

OSTEOPOROSIS

P1 Severe Neurologic Sequela from Osteoporotic Vertebral Fractures: A Report of Two Cases

Japit O. Galagaran Jr, MD and Ester G. Penserga, MD

Section of Rheumatology, Department of Medicine, UP PGH, 2008

OBJECTIVE:To report two adult Filipino patients with osteoporotic vertebral fractures who develop severe neurologic complications

CASE ONE: VG is a 74-year old postmenopausal female with hypertension who was admitted for nape pain and bilateral leg weakness of 5 months duration. Somato-sensory testing showed a spinal level of L1. However, spinal radiographs revealed compression fractures affecting C2-C3, T7-T8 and L3 vertebra. She was started on intra-nasal calcitonin. Following admission, she developed sudden onset dyspnea, diaphoresis and hypertension unresponsive to beta-blockers and clonidine. She subsequently developed respiratory failure followed by hypotensive episodes. Dysautonomia was considered when blood pressure and heart rate lability was observed. Subsequent cardiac enzymes and electrocardiogram showed acute myocardial injury. She was admitted to the ICU but expired eight days later.

CASE TWO: LS is a 66-year postmenopausal female admitted for back pain accompanied by numbness of the lower extremities of 2 weeks duration following a low-impact fall. During admission, she developed chest pain, dyspnea and hypertension. Cardiac enzymes were within normal. Thoracic spine CT scan showed compression deformity at T8-T9 vertebra probably secondary to osteoporosis. Alendronate was given for this patient. She developed tachycardia and diaphoresis with hypertension (MAP 140 mmHg) while admitted in the wards. She also had urinary bladder atony and constipation. She was admitted to the ICU where IV verapamil and clonidine were started. The patient's tachycardia and hypertension eventually resolved. After one week, she was able to start physical rehabilitation and was eventually discharged on the 16th hospital day.

CONCLUSION: Vertebral fractures are often asymptomatic. But in this report, we presented two cases in whom serious neurologic complications developed following osteoporotic fractures. Occurrence of these fractures in the thoracic spine had predisposed these patients to hemodynamic instability leading to potentially life-threatening situations.

P2 Bone Mineral Density in Filipino Women Diagnosed with Systemic Lupus Erythematosus

Lyndon JQ Llamado MD, Andrei RM Rodríguez MD, and Sandra V. Navarra MD.

Section of Rheumatology, Clinical Immunology and Osteoporosis, Department of Medicine USTH

1. **Poster Presentation. 14th PRA Annual Convention, Cagayan de Oro, January 2007**
2. **Lupus An International Journal May 2007; 16 (Abstract Supplement PO292) : 189.**
3. **Poster Presentation. 8th International Congress on SLE. Shanghai, China, May 2007**

INTRODUCTION: Osteoporosis is a significant co-morbidity in patients with SLE. It is a systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility to fracture. There are many disease related variables associated with the development of osteoporosis in SLE. Some of these variables include female sex, the use of systemic corticosteroid, amenorrhea or even menstrual irregularity, deliberate avoidance of exposure to sunlight, and reduced physical activity. The availability of dual energy x-ray absorptiometry (DXA) constitutes a significant advancement in the non-invasive assessment of patients with osteoporosis.

OBJECTIVE: To determine the bone mineral density and its clinical determinants in a cohort of Filipino female patients with systemic lupus erythematosus (SLE).

METHODS

Subjects: SLE patients diagnosed based on the American College of Rheumatology (ACR) criteria seen at University of Santo Tomas Hospital, Section of Rheumatology, Clinical Immunology & Osteoporosis who underwent bone mineral density (BMD) measurements.

DXA measurement: Lumbar spine (LS), femoral neck (FN) and ultradistal forearm (UDFA) BMDs were measured using Lunar DPX-IQ.

Variables: The variables evaluated were age at the time of BMD testing, age of diagnosis of SLE, duration of SLE, age of menarche, height, weight, body mass index (BMI), years since menopause and cumulative prednisone dose.

Statistical analysis: Clinical determinants of bone mineral density were studied using linear regression.

RESULTS: In total, 84 SLE patients were evaluated. The mean age at SLE diagnosis was 36.6 ± 18.8 years with mean disease duration of 9.87 ± 8.7 years. The mean age at the time of BMD measurement was 42.9 ± 15.5 years. The mean age of menarche was 12.9 ± 1.6 years. For those who are already menopausal, the mean duration of amenorrhea at the time of BMD measurement was 11.7 ± 10.3 years. Measurement of the lumbar spine showed a mean BMD of 0.986 ± 0.19 , femoral neck mean BMD was 0.812 ± 0.17 and ultradistal forearm mean BMD was 0.315 ± 0.06 . At the lumbar spine 37% of the patients were osteopenic and 15% were osteoporotic. At the non-dominant femoral neck, 31% were osteopenic and 14% were osteoporotic. In this study, the factors noted to predict BMD were years of menopause, weight and height, disease duration and cumulative prednisone dose.

CONCLUSION: There is a need to enhance awareness of risk factors for low bone mass and increased fracture risk among patients with SLE, assess their BMD status, and reinforce early and aggressive preventive as well as treatment measures for this group of patients.

Research Grant: Lupus Inspired Advocacy (LUISA) Project of the Rheumatology Educational Trust Foundation, Inc.

