Evaluating the Ability of Sri Lankan FRAX Algorithm to Predict Fracture Risk Without Femoral Neck Bone Mineral Density

H.W.A.S. Subasinghe[a], S. Lekamwasam[b], P. Ball[c], H. Morrissey[c] and E.I. Waidyaratne[d]

[a]Department of Pharmacy, Faculty of Allied Health Sciences, University of Ruhuna, Sri Lanka
[b]Department of Medicine, Faculty of Medicine, University of Ruhuna, Sri Lanka
[c] School of Pharmacy, University of Wolverhampton, United Kingdom, Sri Lanka
[d] Department of Anatomy, Faculty of Medicine, University of Ruhuna, Sri Lanka

Corresponding author: sewwandisubasinghe@gmail.com

The application of Fracture Risk Assessment Tool (FRAX) to predict ten-year probability of fragility fractures is restricted in Sri Lanka due to limited availability of Dual Energy X-ray Absorptiometry (DXA) scanners to assess femoral neck bone mineral Density (BMD). The objective of this study is to evaluate the ability of Sri Lankan FRAX algorithm to predict fracture risk of postmenopausal women without using femoral neck BMD data. Postmenopausal women (n=339) were detailed about the research and their written consent was obtained before enrolling into the study. Individual interviews were performed using a content validated datasheet to gather data on clinical risk factors associated with fractures. DXA scans were performed adhering to manufacturer's protocol. Ten-year risks of major osteoporotic fracture (MOFR) and hip fracture (HFR) were calculated including BMD (FRAX-A) and without including BMD (FRAX-FN_0). They were compared to assess the predictability. $P<0.05$ was considered statistically significant. Mean (SD) age and body weight were 63.8 (9.3) years and 51.7 (0.4) kg respectively. Approximately 36% of the study sample were at high risk of fragility fractures according to FRAX-A. Mean difference (SD) between MOFR-A and MOFR-FN0 was 0.11(5.63) while it was 0.37 (4.98) between HFR-A and HFR-FN0. FRAX-FN0 had 79.2% sensitivity, 80.1% specificity, 68.8% positive predictive value (PPV) and 87.4% negative predictive value (NPV). Area under the ROC curve of MOFR-FN0 was 88% (95% CI 0. 85 to 0.92, $p<0.001$) and HFR-FN0 was 89% (95% CI 0.85 to 0.92, $p<0.001$). Both MOFR-FN0 ($R2 = 0.58$, SEE= 3.96, $p<0.001$) and HFR-FN0 ($R2 = 0.38$, SEE= 2.76, $p<0.001$) have high ability to predict MOFR-A and HFR-A respectively. Sri Lankan FRAX algorithm can be used without femoral neck BMD to predict ten-year probability of hip or major osteoporotic fracture in postmenopausal women. It is an acceptable alternative to use in areas with limited DXA facility.

Keywords: Bone mineral density, Fracture risk, FRAX algorithm, Postmenopausal women