Preliminary Report

Modified OSTA Index for Referring Women for DEXA Measurement

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A retrospective study of 696 postmenopausal women with hip measurement by Dual-energy X-ray absorptionmetry (DEXA) from Sapphasittprasong Hospital, Ubon Rahatani and Srinagarind Hospital,Khon Kaen University. All variables : T-score , age and weight were collected and calculated by the original OSTA index and modified OSTA index.

Thai osteoporosis foundation recognized Original OSTA index the cut point below or equal 4 as high risk of osteoporosis. The authors used the modified OSTA index for calculation without truncate, the authors found that the cut off point was <-3.5 making 79 % sensitivity and 58.7% specificity while the original OSTA gave 73%, 62% respectively. The authors proposed modified OSTA index as a making-decision tool before sending the patient for bone mass measurement. That saves the expense of further investigation.

Keywords: *OSTA index, DEXA measurement*

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OSTA index or Osteoporosis Self Assessment Tool for Asians was proposed by L.K.H Koh in 2001[1] which is making a tool for helping physicians to further investigate osteoporosis such as bone mass measurement, OSTA index can be calculated by the following formula:

Integer [0.2X (weight in kilogram- age)]

The suggestion of osteoporosis of the OSTA index is lesser or equal to -1

Bone mineral density (BMD) has correlated to fracture rate, the fracture rate will increase 2 fold of each decrease of one minus standard deviation (SD). At present, the measurement of bone mass density by dual energy X-ray absorptionmetry(DEXA) is recognized as the gold standard[2] for the diagnosis of osteoporosis especially in menopausal women for the prevention and diagnosis, however, routine measurement for diagnosis is not possible because of high costs and the machine is not available for service. The authors suggest a new method for screening of the bone mass by finding the correlation of DEXA and OSTA index so OSTA index considered as a helping tool , the Thai Osteoporosis Foundation suggested that the cut off point lower or equal to -4 was classified as high risk of osteoporosis and these patients must be investigated for BMD measurement. The present study showed the OSTA index, sensitivity, specificity and proposing modified OSTA index for enhancing sensitivity and specificity which is suitable for screening osteoporosis.

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Material and Method

This is a retrospective study of hip BMD of 696 postmenopausal women,aged between 41 to 89 years at Sapphasitthiprasong Hospital(Ubon Rachtani) and Srinagarind Hospital (Khon Kaen University).

OSTA index and modified OSTA index (subtracted age from weight and then multipled by 0.2 and truncating to yield an integer for OSTA but not truncating to modify) The T-Score of Hip BMD, age and weight were collected and calculated for finding of sensitivity and specificity by statistic and graph distribution of both indexes (Fig. 1) the authors also studied the diagnostic accuracy of measurement in the aspect of sensitivity, specificity, positive and negative predictive values, prevalence, ROC curve, area under ROC

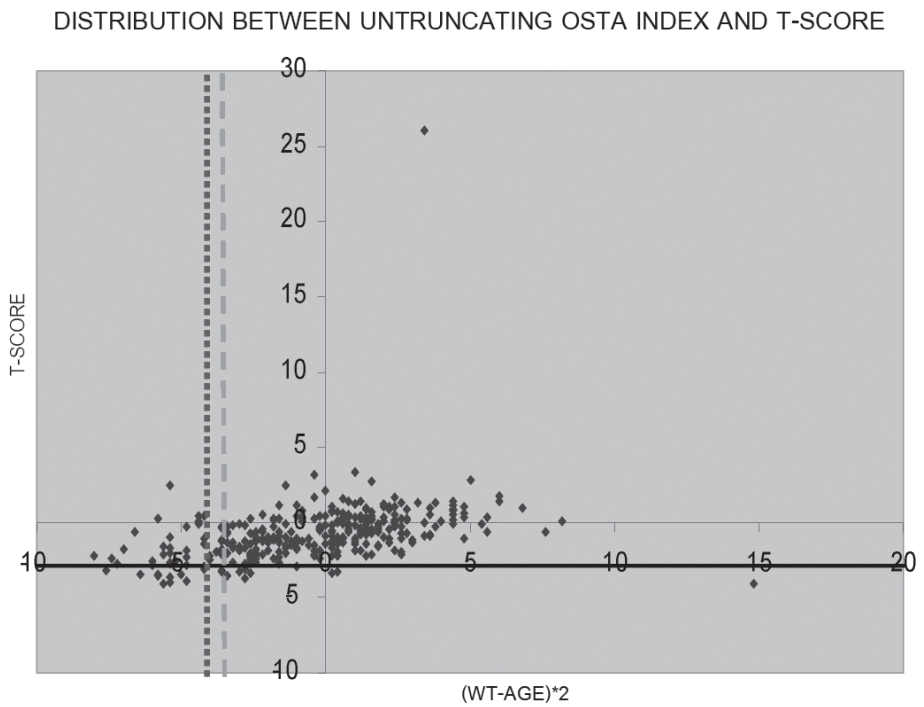

Fig. 1 Distribution between T-score (x) and untruncting OSTA index (y)

curve for comparing original OSTA and modified OSTA indexes

Results

Total 696 menopausal women were enrolled in the present study, age range was 41-89 and mean age was 67.89 with mean of weight being 49.72 kilogram (Fig.2) The prevalence of osteoporosis by T-score (less than or equal to -2.5) was 21.3%. Distribution of age is shown in figure 2. The authors used the modified OSTA index which was calculated as the original but no truncating to identify sensitivity and from ROC curve showed the value of -3.5 as the cut of point. The results were compared to the original OSTA index with other cut off points (<-4) (Table 2).

