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Links Between Osteoarthritis, Periodontital Disease And Osteoporosis In A Wild Mammal Population.

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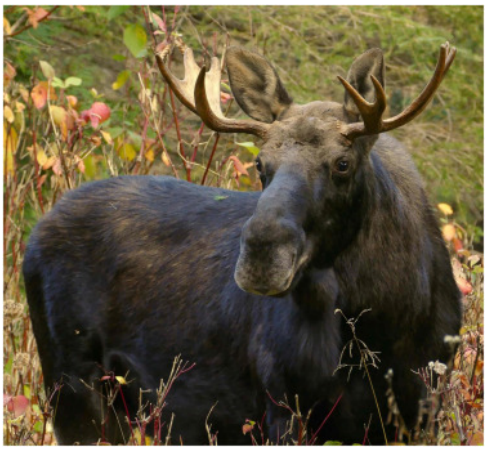
Purpose: The purpose of this study was to document the prevalence and severity of osteoarthritis and how it varied with age and among sexes in a wild population of moose. We also assessed whether the prevalence and severity of osteoarthritis was greater for moose with periodontal disease and whether the prevalence or severity of osteoarthritis was negatively associated with osteoporosis. The value of assessing links between these diseases in a wild mammal population is that the prevalence of these diseases is not confounded by complicating risk factors such as obesity, smoking status, alcohol consumption and socioeconomic status.

Methods: We systematically examined the skeletal remains of more than 2000 adult moose which died of natural causes in Isle Royale National Park (Michigan) between 1959-2020 and recorded whether each individual exhibited osteoarthritis, osteoporosis or periodontal disease. We also recorded the severity of each disease as either slight, moderate or severe. Inter-observer reliability tests indicated that the repeatability of disease assessments was high as two independent observer's assessments of disease presence and severity matched in all 25 (100%) of tests assessing periodontal disease, 24 (96%) of the 25 tests of osteoarthritis, and 23 (92%) of tests of osteoporosis. We analyzed data using logistic regression.

Results: Osteoarthritis was most commonly observed in the lowest vertebrae (fifth lumbar and first sacral) and coxofemoral joint (see image of arthritic hip joint). The prevalence and severity of osteoarthritis increased with age and was significantly higher for male than for female moose across all age-classes. The prevalence and severity of osteoarthritis was greater for moose with periodontal disease, but we found no evidence of an inverse relationship between osteoarthritis and osteoporosis. It was not uncommon for moose older than 5 years to exhibit signs of both osteoarthritis and osteoporosis, with 25% of females and 31% of males exhibiting both diseases.

Conclusions: Our results suggest osteoarthritis is an age-related disease for moose. The higher prevalence of osteoarthritis among males may be partly due to trauma or injuries sustained by male moose when they engage in fights to gain access to females during the breeding season. Our finding that moose with periodontal disease had more prevalent and severe forms of osteoarthritis supports the hypothesis that lipopolysaccharides from bacterial pathogens causing periodontitis may increase the risk of individuals developing osteoarthritis. Lastly, our finding that osteoporosis and osteoarthritis were not inversely related suggests that increased bone mineral density per se is not a risk factor for osteoarthritis (or vice versa) - at least not at the sites where osteoarthritis and osteoporosis occur in this species. Consequently, we hypothesize that risk factors, such as smoking and obesity which occur in humans, but not in wild moose populations may play an important role in explaining why osteoarthritis and osteoporosis are sometimes inversely related in humans.



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