

COMPARISON OF ARTIFICIAL NEURAL NETWORK AND OSTEOPOROSIS SELF-ASSESSMENT TOOLS FOR ASIANS IN PREDICTING OSTEOPOROSIS FOR POSTMENOPAUSAL WOMEN

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Purpose: Osteoporosis is not only a healthy problem but also an economical index in the world. Identifying postmenopausal women with osteoporosis is a difficult task. For this goal, we developed and validated artificial neural network (ANN) with Osteoporosis Self-Assessment Tools for Asians (OSTA) to screen the osteoporosis in postmenopausal women.

Methods: The study population consisted of 942 postmenopausal women (age 62.67 ± 9.97 years) randomly selected into 2 sets, 707 subjects in the training set and the remaining 235 subjects in the validation set. The predictors included age, body weight, body height, body mass index, smoking, alcohol, coffee, and steroid consumptions. The outcome variable was dichotomous, either non-osteoporotic (T-score of greater than -2.5) or osteoporotic (T-score of -2.5 or less) groups classified by the measurement from dual-energy X-ray absorptiometry. The ANN was constructed with data from the training set and tested in the validation set whose outcome variable was unknown to the network. The performance of the ANN was also compared to the OSTA.

Results: The best simultaneous sensitivity and specificity for stratifying women into osteoporotic group were 83.0% (95% confidence interval [CI], 70.2%-91.9%) and 70.9% (95% CI, 64.3%-77.9%) using the ANN and 88.7% (95% CI, 77.0%-95.7%) and 47.8% (95% CI, 40.4%-55.3%) using the OSTA. The area under receiver-operating characteristics (AUROC) curves of the ANN and the OSTA were 0.837 (95% CI, 0.783-0.882) and 0.682 (95% CI, 0.619-0.741), respectively. Pairwise comparison of AUROC curves showed that the difference between areas of the ANN and the OSTA was 0.155 (standard error 0.037; 95% CI, 0.082-0.227; $p < 0.001$). Assessments suggest that the ANN significantly outperformed the OSTA.

Conclusions: The ANN is better than the OSTA at identifying osteoporosis in postmenopausal women. The acceptability of the ANN in clinical practice be worthy of further investigation given their potential effect on the use as potentially screening tool.