

# Omega-3 Polyunsaturated Fatty Acids Role in Depression

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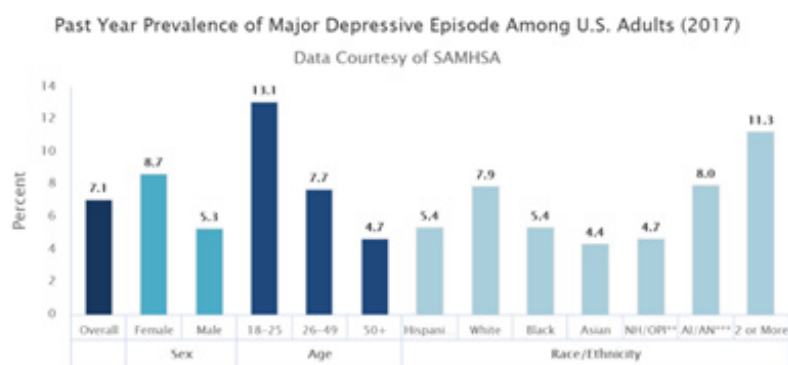
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## Introduction

In recent years many investigations have been focused in the direct consumption of polyunsaturated fatty acids (PUFA) [1] in the prevention of inflammatory and cardiovascular diseases [2], polyunsaturated fatty acids Omega-3 (O3PUFA) represent a wide opportunity area in medical nutrition research, including eicosatetraenoic acid (EPA) emerging as a new potential substance in depression treatment [3]. Major depressive disorder (MDD) is a recurring disease characterized by sadness, loss of interest in activities and decreasing energy. Depression is a polygenic heterogeneous brain disorder, in which the mood of the person has been affected [1,4-7]. Polyunsaturated fatty acids (PUFA) are divided into two main groups or families: Omega-3 PUFA and Omega-6 PUFA [8], the main differences between these substances is the double bond position in the first carbon within the molecule. O3PUFA refers to a group in which the first double bond is 3 carbons from the end (omega) carbon atom of the molecule, while the O6PUFA are a family of PUFA that have in common a final carbon-carbon double bond in the n-6 position [9]. O3PUFA are synthesized by dietary shorter-chained omega-3 fatty acid alpha-linolenic acid (ALA) to form the more important long-chain omega-3 fatty acids: eicosatetraenoic acid (EPA) and docosahexaenoic acid (DHA) [1].

## Depression in the World and the USA

According to the World Health Organization, it is estimated that 300 million people are affected by a depression state, near 800,000 persons die due to suicide every year. Suicide is the second cause of death among people 15-29 ages [10]. In the United States 17.3 million adults had at least one MDD in 2017 (this number represents 7.1% of all adults within the U.S.). The prevalence of MDD was higher in female (8.7%), compared to male (5.3%). On the other side, it is mentioned that the prevalence of MDD was higher in 2 or more races of adults (11.3%), reported as shown in Figure 1 [11].



**Figure 1:** Credits: National institutes from mental health & substance abuse and mental health services administration 2019.

## Treatment and Conclusion

Patients with depression episodes are characterized by a low concentration of O3PUFA, it is well known that this fatty acid perform a key role in the central nervous system, as well as visual and cognitive functions. Carisha et al. [2] concluded in their study that patients with depressive episodes, the presence of O3PUFA low levels in blood circulation, compared to healthy patients, however there were no significant differences in the levels of O6PUFA [2]. The brain is considered a sensitive organ to oxidative damage, hereby the purpose to study the therapeutic use of O3PUFA as an antioxidant [8]. Several studies suggest that administration of O3PUFA has a favorable influence on major depressive disorders, Jahangarda et al. [10] showed that the depression symptoms decreased with O3PUFA administration in a study with n=50 patients, as well as anxiety and sleep symptoms [12,13] in their study with Sixty five patients with co-morbidity of depression and overweight/obesity (BMI $\geq$ 25) observed that omega-3 significantly reduced depression compared with the placebo (P=0.05) [14]. A great number of evidences in bibliography mentions the importance of EPA and DHA consumption in diet or as a dietary supplement, which could contribute to prevent and help in depression treatments [5,6,14-16]. Several strategies could help improve the neuroprotective activity of O3PUFA [8] and results show that the combination of O3PUFA and psychoeducation might be helpful to an improvement in symptoms in people with MDD or moderate depression [16].

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