P3 Risk Factors for Osteoporosis in Filipinos with Rheumatoid Arthritis

Sandra Navarra, Liza Marie Maceda, Anne-Annette Raso, Tito Torralba
St. Luke's Medical Center, Quezon City Philippines

1. **Poster Presentation. 12th APLAR Congress Kuala Lumpur, Malaysia, August 2006.**
2. **APLAR Journal of Rheumatology 2006; 9(suppl.1 P281): A137**
3. **Poster Presentation. 13th PRA Annual Convention. Manila, Jan 2007.**

OBJECTIVE: This study aims to describe the risk factors for osteoporosis in a cohort of Filipino patients with rheumatoid arthritis (RA).

DESIGN: Retrospective, descriptive study

SETTING: Joint and Bone Center of the University of Santo Tomas Hospital in Manila, Philippines

PARTICIPANTS: Patients with rheumatoid arthritis (RA) who were referred for bone mineral densitometry (BMD) at the Joint and Bone Center of the University of Santo Tomas Hospital in Manila, Philippines, from 2002 to 2005.

METHODS: Demographic and clinical data were obtained from patients with rheumatoid arthritis (RA) who were referred for bone mineral densitometry (BMD) at the Joint and Bone Center of the University of Santo Tomas Hospital in Manila, Philippines, from 2002 to 2005. Lumbar spine (LS), femoral neck (FN) and ultradistal forearm (UDFA) BMDs were measured using Lunar DPX-IQ. The variables evaluated were age at BMD test, duration of the RA disease, height, weight, body mass index (BMI), years since menopause, use of cigarettes, coffee, calcium intake, physical exercise, intake of steroid, methotrexate, and hormone replacement (HRT). Only the initial BMD results were considered for those who had serial BMD measurements. The BMD and clinical data were statistically analyzed using comparison of means and linear regression analysis.

RESULTS: A total of 128 patients diagnosed with RA underwent BMD within the study period. There were 121 females and 7 males, with a mean age of 66 ± 7 SD, a mean RA disease duration of 7 years ± 8 SD, and a mean of 14 ± 10 SD years since menopause. Using linear regression analysis, there was a positive correlation between BMD and BMI, and a negative correlation between age, years since menopause with BMD, which were all statistically significant, $p < 0.05$. There was some association between RA disease duration with BMD, but this was not statistically significant. There was no significant effect of smoking, coffee drinking, exercise, calcium intake, use of steroid, methotrexate and HRT on the BMD.

CONCLUSION: In our cohort of Filipino patients with rheumatoid arthritis, the risk factors for low BMD measurements included low BMI, older age and longer years since menopause. These observations suggest that even among these patients with chronic inflammatory disease, the usual risk factors for involutional osteoporosis are applicable, and must be recognized and appropriately addressed.

Research Grant: None

P4 Validation of OSTA among Filipinos

Julie T. Li-Yu MD, Lyndon JQ Llamado, MD, Tito P. Torralba, MD

Section of Rheumatology, Clinical Immunology and Osteoporosis, Department of Medicine USTH

1. Osteoporosis International vol.16 (12) 2005; 1789-1793

2. Oral Presentation. 12th PRA Annual Convention. Cebu. Jan 2005

Osteoporosis is the most common metabolic bone disease in man. It is a special concern not only among postmenopausal women but men as well. In developing countries where there are meager resources, it will definitely be helpful to search for ways on identifying patients with low bone mineral density who have high risks of future fractures. These people need to be identified for treatment consideration in order to reduce the incidence of the disease and its complications. A simple risk index called the **Osteoporosis Screening Tool for Asians (OSTA)**, based only on two variables, age and body weight, performed well in identifying risk of osteoporosis among postmenopausal women. This index has been validated in countries like Japan, Korea, Singapore, and elsewhere around the globe as a useful tool in identifying individuals who will require BMD measurement. This is the first study that validated the said index in 1465 Filipino women and 132 men. It had sensitivity of 97% and 90% and specificity of 59% and 66% with areas under the curve of 0.8506 and 0.8475 respectively for women and men. We conclude that OSTA performed just as well or even better than those done in other populations in identifying individuals who are at varying degrees of risk for osteoporosis. The tool also proves to be a useful guide for clinicians to be more prudent and judicious in employing bone mineral density measurement.

P5 How Useful Is the Canadian Task Force on Preventive Health Care (CTFPHC) Guideline in Screening for Osteoporosis Among Postmenopausal Filipino Women?

Melchor-Alan L. Siriban MD, Ester G. Penserga MD, Jesus Emmanuel AD Sevilleja MD

Rheumatology Section, Department of Medicine UP-PGH

1. 1st Place. Department of Medicine Medicine-UP-PGH Research Forum. Retrospective Category. Oct 2004

2. 1st Place. Retrospective Category. 12th PRA Convention. Mactan, Cebu. Jan 2005

3. Oral Presentation. 35th PCP Annual Convention. Edsa Shangri la, Manila. May 2005

BACKGROUND: Osteoporosis predisposes to fragility fractures which are costly and disabling. There is good evidence that screening is effective in identifying postmenopausal women with low bone mineral density and that treating osteoporosis in this population reduces the risk of fracture. Central BMD using Dual X-ray Absorptiometry (**cdXA**), is the accepted standard for diagnosing osteoporosis. In the local setting this test is costly. There are several clinical practice guidelines which enumerate risk factors that help identify postmenopausal women who should undergo BMD testing. The Canadian Task Force on Preventive Health Care (CTFPH) provide major and minor risk factors for osteoporosis. The major risk factors are: age, history of a fragility fracture, family history of osteoporotic fracture, systemic glucocorticoid therapy, malabsorption syndrome, primary hyperparathyroidism, risk of fall, radiographic evidence of osteopenia, hypogonadism and early menopause. The minor risk factors are a history of rheumatoid arthritis, hyperthyroidism, weight loss >10% at age 25 yr, weight < 57kg, smoking, alcohol intake, excess caffeine, low calcium intake, long term anticoagulation, and anti-convulsant therapy. The One-Minute Osteoporosis Risk Test is a locally developed screening tool for the same purpose.

