Reviewer's report

Title: Quantitative ultrasound is a useful tool to survey osteoporosis in a community without dual-energy x-ray absorptiometry

Version: 3 Date: 6 September 2005

Reviewer: Masayuki Iki

Reviewer's report:

General
In order to know whether QUS can be used or not to screen people with low bone mass as a substitute for DXA, the authors measured BUA for 6493 men and women aged 40 and older living in Kinmen Island, Taiwan, and showed age and gender related differences in BUA and in the prevalence rate of low BUA according to the WHO criteria using a reference young adult value of BUA which the authors obtained from another Kinmen population comprising 96 male and 70 female. The authors concluded that the QUS could be used. However, the study has serious problems in the study design to achieve the objectives and the structure of the manuscript.

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Major Compulsory Revisions

1. The objectives the authors set cannot be achieved by the study design they took. The objectives of the study can be recognized to clarify whether QUS can substitute DXA or not from the introduction section. To achieve the objectives, the author may test the validity of QUS in the diagnosis of osteoporosis using DXA as the gold standard, or compare the predictive value of the QUS for subsequent fracture with that of DXA. However, the authors showed just descriptive data of BUA for Kinmen inhabitants. Even if BUA declines and the prevalence of low BUA population increases with the increase in age, such results do not always ensure that the QUS can be used as a substitute technique for DXA. The authors should change either the study design or the objectives.

2. The same contradiction exists in the discussion and the conclusions. The authors discussed mostly on the age and sex difference in BUA in the discussion section and stated the usefulness of the QUS in the conclusion. This conclusion is demonstrated neither in the results nor in the discussion. The authors should reconstruct the structure of the manuscript itself.

3. If the authors use the present study design, they should change the objectives and clearly state what a new finding is in the study. The authors showed that BUA declined and prevalence of low BMD increased with the increase in age. But this finding has already been very well known. They should describe the scientific value for showing this well-known phenomenon in the Kinmen inhabitants. When the authors find a significant difference in BUA values or prevalence rate of low BUA from other populations based on the measurements using the same QUS model and the cause for the deference is speculated, it may make sense.

4. When the prevalence rate of osteoporosis is calculated according to the WHO criteria, the reference value has a crucial effect because the prevalence of osteoporosis would change dramatically if the reference value changes. The reviewer agrees with the authors in terms of the reference value being derived from a healthy young adult population of the same race or ethnicity as the target population. However, the authors did not give sufficient information for the reference population. Did they choose the reference randomly from the Kinmen inhabitants or on a volunteer basis? What were the inclusion and exclusion criteria? Can they represent the young adult
population in Kinmen? Why was the age of the reference restricted to 20-29 years instead of a usual age range 20-44? The reference value of young adults should be set for each gender. What conditions did the authors set to calculate the sample size required for the reference population? About 5% error from the mean BUA value is expected with 95% probability based on 100 subjects and the mean and SD values in this study. The real value may exist in the range from 85 to 95. Is this range acceptable for the authors to calculate the prevalence rate of low BUA subjects? The authors should address these points adequately.

Minor Essential Revisions
5. P1 L2 Title should not include an abbreviation like “DEXA”.
6. P2 L2 “DEXA” should be changed to “DXA”.
7. P7 L13 “Accuracy” analysis should be “reliability” analysis because the results showed mainly precision of the QUS measurements.
8. P7 L15 The reviewer does not get the meaning of “Otherwise”.
9. P8 L3 “Another 80 volunteers” should be “another group of 80 volunteers”.
10. P9 The method of the selection of independent variables in the multiple regression analysis should be stated in the statistics section.
11. P10 L5 The exclusion criteria for the subjects should be stated in the subjects section with the inclusion criteria.
12. P11 L6 The authors used a linear regression model including age here although they used a quadratic model for age in Figure 2. Dissolve the contradiction.
13. P11 L13 The reviewer did not understand the meaning of “the change in proportion of cutoff values” which should be corrected.
14. P12 L5 The OR for osteoporosis in 10-year increment of age can not be the same for younger (50-59) and older (80-) populations. The authors should change the model.
15. P16 L9 Cite a reference for this sentence.
16. P19 L3 Validity of QUS for predicting subsequent fracture risk has been reported only for wet-type QUS machine and not for dry-type. Even so, it is worthwhile for the authors to discuss this validity as an advantage for using QUS in the discussion section but not in the conclusion.
17. P19 L6 Delete the abbreviation “CEA” which was not used thereafter. Cost-effectiveness analysis should be discussed in the discussion section.
18. P20 “Limitation” should precede the conclusion.
19. P20 L9 The reviewer did not get the meaning from “instead of the correlation between the above two” which should be reworded.
20. Table 1 The columns for total number of the population and t-test for sex differences in weight and BMI are not necessary.
21. Table 2 The columns for t-test for sex difference in BUA and the mean and SD for combined male and female subjects are not necessary.
22. Table 3 The meaning of the heading “OR of Female/Male” is not clear. However, if the OR indicate that for osteoporosis of female compared with male, it is not important.
23. Table 3 The OR for osteoporosis in 10-year increment of age can not be the same throughout the age range.
24. Figure 2 The data for males and females should be presented separately.
29. P11 L3 “Annual loss” in BUA can not be obtained from a cross-sectional study.
30. P15 L12 The conclusion of this paragraph is not clear.
31. Table 2 “Annual loss/year” cannot be calculated in a cross-sectional study.
32. Figure 2 The regression line for male is really quadratic? It looks linear.

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of limited interest

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

Statistical review: No

Declaration of competing interests:

I declare that I have no competing interests.