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FACTS ABOUT FATS

Brochure for Consumers

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PREFACE

The role of dietary fats and oils in human nutrition is one of the most important areas of concern and investigation in the field of nutritional science. It is in everyone' s interest to know what effects fats and oils in diet may have upon human health. The general public wants to be assured that fat and oils are wholesome and safe; the food industry which sales oil based products to the publics is equally concerned. Research on the nutritional aspects of oil and fats conducted, intensively at NIFA for over twenty years. The findings of these investigations have wide ranged benefits implications for consumers, health care providers and nutrition educators, as well as food producers and distributors. New evidence concerning the benefits and risks associated with particular aspects of dietary fat is constantly emerging in both the scientific literature and the popular media. In view of increased use of different oils and fats and frequent occurrence of heart related health problems, it is, therefore, imperative to create awareness among the masses about chemical and nutritional aspects of oils & fats. This brochure is intended to give a simple introduction to consumers who are interested in seeking facts about oils/fats. The information is presented against the background of a brief account of summary of current concern on the relationship between dietary fats and human health. Yet, this task is essential because changing views about the effects of dietary fats and oils can profoundly influence the consumption of various foods and, ultimately, health and nutritional status, food processing technologies, food marketing practices and nutrition policy action.

Introduction

Fats /Oils

Fats/oils are combination of glycerols and fatty acids. These are predominantly triglycerides, and comprised of, fatty acids, hydrocarbons, fat-soluble vitamins, waxes, phosphoglycerides, sphingolipids, sterols, pigments, antioxidants and other minor components. Main sources are plants and animals.

What useful functions do fats have?

Dietary fats and the nutrients associated with it play an important role in health and functioning of the human body.

- **Source of Essential fatty acids** required for physiological functions.
- **Carrier** of fat-soluble vitamins (A, D, K and E).
- **Energy Source**: Highest source of energy (9.5k cal/ gram).
- **Body Insulation**: The fat under skin and around the vital organs protects against temperature change and injuries.
- **Chemical Messengers**: Synthesized from fat, control all body functions i.e. blood clotting, blood pressure, immunity, inflammation etc.
- **Richest Source** of Vitamin "E"(natural antioxidant).
- **Source of ß-carotene** (precursor of Vitamin A).
- **Act as fuel**
- **Body weight**, 15 % of men &, 25 % of women are made up of fat.

What are the primary building blocks of fats?

Fatty acids are the primary building blocks of fats. It influences the physical and chemical characteristics and contributes 94-96% of the total weight of fat molecule. Fatty acids may be saturated, monounsaturated or polyunsaturated.

- **Saturates** straight chain, having no double bond
- **Monounsaturates** having one double bond
- **Polyunsaturates** contains more than one double bond.

The body has a balance requirement for all types of fatty acids. About 80 % of the ingested fat and the saturated and unsaturated fatty acids it contains, are stored in special cells and burnt up as and when required.

What are essential fatty acids and their functions?

The unsaturated fatty acids e.g. linolenic and linoleic are being referred as essential fatty acids. They cannot be synthesized by the body but provided by the dietary sources. They are also known as omega-1, omega-2, omega-3 or vitamin F. Minimum dietary requirement in children is 4% and in adult is 1% of total calories.

Functions: -

- Control plaque formation and blood pressure.
- Promote body defense against cancer and infections.
- Regulate body growth.
- Balance water loss from the body.

Guideline for avoiding rancidity:

- Use of the lowest practicable storage and process temperature.
- Reduce excess of air.
- Minimize interaction with metals.
- Use of proper packing.
- Maximize the retention of Natural/ antioxidants.
- Use permitted levels of Synthetic antioxidants.

FAO/WHO recommended energy intake from fat.

Minimum recommended levels

- Normal health and growth 30-40% (saturated fat > 10%)
- Adults 15%
- Active individual 35%
- During lactation and pregnancy 20% (minimum requirement)
-

Work at NIFA

Tremendous R&D and Human Resource Development work on various aspects of edible oil and fats is being undertaken at NIFA. Comprehensive research studies on characterization, chemical and biological evaluation of conventional and non-conventional edible oils are being conducted. The technical benefits achieved are described below in brief:

- Effect of ionizing radiation, artificial light, sunlight and temperature on commonly consumed fats and oils were tested for their stability. The oils, which contained substantial amounts of natural antioxidants, were found more stable. Gamma rays, sunlight and thermal stress had similar effect on stability of oils.

