

Comment on: Bone mineral density in pediatric celiac disease: Clinical, biochemical, and serologic profiles—a retrospective cohort study

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Introduction

Teke and Basaran published an exciting study in the latest issue of the journal. On utilizing dual-energy X-ray absorptiometry (DEXA) and referral to the Turkish pediatric bone mineral density reference curves (BMDRCs) (2), they found substantial BMD impairments (37.4%) among pediatric patients with celiac disease (CD) (1). The most prominent improvement was noted during follow-up among patients adherent to the gluten-free diet (GFD). Moreover, shorter GFD period and lower body mass index z-scores were noticed among the study CD patients with low BMD, which might help display risk stratification (1). We acknowledge two pertinent points.

First, it is to be noted that densitometry, measured by DEXA, is effective in early identifying individuals at risk for bone frailty, defining the grade of defective bone mass among those with confirmed bone fragility, and guide the necessary therapy. It is necessary to refer to the appropriate BMDRCs, which should enlist an adequately substantial size of healthy individuals of the general population to hold variations in bone measurements while simultaneously accounting for age, gender, and ethnicity. An accurate evaluation of bone health integrity in a given pediatric population relies upon formulation of robust BMDRCs to define if a particular child's BMD is comparable with same-age and gender-peers (3,4). As a result, BMDRCs have been developed for numerous pediatric populations. Updating the established BMDRCs is essential to amend the BMD baseline for the growing population while accounting for demographic and regional differences, prevent under/over-diagnosis of defective bone mineralization, and monitor treatment lines. Indeed, updating the existed BMDRCs for certain population were done and revealed relevant differences in BMD values between the established BMDRCs and updated ones triggering a substantial potential for osteoporosis/osteopenia misdiagnosis (5-7). The validity of the current Turkish pediatric BMDRCs is ruined by several limitations, involving the fact that it was released two decades ago, that it was inspired from a small sample size (n=345), and that participants were recruited

from a single region (Izmir) (2). Thus, it is not representative of the whole pediatric population in Türkiye. We hope that the study by Teke and Basaran would provoke the necessity for updating the available BMDRCs, which in our opinion, tremendously help pediatricians in Türkiye sincerely investigate, monitor, and treat children (1,2).

Second, although DEXA analysis is considered the clinical reference standard for evaluating BMD, it suffers from numerous drawbacks, namely operator dependency, limited sensitivity to early changes in the bone microarchitecture, restricted availability in primary healthcare setups, and an inadequate capability to predict fracture risk, if employed alone. Artificial intelligence (AI), incorporating deep learning and machine learning, provides a transformative potential in improving DEXA-based bone health evaluation (8). The AI algorithms' integration into DEXA image interpretation yields improvements in diagnostic precision and low BMD risk stratification as well as it reduces interpretation times beyond the traditional methods. It allows extraction of complex characteristics of DEXA images and increases the sensitivity to detect early microstructural deterioration, which is typically not identified by the standard DEXA. The combination of comprehensive demographic and clinical data and quantitative image characteristics could improve the early identification of disturbed skeletal BMD and enable personalized therapeutic strategies (8). Interestingly, a chest x-ray-based AI model has been developed and proved effective in accurately predicting pediatric BMD z scores and detecting low BMD (9). In this regard, we suggest future research on implementing AI-based technology within the pediatric clinical workflows in Türkiye and exploring its integration with other diagnostic tools for a comprehensive BMD assessment among those suspected to have compromised skeletal mineralization, including CD patients.

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