GENERAL STUDY DESIGN: Retrospective Study

METHODOLOGY: Consecutive charts were reviewed starting June 2004 until a total of 100 charts that fulfilled inclusion criteria were retrieved. Data pertinent to the Osteoporosis risk factors enumerated by the **CTFPHC** and the **One-Minute Osteoporosis Risk Test** were gathered from charts. The cDXA scans of these patients, interpreted by an accredited clinical densitometrist (International Society for Clinical Densitometry), were also retrieved. The World Health Organization definition of osteoporosis as a **T score** ≤ -2.5 was used.

INCLUSION CRITERIA. Charts of osteoporosis suspect postmenopausal women with cDXA BMD scans were eligible for inclusion. Subjects were from taken from an outpatient private tertiary arthritis clinic in Metro Manila.

EXCLUSION CRITERIA. Patients taking medications for osteoporosis were excluded from the study.

ANALYSIS: Data were tabulated and frequencies were tallied. STATA version 8.0 was used to compute Sensitivity, Specificity, and Predictive Values.

RESULTS: Of the 100 postmenopausal (natural or surgical) women, 63 had osteoporosis. Using cDXA as the gold standard, **CTFPHC** guideline has a Sensitivity of 52.4% (33/63), Specificity of 59.5% (22/37), Positive Predictive Value of 68.8% (33/48), and a Negative Predictive Value of 42.3% (22/52). **One-minute Risk Test** has a Sensitivity of 68.3% (43/63), Specificity of 24.3% (9/37), Positive Predictive Value of 60.6% (43/71), and Negative Predictive Value of 31% (9/29). This study examined the effect of lowering the age cut-off for osteoporosis from 65 to 60 and used at least one risk factor only; this yielded a Sensitivity of 100% (63/63), Specificity of 8.1% (3/37), Positive Predictive value of 64.9% (63/97), and a Negative Predictive Value of 100% (3/3).

CONCLUSIONS: Injudicious use of the CTFPHC guidelines in screening for osteoporosis in the local setting may result in missing several cases with osteoporosis and unnecessarily performing cDXA tests in patients without osteoporosis. Compared to the CTFPHC, the One-Minute Osteoporosis Risk Test is the more sensitive test in the local setting. Moreover, by lowering the age cut-off from 65 to 60 years old, even with only one risk factor present, the sensitivity of screening tools increased to 100%.

P6 Bone Mineral Density Characteristics of Underweight and Obese Postmenopausal Filipino Women at the University of Santo Tomas Hospital

EA Canoy, MD, LM Gaviola, MD VC Magboo, MD, TP Torralba

Poster Presentation. 11th PRA Annual Convention. Manila Hotel. Jan 2004

We studied the association between body weight and bone mineral density among postmenopausal Filipino women. A total of 164 postmenopausal, nonsmoker women underwent dual energy x-ray absorptiometry. They were divided into five groups according to their body mass index (BMI) using Asia-Pacific criteria. Underweight (BMI ≤ 18.5) Normal weight (BMI 18.5-22.9), Overweight (BMI 23-24.9), Obese I (BMI 25-29.9), Obese II (BMI ≥ 30). The five groups were comparable as to age and number of years menopause. The markedly obese (Obese II) group showed the highest BMD. While those with low BMI consistently showed the lowest BMD for lumbar, femoral, ultradistal forearm BMD. There was no difference in the lumbar, femoral, ultradistal forearm among those with normal weight, overweight and mildly obese groups. There was also a significantly higher number of osteoporotic cases among the low BMI group (100%) as compared to markedly obese group (27%). We conclude that underweight postmenopausal Filipino women showed significantly lowest while the markedly obese group showed significantly highest bone mineral density on all sites measured (lumbar, femoral, ultradistal forearm BMD). There were more cases of osteoporosis noted among the underweight groups. Increased bone mass may confer a degree of skeletal protection to heavier postmenopausal women. We suggest that special attention should be given to body weight in the prevention and expected response to osteoporosis treatment.

P7 Peripheral Bone Mineral Density in Systemic Lupus Erythematosus: A Cross-sectional Study among Filipino Lupus Patients

Marichel L. Marcolino, MD, Joseph M. Antigua, MD

Chong Hua Hospital, Cebu City

Poster Presentation. 9th PRA Annual Convention. Edsa Shangri la Hotel, Manila. Jan 2002

OBJECTIVE: To determine the peripheral bone mineral density and the proportion of osteopenia and osteoporosis of patients with systemic lupus erythematosus (SLE).

STUDY DESIGN: Descriptive, Cross-sectional

SETTING: Rheumatology Clinic at Chong Hua Hospital Medical Arts Building (CHH-MAB), Cebu City.

STUDY POPULATION: 29 patients; 27 premenopausal women and 2 male patients with Systemic Lupus Erythematosus recruited from the Lupus Association of Cebu who were attending to a rheumatology clinic at Chong Hua Medical Arts Building.

INTERVENTION: Peripheral bone mineral density (pBMD) measurements, expressed in grams per square centimeter of the calcaneum were done in 29 Filipino patients with Systemic Lupus Erythematosus using the Lunar dual energy x-ray absorptiometry (DXA) bone densitometer (Peripheral Instantaneous X-ray Imager/PIXI™). Peripheral BMD's of patients on glucocorticoids therapy for more than three months (Steroid Group) were segregated from those who were not or on steroid for less than three months (Non-steroid Group).