Stability under fluorescent light

Active Oxygen Method

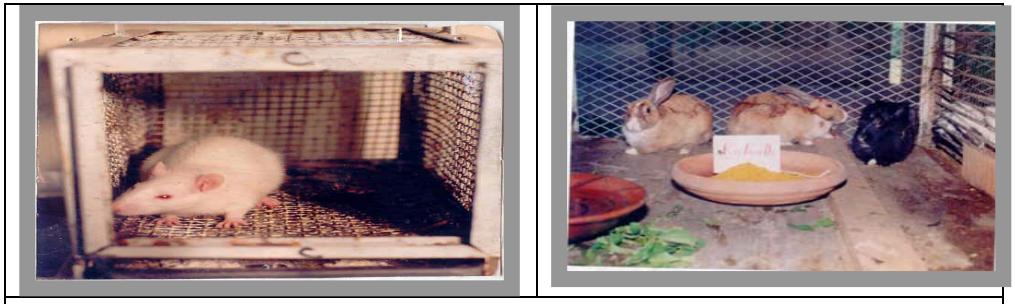
Scientist at Work

- The quality of used fried oils was improved by activated charcoal powder (10%) and MgO (6%) and could be reused for frying.
- Various essential oils (clove, red pepper, sesame, cumin, citrus peel oil and caraway oil) were tested for their antioxidative behavior in comparison with that of common synthetic antioxidant BHT. Clove oil at 0.5% level

produced antioxidative power similar to that of produced by BHT at 0.02%. More natural products are also being tried in this regard.

- Comparative physiological evaluation of different oils/fats in relation to their saturation and micronutrients status were studied using model animals and human subjects. The dietary oils having equal ratio of mono, poly and saturated fatty acids along with beneficial micronutrients were found more hypolipemic.

- Fortification of vegetable ghee, with Red Palm Oil as a natural source of β- Carotene improved Vitamin A status by an average of 35% in blood picture of volunteers belonging to northern, central and southern parts of Pakistan.
- Fortification of vegetable oils with Seabukthrorn oil (indigenous source of β- Carotene) to improve Vitamin - A deficiency and lipid metabolism is in progress.
- The seed oil of *Silybum marianum* (a weed) was found similar in fatty acid composition with sunflower oil. Nutritional studies to evaluate this oil for those of edible purpose are in progress.



Animals Bioassays

Human Studies

Did you know about artificial or tarns fatty acids?

In the Naural State all the fatty acids have typical cis configuration between hydrogen and carbon atoms. Hydrogenation converts the liquid oils to semi solid form, by the addition of hydrogen to the unsaturation in the fatty acids. This helps to increase the stability of the fat or oil. As a result of hydrogenation, fatty acids are isomerismed to trans fatty acids, which may have an adverse effect on health. They are found very rare in nature so these are also known as artificial fatty acids.

Harmful effects of trans fatty acids

- Compete with essential fatty acids.
- Raise total cholesterol and low density lipoprotein (LDL) cholesterol.
- Lowers high-density lipoprotein (HDL) cholesterol and Total/HDL cholesterol ratio.
- Interfering with fat metabolism.
- Enhancing fatty deposits in the arteries
- Raise levels of triglycerides.
- Increase risk of diabetes, hypertension, and cardiovascular diseases.

World trends in consumption of oil and fats

Population growth, economic progress, urbanization and greater dietary diversity lead to an increase in the consumption of oil and fats. The average annual per capita consumption of fat is around 8kg in the most populous nations of Asia as compared with 16 kg for the world and more than 40 kg for the developed countries.

Status of oil and fats in Pakistan

❖ Pakistan is facing a serious shortage of edible oils for the past several years.

Edible oil availability

- Local production = 494,000 tones/annum
- Import = 1200,000 tones/annum
- Per capita availability = 10.24 Kgs/annum.

❖ During last two decades, consumption of edible oil has increased from 0.3 million tons to 1.9 million tons due to population growth, urbanization, and increase in per capita income.

