Reviewer's report

Title: Association of calcaneal quantitative ultrasound parameters with metabolic syndrome in middle-aged and elderly Chinese: A large population-based cross-sectional study

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Reviewer: In Joo IJ Kim

Reviewer's report:

The author must respond to these before a decision on publication can be reached. For example, additional necessary experiments or controls, statistical mistakes, errors in interpretation.

The authors investigated the association of calcaneal quantitative ultrasound parameters with metabolic syndrome in middle-aged and elderly Chinese: A large population-based cross-sectional study.

This study was from large community based database. Even though it was cross sectional study, the large number of subjects could give us much information.

It's originally is proper for the publication. But, it is a little bit lack of logicality. There are repetitions for some paragraphs. There are some grammatical errors.

1. Why the authors did not include the information about T or Z core, and estimated BMD (g/cm²)? Wasn’t it significant? The information needs to be added to the Table 2

2. p3.
In China, a nationwide epidemiological survey from 1997 to 1999 showed that based on bone mineral density (BMD) of vertebra and femur neck measured by dual energy X-ray absorptiometry (DXA), the prevalence of osteoporosis in Chinese over 40 years old was 19.9% for women and 11.5% for men, respectively[6].

# The sentence is awkward. China is repeated in one sentence. This need to be corrected.
Ex A nationwide epidemiological survey from 1997 to 1999 showed that the prevalence of osteoporosis in Chinese over 40 years old was 19.9% for women and 11.5% for men, based on bone mineral density (BMD) of vertebra and femur neck measured by dual energy X-ray absorptiometry (DXA) [6]

3. p7. 3.3 Fragile fractures
# Why don’t you estimate the factors that can predict fragile fracture such as QUS parameters in vertebral or non-vertebral fracture, respectively? In your reference, Cargo study, the risk factors for vertebral or non-vertebral fracture were different. And is there any reason that you didn’t separate the risk factors
for premenopausal women and postmenopausal women? Wasn’t there any difference?

4. p7. 3.4. 25(OH)D levels

In postmenopausal women, we randomly chose 1739 subjects to have their serum 25(OH)D measured. We found that postmenopausal women with MS had lower 25(OH)D levels than those without (42.31 ± 14.07nmol/L vs 44.95 ± 14.63nmol/L, P<0.001), and the difference remained after age and BMI adjustment. In women with vitamin D deficiency [25(OH)D<50nmol/L], the prevalence of MS was 54%, which was significantly higher than those without vitamin D deficiency (47.8%).

# To assess the value of the 25(OH)D, it is need to inform the season of the sampling period. The variation must be large enough to diminish the significance between two groups. The difference is only 16.8ng/dL vs.17.9ng/dL. Is it really meaningful the 1ng/dL differences to judge the vitamin D deficiency?

5. p7-8

Since on one hand QUS is a more convenient and somehow different way for evaluating bone characteristics compared with DXA, on the other hand, MS represents a major health problem nowadays, more information provided by our study will help to understand the pathogenesis of metabolic bone disease further.

# The sentence is awkward

ex) We chose one hand QUS as an evaluation of bone characteristics, because it is more convenient compared with DXA....

6. p8

MS is a cluster of disorders including abdominal obesity, impaired glucose tolerance, hypertension and dyslipidemia, since each component has certain complicated impact on bone metabolism, taking together, the influence of MS on QUS becomes complicated.

# This is already described at introduction. You do not need to repeat the same content.

7. p 8

In our study, the relationship between MS and QUS differs between genders and between menopause statues. We did not found any relationship between MS and QUS in men and premenopausal women, which coincides with the Camargo cohort study[13] and the Taiwan study[14] about QUS, and also in agreement with previous studies with DXA[17].

# In Camargo and Taiwan study, the subjects were postmenopausal women and men. In those studies, there were no relationship between metabolic syndrome and bone metabolism. In this study, there were some relationship between metabolic syndrome and bone metabolism in postmenopausal women. The reason why there were some differences exist needs to be discussed
8. p10 error?
Fragile fractures are the severe consequence of osteoporosis, leading to the increase of disability and mortality
# severe??

9. p11
Thus, the QUS parameters might be different.
# Different from what? QUS parameters and fracture had no relationship? Or the differences between the time that fracture occurred and the time when QUS are measured? What is your point?

10. Tables 1,2,3
There are no explanations about the abbreviations.

p.11
According to Hamann et al[26], BMD is increased in T2DM, in theory, this should be associated with a decreased risk of fractures, but the opposite is seen. So the prediction of osteoporosis and fractures by QUS or DXA could be controversial. This might be the reason for our finding.
# Why the authors mentioned about the T2DM? This study and the others references about the metabolic syndrome and QUS parameters, or prevalent fractures. This study did not include any data or subgroup analysis about T2DM. This paragraph obscured the main results.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**
I declare that I have no competing interests