Meta-analysis

Effect of vitamin E supplementation on aminotransferase levels in patients with NAFLD, NASH, and CHC: Results from a meta-analysis

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A B S T R A C T

Objective: The antioxidant vitamin E has been extensively employed to treat chronic liver diseases. The aim of this study was to assess the effect of vitamin E supplementation in lowering alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels in patients with nonalcoholic fatty liver disease (NAFLD), nonalcoholic steatohepatitis (NASH), and chronic hepatitis C (CHC).
Methods: We searched all publications in PubMed, Web of Science, and Cochrane Library databases up to June 2013. In total, eight articles met the eligibility criteria, among which, two studies about NAFLD, four studies about NASH, and three studies about CHC, were identified and included in the meta-analysis.
Results: According to standardized mean difference and 95% confidence interval, 12.19 (−4.08 to 28.46) for ALT and 6.84 (−3.18 to 16.86) for AST in patients with NAFLD, 4.54 (1.62–7.46) for ALT and 3.55 (1.39–5.71) for AST in patients with NASH, and 0.61 (0.20–1.02) for ALT and 0.68 (0.07–1.29) for AST in patients with CHC, vitamin E supplementation could optimize ALT and AST levels in patients with NASH and CHC, although it was not statistically significantly associated with reduced ALT and AST levels in patients with NAFLD.
Conclusion: To summarize, the evidence currently available supported the theory that vitamin E supplementation can optimize aminotransferase levels for patients with NAFLD, NASH, and CHC, and more well-designed, large-scale clinical trials are encouraged to examine the therapeutic effect of vitamin E for these disorders.

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Introduction

Nonalcoholic fatty liver disease (NAFLD) is a hepatic manifestation of metabolic syndrome, ranging from simple steatosis to necroinflammation, fibrosis and nonalcoholic steatohepatitis (NASH) [1]. Chronic hepatitis C (CHC), which is caused by the infection of hepatitis C virus, has been a major health problem globally affecting a significant percentage of the world's population [2,3]. Although the etiology of NAFLD, NASH, and CHC is multifactorial, oxidative stress has been widely accepted to be a crucial pathogenic factor in these diseases [4–8]. Thus, antioxidant supplementation acts as a promising therapeutic strategy for these chronic liver diseases.

As one of the most important lipid-soluble antioxidants, vitamin E can scavenge free radicals and prevent lipid peroxidation. In recent years, the potential therapeutic effect of vitamin E supplementation on NAFLD, NASH, and CHC has been intensively investigated clinically, although the outcomes are not conclusive [8–14]. In the present study, we aimed to assess the effect of vitamin E supplementation in lowering alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels in patients with NAFLD, NASH, and CHC through meta-analyses.

Methods

Data sources

We searched all publications in PubMed, Web of Science, and Cochrane Library databases up to June 2013 using a combination of following key words: *vitamin E* or *α-tocopherol* and *nonalcoholic fatty liver disease* or *nonalcoholic steatohepatitis* or *chronic hepatitis C* or *hepatitis C virus.*