RESULTS: The mean age of the study population was 29.38 years (SD 8.3), 93 percent of the patients were females and the mean body mass index was 21.02 kg/m² (SD 3.88). The mean peripheral bone mineral density utilizing the calcaneum was 0.44 g/cm² (SD 0.07).

Twenty patients (69 percent) were in the steroid group and only 9 patients (31 percent) in the non-steroid group. Seventy percent (70%) was on glucocorticoids for six years with fifty-five percent (55%) of patients receiving daily prednisone dose of 1-10 mg.

Fifty-five percent (55%) of patients had normal bone density, 45 percent had osteopenia and none had osteoporosis. Among the steroid group, 10 patients (50 percent) had normal pBMD, and 10 patients (50 percent) had osteopenia. For the non-steroid group, 6 patients (66 percent) had normal pBMD and 3 patients (33 percent) had osteopenia.

CONCLUSION: In this study, based on the obtained peripheral bone mineral density, majority of SLE patients had normal pBMD's and none had osteoporosis. However, in relation to their steroid use, the proportion of patient with osteopenia was higher in the steroid group than in the non-steroid group.

P8 Bisphosphonates for Post Menopausal Osteoporosis: A Meta analysis

Evelyn O. Salido, MD, Ruth Saguil-Sy, MD, Melissa Untalan, MD.
Rheumatology Section, Department of Medicine UP-PG, 1997

OBJECTIVE: To assess the efficacy of bisphosphonates in the treatment of post-menopausal osteoporosis.

DESIGN: Meta-analysis

CRITERIA FOR CONSIDERING TRIALS FOR REVIEW: Included Trials were randomized, placebo- controlled, at least single blind, involving post menopausal women with osteoporosis given bisphosphonates or placebo for at least 1 year. The outcomes studied were bone mineral density (BMD) at the lumbar spine using dual x-ray or photon absorptiometry or vertebral fracture occurrence.

SEARCH STRATEGY AND METHOD OF THE REVIEW: Medline search (1983-1996) using MESH terms "bisphosphonates" and "post meno-pausal osteoporosis" and methodologic filters "randomized" or "random" or "clinical trial" was done. Ancestry method was also used.

TRIALS INCLUDED: Nine articles were retrieved; studies with a total population of 485 met the inclusion criteria. Two studies (Reid and Watts) measured both BMD and vertebral fracture while the other two measured only the BMD. These trials were heterogenous (chi-square test) when pooled with lumbar spine BMD as outcome. Heterogeneity could be due to differences in bisphosphonate used, study duration, baseline BMD, and amount of calcium supplementation. The trials which monitored vertebral fracture were homogenous (Breslow-Day =0.001; p=0.974).

METHODOLOGICAL QUALITY: The Cochrane Quality Assessment Scale was used by two independent reviewers to rate the quality of the studies. Three studies were assessed to be at moderate risk for bias due to lack of mention of allocation concealment while the Adami study was assessed to have low risk for bias.

RESULTS: Using the Cochrane Review Manager software, the overall percentage change from baseline in BMD of the lumbar spine after at least 1 year of bisphosphonate use compared to placebo is 4.54% (95% CI 4.40, 4.69). This is despite demonstration of heterogeneity among pooled studies. The overall odds ratio for vertebral fracture occurrence is 0.46 (95% CI 0.16, 1.28).

CONCLUSION: There is a common trend in significantly increasing BMD of the lumbar spine among postmenopausal osteoporotic women given bisphosphonates for at least 1 year compared to those given placebo. There is a protective effect towards the occurrence of vertebral fractures.

P9 National Nutrition and Health Survey (NNHeS) 2003: Prevalence of Osteoporosis and Fractures Among Filipino Adults

Julie T. Li-Yu, MD, MSPH

Osteoporosis Society of the Philippines Foundation, Inc.

Phil Journal of Internal Medicine 2007;45:57-63

OBJECTIVE: The objectives of this study are: 1) to determine the prevalence of fracture and osteoporosis among individuals 50 years and above in the Philippines; 2) to determine the risk factors for osteoporosis; 3) to determine the prevalence of low bone mass using peripheral bone density measurement; and 4) to determine the prevalence of patients at risk for osteoporosis using the Osteoporosis Risk Assessment Tool for Asians (OSTA).

METHODOLOGY: Using a multi-staged cluster sampling methodology, a total of 2,850 adults, 50 years and over out of 4,753 adults aged 20 years and over that were covered in the National Nutrition and Health Survey (NNHeS) in 2003 were examined. A validated questionnaire was administered to the survey respondents to determine the prevalence of fractures and osteoporosis. Random screening of peripheral bone density using the LUNAR pixi was conducted in 284 adults, 50 years and over in the National Capital Region (NCR) only. The respondents were also asked to accomplish a risk assessment profile using the OSPFI-IOF millennium one-minute osteoporosis risk test.

RESULTS: There was no report of osteoporosis among the 50 to 59 years old individuals. The overall prevalence of osteoporosis in adult Filipinos 60 to 69 years of age was 0.8% while those beyond 70 years old was 2.5%. The overall prevalence of fractures was 11.3% in females and 9.0% in males. Using the heel pixi, the overall prevalence of low bone mass was 65.2% in females and 70.0% in males. Using the OSTA, 37.5% of females vs 45.16% of males were in the low risk group, 44.8% of females vs 41.9% of males were identified to be at intermediate risk while 17.6% of females vs 12.9% of males were at high risk for osteoporosis.

RECOMMENDATION: The results of this survey maybe used in considering osteoporosis as an emerging health problem among the elderly population. The data presented can also serve as basis for health policy makers in prioritizing primary as well as secondary preventive health care programs for the elderly, most especially the postmenopausal women.

