

Tran's fats are villains-A Review

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Abstract - The topic chosen for enhances of awareness of effect of trans fat of on human health of mankind. They utilize Oils or fats for cooking purpose without knowing their characteristics. It is duty of Scientists to aware the side effect of Trans fat on health of man kinds. The study aimed to provide the facts of side effect of fat, Tran's fat.

Keywords - Fat Source, Food Additive, Animal Fat

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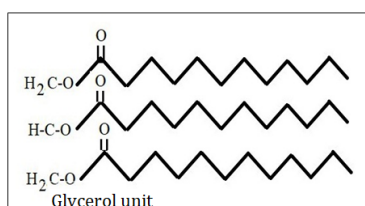
INTRODUCTION

Fats are one of three micro nutrients along with carbohydrate and protein, required by human beings (1). They are quite stable and ideal source for storing energy.

Oils are usually liquid at room temperature structurally both are same. They are triglycerides ie- tri-ester of three fatty acids with the alcohol glycerol.

The examples of oils are corn oil, Olive Oil, sunflower oil, soyabean oil, cottonseed oil etc. On the other hand fats are solid at room temperature. The examples include butter, cheese, avocado, peanuts, and walnuts. Cashew nuts etc. Chemically fats and oils are same.

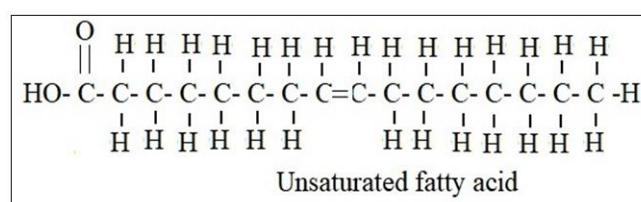
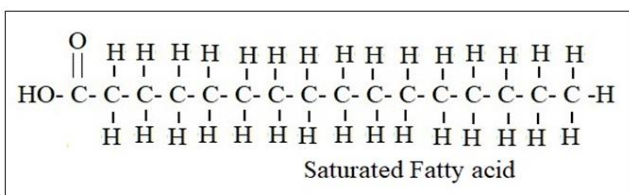
Structure of fats and oils



Zig-zag line carbon atom

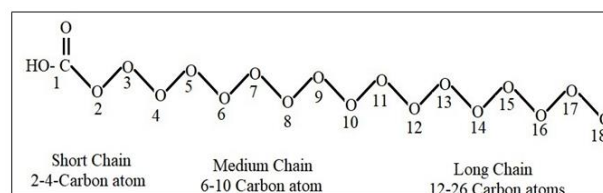
CLASSIFICATION OF FATTY ACIDS

According to nature of bonds:-



According to Chain Length

Difference between fats and oils (2).



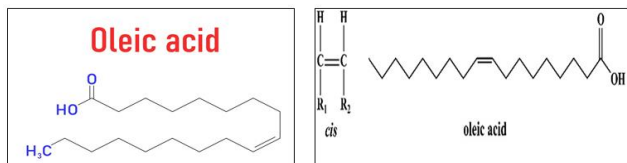
Fats have saturated fatty acids & are also called as hydrogenated fats, Where as oils have unsaturated fatty acids. These are fats which contains long chain carbon atom with carboxylic group. Saturated fats don't have any double bond hence there is a no gap between carbon atoms, these fats are usually solid at room temperature because of these property they are often called "Solid fats." Saturated fats are not good for health and cause high cholesterol, eg Dalda, vanspathi ghee, margarine etc.

Larger number of carbon atoms is a bad fat (3).

Smaller number of carbon atoms is comparatively a good fat.

Nature of double bond is fats and oils

Double bonds may be Cis or Trans



Double bonds are always Cis in natural fatty acid.

Cis bond is good for health.

Tran's bond is bad for health. On heating Cis bond gets converted to Trans (4).

Cis bond is easier to metabolize in the body by enzymes but on heating Cis bond gets converted to trans, correspondingly it gets difficult for ATP enzyme to attack on bond and metabolize them. The fat/oil will not get digested by the body which will lead to accumulation of fat in the body. That is why it is recommended.

To avoid deep fried and processed food.

To not over boil oil.

Tran's fats are villains.

Trans fats are prescribed by health experts are quite unhealthy for human take (6). They are often referred "Sleath fat" because of the so much hidden fats inside it which regularly include on our meals every day.