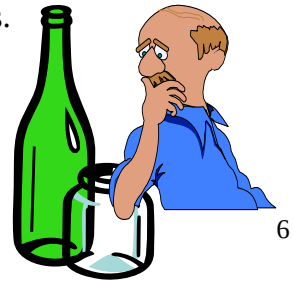
❖ The domestic oil production caters only 30% of the requirement, while the remaining 70% are imported.

❖ About 75 % of the total foreign exchange reserved for import of all food commodities spend on import of edible oils only

❖ Pakistan is world's fourth largest edible oil importer, and its import bill is second to its energy import bill.

Quality deterioration or rancidity

Like other products fats and oils are also trade commodities which are used both in food and industry. One of the major problems in fat is the development of rancidity due to oxidation, with the resultant loss of quality and acceptability. The oxidized oils not only deteriorate the taste of foods to which they are added but also not well from aesthetic point of view. The overall effect of oxidation appears in unnecessary economic loss and many health problems.



Answers to consumers' questions.

Which oil or fat is best?

American Heart Association (AHA) has recommended a diet having 30% fat energy in which the saturates, monounsaturates and polyunsaturates are distributed in an equal ratio of 1:1:1.

Did you know about omega-3 fatty acid?

The unsaturated fatty acids are classified as omega-1, omega-2, omega-3 and so on, based on where the first unsaturation (double bond) appears, counting from the terminal carbon.

Should saturated fat be avoided?

Saturated fatty acids, particularly medium chain fatty acids such as lauric and capric acids, play an important role in supporting the immune system. Palmitic acid is also an important structural storage lipid and oxidized as a source of energy by the body. Saturated fatty acids are also major components of phospholipids and can be regarded as essential component of the membrane structure.

Is all saturated fatty acids are equivalent in their cholesterolemic effects?

The medium and short chain fatty acids are handled by the body like carbohydrates than fats and have no effect on plasma cholesterol concentrations. Palmitic acid is neutral in its ability to raise the serum and LDL Cholesterol. Stearic acid is comparable to oleic acid in its cholesterolemic effects. Only myristic acid increases the level of cholesterol in the blood, whereas stearic acid has no effect, and the polyunsaturated linoleic acid decreases it.

Is cholesterol a harmful substance?

Cholesterol has a number of important biological functions. It is essential for the function of cellular membrane and lipoprotein particles and necessary for the formation of steroid hormones, bile acids and vitamin - D. It is the important constituent of cell membrane, including nervous tissues and brain. Low cholesterol levels are associated with poor performance on a variety of cognitive measures. Cholesterol may not be harmful until it has undergone oxidation.

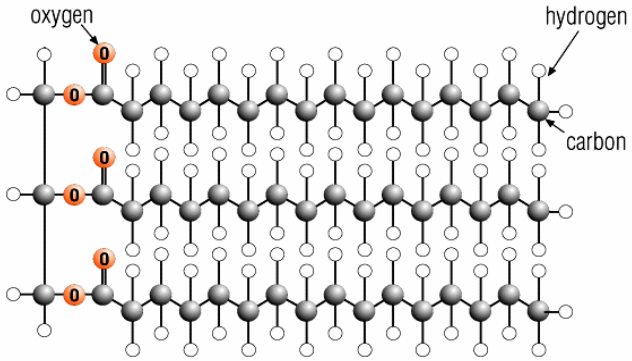
What is good and bad cholesterol?

- HDL cholesterol 'good' cholesterol takes cholesterol out of tissues and blood stream.
- LDL cholesterol 'bad' cholesterol takes cholesterol into the blood stream and tissues. Current knowledge suggests that oxidized LDL cholesterol may be culprit in the process of clogging the arteries, which leads to heart failure or stroke.

Don't panic about fat?

Most people need to reduce their fat consumption somewhat. But body needs fat to function properly and to help it use the fat -soluble vitamins, A, D, E and K, low intake of which could cause many health problems and risks.

An informed public is capable of arriving at correct conclusions in every day nutritional matters. We hope that you will find this brochure useful and informative on the subject of Facts about Fats and its many applications in our daily life.



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