The sensitivity and specificity for MODIFIED OSTA index cutoff of -3.5 were 79.1% and 58.7%, respectively, and the AUC was 0.729 and when compared to the original index were 73.1% and 62.7%, respectively, and the AUC was 0.705 (Table 3)

Discussion

Application of OSTA index was considered as a simple self assessment tool for finding the risk of osteoporosis and the encourage appropriate use of bone mineral density (BMD) measurement. The most

Table 1. Prevalence of osteoporosis corresponding to age

Age	>50	>55	>60	>65	>70	>75	>80
Prevalence	0.213162	0.252971	0.27256	0.289683	0.317073	0.379518	0.479167

Table 2. Sensitivity and specificity in different value of cut off point of modified OSTA index

Cut off point	-0.5	-1.5	-2.5	-3.5	-4.5	-5.5
Sensitivity	0.986577	0.966443	0.926174	0.791946	0.630872	0.422819
Specificity	0.26	0.330909	0.438182	0.587273	0.674545	0.774545
PPV	0.265343	0.28125	0.308725	0.342029	0.344322	0.336898
NPV	0.986207	0.973262	0.956349	0.912429	0.870892	0.832031

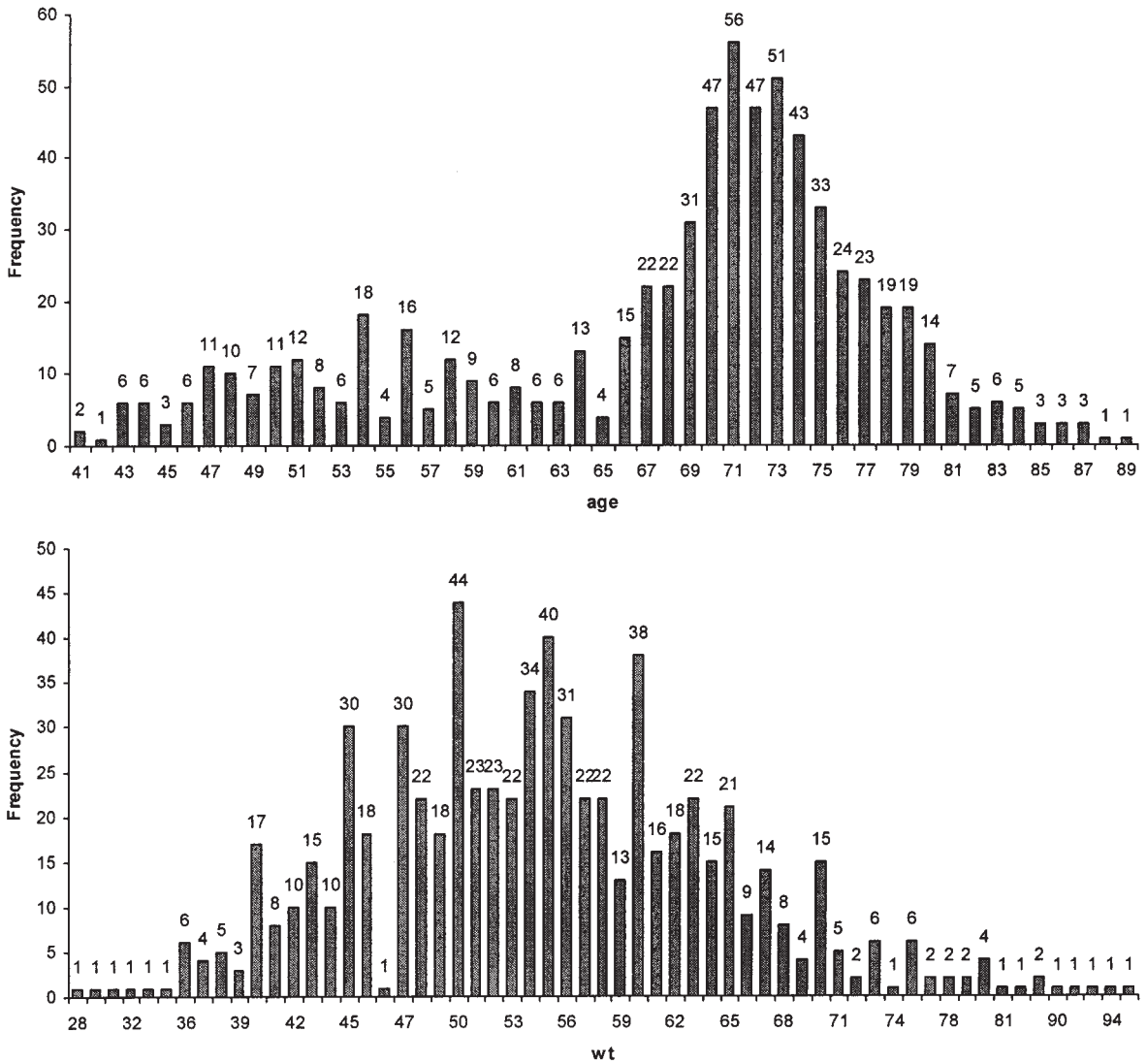

Fig. 2 Distributions of age and weight in this population

Table 3. Comparison of original OSTA index at cut off point (<-4) and modified OSTA index with cut off point (<-3.5)