Tran's fats are formed by rearranging of atoms, by the partial hydrogenation of unsaturated fatty acid.

They are formed by prolonged heating or frying of our food, which in turn loosening of an unsaturated fatty acid chains to a saturated chain(6). These fats are dangerous to human health in sense that Tran's fats are LDL type cholesterol which accumulates in the arteries. It further forms plaque which blocks them or form blood clots leads to many heart problems. Trans fats also lowers the HDL Levels Which removes the excess fat from the body.

TYPES OF UNSATURATED FATTY ACIDS

Monoenoic acids contain one double bond Dienoic and polyenoic acid / Poly unsaturated fatty acid (PUFA) - having many double bonds.

More the number of double bonds better is the oil (7).

The following table shows fatty art of commonly found fats /oil (8).

No. of carbon atoms	Saturated or unsaturated	Structure	Source
4	Saturated	CH ₃ – CH ₂ - CH ₂ -COOH	Butter
6	Saturated	CH ₃ – (CH ₂) ₄ - COOH	Butter
8	Saturated	CH ₃ – (CH ₂) ₆ - COOH	Coconut oil
10	Saturated	CH ₃ – (CH ₂) ₈ - COOH	Coconut oil
12	Saturated	CH ₃ – (CH ₂) ₁₀ - COOH	Palm kernel oil
14	Saturated	CH ₃ – (CH ₂) ₁₂ - COOH	Oil of nutmeg
18	Saturated	CH ₃ – (CH ₂) ₁₆ - COOH	Beef -Tallow

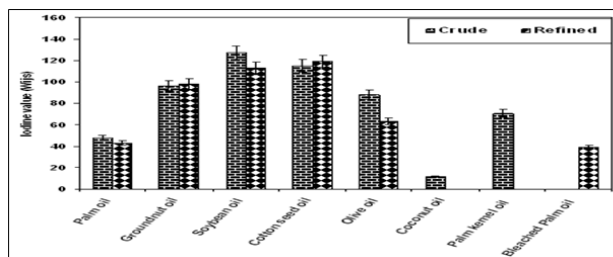
No. of carbon atoms	Saturated or unsaturated	Structure	Source
18	Unsaturated	CH ₃ – (CH ₂) ₇ CH = CH - (CH ₂) ₇ - COOH	Olive Oil
18	Unsaturated	CH ₃ – (CH ₂) ₄ CH = CH - CH ₂ - CH = CH - (CH ₂) ₇ -COOH	Soyabean Oil
18	Unsaturated	CH ₃ – CH ₂ (CH = CH -CH ₂) ₃ – (CH ₂) ₆ -COOH	Fish Oil
20	Unsaturated	CH ₃ – (CH ₂) ₄ (CH= CH -CH ₂) ₄ – (CH ₂ -CH ₂)-COOH	Liver Oil

Iodine number:-

The degree of unsaturation of fatty acid is found from their Iodine number. The Iodine value is measure of relative degree of unsaturation in oil components as determined by the uptake of halogen in Iodometric titration.

Fatty acids in Animal fats are usually saturated Vegetable oils. Generally unsaturated in nature (9). Higher is the iodine number better is the oil/ fat. Therefore it is recommended that vegetable oils and are better than animal fats for consumption.

Iodine Humber corresponding to various Oils



The mechanism of fat when enter the body:-

When fats enter into the body they are converted to cholesterol.

Cholesterol is formed to be waxy and belongs to sterol family of fats. These types of fats are present in the cells of animal tissue and absent in plant tissue. Our body makes its own Cholesterol in apt amount which is essential component of cell membrane and is needed to make certain hormones. Which helps to digest food? None of other dietary sources are required for its Produce. It has been prescribed that normal human being requires 200 mg to 300 mg cholesterol per day. This limit is solely fulfilled by our body itself Just one meal of unhealthy food can exceed this range If there is too much cholesterol in

our blood(10) ; it combines with other Substance present in Blood to forms. "Plaque" or fatty film deposit. This plaque sticks to the wall of arteries and build up which causes coronary artery diseases where in the arteries become blocked or narrow. Cholesterol in our body is transported to proteins hence they are also named as lipoproteins.

Lipoproteins are two types

LDL (Low Density Lipoproteins) is also called bad cholesterol.

