



Vitamin D and non-alcoholic fatty liver disease: a systematic review and meta-analysis

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Non-Alcoholic Fatty Liver Disease (NAFLD) describes a wide range of hepatic pathological conditions beginning with accumulation of lipids, especially triglycerides, in the hepatocytes in the absence of significant alcohol intake¹. NAFLD shows a strong association with obesity, type 2 diabetes (T2D), insulin resistance (IR), hyperlipidaemia and arterial hypertension. Hence it is referred to as the hepatic manifestation of the metabolic syndrome². Studies have shown significant inverse associations between 25-hydroxyvitamin D (25(OH)D) concentration and other diseases including diabetes, hyperlipidaemia, hypertension and peripheral vascular disease, suggesting a possible role for vitamin D in the pathogenesis of NAFLD^{3, 4}. The aim of this study was to systematically review the association between NAFLD and vitamin D using data from both randomised control trials (RCT), cross-sectional and case-control studies. This was to quantify differences in 25(OH)D status between individuals with and without NAFLD, as well as the effect of vitamin D supplementation in NAFLD patients on metabolic function.

The PUBMED database was electronically searched for relevant studies in adolescents and adults from inception up until April 2017. A total of 129 relevant studies were identified and 24 of these were suitable for inclusion in the systematic review.

Meta-analysis of cross-sectional, cohort and case control studies suggested a statistically significantly lower serum 25 (OH) in those with NAFLD, compared with those without NAFLD (Mean Difference (random) = -16.80 nmol/L [-24.38, -9.21] I²=96 % P <0.0001). In addition, meta-analysis of 4 randomised control trials (RCTs) suggested a statistically significant effect of vitamin D supplementation on serum 25 (OH) D levels (Mean Difference (random) = 53.08nmol/L [28.22,77.93] I²=96 % P < 0.0001), Furthermore, meta-analysis of HOMA-IR suggested no statistically significant effect of vitamin D supplementation (Mean Difference (random) = -0.26 [-2.02, 1.51] I²= 99 % P = 0.78).

In conclusion, 25(OH)D status was lower in individuals with NAFLD than in those without NAFLD, suggesting that serum 25 (OH)D levels may be a factor in the development of NAFLD. However, it may also simply be a result of persons with NAFLD having higher adiposity than those without NAFLD, as increased adiposity is associated with reduced 25(OH)D concentration. This is the first study to report a meta-analysis of vitamin D supplementation in NAFLD patients. No effect was found of vitamin D supplementation on HOMA-IR. Therefore this review does not support the use of vitamin D supplementation for NAFLD patients in terms of improving metabolic function, although it could have other health benefits, such as for immune and musculoskeletal health.

1. Sanyal *et al.*, 2010. *N Engl J Med*, **362**, 1675–85.
2. Loomba *et al.*, 2012. *Hepatol*, **56**,943–51.
3. Anderson *et al.*, 2010. *Am J cardiol*, **106**,963–68.
4. Li *et al.*, 2013. *Endocrine*, **44**,465–72.