

COMMENTS ABOUT THE POTENTIAL RELATIONSHIP BETWEEN VITAMIN D STATUS AND OBESITY OR BODY FATNESS

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There is a great interest in uncovering preventive roles of the extra-skeletal effects of vitamin D. To date, obesity and vitamin D deficiency have been recognized as major public health issues worldwide (1-3). The role of vitamin D *per se* in the aetio-pathogenesis of obesity is very important to clinical nutrition and public health and several studies described an inverse association between an increase in total body fat and decreased 25(OH) vitamin D levels (4). It has been speculated that this was due to low intake of the vitamin, to the fact that obese people are less prone to the outdoor activity, resulting in a lower sunlight exposure and to the fat-soluble nature of the vitamin, which is sequestered in the expanded adipose tissue mass (4). Other findings reported that low levels of vitamin D could be involved as a possible mechanism in the pathogenesis of obesity (5-7). However, there are no consistent evidences for the casual relationship between the two events.

In the last years, several studies on the association between vitamin D deficiency and anthropometric state were reported (8) and several randomized controlled trials (RCTs) with vitamin D supplementation were also conducted (7). Whether the inverse relationship between vitamin D levels and body fatness appears consistent, on the other hand the cause-effect relationship has not been still elucidated.

To investigate a possible association between vitamin D levels and different measures of body fatness, we analyzed meta-analysis, performed for BMI (Kg/m^2), Fat Mass (FM, Kg) and Free Fat Mass (FFM, Kg) % of FM and % of FFM, that have been recently published.

Pathak *et al.* (4) considered $n=12$ RCTs and highlighted a small effect of vitamin D supplementation on BMI reduction, as well as on FM, not reaching statistical significance. Authors concluded that in absence of caloric restriction, vitamin D supplementation did not reduce obesity condition.

Saneei *et al.* (8) considered $n=34$ cross-sectional studies and described a significant inverse, but weak, correlation between serum 25(OH) vitamin D levels and BMI in a representative adult population. This association was significant both in man and in women, except for women in developing countries.

Finally, Pereira-Santos *et al.* (3) considered $n=23$ observational studies (cohort, case-control and cross-sectional studies), and evaluated the association between obesity and vitamin D deficiency, revealing a positive association between BMI and 25(OH) vitamin D levels.

Overall, we may conclude that even if some evidences suggest an inverse association between vitamin D and body fatness measures, they are still not sufficient to support a causal relationship. In particular, studies considered by meta-analysis previously mentioned appear heterogeneous if looking at sampled population (enrolled subjects presented BMI values which were both altered -by means of obesity and overweight- and normal). Furthermore, several confounding factors such as physical activities, dietary intakes and different climatic conditions have not been taken into account in any of the papers included in the meta-analysis. Finally, the design of the studies considered was mainly observational, therefore, causal relations cannot be inferred and further studies (such as prospective ones) should be performed to evaluate the potential associations between vitamin D status and BMI.

In conclusion, the findings recently published support the still controversial effect of vitamin D status and body composition.

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