LDL is formed Liver and Carry cholesterol to arteries.

HDL (High Density Lipoproteins) also called as good cholesterol.

HDL Carry cholesterol back to liver for elimination.

Saturated fats among all the fats increase the amount of LDL in our body. This causes formation of arterial plaque deposits on wall of arteries.

These plaques with time harden up, which leads to narrowing of arteries.

These obstruct the blood flow causes risk of heart attacks.

Saturated fats increases LDL the bad cholesterol in our body on the other hand HDL removes cholesterol. This intake of these fats should be avoided.

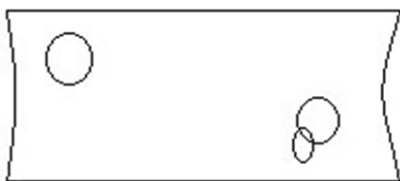
Poly unsaturated fatty acid (PUFA) increase the amount of HDL is our body which is considered to be good fat.

LDL/HDL Ratio:-

With the total levels of cholesterol, the LDL and HDL amount should also be monitored (12).

LDL/HOL ratio: With the total. levels of cholesterol, the LDL and HDL amount should also be monitored.

The ratio of LDL/HDL are often used to check the chances of a person to develop heart diseases The ratio should be less than 3 to 1 for minimal risk



Cholesterol in Arteries

LDL release Cholesterol HDL picks up Cholesterol

Due to the fear of heart and heath disease cause by

Consumption of bad fats and oils it is not suggested that we should stop eating all fats/ oils. The precautionary measures should take while Choosing a good quality of fat/ oil for the consumption.

Reduce the Intake of fat / oil and eat balanced diet.

3. Essential Fatty Acid:-

It has been found that not all fats are villains some of the fats are beneficial for us too some poly unsaturated fats are quite essential fatty acid so one need an Outside source for it.

Essential Fatty Acid Are:-

Are critical to our health

But cannot be manufactured by our bodies.

May reduce the risk of coronary heart diseases.

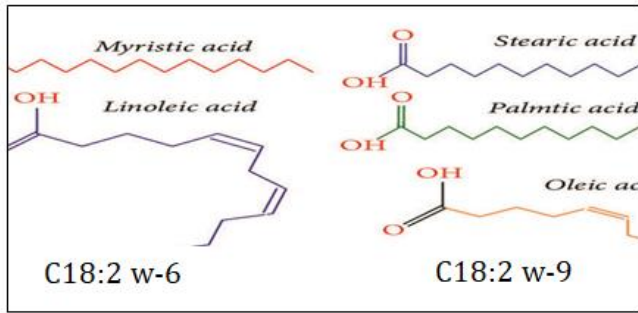
Can boost our immune systems

Few dietary foods which are taken by us are leafy vegetables.

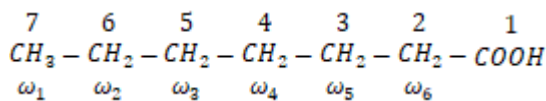
Walnut, fish, shell fish, flaxseed (Linseed)oil, Olive oil, soya oil and sunflower seeds.

The three major types of essential fatty i.e omega-3 Omega-6 and omega-9 fatty acid are tabulated.

Family name	Common name	Source
Omega-3	Alpha Linolenic acid	Canola and soyabean
	Eisosapentanoic acid	Oils, some nuts, flaxseed, Fish
	Docosahexaenoic acid	Fish
Omega-6	Linoleic acid	Corn flower, soyabean
	Arachidonic acid	Cotton seed and sunflower oil, animal products
Omega-9	Oleic acid	Canola, olive, peanuts oil, animals products, avocado



Omega-3, Omega-6 and Omega-9 are major kinds of fatty acids that are naturally found unsaturated fatty acids, where Omega-3, 6 and 9 indicates the position of double bonds at 3, 6 and 9 position from tail end of carboxylic acid group (11) Eg.



The three Omega acids ω_3 series Linolenic acid (18 : 3; 9,12,15) ω_6 series Linoleic acid (18 : 2; 9,12) ω_9 series Oleic acid (18 : 1; 9).

ω_6 series Arachidonic acid (20 : 4; 5,8,11,14) are poly unsaturated fatty acid (PUFA).

