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The effect of dietary intervention, with or without co-interventions, on inflammatory markers in patients with non-alcoholic fatty liver disease: a systematic review and meta-analysis

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Non-alcoholic fatty liver disease (NAFLD) is prevalent in approximately 25% of adults worldwide.(1) NAFLD ranges from simple steatosis to non-alcoholic steatohepatitis (NASH), with inflammatory cytokines and adipokines key drivers of disease progression.(1) Poor dietary patterns promote an inflammatory milieu, however the effects of specific diets on inflammatory processes remain largely unknown. Alternate therapies, including nutraceuticals which are classified as food derived alternatives to pharmaceuticals that may provide health benefits, are increasingly used alongside diet to assist the improvement of NAFLD.(2) Vitamin E, vitamin D, omega-3 polyunsaturated fatty acids, resveratrol, and probiotics, are among the supplements tested in clinical studies.(2) However, due to heterogeneity of supplements and outcome measurement tools, doses and study duration, the ability to conclusively state which are the most superior to use in conjunction with diet has not been established. This systematic review and meta-analysis aimed to summarise evidence of the effect of dietary intervention on inflammatory markers in patients with NAFLD. Electronic databases MEDLINE, EMBASE, CINAHL and Cochrane Library were searched for clinical trials where dietary intervention with or without supplementation was compared to a control group and investigated outcomes of inflammatory cytokines and adipokines. Data were grouped by outcomes for inflammatory markers and pooled for meta-analysis where heterogeneity of data allowed. Methodological quality and risk of bias were assessed using the Academy of Nutrition and Dietetics Criteria. Forty-four studies with a total of 2,579 participants were included, 53% were male, aged ranged from 18 to 80 years, and body mass index was between 23-40 kg/m^2. Interventions ranged from 2 weeks to 2 years. Meta-analyses indicated intervention with an isocaloric diet plus supplement was more effective in reducing C-reactive protein (CRP) (0.44; 95% CI [0.20, 0.68], $p = 0.0003$) and tumour necrosis factor alpha (TNF-α) (0.74; 95% CI [0.02, 1.46], $p = 0.03$) than an isocaloric diet alone. Supplementation in the form of conjugated linoleic acid, probiotic, prebiotic or symbiotic (*B. coagulans*), nigella sativa seed, ginger, coffee bean extract, trans-resveratrol, and flaxseed, significantly improved markers alongside an isocaloric diet. No significant weighting was shown to either intervention when a hypo-caloric diet was used for the outcomes of CRP (0.30; 95% CI [−0.84, 1.44], $p = 0.60$) and TNF-α (0.01; 95% CI [−0.43, 0.45], $p = 0.97$). Findings further suggested that weight loss drove improvements, with all but two of the studies that intervened with a hypocaloric diet and were included for meta-analysis, reporting significant ($p < 0.05$) weight-loss in both dietary intervention groups. In conclusion, hypocaloric and energy-restricted diets alone or with added supplementation, and iso-caloric diets with supplementation were shown to be most effective in improving the inflammatory profile of patients with NAFLD. To better determine the effectiveness of dietary intervention alone in NAFLD, further investigations of longer durations, with larger sample sizes are required.

References

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