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The effects of N-acetylcysteine on inflammatory and oxidative stress biomarkers: A systematic review and meta-analysis of controlled clinical trials

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Abstract

Prolonged inflammation could be considered as the leading cause of chronic diseases such as cardiovascular disorders, type two diabetes, and obesity. N-acetylcysteine (NAC) is considered an antioxidant. The present meta-analysis aims to determine the efficacy of NAC in alleviating inflammation and oxidative stress. PubMed-Medline, SCOPUS, Web of Science and Embase databases and Google Scholar were searched up to Nov 2019. Random effect analysis was used to perform meta-analysis. Subgroup analyses were carried out to find heterogeneity sources. Meta-regression analysis was used to explore linear relationship between effect size and variables. Trim and fill analysis were performed in case of the presence of publication bias. Quality assessment was performed using Cochrane Collaboration's tool. A total of 28 studies were included in meta-analysis. NAC significantly decreased malondialdehyde (MDA) (SMD = -1.44 $\mu\text{mol/L}$; 95% CI: -2.05, -0.84; $P < 0.001$), IL-8 (WMD = -2.56 pg/ml; 95% CI: -3.89, -1.23; $P < 0.001$) and homocysteine (WMD = -1.45 pg/ml; 95% CI: -2.74, -0.17; $P = 0.027$) levels. There were no significant effects of NAC supplementation on CRP (SMD = -0.1 g/L; 95% CI: -0.52, 0.32; $P = 0.647$), TNF- α (WMD = -0.2 pg/ml; 95% CI: -0.65, 0.25; $P = 0.378$) and IL-6 (WMD = -0.41 pg/ml; 95% CI: -1.15, 0.32; $P = 0.270$) levels. However, NAC effects were significant in ameliorating TNF- α and IL-6 using sensitivity analysis. NAC significantly decreased MDA, IL-8, and homocysteine levels. The effects of NAC on amending TNF- α and IL-6 levels were significant after sensitivity analysis. No significant change was observed on CRP levels.

Keywords: Inflammation; Meta-analysis; N-Acetylcysteine; Oxidative stress; Systematic review.

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