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Research article

SCREENING OF FUNGI FOR PRODUCTION AND PURIFICATION OF OMEGA-3 FATTYACID

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ABSTRACT

Omega fatty acids, major importance in the prevention or treatment of a range of human diseases or disorders related with inflammation. These fatty acids are found in transgenic plants, fungi, and animals and even in microorganisms but in major amounts can be extracted from fatty fish. However, due to bioaccumulation of fat-soluble vitamins and high levels of saturated and omega-6 fatty acids, they may have deleterious health effects. It becomes necessary to search for novel and rich sources containing omega-3 fatty acids and one of the alternatives include fungi. The present study deals with production and purification of omega-3 fatty acids from Trichoderma viride and Aspergillus niger. In the present study, the main objective was to explore the beneficial effects of fungi for the maximum lipid production through optimized conditions and the results clearly showed that Trichoderma viride was the significantly highest lipid producer, with lipid production at initial pH 6.0 and incubation temperature 40°C.

Keywords: Fungi, fatty acids, pH, PUFA, temperature

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INTRODUCTION

Omega-3 (ω-3) fatty acids essential for cardiovascular health are usually polyunsaturated fatty acids (PUFAs) and are recognized as essential dietary components for the human health. [1] Omega-3 fatty acids with three essential fatty acids such as eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA) and alpha-linolenic acid (ALA) have significant health benefits in preventing arteriosclerosis and coronary heart disease, and for reducing arthritis by preventing certain inflammation.[2] They are considered as essential nutrients since human body cannot synthesize them, they have to be provided through food. Even tough, these essential fatty acids can be synthesized in the body using alpha linolenic acid (ALA) but only in meagre amount. Such ALA which also an 18-carbon omega-3 fatty acid are found in plants such as flaxseed, soybeans and walnuts.[3] Omega fatty acids are rich in salmon, halibut, tuna and other sea foods include algae and krill. [4] Consuming omega-3 PUFA may be the one among therapeutic strategies to prevent the "cytokine storm" in cardiovascular complications associated to COVID-19. [5] Generally, omega fatty acids are structure with repeated double bonds. Such double bond occurs first between the third and fourth carbon counting from the methyl end (omega carbon) of the chain. [6]

Omega fatty acids can change the rigidity property of the cell membrane by modulating the membrane channel proteins with altered cellular function.[3] They can bind to transcription factors such as PPAR-α, HNF-4α and SREBP-1c in order to regulate gene expression that has direct impact on inflammatory pathways. Even they regulates proliferator-activated receptor of peroxisome and helps in the healing of intestinal mucosa. [7] By incorporating in membrane phospholipids, omega fatty acids are increasing systemic arterial compliance. [8] In endothelial cells, omega fatty acids are involved in the release of nitric oxide for improved endothelial function. Omega fatty acids can decrease serum levels of triglycerides through fatty acid degradation. [9] Furthermore, they are anti-thrombotic, when taken in high doses.[10] DHA is the fatty acids found rich in retinal phospholipids and they involved in maintaining the functional integrity of retina. [11]