SIFF 2026
Singapore International Food Forum 2026

Impact of Algae Consumption/supplementation on Cardiometabolic Health: A Systematic Review and Meta-analysis

He Qing[a], Marven Ng[a], Kim Jung Eun[ab*]

[a] *Department of Food Science and Technology, National University of Singapore, 1 Science Drive 3, Singapore 117550*
[b] *Bezos Centre for Sustainable Protein, National University of Singapore*

Abstract

Background/objective: Algae, including both microalgae and macroalgae, are widely consumed as food or supplementation and have been suggested to exert beneficial effects on cardiometabolic health due to their high nutritional value with presence of dietary proteins, unsaturated fatty acids, polysaccharides, and polyphenols [1-2]. However, existing evidence about their benefits on cardiometabolic health remain inconsistent and has not been comprehensively synthesized. Therefore, this study aimed to systematically evaluate the effects of higher algae consumption and supplementation on cardiometabolic health outcomes from randomized controlled trials and observational studies.

Methods: Systematic searches were conducted in PubMed, Embase, Cochrane Library and CINAHL and a total of 97 randomized controlled trials were included in the systematic review, of which 92 were eligible for meta-analysis. Among these, 63 studies investigated microalgae (predominantly *Spirulina* and *Chlorella*), 33 studies investigated macroalgae (predominantly brown seaweed and red algae), and 1 study included both microalgae and macroalgae as part of intervention. Although observational studies were considered according to predefined PICOS criteria, none met the inclusion criteria thus no data were collected from observational study.

Results: Higher algae consumption and supplementation significantly reduced fasting insulin (mean difference [MD] = -2.01 pmol/L; 95% confidence interval [CI]: -3.46, -0.55), fasting glucose (MD = -0.10 mmol/L; 95% CI: -0.16, -0.03), glycosylated hemoglobin (MD = -0.11%; 95% CI: -0.16, -0.05) levels, and homeostasis model assessment-insulin resistance index (MD = -0.14; 95% CI: -0.25, -0.03). Significant improvements were also observed in lipid-lipoprotein profiles, including reductions in triglycerides (MD = -0.12 mmol/L; 95% CI: -0.17, -0.07), total cholesterol (MD = -0.15 mmol/L; 95% CI: -0.23, -0.07), low density lipoprotein-cholesterol (MD = -0.14 mmol/L; 95% CI: -0.21, -0.06), and increase in high density lipoprotein-cholesterol (MD = 0.04 mmol/L; 95% CI: 0.01, 0.07) levels. Additionally, higher algae consumption and supplementation reduced systolic blood pressure (MD = -1.52 mmHg; 95% CI: -2.89, -0.16), diastolic blood pressure (MD = -1.08 mmHg; 95% CI: -1.78, -0.38), as well as atherogenic index (MD = -0.08; 95% CI: -0.12, -0.04). Subgroup analyses revealed that higher microalgae consumption and supplementation exerted improvements in all of these parameters while these benefits were not observed with macroalgae consumption.

Conclusion: The higher algae consumption and supplementation can improve cardiometabolic health and this benefit was predominantly explained by higher microalgae consumption.

Keywords: Algae, microalgae, macroalgae, cardiometabolic, meta-analysis

This study was funded by Bezos Earth Fund.

References

[1] Wells ML, Potin P, Craigie JS, Raven JA, Merchant SS, Helliwell KE, Smith AG, Camire ME, Brawley SH. Algae as Nutritional and Functional Food Sources: Revisiting Our Understanding. J Appl Phycol. 2017; 29(2): 949-982. Doi: 10.1007/s10811-016-0974-5.

[2] Chen W, Li T, Du S, Chen H and Wang Q. Microalgal Polyunsaturated Fatty Acids: Hotspots and Production Techniques. Front. Bioeng. Biotechnol. 2023; 11:1146881. Doi: 10.3389/fbioe.2023.1146881.

* Corresponding author *E-mail address:* fstkje@nus.edu.sg