THE RELATIONSHIP BETWEEN VITAMIN D AND NON-ALCOHOLIC FATTY LIVER DISEASE IN TYPE 2 DIABETIC EGYPTIAN PATIENTS

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INTRODUCTION AND OBJECTIVES
- Diabetes mellitus, hypovitaminosis D, and non-alcoholic fatty liver disease (NAFLD) are common medical conditions that share some risk factors, one of which is obesity¹.
- Both NAFLD and vitamin D deficiency have been linked to the development of metabolic syndrome and type 2 diabetes².
- The aim of this study is to evaluate the level of serum 25-hydroxy vitamin D [25(OH)D] in type 2 obese diabetic Egyptian patients with variable degrees of hepatic steatosis.

METHODS
- Sixty type 2 obese diabetic patients with normal liver functions were recruited in this cross-sectional study. Exclusion criteria were the presence of hepatitis B or C infection and clinical evidence of chronic liver disease.
- Body mass index (BMI), glycosylated haemoglobin (Hb A1C), aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma glutamyltransferase (GGT), lipid profile, and 25(OH)D were measured.
- Liver steatosis was assessed semi-quantitatively by ultrasound on a scale of 0-3 on the basis of abnormally intense, high level echoes arising from the hepatic parenchyma, liver-kidney difference in echo amplitude, echo penetration into deep portion of the liver and clarity of liver blood vessel structure into: 0 = absent; 1 = mild; 2 = moderate; 3 = severe³.

RESULTS
- 55% of patients had 25(OH)D deficiency with a mean of 15.21 (±1.91) and 45% had normal 25(OH)D with a mean of 26.33 (±2.97). 20% of patients had no evidence of steatosis by ultrasound, 23% had mild steatosis, 30% had moderate steatosis and 27% had severe steatosis.
- There was a significant negative correlation between 25(OH)D and age, p=.027; Hb A1C, p=.000; triglycerides (TG), p=.022 and degree of steatosis, p=.047. 25(OH)D showed a significant positive correlation with high density lipoproteins (HDL), p=.046. ANOVA showed a significant association between the degree of steatosis and BMI, p=.000.
- Using multivariate analysis Hb A1C was the only significant predictor for vitamin D level when tested with BMI and duration of diabetes, p=0.000.
- Patients were divided into 2 subgroups according to 25(OH)D level; group 1 had normal levels, group 2 were deficient in 25(OH)D. There was a significant difference between both groups as regards age, p=.035; HbA1C, p=.000; TG, p=.004; and HDL, p=.028, with vitamin D deficient patients showing higher age, higher HbA1C, higher TG and lower HDL levels. The two groups did not differ significantly as regards the grading of hepatic steatosis, nor the BMI.

CONCLUSION
- More than half of our patients had 25(OH)D deficiency. Our results show an association between vitamin D deficiency and some markers of the metabolic syndrome in the form of a significant correlation between 25(OH)D and TG and HDL levels.
- However, we found no difference between patients with normal 25(OH)D and those deficient in it regarding BMI. This may be attributed to the fact that all of our patients were obese with a BMI above 30.
- Poor glycemic control was associated with lower levels of 25(OH)D independent of BMI and duration of diabetes. More extensive randomized controlled trials are needed to establish a cause-effect relationship between these 2 factors.
- Routine measurement of vitamin D should be advocated in diabetic patients, and until causal relationship between vitamin D deficiency and glycemic control is established current guidelines for vitamin D supplementation should be followed.
- One of the limitations of this study is that an estimate of the daily intake of vitamin D and sun exposure was not assessed, especially with more than half of our patients being perimenopausal females.

REFERENCES
1. Kwok, RM; Torres DM; and Harrison SA (2013). Vitamin D and nonalcoholic fatty liver disease (NAFLD): is it more than just an association? Hepatology, 58: 1166-1174.
2. Williams, KH; Shackel, NA; Gorrell, MD et al. (2013). Diabetes and nonalcoholic fatty liver disease: a pathogenic duo. Endocrine Reviews, 34(1): 84 -129.