Hand radiograms as an alternative for bone mass screening in cystic fibrosis

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ABSTRACT

Purpose: Cystic fibrosis (CF) is a genetic, metabolic disease. Long-term therapy often leads to inappropriate calcification of bones. Dual X-ray absorptiometry (DXA) is considered a „gold-standard" for bone mineral density (BMD) assessment, but high usage costs can limit its availability. This paper compares two methods for BMD assessment in CF patients: hand radiograms method and densitometry using DXA method.

Materials and methods: The study was performed in a group of 26 CF patients (10F, 16M), aged 7-30 years. In all cases, DXA measurements were performed, along with bone mass assessment using DENSY2004 system for digital assessment of hand radiograms. Stepwise binary logistic regression was used to examine the contribution of bone age, BMI, Cole's index and hand radiograms parameters to low BMD expressed as Z-score $\leq$-1SD.

Results: Statistical analysis of the gathered data revealed that hand radiograms method allow for estimation of Z-score below -1SD with accuracy of 84.62% comparing to DXA. Sensitivity and specificity of this estimation in the studied group of CF patients was 86.67% and 81.82%.

Conclusions: Hand radiograms method has good accuracy, sensitivity and specificity; therefore, it can be an alternative for DXA in BMD assessment. It can be implemented in chronic diseases affecting BMD like cystic fibrosis.

Key words: cystic fibrosis, bone mineral density, osteoporosis, dual X-ray absorptiometry, hand radiograms