Keywords: osteoporosis, fracture, OSTA, prevalence

P10 Survey of Vitamin D levels among post-menopausal Filipino women with osteoporosis

Anne-Annette P. Raso, MD, Sandra V. Navarra, M.D., Julie Li-Yu, MD, Tito P. Torralba, M.D.

Section of Rheumatology, Clinical Immunology and Osteoporosis, Department of Medicine USTH

OBJECTIVE: To determine the prevalence of vitamin D inadequacy in a group of Filipino post-menopausal women with low bone mass

DESIGN: random survey

SETTING: postmenopausal women diagnosed with osteoporosis consecutively seen at a tertiary hospital (UST Hospital)

PATIENTS/PARTICIPANTS: Seventy post-menopausal Filipino women diagnosed with osteoporosis (using WHO criteria) by central bone mineral density measurement and having undergone laboratory work-

up prior to initiation of treatment for osteoporosis were recruited into the study. Laboratory tests done prior to inclusion into the study included serum electrolytes (sodium, potassium, calcium, magnesium), liver and renal profiles, as well as bone resorption marker (serum CTX). Serum 25(OH)D was determined by enzyme linked immunosorbent assay in a separate blood extraction after subjects were enrolled into the study.

RESULTS: Mean age of subjects was 70+8 years (range 54-84), with mean of 22 +10 years (4-45 years) since menopause. Overall serum 25(OH)D levels ranged between 48-128 nmol/l, with a mean of 87+ 20.48 nmol/l. Vitamin D levels were divided as follows: 80-140nmol/l (adequate), 25-79nmol/l (inadequate or insufficient), and <25nmol/l (deficient). Sixty-four percent (45/70) of subjects had adequate 25(OH)D levels while 36% (25/70) had inadequate (insufficient) levels of 25(OH)D. No 25(OH)D value fell within deficient levels of < 25nmol/l in this study. Laboratory profile of all subjects yielded normal liver and renal functions as well as serum electrolytes levels. No subject was on anti-resorptive therapy at the time, though 28% (21) had been on calcium and vitamin D supplementation. The mean CTX level was 0.67+0.25 ng/ml (range 0.18-1.49), all within postmenopausal values. Fisher's exact test did not show a significant association between WHO classification of BMD and serum 25 (OH)D levels (p=0.4804).

CONCLUSION: Among this group of postmenopausal Filipino women with low bone mass, 36% had insufficient levels of 25(OH)D. There was no serum 25(OH)D below 25nmol/l in this study. Majority (64%) of these women have normal serum vitamin D levels in contrast to what has been reported in similar groups in other Asian countries. Limitations of study did not include length of time of sunlight exposure, content of calcium intake in the diet, and genetic profile. Further studies need to be explored to better understand the distinct characteristics of Filipinos in contrast to other races.

P11 Investigation of the Relationship between Type 2 Diabetes and Osteoporosis Using Bayesian Inference

M. Sta. Romana¹ and J.T. Li-Yu²

¹*Department of Epidemiology and Biostatistics, UP College of Public Health*

²*Faculty of Medicine and Surgery, University of Sto. Tomas Hospital.*

Journal of Clinical Densitometry 2007; 10 (4): 386-390

This study aims to determine the prevalence of Type 2 diabetes in women with osteoporosis and estimate the odds ratio (OR) of osteoporosis in women with Type 2 diabetes using Bayesian inference. This is a case-control study design that looked into prevalence of diabetes among 582 female patients who had normal bone mineral density (BMD) and 598 female patients with osteoporosis. The subjects included women at least 30 year of age who had their BMD measured in the lumbar spine and femoral neck using dual-energy X-ray absorptiometry at a tertiary referral center in Manila, Philippines. Prevalence of Type2 diabetes in subjects with osteoporosis is 22.41%, whereas 19.07% of the subjects with normal BMD had diabetes. The odds of developing osteoporosis is 22.54% higher for Type 2 diabetic subjects. Patients with osteoporosis were older than subjects with normal BMD by almost 10 year. Of the diabetic osteoporotic patients, 44.78% were physically active compared with 20.72% diabetics with normal BMD. Most of the diabetics (60.36%) with normal BMD were obese, whereas majority of diabetic osteoporotics (64.93%) have normal body mass index (BMI). Less than 10% of both diabetic osteoporotic and diabetics with normal BMD have ever undergone hormone replacement therapy. Of the 598 subjects with osteoporosis, 124 (20.74%) had suffered from fragility fractures. When controlling for physical activity and BMI, the odds of developing osteoporosis was 21.73% and 53.89% higher for Type 2 diabetics, respectively. In considering all possible confounders and effect modifiers (age, physical activity, BMI, and hormone replacement therapy) in the model which made use of a diffuse normal prior distribution, the estimate for OR (Model 1) is 0.67. A separate analysis excluding modifiable confounders were included in the model, the direction of the relationship changed. Considering the credible intervals (95% credible interval in both models), the study concluded that diabetes is indeed a protective factor for osteoporosis. Results of the study may have potential limitations. There are sources of bias that have been identified-selection bias where patients included in the study were referred by primary caregivers for a specified reason as well as misclassification and recall biases on certain information such as type and duration of physical activity. Diabetes is a protective factor for osteoporosis in this referred population of women. However, with the well-known diabetes-related factors, that is, microvascular complications, visual acuity, and risk for fall,

one should still strongly consider assessing and screening for osteoporosis and fracture risk reduction in diabetic patients.

