

Vitamin D and ferritin correlation with chronic neck pain using standard statistics and a novel artificial neural network prediction model.

Aim: Despite the high prevalence of chronic neck pain, there is limited consensus about the primary etiology, risk factors, diagnostic criteria and therapeutic outcome. Here, we aimed to determine if Ferritin and Vitamin D are modifiable risk factors with chronic neck pain using standard statistics and artificial intelligence neural network (ANN). **Methods:** Fifty-four patients with chronic neck pain treated between February 2016 and August 2016 in King Abdullah University Hospital and 54 patients age matched controls undergoing outpatient or minor procedures were enrolled. Patients and control demographic parameters, height, weight and single measurement of serum vitamin D, Vitamin B12, ferritin, calcium, phosphorus, zinc were obtained. An ANN prediction model was developed. **Results:** The statistical analysis reveals that patients with chronic neck pain have significantly lower serum Vitamin D and Ferritin (p -value $<.05$). 90% of patients with chronic neck pain were females. Multilayer Feed Forward Neural Network with Back Propagation(MFFNN) prediction model were developed and designed based on vitamin D and ferritin as input variables and CNP as output. The ANN model output results show that, 92 out of 108 samples were correctly classified with 85% classification

accuracy. **Conclusions:** Although Iron and vitamin D deficiency cannot be isolated as the sole risk factors of chronic neck pain, they should be considered as two modifiable risk. The high prevalence of chronic neck pain, hypovitaminosis D and low ferritin amongst women is of concern. Bioinformatics predictions with artificial neural network can be of future benefit in classification and prediction models for chronic neck pain. We hope this initial work will encourage a future larger cohort study addressing vitamin D and iron correction as modifiable factors and the application of artificial intelligence models in clinical practice.