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Risk factors for osteoporosis in postmenopausal Thai women attending menopause clinic at King Chulalongkorn Memorial Hospital

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Background : *BMD measurement is the best method to estimate bone mass and predict fracture risks. But it is not available in some area and the cost of this investigation is expensive. Another possible approach to early detection of osteoporosis is the use of clinical and historical risk factors to predict bone mass.*

Objective : *To assess risk factors of osteoporosis women.*

Setting : *Menopause clinic at King Chulalongkorn Memorial Hospital*

Design : *Case - control study*

Materials and Methods : *During 1995, 242 women were recruited for the analysis. The age range of studied population was 43 - 75 years. Bone mass measurement was performed at lumbar spine (L1-4) and hip utilizing dual energy X-ray absorptiometer, Hologic QDR - 2000.*

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Intervention : *Information regarding menstrual and surgical history, dietary intake, educational background, parity, income, body mass index (BMI), alcohol intake, exercise and smoking were obtained.*

Results : *No variables is associated when focused at t he spine and at femoral neck in premenopausal group.Age > 60 years [OR = 3.52, (1.51- 8.21)], Low BMI [OR = 2.5, (1.42 - 4.55)], High BMI [OR = 0.32, (0.16 - 0.64)] are associated when focused at the femoral neck in postmenopause group. Age > 60 years [OR = 3.52, (1.51- 8.20)], Years since menopause >15 years [OR = 4.03, (1.63- 9.92)], Low BMI [OR = 2.04, (1.08-3.71)] and high BMI [OR = 0.41, (0.18 - 0.92)] are associated when focused at the spine in postmenopause group.*

Conclusion : *The risk factors analysis alone is not accurate enough to predict bone mass and only a few risk factors are significant. But such analysis may help decide in which women BMD measurement is most strongly indicated.*

Key words : *Risk factors, Menopause, Osteoporosis.*

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สุวิทย์ บุณยะเวชชีวิน, กอบจิตต์ ลิมปพยอม, กระเษียร ปัญญาคำเลิศ, มาคุ้มครอง โปษยะจินดา, นิมิต เตชไกรชนะ.ปัจจัยเสี่ยงของการเกิดโรคกระดูกพรุนในสตรีไทยในวัยหมดประจำเดือนที่มารับบริการที่คลินิกวัยหมดประจำเดือน โรงพยาบาลจุฬาลงกรณ์. จุฬาลงกรณ์เวชสาร 2544 มี.ค; 45(3): 233 – 40

ข้อมูลพื้นฐาน : *การวัดความหนาแน่นของกระดูกเป็นวิธีที่ดีที่สุดในการวัดมวลกระดูกแต่เครื่องมือดังกล่าวไม่มีในทุกสถานบริการและค่าใช้จ่ายมีราคาแพง วิธีอื่นที่ช่วยในการวินิจฉัยภาวะกระดูกพรุน คือ การใช้ปัจจัยเสี่ยงทางคลินิกและจากประวัติอดีต*

วัตถุประสงค์ : *เพื่อประเมินการใช้ปัจจัยเสี่ยงในการวินิจฉัยโรคกระดูกพรุนในสตรีไทย*

สถานที่ : *คลินิกวัยหมดประจำเดือน โรงพยาบาลจุฬาลงกรณ์*

รูปแบบการศึกษา : *Case - control study*

วัสดุและวิธีการ : *ระหว่างเดือนมกราคม ถึงกันยายน พ.ศ. 2538 อายุของผู้รับบริการอยู่ในช่วง 43 - 75 ปี ทำการวัดความหนาแน่นของกระดูกที่บริเวณช่วงเอว (L_1-L_4) และบริเวณสะโพก โดยใช้เครื่อง Dual energy X-ray absorptiometer, Hologic QDR-2000*

วิธีการ : *ทำการบันทึกลักษณะประจำเดือน การผ่าตัด ลักษณะอาหารที่รับประทาน การศึกษา จำนวนการคลอด รายได้ ค่าดัชนีมวลกาย (BMI) ประวัติการดื่มเหล้า การสูบบุหรี่*

ผลการศึกษา : *ไม่พบปัจจัยเสี่ยงที่มีนัยสำคัญเพื่อพิจารณาที่กระดูกสันหลังและคอกระดูกต้นขาพร้อมกันและพบว่าอายุมากกว่า 60 ปี [OR = 3.52, (1.51 - 8.21)], ดัชนีมวลกายน้อย [OR = 2.5, (1.42 - 4.55)] ดัชนีมวลกายมีค่ามาก [OR = 0.32, (0.16 - 0.64)] เป็นปัจจัยเสี่ยงที่มีนัยสำคัญเมื่อพิจารณาที่คอกระดูกต้นขา ในสตรีวัยหมดระดูและอายุมากกว่า 60 ปี [OR = 3.5, (1.51 - 8.20)] ช่วงเวลาการหมดประจำเดือน >15 ปี [OR = 4.03, (1.63 - 9.92)] ดัชนีมวลกายน้อย [OR = 2.04, (1.08 - 3.71)] และดัชนีมวลกาย มีค่ามาก [OR = 0.41, (0.18 - 0.92)] เป็นปัจจัยเสี่ยงที่มีนัยสำคัญ เมื่อพิจารณาที่กระดูกสันหลังในสตรีหมดระดู*

