bone health in cyclists may be related to the low-impact nature of the sport. This is supported by studies that show improved bone health with high-impact sports and decreased bone health in swimmers.

Strength training and bone health

- Strength training has been shown to have a direct positive relationship with bone health. This is supported by our finding that male cyclists with osteoporosis or osteopenia did not participate in strength training.

Cardiovascular training

- Research suggests all individuals should incorporate high-intensity, high-impact, and multidirectional exercise to improve bone health. No relationship was found between the volume of cardiovascular training in these senior athletes and bone health. It should be noted, however, that all groups tested reported volumes of cardiovascular exercise that are more than double the minimum recommendations.

Grip strength and bone health

- Grip strength is a measurement often used to represent an individual's overall muscle strength. Higher grip strength is associated with a lower prevalence of osteoporosis.
- Female senior athlete cyclists with low bone health demonstrated significantly lower grip strength than female senior athletes. This finding further suggests the need to explore the relationship between cycling and bone health in this population.

Clinical Relevance

Senior athletes should be encouraged to continue their highly active lifestyles. It may be appropriate for senior athletes who participate exclusively in cycling to engage in other modes of exercise which include resistance training and activities with higher impact. Regardless of participation in competitive sport, all seniors should be screened for osteoporosis and osteopenia.

References

Can be found at the QR code provided.