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Keywords
Multiple Sclerosis, Risk factors, Osteoporosis, Women's Health Initiative

Comments
Poster presented on Senior Scholars Program Poster Presentation Day at the University of Massachusetts Medical School, Worcester, MA, on April 30, 2014. Medical student Christopher Perrone participated in this study as part of the Senior Scholars research program at the University of Massachusetts Medical School.

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The Role of Multiple Sclerosis as a Risk Factor for the Development of Osteoporosis

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Background

- Multiple sclerosis (MS) is an autoimmune progressive neurological disease that leads to early disability of young adults. Reduced mobility and frequent falls, secondary to spasticity and ataxia, increase the risk for osteoporosis. In fact, fractures are a major cause of morbidity and mortality in patients suffering from MS.1,2 Moreover, many patients with MS and low bone mass or previous fractures are not taking supplementary calcium or vitamin D.1
- Several studies have examined the incidence of reduced bone mineral density (BMD) amongst people with MS, and the majority providing evidence that BMD is significantly reduced in MS patients. The most significant risk factors appear to arise from the chronic disease process of MS and not from glucocorticoid use.3 However, the temporal relationship between these two factors has not been previously studied.4
- Fortunately, data from the Women’s Health Initiative provides a unique opportunity to examine the development of osteoporosis over time and its relationship to MS. The WHI population is ideal to study because patients are more likely to reflect the longitudinal illness MS that affects mostly women.

Methods

- Data was obtained from the Women’s Health Initiative database. The Women’s Health Initiative (WHI) enrolled a total of 161,808 women, with 93,976 participants in an observational study (WHI-Os) and 68,122 participants in clinical trials (WHI-CT), between 1993 and 1998 with an average of 7.6 years of follow-up until March 31, 2005. At baseline, the mean age was 63 years and about 18% of the women were from ethnic minority groups. Both multiple sclerosis and osteoporosis were diagnosed identified at baseline and in follow-up in the WHI cohort.
- The sample included 449 women who reported an MS diagnosis at baseline and 152,432 women without MS who comprised a control group. Baseline measures of self-reported osteoporosis, age, smoking status, steroid and anti-inflammatory use, and supplementary as well as dietary calcium and vitamin D were analyzed using multivariate linear regression. The analysis cannot determine temporal ordering of predictors and osteoporosis, significant associations were observed with age, smoking, steroid use, anti-inflammatory use, supplementary calcium and vitamin D as well as dietary vitamin D. After adjusting for confounders, self-reported MS diagnosis was more strongly associated with self-reported osteoporosis diagnosis.

Results

- Table 1: Baseline characteristics of participants with and without MS. Women with MS are nearly three times as likely to report osteoporosis, are younger, and more likely to have smoked, and consume less supplementary calcium.
- Table 2: Multivariate logistic regression model for self-report of an osteoporosis diagnosis. A cross-sectional logistic regression of baseline data was used to determine factors positively associated with an osteoporosis diagnosis. While this analysis cannot determine temporal ordering of predictors and osteoporosis, significant associations were observed with age, smoking, steroid use, anti-inflammatory use, supplementary calcium and vitamin D as well as dietary calcium. After adjusting for confounders, self-reported MS diagnosis was more strongly associated with self-reported osteoporosis diagnosis.

Conclusions

- Table 3: WHI study follow-up. Significant associations were found between variables and both MS and osteoporosis.

Table 1: Baseline characteristics of participants with and without MS. Women with MS are nearly three times as likely to report osteoporosis, are younger, and more likely to have smoked, and consume less supplementary calcium.

Table 2: Multivariate logistic regression model for self-report of an osteoporosis diagnosis. A cross-sectional logistic regression of baseline data was used to determine factors positively associated with an osteoporosis diagnosis. While this analysis cannot determine temporal ordering of predictors and osteoporosis, significant associations were observed with age, smoking, steroid use, anti-inflammatory use, supplementary calcium and vitamin D as well as dietary calcium. After adjusting for confounders, self-reported MS diagnosis was more strongly associated with self-reported osteoporosis diagnosis.

Table 3: WHI study follow-up. Significant associations were found between variables and both MS and osteoporosis.

Figure 1: Activity level according to age from the North American Research Committee on Multiple Sclerosis (adapted figure).

References

2. Kumpman MT, Erikson EF, Holmøy T. Multiple sclerosis, a cause of secondary accumulation of disability due to a proved neurodegenerative process. With the three-fold risk noted in the WHI sample, the impact of MS on developing osteoporosis may be a function of early-stage MS, which was not prevalent in the WHI cohort.
3. Additional prospective studies should examine bone changes and incident osteoporosis in a younger MS population to determine if early detection and treatment could ultimately prevent the increased risk of osteoporosis seen in women with MS in this study.

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