Summary
And
Conclusions
Summary:

• It is the type of fats and oils that we consume that is directly correlated to the rise of epidemic degenerative disease; it is not the amount of fats and oils that we eat that causes the problem. The goal of modern medicine is no longer merely treatment of sickness.

• Life as is known is depends upon biochemical reactions, if these ceases, death results. Health depends on the regulated, harmonious functioning of the thousands of biochemical reactions and processes that occur in normal cells and operate to maintain the constancy of the internal environment. Disease results from alterations or imbalance of either the structures or the amounts of certain biomolecules; or disturbances of biochemical reactions or processes and are seen as abnormality in the structure and function of cells, organ and systems generated by biochemical mechanisms.

• The major prerequisite for maintenance of health is that there be optimal balance of a number of essential chemicals or nutrients in the body; the chief of these are vitamins, certain amino acids, certain fatty acids, various minerals and water.

• Fatty acids are one such macromolecule. Linoleic acid [LA], n-6 or ω-6 FA) and α-linolenic acid [ALA], n-3 or ω-3 FA) are the special fats [poly-unsaturated fatty acids (PUFAs)] that the body needs as much as it needs vitamins. Like vitamins and other essential nutrients, they are essential and important dietary constituents, because they cannot be synthesized in body tissues from other compounds in food but are to be supplied in food, therefore they are known as “Essential fatty acids” (EFA).

• Over consumption of saturated fats and n-6 fatty acid containing fats are increased in the developed and developing countries around the globe.

• Imbalance in the dietary consumption of n-6 to n-3 fatty acids (as noticed epidemiologically in the present industrialized society and is observed around 12-20:1) is at the root for the genesis and progression of many acute and chronic degenerative diseases.

• Restoration of this ratio towards near normal (i.e. 1:4, which linseeds oil provides approximately) either by dietary correction or as a therapeutic supplement of
EFAs has been proved to be preventive or curative in many acute and/or chronic diseases.

- The eicosanoids (2-series) and cytokines (4-series) produced from n-6 fatty acid are powerful pro-inflammatory and tissue proliferative.
- n-3 fatty acids (animal or vegetable source derived) competes with n-6 fatty acid for enzymatic metabolic pathways and decreased production of pro-inflammatory and tissue proliferative mediators.
- The n-3 fatty acid derived eicosanoids (3-series) and cytokines (5-series) possess negligible or low-grade inflammatory and proliferative effects.
- The biological and therapeutic importance of the essential fatty acids lies not in their potential as an energy substrate, but in their role as metabolic precursors in addition to their hypolipidemic effects. The effects are most probably related to the function of EPA as precursor of eicosanoids and its interaction with eicosanoids originating from the n-6 FA.
- Great progress has taken place in our knowledge of the physiologic and molecular mechanisms of the various fatty acids in growth and development and in health and disease. Specifically, their beneficial effects particularly fish and/or fish-oil derived n-3 fatty acid have been shown in the prevention and management of coronary heart disease, hypertension, type 2 diabetes, renal disease, rheumatoid arthritis, ulcerative colitis, Cohn’s disease, and chronic obstructive pulmonary disease.
- As is known that most of the Indians are vegetarians do not like to eat fish or do not like to use medicine derived from animal source, present study was planned to evaluate therapeutic efficacy and tolerability of linseed oil derived EFAs in hyperlipidemia, arthritis (OA, RA) and acute viral hepatitis. Moreover, as per our knowledge no such long term or short term study in Indian subjects/patients have been conducted.
- In this clinical study we have evaluated therapeutic efficacy and tolerability of EFAs for hypolipidemic effect in dyslipidemic subjects/patients, improvement in inflammatory cardinal symptoms of OA and RA as well as duration of recovery in acute viral hepatitis patients.
• It has been observed from the obtained results at the end of treatment are due to supplementation of EFAs and significantly more appreciable than the results observed at the end of placebo treatment.

• Restoration of the abnormal lipid profile towards cardio-protective direction i.e. statistically significant decrease in total cholesterol, LDL,Tg,VLDL while statistically significant increase in HDL level.

• Improvement in cardinal clinical inflammatory symptoms of osteoarthritis & rheumatoid arthritis i.e. reduction in joint pain at rest and on movement, swelling, tenderness together with improvement in mobility i.e. decrease in morning stiffness etc has also been observed with EFAs therapy.

• Improvement of liver enzymes value (liver function test values) at the end of EFAs with conventional treatment compared to conventional treatment alone suggests for faster regeneration and recovery in patients with acute viral hepatitis.

• No serious adverse events were observed during therapy duration follow up.

• No abnormal influence of EFAs or placebo observed on other vital parameters like RFT, LFT, Hematological (Hb, total counts), BT, PT, CT, and FBS was observed during six weeks therapy.

• Acceptance of drug therapy observed by taking patients opinion showed good tolerability of the EFAs treatment in all the studied diseases.

• However, well-designed long-term studies are needed to establish long-term tolerability and safety of EFAs therapy.
Concluding remarks

- Chronic inflammatory diseases are on a rise in modern society.

- Many epidemiological studies have shown an association with food intake, nutritional status, and increase in the incidence of chronic inflammatory diseases.

- Nutritional management of diseases like hyperlipidemia is gaining favor with medical fraternity.

- Inflammation is a beginning point of many a diseases and contributes to the progression and worsening of diseases.

- Recent advances in the understanding of inflammation have given pharmacologists many valid targets to look into, develop new drugs targeting these molecules like cytokines.

- Drugs targeting these areas are still far from becoming clinical reality.

- Current gaps in the therapy for many a chronic diseases which plague the society are evident. Lack of safety on prolonged use is the key area.

- Therefore it is imperative that we relook into the basic factors leading to genesis of these diseases.

- The goal of modern medicine is no longer merely treatment of sickness but also prevention of diseases, promotion of health and improvement of quality of life of individual and group or community.

- Essential fatty acids, which are normal component of our diet, play many important physiological roles.

- Fatty acids play an important role in human physiology and diseases and many clinical studies have shown that supplementation of essential fatty acids may have a beneficial role in treatment of these diseases.
• This study has evaluated the therapeutic efficacy of EFAs in hyperlipidemia, OA, RA and acute viral hepatitis.

• The results of our study demonstrate that EFA can be used as adjuvant therapy in these diseases.

• Lack of any major adverse events should lead to good patient acceptance.

**Future prospectives**

• Future studies can further evaluate the therapeutic effects of EFA in other inflammatory diseases like Ulcerative colitis

• Other plant sources of EFA can be explored for future and there therapeutic efficacy can be evaluated.

• Large well controlled studies for both short term and long term can be undertaken to evaluate the role of EFA in patients in different geographical regions, different patient subgroup profiles.