สรุป : *การใช้ปัจจัยเสี่ยงอย่างเดียวไม่แม่นยำพอในการทำนายมวลกระดูก และพบว่ามีปัจจัยเสี่ยงบางปัจจัยที่มีนัยสำคัญ แต่วิธีนี้อาจมีประโยชน์ในการช่วยคัดเลือกสตรีที่จำเป็นในการวัดมวลกระดูก การศึกษาพร้อมกันในหลายสถาบันในประเทศไทย ในสตรีจำนวนมากขึ้นจะช่วยเพิ่มความแม่นยำถึงประโยชน์ของการใช้ปัจจัยเสี่ยงในการช่วยคัดกรองสตรีที่จำเป็นในการตรวจมวลกระดูก ขณะนี้กำลังดำเนินการอยู่และจะรายงานผลการศึกษาต่อไป*

Osteoporosis exacts a huge toll in suffering and health care costs, hip fractures are the most serious and costly outcome of this process.[1] Low bone mass is a major determinant of osteoporotic fracture, and its measurement is a predictor of subsequent fracture.[2] It is generally accepted that measuring bone mineral density (BMD), which indirectly reflects bone mass, by various methods, can predict future fracture risks.[3,4]

BMD measurement is the best method to estimate bone mass; but it is not available in some areas and the cost of this investigation is expensive. Another possible approach to early detection of osteoporosis is the use of clinical and historical risk factors to predict bone mass,[4,5] even though it is accepted that a risk factors analysis is not an adequate substitute for BMD measurement.[6,7] However, unnecessary bone mass measurements may be reduced by stratifying patients according to their risk factors before requesting a BMD assessment. The aim of this study was to assess the clinical and historical risk factors of osteoporosis in postmenopausal Thai women whether it can be used to predict the osteoprorosis when compared to the bone mass measurement. This risk assessment may be beneficial in the place where bone mass densitometer not available. Risk factors that were identified will be advantageous for the risk prevention program in the future.

Materials and Methods

Two hundred and forty two healthy women attending menopause clinic at Chulalongkorn hospital from January to September, 1995 were recruited for the analysis. All subjects were apparently healthy and were not taking medications known to influence calcium homeostasis. The women all answered the same specially developed questionaire. These 11 variables had sufficient frequency (> 5 %) in our population) to allow statistical calculation. The risk factors were age, years since menopause, parity, history of bilateral salpingo-oophorectomy (BSO), smoking, alcohol intake, exercise, vegetarian diet, education, income and body mass index.

Bone mass measurements of the hip and spine were performed utilizing a dual energy X-ray absorptiometer (DEXA), Hologic QDR 2000. A standard region of measurement, including lumbar spines (LS: L1-4) was scanned. Patients with severe osteoarthritic changes or compression of the vertebrae were excluded from the study. Bone mineral density (BMD) of the hip (at the femoral neck) and at anteroposterior L_2-L_4 were measured in each subject.

Osteoporosis was defined according to the study group of the World Health Organization (WHO) as a BMD greater than 2.5 standard deviations below the mean value of peak bone mass in young normal young women.

Statistical analysis

The statistical analysis was performed using SPSS Version 7.0 for Microsoft Windows 95®. The correlations between variables and bone mass status were determined by stepwise logistic regression. The estimated partial odds ratio (and 95 % confidence intervals) of each risk factor were computed by taking the exponent of the product of its coefficient in the logistic regression with the difference within the variables.

Results

The main clinical characteristics of the population and the frequency of each risk factor are given in Table 1. For bone mass in the lumbar spine, age, low BMI, high BMI, years since menopause and vegetarian diet were significantly associated on univariate analysis (Table 2). When using stepwise multiple logistic regression, age, years since menopause, low BMI and high BMI were shown to be associated with osteoporosis in the lumbar spine. (Table 3) For bone mass in the femoral neck, age, low BMI, high BMI and years since menopause were significant at univariate analysis (Table 4). When using stepwise multiple logistic regression, age, years since menopause, low BMI, high BMI were shown to be associated with osteoporosis in the femoral neck. (Table 5)

Table 1. Clinical features, history and bone mineral density of spine (L1-4) and femoral neck (N= 242).