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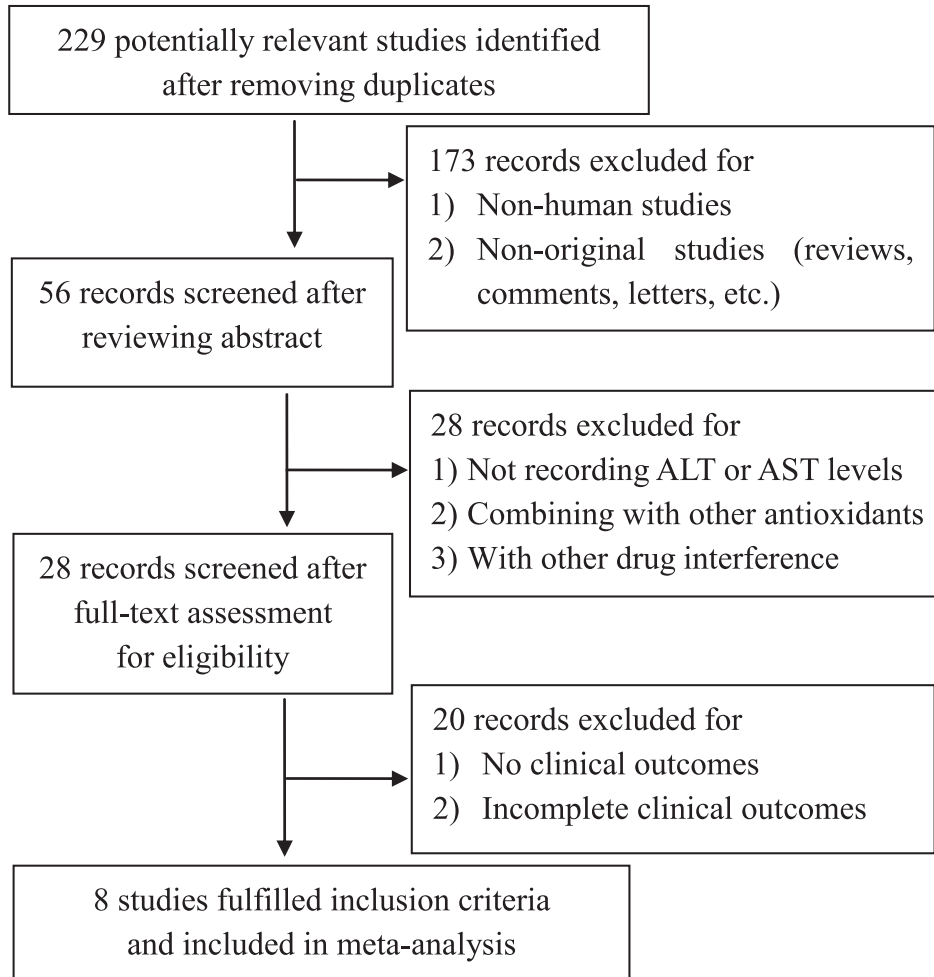
Fig. 1. Process of studies selection included in the meta-analyses. ALT, alanine aminotransferase; AST, aspartate aminotransferase.

Selection criteria

ALT and AST levels are two of the most important sensitive detections in reflecting liver dysfunction in clinical diagnosis. Therefore, in the present meta-analyses, ALT and AST levels were employed as the parameters to characterize disease status. We included studies that supplied vitamin E during the treatment of NAFLD, NASH, or CHC. Excluded studies were those that 1) supplied vitamin E combined with other vitamins or nutrients; 2) supplied vitamin E combined with other drugs, such as ursodeoxycholic acid (UDCA); and 3) reported incomplete or no clinical outcomes regarding ALT and AST levels. The detailed process of reference selection is schemed in Figure 1. Finally, eight studies, among which two focused on NAFLD [14,15], four on NASH [14,16–18], and three regarding CHC [19–21], were identified and included in the meta-analyses.

Data extraction and meta-analysis

The following information was extracted from each included study: first author, year of publication, country, number of patients, form and daily dosage of vitamin E, period of treatment, mean and SD of baseline and endline ALT or AST levels. Two authors reviewed all studies and data disagreement was resolved through discussion. We used random-effects model to pool the SMD and 95% confidence interval (95% CI) across the included studies [22]. To assess heterogeneity across studies, we used the χ^2 and the I^2 test statistics [23]. When the I^2 value was >50% and the P-value was >0.05, the analysis was not considered to report significant differences. Statistical analyses were conducted using the Stata 12.0 statistical software (Stata Corporation, College Station, TX, USA).

Results

Effect of vitamin E supplementation on aminotransferase levels in patients with NAFLD

Two studies in the meta-analysis focused on the effect of vitamin E supplementation on ALT and AST levels in patients

Table 1
Summary of studies regarding the effect of vitamin E supplementation on aminotransferase levels (in IU/L) in patients with NAFLD

Reference	Country	Participants (N)	ALT (IU/L)		AST (IU/L)		Mean age (y)	Vitamin E form	Dosage	Treatment period
			Baseline	Endline	Baseline	Endline				
Haseqawa 2001 [14]	Japan	10	167 ± 8	41 ± 3	59 ± 3	28 ± 2	38 ± 3	α-tocopherol	300 mg/d	12 mo
Wang 2008 [15]	China	19	139.97 ± 19.82	73.28 ± 10.11	78.55 ± 23.11	45.8 ± 6.66	13.4 ± 1.6	α-tocopherol	100 mg/d	1 mo

ALT, alanine aminotransferase; AST, aspartate aminotransferase; NAFLD, nonalcoholic fatty liver disease