**Nutritional virtues of oils**

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Lipids are the fatty acids and their derivatives, and substances related biosynthetically or functionally to these compounds. Major source of lipids is vegetable oils. Oils and fats are the major component of lipids. Fats are solid or semi-solid at room temperature while oils are liquid at room temperature.Oils & Fats have caloric and nutritional value and provides 9 kcal/g, increase palatability of food, enhance flavor and modify the texture of foods, delays digestion, impart the feeling of satiety, associated with the fat-soluble vitamins A, D, E and K, and the absorption of these vitamins is impaired at very low fat intakes.

Oils may be animal, vegetable, or petrochemical in origin, and may be volatile or non-volatile. Fatty acids are the building blocks for acyl glycerols. The natural oils and fats contain saturated and unsaturated fatty acids. The most common fatty acid acids and melting points are provided in table 1.

Table 1: Fatty acid present in oils and fats

|  |  |  |
| --- | --- | --- |
| **Common Name** | **Molecular weight** | **Melting Point, °C** |
| Caproic | 116.16 | -2.0 |
| Caprylic | 144.21 | 16.5 |
| Capric | 172.26 | 31.3 |
| Lauric | 200.31 | 43.6 |
| Myristic | 228.37 | 53.8 |
| Palmitic | 256.42 | 62.8 |
| Stearic | 284.47 | 69.9 |
| Arachidic | 312.52 | 75.3 |
| Behenic | 340.58 | 79.8 |
| Lignoceric | 368.63 | 84.1 |
| Myristoleic | 226.35 | 54.4 |
| Palmitoleic | 254.40 | 1.5 |
| Oleic | 282.45 | 13.4 |
| Elaidic | 282.45 | 51.5 |
| Linoleic | 280.44 | 6.5 |
| Linolenic | 278.42 | 12.8 |
| Elaeostearic | 278.42 | 49.0 |
| Ricinoleic | 298.46 | 17.0 |

Fats and oils are mostly used for salad dressing and cooking includes coconut, corn, cottonseed, olive. Palm, groundnut, sunflower, safflower, sesame, rice bran and mustard etc.

Groundnut, sunflower and safflower oil can be used in different forms of cooking such as frying, seasoning and grilling. These oils are good source of Omega 6 fatty acids and vitamin E. vitamin E is known to act as an anti-oxidant by protecting the skin from   
acne or scars. Canola oil and mustard oil has high smoke point, thus making it ideal for high-heat applications like sauteing, frying and grilling. It also has a good content of Omega 3, 6 and 9 fatty acids which help in maintain good cholesterol levels. It is ideal for Indian cooking as it doesn't overpower the flavour or taste of the ingredients.  
Olive oil is rich source of Omega 9 fatty acids, vitamins and phenolics. It can be used very well for salads and appetizers. Rice bran is popularly known as heart oil /golden health oil. It has a balanced fatty acid profile, natural antioxidants (Oryzanol, Tocopherols and Tocotrienols), and lower retention in foods. It contains 1-2% of alpha linolenic acid which is sufficient to meets the requirement of n-3 Fatty Acids.

The consumption pattern of fats and oils in world varies according to geographical region and availability. The Indian Council of Medical Research (ICMR) and American Heart Association (AHA) recommended that best possible health benefits can be attained by consuming equal proportions of SFA, MUFA and PUFA (Table 2). The above said composition is not accessible from any single fat/oil found from natural sources. The characteristics of any fat/oil can be modify through blending, fractionation, hydrogenation or combinations of these processes offers greater functionality to food and allied industries.

Table 2: Recommendation of fatty acids in diet

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S |  | MU |  | PUFA |  |  |  |  |  |  |
| 1 | : | 1 | : | 1 | 33.3 | : | 33.3 | : | 33.3 | (American Heart Assn.) |
| 1 | : | 1.5 | : | 1 | 28.5 | : | 43 | : | 28.5 | (Japan’s Ministry of  Health & Welfare) |
| 1 | : | 1.5 | : | 0.7 | 31 | : | 48 | : | 21 | (WHO) |