Key words: Bayesian inference, diabetes mellitus, osteoporosis

P12 Determination of Normative Bone Mineral Density Values in Filipino Women

Tito P. Torralba, MD, Millicent Y. Tan-Ong, MD, Sarah H. Dy, RRT, Sue Celle T. Saavedra, MD, Charito C. Bermudez, MD, Leilani Mercado-Asis, MD, PhD, Lyndon Q. Lllamado, MD, Julie L. Yu, MD

1. **Journal of Rheumatology 2004; 7 (1), 30–37.**
2. **This article was originally published in the Philippine Journal of Internal Medicine January–February 2001; 39: 31–37 and was republished with written permission by the Editor-in-Chief of the Philippine Journal of Internal Medicine.**
3. **Research Award, 8th PRA Annual Convention, Baguio City, Jan. 2001;**
4. **Finalist in the 2001 Scientific Poster Contest of the Philippine Council for Health Research and Development (PCHRD);**
5. **Finalist in the 2001 UST Fellows’ Research Paper contest**

OBJECTIVES: To obtain reference values of bone mineral density (BMD) for Filipino women in order to make a population-specific diagnosis of osteoporosis.

STUDY DESIGN: Cross-sectional

SETTING: Osteoporosis Unit, Joint and Bone Center, Section of Rheumatology and Clinical Immunology, Department of Medicine, Santo Tomas University Hospital, Manila, Philippines, tertiary health center, institutional.

PARTICIPANTS: 442 healthy Filipino women volunteers recruited from the outpatient department-Rheumatology and Clinical Immunology Clinic of the Santo Tomas University Hospital and from within the University of Santo Tomas campus. Subjects with known underlying illness or conditions or intake of drugs that predispose to osteoporosis were excluded from the study.

INTERVENTION: Bone mineral density (BMD) measurements, expressed in grams per square centimeter of the lumbar spine, non-dominant femur and non-dominant forearm were done in 442 consecutive healthy Filipino women using the LUNAR DPX-IQ machine.

RESULTS: Means and standard deviations of BMD measurements at each site were calculated using Kwikstat software version 3.6 release 7. Results were grouped in decades to serve as reference per decade.

Age Group (years)	No. of Subjects	L1-L4 (g/cm ²) Mean (S.D)	Femoral neck (g/cm ²) Mean (S.D.)	Radius ultra-distal (g/cm ²) Mean (S.D.)
20-29	16	1.0879 (0.11)	0.8895 (0.11)	0.3606 (0.04)
30-39	40	1.1322 (0.12)	0.8867 (0.11)	0.3595 (0.05)
40-49	70	1.0751 (0.13)	0.8748 (0.10)	0.3564 (0.10)
50-59	79	0.9796 (0.14)	0.8213 (0.12)	0.3288 (0.05)
60-69	87	0.8711 (0.15)	0.7169 (0.13)	0.2896 (0.05)
70 and above	50	0.8346 (0.18)	0.6480 (0.11)	0.2662 (0.04)

CONCLUSION: BMD measurements of these 442 healthy Filipino women may serve as an initial reference guide for the diagnosis of osteoporosis in Filipino women.

P13 Risk Factors for Osteoporosis Among Patients seen at the University of Santo Tomas Hospital

Millicent T. Ong, Sandra V. Navarra, Sarah Jane Dy, Tito P. Torralba
Section of Rheumatology, Clinical Immunology and Osteoporosis, Department of Medicine USTH

Poster Presentation. 17th Scientific Meeting of the International Bone and Mineral Society Meeting in Montreal, Canada, June 2007.

OBJECTIVE: To describe the prevalence and risk factors for osteoporosis among patients seen at the University of Santo Tomas Hospital, Manila, Philippines

METHODOLOGY: Records of patients aged 20 years and older referred for bone mineral density (BMD) testing using the Lunar DPX-IQ densitometer at the Joint and Bone Center, University of Santo Tomas Hospital, Manila, Philippines from January 1, 1999 to December 31, 2005 were reviewed. Patients with scans of the lumbar spine, femur and forearm were included in the study. The World Health Organization classification was used to categorize BMD T-score as normal (T-score of >-1.0 SD), osteopenic (T-score of <-1.0 SD) or osteoporotic (T-score of <-2.5 SD). Prevalence of osteopenia and osteoporosis were calculated according to age and gender.

RESULTS: A total number of 5,024 patient records were included. There were 4,640 (92.4%) females and 384 (7.6%) males. Overall prevalence of osteoporosis in females and males was 36.5% and 23.0% respectively. Overall prevalence of osteopenia in females and males was 35.0% and 41.7% respectively. Majority of those with osteoporosis, 85.5% (1,454) of females and 60.9% (53) of males, were from the 50 to 79 age group. Up to 43.8% of the 50 to 79 year old females had osteoporosis, while up to 26.4% of those 50 to 79 year old males were osteoporotic. In addition to menopause in women, risk factors for osteoporosis identified in the study included use of corticosteroids, thyroid dysfunction, smoking, family history of osteoporosis, systemic lupus erythematosus, rheumatoid arthritis, malignancy, hyperparathyroidism, epilepsy, heavy caffeine intake, renal dysfunction and ankylosing spondylitis.

CONCLUSION: In this descriptive study of patients referred for BMD testing in a tertiary medical center, we have identified risk factors for osteoporosis which warrants early and equal vigilance in screening for osteoporosis in both genders aged 50 years and older.

