Abstract
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Fat is generally a nutrient that has had a bad press. But there are certain fatty acids that are essential for health. There are two essential fatty acids (EFAs): linoleic acid (LA) and alpha-linolenic acid (ALA). Like vitamins and other essential nutrients, they are important dietary constituents because they cannot be synthesized in body tissues from other compounds in food. They belong to two different chemical series, n-6 or omega 6 and n-3 or omega 3, and are not inter-convertible in vivo.

The biological importance of the essential fatty acids lies not in their potential as an energy substrate, but in their role as metabolic precursors. Each essential fatty acid is transformed by a series of desaturations and elongations to longer chain unsaturated fatty acids with important metabolic and structural functions. Longer chain derivatives with more than 20 carbon atoms in the chain are called long chain polyunsaturated fatty acids (LCPs or LCPUFAs). In man’s journey from food gatherer to food cultivator many changes in the composition of diet have happened. One of the noticeable changes brought to the forefront by nutritionists is an altered ratio of n-3 and n-6 fatty acids. It has been postulated that recent increase in the incidence and prevalence of acute and chronic inflammatory diseases is due to increased n-6 fatty acids at the cost of n-3 fatty acids.

Numerous studies have shown that correction of fatty acid imbalances may have a therapeutic effect in various acute and chronic inflammatory diseases. However most of the western studies have studied the effect of fish oils, which are excellent source of essential fatty acids. Since environmental pollution is on the rise and contamination of animal foods is more severe as they are higher in the food chain, it was decided to evaluate the effects of flax seed oil as it is an important and valuable source of essential fatty acids supplement.

Linoleic acid (LA; 18:2n-6) and alpha-linolenic acid (ALA; 18:3n-3) and their long-chain derivatives are important components of animal and plant cell membranes. When humans ingest fish or EFAs, the ingested eicosapentaenoic acid (EPA; 20:5n-3) and docosahexaenoic acid (DHA; 22:6n-3) partially replace the n-6 fatty acids [particularly arachidonic acid (AA; 20:4n-6) in cell membranes, especially those of platelets,
erythrocytes, neutrophils, monocytes, and liver cells (reviewed in American J. of Clin. Nutr. 54: 438-463 by Simopoulos A.P.. 1991). As a result, ingestion of EPA and DHA from fish or EFAs leads to:

1) Decreased production of prostaglandin E2 metabolites.
2) Decreased concentrations of thromboxane A2, a potent platelet aggregator and vasoconstrictor.
3) Decreased formation of leukotriene B4, an inducer's of inflammation and a powerful inducer's of leukocyte chemotaxis and adherence.
4) Increased concentrations of thromboxane A3, a weak platelet aggregator and vasoconstrictor.
5) Increased concentrations of prostacyclin PGI3, leading to an overall increase in total prostacyclin by increasing PGI3 without decreasing PGI2 (both PGI and PGI3 are active vasodilators and inhibitors of platelet aggregation).
6) Increased concentrations of leukotriene B5, a weak inducer's of inflammation and chemotactic agent (416; 417).

So the correction of imbalances of EFAs in our diet is an natural and safe way of ensuring arrest of disease progression and decrease the inflammatory processes that are the root cause of many a diseases. The diseases undertaken in this study were osteoarthritis, rheumatoid arthritis and hyperlipidemia. In addition we also recruited patients suffering from acute viral hepatitis to assess the effects of EFAs in acute setting of inflammatory injury. The main reason of selection of these diseases was the shear load of the said diseases in our clinical setting and current existing gaps in the therapy in terms of arresting the disease progression and unacceptable safety profile of the drugs used in long run.

We have observed that supplementation of EFAs in RA, OA and acute viral hepatitis along with conventional therapy increased the efficacy of the currently used medications, greater and rapid onset of relief of signs and symptoms of the disease, improvement of biochemical parameters. In hyperlipidemia supplementation of EFAs along with dietary advise lead to greater reduction of deleterious fats and an overall improvement of lipid profile, which is associated with decreased cardiovascular risks.
At the same time no life threatening and other adverse events, which could compromise with patient's health related quality of life, were documented during the course of our study. Therefore we conclude that EFA supplements could dramatically improve outcomes of both chronic and acute inflammatory conditions when given along with the current treatment regimens. However clinical evidence related to these findings needs to be strengthened with better-controlled blinded clinical studies to establish the use of EFAs as adjuvant therapy in these clinical conditions.