INPLASY

Application value of FRAX in high altitude areas of China — an meta analysis

INPLASY202510040

doi: 10.37766/inplasy2025.1.0040

Received: 12 January 2025

Published: 12 January 2025

Corresponding author:
Yong Guo

cervical@sina.com

Author Affiliation:
Beijing Daxing District People's Hospital, Daxing Teaching Hospital, Capital Medical University.

Guo, Y; Zhang, Y; Jiao, TT; Zhang, ZH.

ADMINISTRATIVE INFORMATION

Support - International project "IOF for fracture risk assessment of FRAX in population with reduced bone mass" (IOFCJO-D001); Daxing District Preventive Medicine Association Research Project “A cohort study of osteoporotic fracture risk in older adults with community chronic disease co-morbidities”(XHKY202405).

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202510040

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 January 2025 and was last updated on 12 January 2025.

INTRODUCTION

Review question / Objective To investigate the application value of FRAX in fracture risk assessment in high altitude areas of China.

Condition being studied Osteoporosis (OP) is a systemic metabolic disease characterized by decreased bone mass and bone structure destruction, leading to reduced bone strength and increased risk of osteoporotic fractures (OF) . Due to its insidious onset and high mortality and disability rates, how to better predict fracture risk and provide timely intervention has always been a focus of clinical research. The World Health Organization (WHO) introduced the Fracture Risk Assessment Tool (FRAX) in 2008, which helps predict the 10-year risk of hip or other major site osteoporotic fractures. It is simple to use and has good generalizability. It has been validated in untreated patients aged 40 to 90 years from four races in Europe and America, but due to differences in geography and race, the application of FRAX in different regions and populations in China is still under investigation. The plateau areas of China (including the Yunnan-Guizhou Plateau, Qinghai Plateau, Inner Mongolia Plateau, and Loess Plateau) are characterized by low oxygen, low pressure, and cold climate, making osteoporosis more likely to occur. However, the regional economy is relatively backward, and the popularization rate of bone density testing is low, so there is an urgent need for a more convenient and fast OF risk assessment tool to improve early intervention capabilities. There have been reports on the application of FRAX in plateau areas, and this study conducts a meta-analysis of the

application results of FRAX in China's plateau areas to provide data support for its popularization in China's plateau areas.

METHODS

Participant or population There are clear diagnostic criteria for severe osteoporosis or osteoporotic fracture; The study subjects are from plateau areas in China, including Qinghai, Tibet, Yunnan, Guangxi, Guizhou, Sichuan, Inner Mongolia, Shanxi, Ningxia Hui Autonomous Region.

Intervention The literature included in this study is observational. The purpose of the study is to evaluate the diagnostic value of FRAX for severe osteoporosis or fracture.

Comparator We need directly (or indirectly) the true positive value (TP), false negative value (FN), false positive value (FP), and true negative value (TN) of the 10-year probability of major osteoporotic fracture (PMOF) and the 10-year probability of hip fracture (PHF) for Chinese plateau people.

Study designs to be included The research type of this study is cross-sectional study.

Eligibility criteria ① The purpose of the study is to evaluate the diagnostic value of FRAX for severe osteoporosis or fracture; ② There are clear diagnostic criteria for severe osteoporosis or osteoporotic fracture; ③ The study subjects are from plateau areas in China, including Qinghai, Tibet, Yunnan, Guangxi, Guizhou, Sichuan, Inner Mongolia, Shanxi, Ningxia Hui Autonomous Region; ④ The true positive value (TP), false negative value (FN), false positive value (FP), and true negative value (TN) of the 10-year probability of major osteoporotic fracture (PMOF) and the 10-year probability of hip fracture (PHF) can be directly (or indirectly) obtained.

Information sources The databases include the PubMed database, Cochrane Library, Wanfang Data, and China Academic Journal Full-text Database (CNKI).

Main outcome(s) The true positive value (TP), false negative value (FN), false positive value (FP), and true negative value (TN) of the 10-year probability of major osteoporotic fracture (PMOF) and the 10-year probability of hip fracture (PHF).

Quality assessment / Risk of bias analysis The quality evaluation is conducted using the diagnostic accuracy study quality evaluation method 2 (quality assessment of diagnostic accuracy studies-2, QUADAS-2) list provided by RevMan5.3 statistical software.

Strategy of data synthesis Stata15.0 and Rstudio 4.0.3 software will be used to process the original data extracted from the included literature. The presence of threshold effects is judged by calculating the Spearman correlation coefficient, and the heterogeneity caused by non-threshold effects is evaluated by Q test and I2 test. If $P>0.1$ and $I2<50\%$, a fixed effect model is used. If $I2\geq50\%$ or $P<0.1$, heterogeneity is considered to exist, and a random effect model is adopted, and further meta-regression analysis is conducted to explore the sources of heterogeneity. Stata15.0 and Rstudio 4.0.3 software are used to calculate the sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), and diagnostic odds ratio (DOR), draw the summary receiver operating characteristic curve (SROC), calculate the area under the curve (AUC), and draw the Fagan plot.

Subgroup analysis 'in PMOF without BMD' or 'not using fracture as the gold standard' or 'gender'.

Sensitivity analysis Using Stata15.0 software, the stability of the results is tested by sequentially excluding literature.

Country(ies) involved China/Beijing Daxing District People's Hospital, Daxing Teaching Hospital, Capital Medical University.

Keywords FRAX; high altitude; osteoporosis; fracture risk; meta-analysis.

Contributions of each author
Author 1 - Yong Guo.
Author 2 - Ying Zhang.
Author 3 - Tingting Jiao.
Author 4 - Zhihai Zhang.