P14 Comparison of Bone Mineral Density Interpretations at Central and Peripheral Sites Among Filipinos

Millicent Y. Tan-Ong, Tito P. Torralba, Sandra V. Navarra, Sarah Jane H. Dy

Section of Rheumatology, Clinical Immunology and Osteoporosis, Department of Medicine USTH

1. Published in the Philippine Journal of Internal Medicine, 39:133-37, May-June 2001;

2. Research Award, Eighth Annual Convention of the PRA, Baguio, Jan. 2001.

OBJECTIVE: To compare the bone mineral density (BMD) interpretations at central (lumbar spine and femur) and peripheral (forearm) sites, and determine concordance, if any between these sites.

STUDY DESIGN: Descriptive, Cross-sectional

SETTING: Osteoporosis Unit, Joint and Bone Center, Section of Rheumatology and Clinical Immunology Department of Medicine, Santo Tomas University Hospital, Manila Philippines, tertiary health center, institutional.

PARTICIPANTS: 1,309 subjects:1,157 females aged 20 to 88 years old (mean of 52.1 years old) and 152 males aged to 20 to 89 years old (mean of 47.5 years old) referred for osteoporosis screening at the Osteoporosis Unit.

INTERVENTION: Bone mineral density (BMD) measurements, expressed in grams per square centimeters of the lumbar spine, and/or non-dominant femur (central site) and non-dominant forearm (peripheral site) were done in consecutive Filipino women and men using the Lunar DPX-IQ densitometer.

MAIN OUTCOME MEASURES: Interpretation of BMD measurement of the lumbar spine, femur and forearm was based on the World Health Organization (WHO) criteria for osteoporosis: Normal: T-score (young normal adult mean) of above-1.0 SD (standard deviation) below the young normal adult mean; Osteopenia: T-score of -1.0 to -2.5 SD below young normal adult mean and Osteoporosis: T-score of >-2.5 SD below the young normal adult mean.

RESULTS:

Total	All subjects (n=1.309)	Female (n=1.157)	Male (n=152)
Concordant BMD interpretation	61.3% (803)	62.2% (720)	54.6% (83)
1. Normal	29.9% (392)	29.1% (337)	36.2% (55)
2. Osteopenic	19.2% (251)	19.8% (229)	14.5% (22)

3. Osteoporotic	12.2% (160)	13.3% (154)	3.9% (6)
Discordant BMD interpretation	38.6% (506)	37.8% (437)	45.4% (69)

There were 255 (19.5%) patients who had normal peripheral BMD but had either osteopenic or osteoporotic central BMD. On the other hand, 98 (7.5%) patients had normal central BMD but had either osteopenic or osteoporotic peripheral BMD.

CONCLUSION and RECOMMENDATION: Although a slight majority of patients, 62% in females and 55% in males, had concordant BMD readings at the central and peripheral sites, a normal peripheral BMD did not always connote a normal central BMD and vice-versa, hence it is still best to obtain site-specific BMD measurement to predict site-specific fracture risks.

P15 Determination of Risk Factors for Osteoporosis Among Filipino Patients Using the BMD and Osteoporosis National Epidemiologic Survey (BONES).

Sandra Tankeh-Torres, Millicent Y. Tan-Ong, Bee Giok Tan-Sales
Section of Rheumatology and Bone Densitometry Unit, Cardinal Santos Medical Center, San Juan, Metro Manila, Philippines

1. Poster Presentation. 12th APLAR Congress. Kuala Lumpur, Malaysia, August 2006
2. APLAR Journal of Rheumatology 2006; 9(suppl.1) A140.

BACKGROUND: Establishing the risk factors for osteoporosis among Filipinos will facilitate early identification of patients who should undergo Dual energy X-ray Absorptiometry (DXA) screening early preventive measures of correcting modifiable risk factors and possibly early pharmacologic intervention to prevent fracture. This is the first local study to determine the risk factors in a Filipino population seen in five Norland Bone Densitometry Centers (BDC) nationwide.

OBJECTIVE: To determine risk factors associated with osteoporosis among Filipino patients seen in five Norland Bone Densitometry Centers (BDC) nationwide.

METHODOLOGY: Data from all patients who had Bone Mineral Density (BMD) testing, using the Norland XR 46 densitometer, in five Bone Densitometry Centers in the Philippines nationwide from January 1, 2001 to December 31, 2004 (BONES study), were used for this analysis. The World Health Organization classification was used to categorize BMD T-score as normal (T-score of >1.0 SD), osteopenic (T-score of <-1.0SD) and osteoporotic (T-score of <-2.5 SD). The odds ratios of the different risk factors for osteoporosis using univariate analysis were calculated.

RESULTS: There were a total of 6,182 evaluable records. The risk factors that were strongly associated with osteoporosis were loss of height (OR 3.34, p<0.001), history of fall (OR 2.84, p<0.001), body weight less than 127 lbs (OR 2.34, p<0.001). Body Mass Index (BMI) of <16kg/m² (OR 2.15, p<0.001), history of previous fracture (OR 2.12, p<0.001). Other significant risk factors for osteoporosis were history of chronic renal disease (OR 1.92, p=0.012), medication intake (either heparin, antidepressants, anticonvulsants or antidiabetic drugs) (OR 1.37, p=0.007), history of other diseases (either rheumatoid arthritis, lupus, chronic renal disease, kidney transplant or cancer) (OR 1.30, p=0.032, sedentary lifestyle (OR 1.19, p=0.004), and alcohol intake (OR 0.385, p=0.013)

CONCLUSION: The risk factors that were found to be strongly associated with osteoporosis were loss of height, history of fall, body weight less than 127 lbs., BMI <19kg/m², and history of previous fracture. The identification of those risk factors will facilitate decisions on further testing using DXA BMD measurements in the general population.

Acknowledgement: Participation of Norland Bone Densitometry Units in Cebu Doctor's Hospital, Davao Doctors' Hospital, New World Laboratory and Accuvision.

