

## Abstract

# Comparative Analysis of Fatty Acid Profiles in Erythrocyte Membranes in Vegetarians Compared to Omnivores <sup>†</sup>

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**Abstract:** Background: The fatty acid profiles in cellular membranes can be influenced by many endogenous and external factors, including diet. They are also associated with numerous metabolic and health conditions, including cardiovascular diseases and inflammation. Objective: This study provides a comparative analysis of the fatty acid profiles in subjects on vegetarian and omnivorous diets. Methods: The study enrolled 152 apparently healthy subjects, comprising 78 omnivores and 74 individuals who had followed a vegetarian diet for a minimum of 2 years, including 61 vegans and 13 lacto-ovo vegetarians. The subjects in the omnivore and vegetarian groups were matched by gender, age, and body mass index (BMI). The composition of the fatty acids in their erythrocyte membranes was determined using gas–liquid chromatography and presented as a percentage of total fatty acids. Results: The study revealed statistically significant differences in the fatty acid profiles: vegetarians had higher levels of oleic acid (OA, 18:1 n-9) ( $p < 0.001$ ) and linoleic acid (LA, 18:2 n-6) ( $p < 0.001$ ), while at the same time having lower levels of gamma-linolenic acid (GLA, 18:3 n-6) ( $p < 0.05$ ), eicosapentaenoic acid (EPA, 22:5 n-3) ( $p < 0.001$ ), docosapentaenoic acid (DPA, 22:5 n-3) ( $p < 0.001$ ), docosahexaenoic acid (DHA, 22:6 n-3) ( $p < 0.001$ ), and total omega-3 polyunsaturated fatty acid (PUFA) ( $p < 0.001$ ) and a lower omega-3 index ( $p < 0.001$ ). Additionally, they had lower omega-3 to omega-6 PUFA ( $p < 0.001$ ); EPA/arachidonic acid (ARA, 20:4 n-6) ( $p < 0.001$ ); and DHA/ARA ratios ( $p < 0.001$ ). The activity of delta-6 desaturases (D6D), estimated as the GLA/LA ratio, was higher in the omnivores ( $p < 0.005$ ), while the activity of elongase 2 (ELOV2), estimated as the DPA/EPA ratio, was higher in the vegetarians ( $p < 0.005$ ). Most of the differences presented in both vegans and vegetarians, except for GLA and D6D, where differences were observed only in vegans compared to omnivores. Discussion: This study highlights the distinct fatty acid profiles associated with vegan, lacto-ovo vegetarian, and omnivorous diets, suggesting their differential impact on inflammation, disease protection, and overall health. Understanding the implications of the fatty acid profiles within these dietary patterns can be used for personalized nutritional recommendations and supplementation for individuals adhering to specific dietary lifestyles.

**Keywords:** fatty acids; omega 3; vegan; vegetarian; diet



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