Neural Network Model For Predicting Cognitive Impairment in the Elderlyin Korea: Distal Literacy and Lifestyle

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노년층의 인지장애 예측을 위한 신경망 모델: 디지털 리터러시와 생활방식

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Abstract

Prediction of cognitive impairment was carried out using a neural network machine learning algorithm. The neural network model was used to identify factors influencing cognitive impairment. Data from the 2020 5th Survey on the Status of the Elderly, which focuses on individuals aged 65 and older, were analyzed. The results of the neural network analysis reveal the construction of a neural network model based on significant variables such as digital literacy, exercise time, the number of chronic diseases, frequency of alcohol consumption, and depression. The neural network (NN) model demonstrated a high predictive accuracy of 79.3%. This study presents a neural network model for predicting cognitive impairment in the elderly. The model was successfully validated through rigorous testing and highlights the importance of developing programs that promote continuous education and social activities. This is particularly important for individuals with low digital literacy to promote a healthy and active lifestyle for older adults.

1. Introduction

Previous research has indicated an association between digital literacy, lifestyle factors, and cognitive impairment in older adults [1]. Therefore, our aim was to predict cognitive impairment based on digital literacy and lifestyle factors [2]. The study's findings are expected to provide valuable information for developing strategies to prevent cognitive impairment in the elderly.

2. Methods

Prediction of cognitive impairment was conducted using a neural network machine learning algorithm.

In this study, national open data from the 5th Sur vey on the Status of the Elderly, conducted in 2020

, for individuals aged 65 and older (N = 9,920) were utilized. The variables included digital literacy, lifestyle habits, and chronic diseases.

3. Methods

The artificial neural network model predicts cognitive impairment with 73.3% accuracy and a cross-entropy error of 39.120. The results of the neural network reveal the development of an artificial neural network model based on significant variables such as digital literacy, exercise time, number of chronic diseases, frequency of alcohol consumption, and depression (Fig. 1). The area under the ROC curve was 0.793 (Fig. 2).

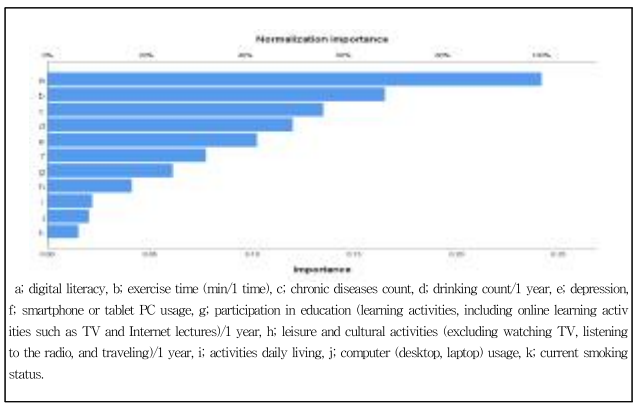
4. Discussion

This study aims to predict cognitive

impairment in the elderly. To evaluate the likelihood of cognitive impairment occurrence, a prediction model based on neural networks (NN) was developed. The model's performance was validated by verifying the prediction accuracy through reliable experimental results and analysis.

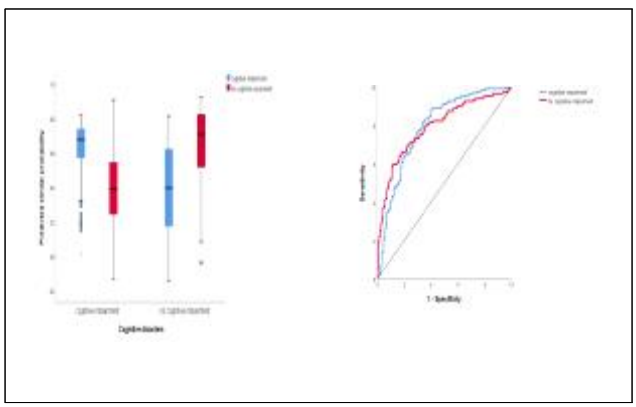
5. Conclusions

To prevent cognitive decline in the elderly, it is important to develop and evaluate programs that promote continuous education and social activities, especially for those who have low digital literacy. These efforts will provide a basis for promoting a healthy and active lifestyle in older adults.



a: digital literacy, b: exercise time (min/1 time), c: chronic diseases count, d: drinking count/1 year, e: depression, f: smartphone or tablet PC usage, g: participation in education (learning activities, including online learning activities such as TV and Internet lectures)/1 year, h: leisure and cultural activities (excluding watching TV, listening to the radio, and traveling)/1 year, i: activities daily living, j: computer (desktop, laptop) usage, k: current smoking status.

[Fig. 1] Importance of significant variables as a result of Neural Network



[Fig. 2] Predicted value chart by observation / ROC curve

References

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[2] H. Y. Park and J. Y. Ha, “Prediction models of mild cognitive impairment using the Korea Longitudinal Study of Ageing,” J. Korean Acad. Nurs., vol. 50, pp. 191-199, Apr. 2020.