

Simple Early Detection Method for Elderly People with Musculoskeletal Aging-Related Diseases Based on Artificial Intelligence Model

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Abstract

Backgrounds: Late-diagnosis is one of the main bottlenecks of prevention and treatment of musculoskeletal aging-related disease. A simple early detection model for musculoskeletal aging-related disease, particularly osteosarcopenia, is needed.

Methods: A total of 125 multi-dimensional features from 853 elderly subjects were included in this study. Feature selection was performed using logistic regression, LASSO regression, and XGBoost. Models were then built based on XGBoost algorithm to meet different detection demands. **Results:** A total of 22 features (13 general features and 9 grouping features) were finally selected to build early detections models using the XGBoost algorithm. Model_11 to Model_20 were built based on binary-classification (normal and abnormal), of which the accuracy rate (63.74% to 92.40% in testing dataset) and AUC (0.74 to 0.96 in testing dataset) was higher than the accuracy rate (61.40% to 85.96% in testing dataset) and AUC (0.63 to 0.86 in testing dataset) of model_1 to model_10 that were built based on multiple-classification (normal, 1 abnormal and 2 abnormal). Further, Model_19 (13 general features, grip grouping, SCAR-F grouping, calf girth grouping and bone density examination) performed second only to Model_11(all features) with an accuracy rate of 87.13% and an AUC of 0.92 in the testing dataset. Moreover, life satisfaction, falls in the past year, BMI, time spent indoors, and drink milk were identified as important features in Model_19. **Conclusions:** In elderly, the high-risk population of musculoskeletal aging related diseases can be early detected by model of epidemiological factors, then to diagnosis and treat. Besides, risk factors indicated in this study such as indoor air improvement and no drinking provide clues for prevention of musculoskeletal aging related diseases.

Keywords

Osteoporosis, Sarcopenia, Osteosarcopenia, Risk Factor, Machine Learning, Early Detection