Arachidonic acid, Linolenic acid and Linoleic acid are also needed for the synthesis of important group of compounds namely Eicosanoids which is required for prevention of Psoriasis (characterized by the presence of horny eruption on the posterior and Lateral parts of limbs on the back buttock, loss of hair and poor wound healing).

It is one of the crucial essential fatty acid which our body cannot make. It has lot of uses is improving health and preventing body from disease. Like strokes, depression, arthritis, allergies, Circulatory problems, skin problems etc.

The intake of it improves various brain functions lowers triglycerides helps in hearts problems used to prevent blood clotting problems, reduces blood pressure and lowers the cholesterol Levels in body.

The unsaturated fatty acid which the body cannot synthesize and therefore must be consumed in the diet are referred to as essential fatty acids.

The fatty acids – linoleic and linolenic cannot be synthesized by humans these two are essential fatty acid.

Arachidonic acid can be synthesized from linoleic acid. However the conversion efficiency of linoleic acid to arachidonic acid is not clearly known in man. And for this reason some nutritionists recommended that it is better to include some amount of arachidonic acid also in the diet.

It has been recommended that at least 30 % of the dietary fat should contain PUFA.

It is proof beyond doubt that elevated serum cholesterol (>200mg/d) increase the risk of atherosclerosis and coronary heart diseases.

Essential fatty acids are the structural components of biological membranes participate in the transport and utilization of cholesterol. It prevents fat accumulation in the liver and also required for synthesis of prostaglandins.

The deficiency of essential fatty acid is associated with several complications these include impairment in growth and reproduction, increased BMR and high turnover of phospholipids. The essential fatty acid deficiency in human is characterized by scaly dermatitis.

The essential fatty acids more frequently called poly unsaturated fatty acid (PUFA) are pre dominantly present in vegetable oil and fish oils.

Food rich in omega 3 fatty acids are:-

Salmon fish

Mackerel EPA & DHA

Sardines fish : 2.2 gram EPA & DHA

Anchovies fish 1gram EPA & DHA

Chia seeds 4.9 gram ALA

Walnuts 2.5 gram ALA

Flaxseeds 2.3 gram ALA

Omega-6 is a type of poly unsaturated fats mostly found in plant fats. It plays an essential role in our body maintaining a hormone balance. It help in immune functioning, provides cellular energy and helps for proper brain functioning. The Limit of it's as intake should be monitored as too much of omega 6 can lead to Circulatory and heart problems.

Its example included Linoleic acid which can be converted into longer omega-6 fatty acid such as arachidonic acid. Conjugated Linoleic and (CLA) is another example of omega-6 fatty acid which has several health benefits.

The recommended ratio of omega-6 to omega-3 fatty acids in the diet is 4:1 less food rich in omega-6 fatty acid are :-

soya bean oil : 50g

corn oil : 49 g

walnuts : 37g

Sunflower seeds: 34g

Almonds: 12g

Cashew Nuts : 8 g

Omega 9 is the third type of are essential fatty acids. These are mono unsaturated fatty acid with example as oleic acid that is required most commonly in the diet. Omega -9 fats are most abundant fats in most cells in the body needed for several health benefits.

Researchers have proven that this type of essential fatty acid can prevent Alzheimer disease and even AIDS (13).

Food rich in omega- 9 fatty are:-

Olive Oil: 83 g

Cashew nut Oil: 73g

Almond oil : 70g

Avocado Oil: 60g

Peanut oil: 47g

Almonds: 30g

Cashews: 24g

Walnuts: 9g

4. GOOD OILS/ FATS

Good sources - cold water fish, walnut oil, flaxseed, soya and olive oil.

Omega -3 fats are best fats

CONCLUSION

Saturated and Trans fats are not good for health, it increases the LDL levels and causes heart diseases (12).

LDL/HDL ratio greater than 3:1 indicates average risk.

Unsaturated fats are good for health and should be included in the diet and recommended to avoid, cholesterol rich food (eg. Egg yolk) for better health.

Poly unsaturated fats like omega-3 omega-9 are very essential for human body and should be added in our rotation diet.

It has been recommended that fat intake is around 20 to 30% of daily calorie requirement, containing about 50% of PUFA.

Very high intake of PUFA may not be advisable. This is due to the fact that excess PUFA unless accompanied by antioxidant (Vitamin E, carotenes) is believed to be injurious to the cells due to over production of free radicals.

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