The possible link between obesity and vitamin D deficiency

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***Abstract*:**
Vitamin D has an essential role in calcium and bone metabolism. Recently, vitamin D insufficiency has been shown to be associated with high risk of developing type 2 diabetes mellitus and cardiovascular disease (CVD), similar cardiovascular risk factors like hypertension and obesity. Some reviews suggest an inverse association between vitamin D and cardiovascular risks, on the other hand, Parkera et al. showed the highest levels of serum vitamin D were associated with a significant (43%) reduction in cardio-metabolic disorder. [1] The scope of this study was to assess the association of serum vitamin D levels with the presence of obesity and metabolic syndrome in adult patients and ferritin level.

Keywords: 25 hydroxyvitamin D, obesity, metabolic syndrome, fatty liver index

Material and methods :
A retrospective study of all adult patients with obesity who were admitted to a clinical centre from Bucharest between January 2011 and October 2016. A retrospective chart review of 102 adult patients, 54,9% (56) women, mean age 42,44±12,61 yrs, with vitamin D deficiency, overweight and obese. Enrolled patients have been divided by gender into two groups.

History and detailed medical history, clinical examination with anthropometric parameters (height, weight, waist circumference), biological markers [vitamin D, ferritin, GGT (gamma-glutamyl transferase), folic acid, HbA1c, FBG(fasting blood glucose)], body fat percentage (MGT), visceral fat level (MGV) and skeletal muscle percentage (MMT), (measured with bioimpedance -Omron body composition device) were determined. We collected data regarding age and laboratory parameters: fasting blood glucose, HbA1c (glycosylated haemoglobin), triglycerides, total cholesterol, HDL cholesterol, GGT, ferritin, 25 (OH) D3, folic acid, AST(aspartate aminotransferase), ALT(alanine aminotransferase). NAFLD (nonalcoholic fatty liver disease) was determined by the FLI (fatty liver index) using metabolic parameters, such as TG, BMI(body mass index), GGT, and waist circumference

Results :
In our study, we evaluated 102 patients with vitamin D deficiency, overweight and obese. Female gender was predominant. There was a statistically significant difference between groups in BMI, SBP(systolic blood pressure), ferritin, HDLc, GGT, FLI and also visceral fat. Prevalence of metabolic syndrome in our study was significantly higher in men. The association between ferritin levels and 25(OH)vitamin D deficiency, with and without correction for age, body composition (total fat mass and visceral fat mass) and FLI was assessed by univariate linear regression analysis.

Discussion and conclusion :
In our study, the level of serum 25-OH vitamin D was inversely associated with BMI, abdominal obesity, visceral fat and FLI in all patients. In men, vitamin D was significant negative correlated with BMI, abdominal obesity, FLI and ferritin. In women, vitamin D levels showed no significant correlation with any metabolic parameters, the observation that was described in another study too [2]. In women, we find only a significant negative relationship with folic acid.

Low serum 25 hydroxyvitamin D is known to perturb cellular function in tissues, including the endocrine pancreas, which is involved in obesity and metabolic syndrome.

Maintaining the serum 0H-vitamin D over a certain level involve a protective effect on appearance of metabolic diseases like metabolic syndrome, insulin resistance and also fatty liver. These results are similar in others studies

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suggesting a relationship between serum 25 OH-vitamin D and appearance of metabolic diseases [3,4,5].

It is known that individuals with a long-standing MS(metabolic syndrome) have a higher risk of developing fatty liver disease.[6,8]

Patients with fatty liver disease had lower levels of serum vitamin D and also higher likelihood of 25OH-vitamin D deficiency as was suggested in meta-analysis. In obese patients, vitamin D being soluble in fat is sequestered mainly in tissue and is therefore low in serum [7]. This is a possible explanation on reduced bioavailability of vitamin D metabolite [7]. That Vitamin D metabolite it seems that regulates transcription of multiple gene products with antiproliferative, prodifferentiative, and immunomodulatory effects [7,8]. This could mean that obese patients will be more susceptible to developing metabolic syndrome [5-7] as well as cardiovascular diseases [1,5-7]. We need more studies to investigate this unexpected finding. Contrary to existing evidence, our study results did not show a significant association between individual metabolic risk factors (fasting blood glucose, triglycerides, HDL cholesterol and blood pressure) with vitamin D status. Our study had a small number of patients, and because of that, it may not have adequate power to detect a significant association between individual risk factors.[9,10]

We need to study the health benefits of vitamin D in preventing and combating metabolic syndrome and other relevant diseases because vitamin D insufficiency is still not treated as a severe problem.The evaluation of ferritin level in obese patients can bring important benefits in terms of therapeutic attitude and nutritional intervention to them.

It may be possible to reverse the increasing prevalence of obesity by improving vitamin D status and ferritin level. Further clinical and experimental studies are needed to ascertain the role of vitamin D and ferritin in obesity and metabolic syndrome.

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