Vegetable oils do not contain cholesterol. Animal fats, coconut oil and palm oil are full of saturated fatty acids. It is known that saturated fatty acids accelerate the metabolism of cholesterol. Human body cannot synthesize poly unsaturated fatty acids (PUFA). PUFAs are essential fatty acids and we have to supply to body. (n-3) Fatty acids like Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) play important role as neutraceuticals. DHA is the primary structural lipid in human brain tissue and is poorly synthesized by infants. Babies need DHA when their brains are developing and primary source of DHA for infants is breast milk. Breast milk fats have a high proportion of unsaturated fatty acids at position 1 and 3 together with palmitic acid at position 2. The vegetable based oils usually used in the baby formula have a saturated fatty acid, such as palmitic acid, at position 1 and 2. This palmitic acid released into the gut upon hydrolysis by pancreatic lipases where it tends to form soap with calcium ions. The calcium soaps are excreted in the faeces leading to constipation and excessive stool hardness. It also leads to a loss of calcium. n-3 fatty acids essential in growth and development throughout the human life cycle. Diets rich in n-3 fatty acids increase HDL cholesterol and decrease LDL levels. Fish oil is the major source for DHA and EPA. High PUFA on frying undergoes polymerization and produce free radicals these free radicals are the main cause for many diseases including cancer. Availabilty, price and fatty acid composition (Table 3) of the oils are the important criteria for selection. Vanaspati (hydrogenated vegetable fat) is also called poor man’s ghee. Vanaspati formed by unsaturated fatty acid (oils) with hydrogen in presence of catalyst to convert it into saturated fatty acid (ghee). This hydrogenated fat contains traces of catalyst and 20-35% trans fatty acids (Elaidic acid – trans). Both metal and trans fats are harmful for the body. Now according to the new regulation of government Trans fat should not be more than 10%.

In the past, man used to work from dawn to dusk. Now everything is replaced by machinery, Man is facilitated physically to a greater extent but he has not reduced his diet. Man becomes fat and obesity is directly proportional to CVD. Fat deposits interfere in natural working of body. They block the vessels and cause many diseases and deaths in acute cases. Now a days effort are being made towards trans free vanaspati and structured lipids. In conclusion we can say that oil consumption is very essential to provide energy and for bioavailability of nutrients but fat quality and quantity should be monitored.

Table 3: Fatty acid composition of common edible fats and oils

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Oil** | **8:0** | **10:0** | **12:0** | **14:0** | **16:0** | **16:1** | **18:0** | **18:1** | **18:2** | **18:3** | **20:0** | **20:1** | **22:1** |
| **Cocoa butter** |  |  |  | 0.1 | 25.8 | 0.3 | 34.5 | 35.3 | 2.9 |  | 1.1 |  |  |
| **Coconut** | 8.0 | 6.4 | 48.5 | 17.6 | 8.4 |  | 2.5 | 6.5 | 1.5 |  | 0.1 |  |  |
| Palm kernel | 3.9 | 4.0 | 49.6 | 16.0 | 8.0 |  | 2.4 | 13.7 | 2.0 |  | 0.1 |  |  |
| **Palm** |  |  |  |  | 45.1 | 0.1 | 4.7 | 38.8 | 9.4 | 0.3 | 0.2 |  |  |
| **Olive** |  |  |  |  | 13.7 | 1.2 | 2.5 | 71.1 | 10.0 | 0.6 | 0.9 |  |  |
| Groundnut |  |  |  | 0.1 | 11.6 | 0.2 | 3.1 | 46.5 | 31.4 |  | 1.5 | 1.4 |  |
| **Rice bran** | 0.1 | 0.1 | 0.4 | 0.5 | 16.4 | 0.3 | 2.1 | 43.8 | 34.0 | 1.1 | 0.5 |  |  |
| **Mustard** |  |  |  | 1.4 | 3.8 | 0.2 | 1.1 | 11.6 | 15.3 | 5.9 | - | 6.2 | 41.1 |
| **Corn** |  |  |  |  | 12.2 | 0.1 | 2.2 | 27.5 | 57.0 | 0.9 | 0.1 |  |  |
| **Cottonseed** |  |  |  | 0.9 | 24.7 | 0.7 | 2.3 | 17.6 | 53.3 | 0.3 | 0.1 |  |  |
| **Sunflower** |  |  | 0.5 | 0.2 | 6.8 | 0.1 | 4.7 | 18.6 | 68.2 | 0.5 | 0.4 |  |  |
| **Safflower** |  |  |  | 0.1 | 6.5 |  | 2.4 | 13.1 | 77.7 |  | 0.2 |  |  |
| **Soybean** |  |  |  | 0.1 | 11.0 | 0.1 | 4.0 | 23.4 | 53.2 | 7.8 | 0.3 |  |  |
| **Linseed** |  |  |  |  | 4.8 |  | 4.7 | 19.9 | 15.9 | 52.7 |  |  |  |
| **Sesame** |  |  |  |  | 9.9 | 0.3 | 5.2 | 41.2 | 43.3 | 0.2 |  |  |  |