Funded Partially by: Sanofi-Aventis, Philippines

P16 Prevalence of Osteoporosis Among Patients seen in five Norland Bone Densitometry Centers and BMD and Osteoporosis National Epidemiologic Survey (BONES).

Bee Giok Tan-Sales, Millicent Y. Tan-Ong, Sandra Tankeh-Torres.

Section of Rheumatology and Bone Densitometry Unit, Cardinal Santos Medical Center, San Juan, Metro Manila, Philippines

1. Poster Presentation. 12th APLAR Congress. Kuala Lumpur, Malaysia, August 2006
2. APLAR Journal of Rheumatology 2006; 9(suppl.1) A63.

BACKGROUND: There is no published data on the prevalence of osteoporosis in the Philippines. This is the first prevalence study analyzing data from five Norland Bone Densitometry Centers (BDC) in three metropolitan areas, representative of the major regions of the country.

OBJECTIVE: To determine the prevalence of osteoporosis among patients seen in five Norland BDC in the Philippines.

METHODOLOGY: All records of patients who had BMD testing using the Norland XR46 densitometer in the five Norland BDC, nationwide from January 1, 2001 to December 31, 2004, were included in the study. The World Health Organization classification was used to categorize BMD T-score as normal (T-score of $>-1.0SD$), osteopenic (T-score of $<-1.0SD$) or osteoporotic (T-score of $<-2.5 SD$). Prevalence of osteopenia and osteoporosis were calculated according to age and gender. Data were analyzed using Minitab 14.

RESULTS and CONCLUSION: A total number of 6317 patient records were included. There were 5748 (91%) females and 569 (9%) males. Overall prevalence of osteoporosis in females based on the lumbar spine and femoral neck is 43.1% and 3.3% respectively. The prevalence of osteoporosis in the perimenopausal group (45 to 55 years) based on the lumbar spine is 27.5%. Overall prevalence of osteoporosis among males based on the lumbar spine and the femoral neck is identical at 4.2%. The highest incidence of osteoporosis is seen among patients older than 70 years in both the male and female groups. There was a higher percentage of patients diagnosed with osteoporosis in the spine compared to hip. There were 4595 patients assessed for the presence of risk factors. Seventy-three percent (73%) of both males and females had at least one risk factor for osteoporosis.

RECOMMENDATION: Data based on the general population should be undertaken to obtain more representative information as to the true prevalence of osteoporosis in the country. Nevertheless, aggressive campaigns to educate, screen and treat osteoporosis among this high risk group must be urgently undertaken to prevent osteoporotic fractures and their complications.

ACKNOWLEDGEMENTS: Participation of Norland Bone Densitometry Centers at Cebu Doctors Hospital, Davao Doctors Hospital, New World Laboratory and Accuvision Center. Funded Partial by: Sanofi-Aventis Philippines.

P17 Validation of OSTA in Filipino Patients Using the BMD and Osteoporosis National Epidemiologic Survey (BONES) Database.

Sandra Tankeh-Torres, Millicent Y. Tan-Ong, Bee Giok Tan-Sales

Section of Rheumatology and Bone Densitometry Unit, Cardinal Santos Medical Center, San Juan, Metro Manila, Philippines

1. Poster Presentation. 12th APLAR Congress. Kuala Lumpur, Malaysia, August 2006
2. APLAR Journal of Rheumatology 2006; 9(suppl.1) A140.

BACKGROUND: The Osteoporosis Screening Tool for Asians (OSTA) is a simple and rapid way to classify patients who need further testing with a Dual Energy Xray Absorptiometry (DXA) machine. While other studies have excluded patients with risk factors in their OSTA validation study, all patients regardless of presence or absence of risk factors were included in this study to simulate actual clinical practice. This is the first multi-center nationwide validation of OSTA in Filipino patients.

OBJECTIVE: To determine the correlation of OSTA with femoral neck bone mineral density (BMD) T-score in order to validate its utility as a screening tool for osteoporosis among Filipino patients with or without risk factors for osteoporosis.

METHODOLOGY: Age, weight and femoral neck BMD data from the BMD and Osteoporosis Nationwide Epidemiologic Survey (BONES) Database were used for this analysis. The BONES study included all patients who had BMD testing using the Norland XR46 densitometer, in five Norland Bone Densitometry Centers nationwide from January 1, 2001 to December 31, 2004. The World Health Organization classification was used to categorize femoral neck BMD T-score as normal (T-score of >2.5 SD). The Chi-square test was used to determine the correlation of OSTA and femoral neck T-score.

RESULTS: A total number of 5,727 patient records were included. These were 5177 (91%) females and 550 (9%) males. The chi-square test result for the total number of subjects was 1154.8 which was highly significant ($p=0.0001$). In separate analyses done on the female and male populations, a similar trend was seen. In the female population analysis, the Chi-square test result was 1,132.4 ($p<0.0001$), while in the male population analysis, the result was 28.9 ($p<0.0001$). These results indicate that the OSTA strongly correlated with the femoral neck BMD T-score. The sensitivity of OSTA using femoral neck BMC is 75.1%, specificity is 57.7%. The positive predictive value is 5.7% and negative predictive value is 98.5%.

CONCLUSION: There is a very strong positive correlation between OSTA risk stratification and BD T-score at the femoral neck. OSTA is an excellent screening tool for patients whether or not risk factors for osteoporosis are present.

ACKNOWLEDGEMENTS: Norland Bone Densitometry Centers at Cebu Doctors' Hospital, Davao Doctors' Hospital, New World Laboratory and Accuvision, Philippines.

Funded in part by: Sanofi-Aventis Philippines