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ORIGINAL ARTICLE

Trabecular Bone Score in obese, overweight and normal-weight young men

Le Trabecular Bone Score chez des jeunes hommes obèses, en surpoids et normo-pondérés

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KEYWORDS
Body composition;
Bone microarchitecture;
Peak bone mass

Summary
Objective. — The aim of this study was to compare Trabecular Bone Score (TBS) in obese, overweight, and normal-weight young men.
Methods. — This study included 12 obese, 32 overweight, and 23 normal-weight young Lebanese men. Weight and height were measured, and body mass index (BMI) was calculated. Body composition, bone mineral content (BMC), bone mineral density (BMD), and lumbar spine (L1-L4) TBS were assessed by dual-energy X-ray asborptiometry (DXA). Physical activity, daily calcium intake and Pittsburgh sleep quality index were evaluated using validated questionnaires. Maximal oxygen consumption (VO_2 max in l/min) was measured whilst exercising on a bicycle ergometer using a specialized device.
Results. — Weight, lean mass, fat mass, BMI, whole body (WB) BMC and WB BMD were significantly different among the three groups (obese, overweight and normal-weight). Trabecular Bone

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score (TBS) was not significantly different among the three groups (obese, overweight and normal-weight). In the whole population ($n = 67$), weight, lean mass, BMI and VO_2 max (l/min) were positively correlated to BMC and BMD but not to TBS.
Conclusion. — This study suggests that obesity and overweight do not positively affect trabecular bone score values in young men. Body mass index is not a determinant of trabecular bone score in young men.

MOTS CLÉS
Composition corporelle ;
Microarchitecture osseuse ;
Pic de masse osseuse

Résumé
Objectif. — L'objectif de cette étude est de comparer les valeurs de Trabecular Bone Score (TBS) chez des jeunes hommes obèses, en surpoids et normo-pondérés.
Méthodes. — Au total, 67 jeunes hommes (âgés de 18 à 30 ans) de nationalité libanaises ont participé à cette étude (12 obèses, 32 en surpoids et 23 normo-pondérés). Le poids et la taille ont été mesurés, et l'indice de masse corporelle (IMC) a été calculé. La composition corporelle, le contenu minéral osseux (CMO), la densité minérale osseuse (DMO) et le TBS au niveau du rachis lombaire (L1-L4) ont été mesurés par DXA. Le volume hebdomadaire d'activité physique, la consommation calcique journalière et la qualité de sommeil étaient évalués par des questionnaires validés. La consommation maximale d'oxygène (VO_2 max en L/min) était directement mesurée par un système de mesure spécifique lors d'un effort maximal sur bicyclette ergométrique.
Résultats. — Le poids, la masse maigre, la masse grasse, l'IMC, le CMO du corps entier (CE) et la DMO CE étaient significativement différents entre les trois groupes (obèse, en surpoids et normo-pondéré). Le TBS n'était pas significativement différent entre les trois groupes (obèse, en surpoids et normo-pondéré). Dans la population entière, le poids, la masse maigre, l'IMC et la VO_2 max (L/min) étaient positivement corrélés aux valeurs de CMO et de DMO mais pas aux valeurs de TBS.
Conclusion. — Cette étude suggère que l'obésité et le surpoids n'influencent pas les valeurs de TBS chez les jeunes hommes. L'indice de masse corporelle n'est pas un déterminant du TBS chez les jeunes hommes.

1. Introduction

Although osteoporosis is known to mainly affect postmenopausal women, there is enough evidence to support substantial loss of bone strength with aging in men as well [1—3]. Bone strength is influenced by several factors such as BMD, bone geometry, cortical porosity and bone microarchitecture [4—6]. Bone microarchitecture is one of the factors that directly influence fracture risk [4—6]. The trabecular bone score (TBS) is a texture parameter that evaluates pixel gray level variations in DXA images of the lumbar spine [4—17]. The TBS variations may reflect bone microarchitecture [4—17]. Recent studies have shown that TBS is related to fractures in elderly women [9—12,15—17]. We have previously shown that obesity and overweight are associated with higher BMD values at the hip and the lumbar spine [3,18—21]. However, we have also shown that the correlation between BMD and TBS is relatively low suggesting that BMD and TBS reflect different bone properties and may not have the same predictors [22,23]. Moreover, little is known concerning the influence of morphological characteristics (weight, height, and BMI) on TBS in young adult men. The main aim of this study was to compare trabecular bone score in obese, overweight, and normal-weight young Lebanese men. We have hypothesized that the influence of obesity and overweight on TBS values would be different from that on BMD.

2. Methods

2.1. Subjects and study design

The study participants ($n = 67$) were recruited from 2 private universities located in North Lebanon. All participants were non-smokers and had no history of major orthopedic problems or other disorders known to affect bone metabolism. Other inclusion criteria included no diagnosis of comorbidities and no history of fracture. Participants were divided into three groups (obese [$n = 12$], overweight [$n = 32$], and normal [$n = 23$]) using international cut-offs for body mass index (BMI) [24]. This study was approved by the University of Balamand Ethics Committee.

2.2. Anthropometrical measurements

Weight and height were measured, and body mass index (BMI) was calculated. Body composition was assessed by DXA (GE-Lunar, iDXA). In our laboratory, the in vivo coefficients of variation were < 1% for fat and lean mass [21—23,25].

2.3. VO_2 max assessment

We directly assessed VO_2 max of the participants using a Cosmed Fitmate pro device (version 2.20) while exercising

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