

## Prevalence of Osteoporosis in Osteoarthritic Patients Undergoing Total Hip or Total Knee Arthroplasty

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### Abstract

**Objective**—To determine the prevalence of osteoporosis in osteoarthritic patients undergoing total hip or total knee arthroplasty.

**Design**—Cross-sectional study.

**Setting**—The Specialized Outpatient Rehabilitation Service's (SORS) Pre-surgical Arthroplasty Service located at the Chedoke Hospital, Hamilton Health Sciences, Hamilton, ON, Canada.

**Participants**—SORS outpatients (N=364), from the period of March 2006 to March 2007.

**Interventions**—Not applicable.

**Main Outcome Measures**—Prevalence of osteoporosis was determined by review of a self-reported survey, and defined by (1) self-reported diagnosis of osteoporosis, (2) history of fragility fracture (defined by a bone fracture occurring as a result of a fall from standing height or less after the age of 50), or (3) current treatment for osteoporosis using bisphosphonates.

**Results**—Of the study cohort, 26% were classified as having osteoporosis, according to our criteria. Of the patients with self-reported osteoporosis or a history of fragility fractures, only 37% and 17% reported current treatment with bisphosphonates, respectively.

**Conclusions**—Osteoporosis is common in the osteoarthritic arthroplasty population, with a prevalence at least equal to that in the general population. Due to the self-reported nature of the study, the prevalence of osteoporosis in this population is likely significantly higher. Results from this study indicate need for further research, specifically in formal assessment for osteoporosis in patients undergoing a joint replacement.

### Keywords

Osteoarthritis; Osteoporosis; Prevalence; Rehabilitation

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The number of joint replacements performed in north America is on the rise, and will continue to increase as the population ages.<sup>1</sup> The primary reason for hip and knee replacements is OA, caused by a wide variety of factors, including birth defects, excess weight, joint fractures, or other injuries that can damage cartilage. The demographic of patients requiring joint replacements of the knee and hip includes primarily older women.<sup>1</sup> It is also older women who are at the highest risk of osteoporosis and therefore of fragility fractures.<sup>2</sup> Furthermore, the insertion of an implant can change the stresses and strains that a bone experiences, possibly stimulating bone remodeling and resorption, leading to a decrease in bone density postsurgery.<sup>3</sup> Patients at risk for osteoporosis should be screened for this condition, and where applicable, treated with the appropriate medications and supplements.<sup>2</sup> The purpose of this study was to determine the prevalence of osteoporosis in a sample of prearthroplasty patients.

## METHODS

Our patient population was obtained from the Specialized Out-patient Rehabilitation Service's Pre-surgical Arthroplasty Service located at the Chedoke site, Hamilton Health Sciences, Hamilton, Ontario. This service is available to prearthroplasty patients referred by an orthopedic surgeon. Its purpose is to educate, to facilitate early postoperative discharge and community reintegration, and to prevent acute care readmission. Data were collected from the self-reported Pre-Arthroplasty Rehabilitation Screening-Client Report questionnaire that participating patients filled out from March 2006 through March 2007. Of the 395 questionnaires, 364 were fully completed and were included in data analysis. Patients were asked to list whether they had a history of diabetes, seizures, cancer, stroke, arthritis, previous joint surgery, fractures, or osteoporosis. Subjects were asked to explore "yes" answers in a comment box. From this, we tried to obtain information regarding nature of prior fracture. If mechanism and date of injury were provided, we decided whether the fracture was a fragility fracture based on the accepted definition: "bone fracture occurring as a result of a fall from standing height or less after the age of 50." Participants were asked to list current medications. Presence of osteoporosis was defined by fulfilling at least 1 of the following criteria: (1) self-reported diagnosis of osteoporosis, (2) history of fragility fracture, or (3) current treatment for osteoporosis using bisphosphonates. SPSS version 15<sup>a</sup> was used to describe the population using univariate analyses.