Characters	Mean ± SD
Age (yrs)	52.43 ± 5.93
Height (cms)	154.09 ± 5.47
Weight (Kgs)	56.45 ± 9.51
BMI (Kg/m^2)	23.69 ± 5.37
Years since menopause (yrs)	6.00 ± 5.37
Femoral neck BMD (gm/cm^2)	0.70 ± 0.12
BMD of L1-4 (gm/cm^2)	0.86 ± 0.13
	%
Age >60 yrs	10.3 %
Years since menopause >15 yrs.	6.0 %
History of BSO	18.2 %
Smoking	5.1 %
Alcohol >250 cc/week	12.4 %
Exercise <1 hour/week	74.0 %
Nulliparous	31.5 %
Vegetarian diet	5.2 %
Education <Primary school	20.2 %
Income <200 US$ per months	7.0 %
High body mass index (BMI >26)	27.2 %
Low body mass index (BMI <22)	26.9 %

Discussion

At present there is general agreement that, for a number of reasons, population screening by BMD can not be justified and facilities for bone densitometry remain restricted to relatively few centers. Another possible approach to the early detection of osteoporosis is the use of clinical and historical risk factors to predict bone mass, eventhough the prediction of bone mass based on this analysis has been shown to be inaccurate for general use.[6,7] However, the assessment of risk factors is still worthwhile and may be used as a guide to patient selection for bone mass assessment.[8,9] Women in different ethnic groups, or exposed to a differing degree of sunlight, life style, genetic background or nutrition, may have different risk factors.[10-12] In this study, only age and BMI were significant risk factors for low bone density in the femoral neck while age, BMI and years since menopause were the significant risk factors for the lumbar spine. Obesity (high BMI) was belived to be associated with the high bone mass density due to the high estrogen content from peripheral conversion. Differing risk factors between these two sites may be due to differences in the proportions of cortical and trabecular bone. Years since menopause is related to estrogen deficiency, which predominantly effects trabecular bone.[13] On the other hand, this study found that chronological age was

Table 2. Factors associated with postmenopausal osteoporosis at the spine using Univariate analysis (Chisquare).

Factors	P value	Odds ratio	95 % CI
Age			
<60 years	-	1	-
≥60 years	0.001	3.44	(1.7 - 6.2)
Low BMI			
>22 Kg/m^2	-	1	-
≤22 Kg/m^2	0.002	2.53	(1.38 - 4.64)
High BMI			
<26 Kg/m^2	-	1	-
≥26 Kg/m^2	0.01	0.38	(0.17 - 0.84)
Years since menopause			
<15 years	-	1	-
≥15 years	0.02	3.03	(1.52 - 9.72)
Food			
non vegetarian	-	1	-
Vegetarian	0.03	1.52	(1.42 - 6.63)

Table 3. Factors associated with postmenopause osteoporosis at Lumbar spine using Logistic regression.

Factors	Odds ratio	95% Confidence Interval
Age ≥60 yrs	3.52	(1.51-8.20)
Years since menopause ≥15 yrs.	4.03	(1.63-9.92)
Low BMI (≤22 Kg/m^2)	2.04	(1.08-3.71)
High BMI (≥26Kg/m^2)	0.41	(0.18-0.92)

Table 4. Factors associated with postmenopausal osteoporosis at the Femoral neck using Univariate analysis (Chisquare).

Factors	P value	Odds ratio	95 % CI
Age			
<60 years	-	1	-
≥60 years	0.001	4.11	(1.6 - 8.6)
Low BMI			
>22 Kg/m^2	-	1	-
≤22 Kg/m^2	0.001	2.12	(1.22 - 5.66)
High BMI			
<26 Kg/m^2	-	1	-
≥26 Kg/m^2	0.03	0.26	(0.15 - 0.96)
Years since menopause			
<15 years	-	1	-
≥15 years	0.02	4.11	(1.55 - 9.86)

Table 5. Factors associated with postmenopausal osteoporosis at Femoral neck using Logistic regression.

Factors	Odds ratio	95 % Confidence Interval
Age ≥60 yrs	3.52	(1.51 - 8.21)
Low BMI (≤ 22 Kg/m^2)	2.54	(1.42 - 4.55)
High BMI (≥ 26Kg/m^2)	0.32	(0.16 - 0.64)

related to low bone mass at femoral neck. This can be explained by the propensity of cortical bone to be affected by parathyroid hormone which increase with advancing age.[14,15]

This study confirms that a risk factors analysis alone is not accurate enough to predict bone mass and only a few risk factors are significant. But such analysis may help decide in which women BMD measurement is most strongly indicated. This is was hospital - based study, in which most of the postmenopausal women lived in Bangkok. A multicenter study in Thailand with a greater sample size may yield more accurate data. Such a study has been commenced and the results will be reported as they become available.

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