Quantitative Ultrasound Capably Predicts Osteoporosis

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This study aimed to investigate whether the quantitative ultrasound t-score (QUS t-SCORE) at calcaneus could identify osteoporosis in the postmenopausal female patients as best as the osteoporosis diagnosis by the dual energy x-Ray absorptiometry (DEXA). The correlation between QUS t-score and DEXA hip t-score was conducted. The sensitivity, specificity and correlation of QUS between right calcaneus, left calcaneus and DEXA hip were 0.94, 0.67, 0.65, 0.88, 0.75 and 0.54 respectively. The finding confirmed that the quantitative ultrasound t-score (QUS t- SCORE) at calcaneus could detect osteoporosis.

Keywords: *Quantitative ultrasound, T-score*

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Osteoporosis is a serious public health problem. The postmenopausal bone loss and the microstructural deterioration possibly lead to a decrease in bone strength and an increase in the bone fragility. These states result in low-energy fractures[1]. At present, the measurement of the bone mass density by dual energy X-ray absorptionmetry (DEXA) is recognized as the gold standard[2] for diagnosing osteoporosis especially in the menopausal women. Additionally, the result of osteoporosis diagnosis can be used for prevention. However, the DEXA service is not generally available in hospitals according to the high cost of establishing this almost 2-million-baht equipment[2]. Patients, consequently, cannot be regularly performed by this bone mass measurement.

Recently, the studies of the quantitative ultrasound (QUS) have offered an alternative method for the non-invasive assessment of skeletal status. This QUS technique is less expensive and more time-saving than the others and also free from radiation[3,4].

The aim of this study was to investigate whether the quantitative ultrasound t-score (QUS t-SCORE) at calcaneus could also identify the patients' osteoporosis after being diagnosed by the dual energy x-Ray absorptiometry (DEXA).The correlation between QUS t-score and DEXA hip t-score was conducted.

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Material and Method

Seventy-four postmenopausal women between 50 to 89 years old were included in this study. All participants were firstly performed by the DEXA measurement named Lexxos at hip, and later by the QUS measurement named Lunar Express Achilles at right and left calcaneus on the same day.

The total of Hip BMD t-score and both right and left QUS t-score were collected and calculated for the comparison of sensitivity, specificity and Pearson correlation.

Results

The total of 74 postmenopausal women was enrolled, the age range was 50-89 and the mean age was 65.12. The sensitivity, specificity and correlation of QUS at right calcaneus and left calcaneus were 0.94, 0.67, 0.65, 0.88, 0.75and 0.54 respectively (Table 1, 2) (Fig. 1, 2).

Discussion

According to the outcome of the QUS t-score at calcaneus, this tool could definitely find the risks of osteoporosis. It was one of the most suitable osteoporosis diagnosis equipment as it was simple and cheap. Its sensitivity and specificity in diagnosis osteoporosis were high. Additionally, when compared with the study of OSTA INDEX[5] of which the sensitivity and specificity were 79% and 58.7%, the QUS measurement was more capable of diagnosing

Table 1. The comparison of sensitivity and specificity between Hip t-score and QUS t-score

	Sensitivity	Specificity
Right calcaneus	0.94	0.67
Left calcaneus	0.88	0.75

Table 2. The Pearson correlation between Hip t-score and QUS t-score

	Peason correlation
Right calcaneus	0.65
Left calcaneus	0.54

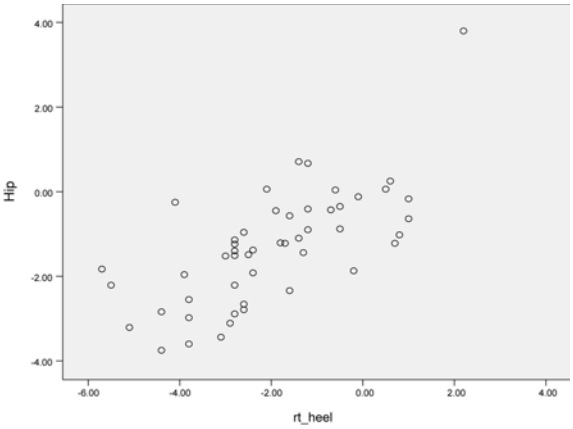

Fig. 1 The DEXA t-score at hip and QUS t -score at right calcaneus (r = 0.65)

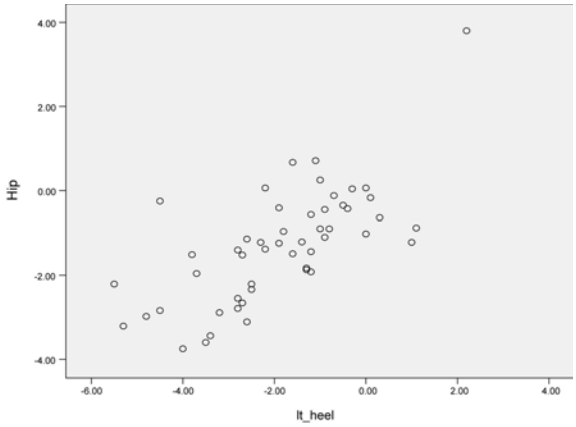

Fig. 2 The DEXA t-score at hip and QUS t-score at left calcaneus (r = 0.54)

osteoporosis. However, the correlation between the QUS t-score and DEXA t-score was moderate.

In conclusion, the osteoporosis can be perfectly diagnosed by the QUS t-score measurement. This equipment is strongly suggested to be widely installed in hospitals according to its high capacity and less expensive cost in comparison with the DEXA expense.

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เครื่องวัดมวลกระดูกที่ส้นเท้าแบบ ultrasound สามารถทดแทน การวัดมวลกระดูกแบบ DEXA ที่ข้อสะโพกในหญิงวัยหมดประจำเดือน

ทรงเกียรติ เล็กตระกูล

ผู้นิพนธ์ได้ทำการศึกษาเปรียบเทียบผลของค่าt-score ในหญิงวัยหมดประจำเดือนที่มาตรวจ รักษาในโรงพยาบาลสรรพสิทธิประสงค์ จังหวัดอุบลราชธานี โดยการวัด BMD ด้วยเครื่อง DEXA (Dual-energy X-ray absorptionmetry) กับการวัดด้วยเครื่อง quantitative ultrasound แบบ express lunar archelles ที่กระดูกส้นเท้าทั้งข้างซ้ายและขวา โดยถือค่าที่ข้อสะโพกเป็น gold standard ตามข้อกำหนดขององค์การอนามัยโลก ผลการศึกษาพบว่าค่า t-score ที่กระดูกส้นเท้าขวาและซ้ายมีค่า sensitivity , specificity เท่ากับ 0.94, 0.67 และ 0.88, 0.75 ตามลำดับ ซึ่งถือว่า มีความไวสูงในการระบุว่า ผู้ป่วยมีโอกาสเป็นโรคกระดูกพรุน ส่วนค่า correlation นั้นเท่ากับ 0.65 และ 0.54 ตามลำดับ ซึ่งแสดงว่าความสัมพันธ์ของค่า t-score ของข้อสะโพกโดยวิธี DEXA และ QUS ของกระดูกส้นเท้ามีในระดับปานกลาง