## RESULTS

Descriptive characteristics for the study cohort are presented in table 1. The prevalence of osteoporosis in osteoarthritic patients by: (1) self-reported diagnosis, (2) history of fragility fracture, or (3) current treatment for osteoporosis was 18%, 7%, and 11%, respectively. An additional 14% of patients reported a fracture; however, it was unclear if they were fragility fractures, so these patients were not included in the osteoporotic population. Overall, 26% of patients, by fulfilling at least 1 criterion, were classified as osteoporotic. Of these, 79% were women and 21% were men. OA was the most prevalent type of arthritis in this cohort. For

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<sup>a</sup>Supplier  
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respondents that did not specify type of arthritis, we assumed that the vast majority had OA, as deduced by joint(s) involved and reported medications. Of the patients who had a fragility fracture, 42% self-reported a diagnosis of osteoporosis, and 17% were taking anti-resorptive medications. Of the patients with a self-reported diagnosis of osteoporosis, 37% were taking a bisphosphonate. The largest age group of patients with osteoporosis was 65 to 80 (46%), followed by 50 to 65 (42%), and over 80 (9%).

## DISCUSSION

The main finding in this descriptive study of prearthroplasty patients is an osteoporosis prevalence of 26%, which is at least similar to that of the general population, as evidenced by the CaMos. A recent CaMos report used BMD testing in individuals aged 65 and older, and found a prevalence of osteoporosis to be 17.2% overall, and higher in women (25.6%).<sup>4</sup> Based on the limitations of a self-reported survey, we highly suspect that the actual osteoporosis prevalence in our study group is much higher, because many persons are unaware of having osteoporosis. This was shown in the CaMos study, in which 77% of women and 93% of men with BMD-defined osteoporosis were not aware of having the disease.<sup>4</sup> Additionally, some osteoarthritic participants may have had BMD testing in the past with false negative reports, because an inverse relationship has been described between OA and BMD at the OA affected joint.<sup>5</sup> Specifically, OA affecting the lumbar spine and hip may interfere with the accuracy of bone density assessment due to inclusion of osteophytes in the measurement of BMD.<sup>6</sup> Interestingly, however, even 18% is a high self-reported figure, when compared to a 1995 South Australian Health Survey, which showed a self-reported osteoporosis prevalence of 4.8% and 1.4% for women and men, respectively.<sup>7</sup> This vast difference could be somewhat biased in our population, because the patients have been under medical care for musculoskeletal complaints and thus are perhaps better informed regarding osteoporosis. Our study showed that only 37% of patients with self-reported osteoporosis reported current treatment with bisphosphonates. Furthermore, only 42% of patients with a fragility fracture self-reported osteoporosis, and only 17% of these persons reported taking anti-resorptive medications. This is comparable with prior studies suggesting that 50% to 98% of individuals receive no treatment for osteoporosis after a fragility fracture.<sup>8</sup> Main study limitations included the self-report nature of the survey, the phrasing of some survey questions, and the fact that our cohort was principally referred from only 4 orthopedic surgeons.

## CONCLUSIONS

Arthroplasty patients are at a higher risk for osteoporosis pre-surgery, due to age and sex, as well as postsurgery, due to the resulting bone resorption and remodeling. We show an osteoporosis prevalence in this sample at least equal to, and likely greater than, that in the general population. With this patient demographic being at a higher risk for osteoporosis, it is even more essential that they are screened and treated. Results from our study indicate areas requiring further research, such as the need for formal assessment of osteoporosis in patients undergoing a joint replacement. This would perhaps be best served by a combination of well designed self-reported surveys and objective bone mineral density testing. Additionally, due to their anabolic effect on osteoblasts, bisphosphonates also have

the potential to enhance bone growth into joint implants, and prevent bone resorption under adverse conditions.<sup>9</sup> Current results may thus serve to promote the study of bisphosphonate use as part of a growing armamentarium to extend the long-term durability of joint arthroplasties.

## Acknowledgments

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## List of Abbreviations

<b>BMD</b>	bone mineral density
<b>CaMos</b>	Canadian Multicentre Osteoporosis Study
<b>OA</b>	osteoarthritis

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**Table 1**

Descriptive Characteristics for Study Cohort (N=364)

Characteristics	n (%)
Mean age $\pm$ SD (y)	65 $\pm$ 11
Age (y)	
<50	32 (9)
50–65	158 (43)
65–80	150 (41)
>80	24 (7)
Sex	
Men	150 (41)
Women	214 (59)
Comorbidities	
History of diabetes	62 (17)
History of cancer	47 (13)
History of stroke	14 (4)
History of seizures	3 (1)
Arthritis	
OA	104 (29)
Rheumatoid arthritis	13 (4)
Unknown type	247 (67)
Joint replaced	
Knee arthroplasty	215 (59)
Hip arthroplasty	94 (26)
Bilateral knee arthroplasty	40 (11)
Knee revision	8 (2)
Hip revision	8 (2)