Cut off point	-4	-3.5
Sensitivity	0.731544	0.791946
Specificity	0.627273	0.587273
PPV	0.347134	0.342029
NPV	0.896104	0.912429

important factor is the cut off point value which can change the sensitivity and specificity. Normally the higher the sensitivity the lower the specificity and the result of low specificity will get more false positive diagnosis which needs further investigation for confirmation.

The original OSTA index used the cut off point <-1 but some applications suggested zero value[5] or <-4 [6] The present study used the cut off point <-3.5 from calculation of modified OSTA index that showed 79 % sensitivity and 58.7 % specificity compared to the cut off point, <-4 in which the sensitivity was 73.1 % with 62.7 % of specificity (Table 3).

The authors proposed the modified OSTA index at the cut off point, <-3.5 which is moderate sensitivity, suitable and low cost in diagnosis which does not need more expense of further confirmed investigation.

References

1. Koh LKH, Sedrine WB, Torralba TP. A simple tool to identify Asian women at increased risk of osteoporosis. Osteoporos Int 2001; 12: 699-705.
2. Nelson B. Watts fundamentals and pitfalls of bone densitometry using dual-energy X-ray absorptiometry (DXA). Osteoporos Int 2004; 15: 847-54.
3. Bates DW, Black DM, Cummings SR. Clinical use of bone densitometry: clinical applications. JAMA 2002; 288: 1898-900.
4. Dawson B, Trapp RG. Basic& clinical biostatics. 4th ed. New York : McGraw Hill Companiess, 2004.
5. Greater S, Leelawattana R, Greater A. Validation of the OSTA index for discriminating between high and low probability of femoral neck and lumbar spine osteoporosis among Thai postmenopausal women. J Med Assoc Thai 2004; 87: 1286-92.
6. Park HM,Sedrine WB,Reginster JY,Ross PD. Korean experience with the OSTA risk index for osteoporosis: a validation study.J Clin Densitom 2003; 6: 247-50.

การดัดแปลงค่า OSTA index เพื่อใช้ในการตัดสินใจส่งสตรีวัยหมดประจำเดือนไปตรวจวัดมวลกระดูก

ทรงเกียรติ เล็กตระกูล , ศุภศิลป์ สุนทราภา

ผู้วิจัย ได้ทำการศึกษาย้อนหลัง ในผู้ป่วยสตรีวัยหมดประจำเดือน จำนวน 696 คน ที่มารับการวัดความหนาแน่นกระดูก ด้วยเครื่อง DEXA (Dual-energy X-ray absorptionmetry) ที่ รพ.สรรพสิทธิประสงค์อุบลราชธานีและรพ.ศรีนครินทร์ คณะแพทย์ศาสตร์ มหาวิทยาลัยขอนแก่น ได้รวบรวมข้อมูลเกี่ยวกับ T-score อายุและน้ำหนักของผู้ป่วย โดยนำค่าที่ได้ไปวิเคราะห์ ดัดแปลง OSTA index แบบดั้งเดิม

ขั้นตอนต่อมา ผู้วิจัยได้คำนวณค่า OSTA index แบบ ดั้งเดิม แล้วหาค่า sensitivity และ specificity ของจุดตัดที่จะบอกว่ามีความเสี่ยงสูงต่อการเป็นโรคกระดูกพรุน คือน้อยกว่าหรือเท่ากับ -4 (ตามคำแนะนำของแนวทางปฏิบัติ ของมูลนิธิโรคกระดูกพรุนแห่งประเทศไทย) แล้วนำข้อมูลที่ได้ มาเปรียบเทียบกับ สูตร modified OSTA index ซึ่งคำนวณโดยใช้สูตรแบบดั้งเดิม แต่ไม่ตัดเศษส่วนโดยมีจุดตัด ที่คำนวณแล้วอยู่ที่ค่า น้อยกว่าหรือเท่ากับ -3.5 โดยผลที่ได้มีค่า sensitivity ที่ 79% และ specificity ที่58.7% เมื่อเทียบกับ sensitivity ที่ 73%และ specificity ที่ 62% ที่ได้จาก OSTA index แบบเดิม ผู้วิจัยแนะนำให้ใช้. modified OSTA index เพื่อเป็น screening test ในการค้นหาส่งต่อผู้ป่วยเพื่อวัดมวลกระดูก เพื่อเป็นการประหยัดค่าใช้จ่ายของประเทศในการดูแลผู้ป่วยโรคกระดูกพรุน