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Editorial**Dietary management of Omega-3 fatty acids: should two more be declared as semi essential?****Arambam Giridhari Singh****Professor, Department of Biochemistry**DOI: <https://doi.org/10.3126/jonmc.v7i2.22263>

Amidst the emergence of coronary artery disease (CAD) and stroke as number 1 and number 2 ranker among the latest world's top 10 killer diseases [1,2], researchers started exploring the facts regarding the involvement of omega-3 fatty acids in controlling the risk factors of these diseases. They observed that fish eating communities had very low prevalence rates of both CAD and Stroke. This was later found to be partially due to consumption of omega-3 fatty acids present in those fishes [3]. The benefits reported earlier as being rendered by omega-3 fatty acids for heart health are justified by their involvement in (a) the reduction of the level of **triglycerides**, (b) reduction of **blood pressure** among people with hypertension, (c) raising **HDL (good) cholesterol** level, (d) **stopping blood platelets from clumping** together and thus, preventing formation of harmful **clots**, (e) prevention of the **plaque** from **hardening** of arteries, (f) minimizing the production of substances released during the **inflammatory response**. Over and above these beneficial effects, fatty acids of this family are also found to be involved in, **fighting depression and anxiety**, improving **eye health**, promoting **brain health** during pregnancy and early life, reducing symptoms of "**Attention deficit hyper activity disorder**"(ADHD) in children, reduction of **metabolic syndrome** via improving insulin resistance, inflammation and heart disease risk factors, fighting of **autoimmune diseases**, improving **mental disorders**, preventing **cancer & asthma** in children, reducing fats in liver, improving **bone and joint health**, alleviating **menstrual pain**, improving **sleep**, maintaining **skin health** and many others which are on their clinical trials[4].

Omega-3 fatty acids which are important in human nutrition are three in number. They are alpha linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Human body does not have any precursor molecules for synthesis of omega-3 fatty acids but, DHA and EPA can be synthesized from alpha linolenic acid (ALA). Therefore, only ALA has been listed as essential omega-3 fatty acid. ALA is purely of plant origin and its specific function still remained a matter of debate. Whereas, EPA and DHA are the acids having important physiological and biological roles in human health and development but, their dietary sources are mostly fatty fishes. Studies demonstrated that majority of ALA is β oxidized and only approximately 5% of ALA is converted to EPA and less than 0.5% to DHA. Even, very high intakes of dietary ALA failed to effectively modulate plasma and tissue level of DHA. Conversion of ALA to EPA and DHA is greater in women due possibly to the regulatory effect of estrogen. Again, partitioning of ALA towards β oxidation was also lower in women than in men; some ALA being spared for synthesis of EPA and DHA.

Keeping aside this slight gender variation, the overall outcome is that very little quantity of ALA appears to be the real source of EPA and DHA in both the sexes. **Considering all the above facts, professional organizations emphasized direct supplementation of EPA and DHA in the diet for optimal health and disease risk reduction [5]**

Are we getting omega-6 to omega-3 fatty acids as per the desired ratio (4:1) in our diet?

'The real answer from more than 95% of population in a developing country will be "No". We are getting enough omega-6 fatty acids from our day today foods for which no discussion will be inserted in this editorial. But, more than 75% of our population might be living with a very low level of omega-3 fatty acids in their blood and tissues. Because of this, the ratio of omega-6 to omega-3 might be always on the higher side. Scientist believes omega-6 is pro inflammatory and omega-3 is anti-inflammatory. Chronic inflammation may be one of the leading driver of most serious modern diseases including heart disease, metabolic syndrome, diabetes mellitus, arthritis, Alzheimers and many types of cancer. So, increasing omega-3 quantity in our diet is the only option left for optimizing the ratio hence, for a better health. Fishes rich in omega -3 fatty acids are salmon, mackerel, herring, sardines, tuna etc and are mostly of marine origin. Other non-fish food options that do contain more omega-3 fatty acids include flaxseeds, flaxseed oils, walnuts, canola oil, soybean and soybean oil. However, the heart healthy benefits from eating these foods are not as strong as it is from eating fish. The non-fish foods listed above provide only ALA and as explained, we get very little amount of EPA and DHA synthesized from it [6].

The author's own feeling why we may face consequences of omega-3 deficiency is as listed:

Lack of awareness: None of us is consuming flaxseed the richest source of ALA, chiaseed, soybean seed regularly as being known to be good sources of ALA. Even if we consume, we know that the quantity of EPA and DHA will be very less (as explained). Everybody around us seems to be unaware of the list of those sea fishes identified as rich sources of EPA and DHA.

Vegetarian foods: In some developing countries, a large percentage of the populations are living on vegetarian foods only. It has already been reported that EPA and DHA level may be dangerously low in vegans and vegetarians. For them, the only option left for correction could be harvesting of a type of marine algae rich in EPA and DHA [7].

Geographical location: Most of the omega-3 rich fishes listed being of marine origin, people staying far away from sea will never bother of taking those fishes unless they know the importance of these fatty acids.

Last message The most important message to be conveyed to all the medicos and to those, occupying important positions in the health care delivery system of the country is that, awareness campaign for all types health related messages/ issues be kept continued as for example omega-3 fatty acids. One can go up to the country's top office for submission of list of demands inclusive of implementation of a system for regular supply of fishes rich in omega-3 to all corners of the country, installation of competent laboratories for analysis of food stuffs like locally available fishes for estimation of EPA and DHA, distribution of supplements like omega-3 rich fish oils etc. Just to enable the demands mentioned be enforced, **declaration of Eicosapentaenoic acid(EPA) and Docosahexaenoic acid (DHA) as semi-essential fatty acids may be a reasonable decision because, alpha linolenic acid (ALA) cannot produce both the acids as per the need of the body. To**

support this, we can cite the explanation given while declaring arginine and histidine as semi essential amino acids.

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