

PATTERN OF EDIBLE OIL CONSUMPTION AND DIABETES MELLITUS

B.D. Punekar*

Lipids are important constituents of all body-tissues but data on fat consumption in developing countries is scanty. One of the reasons is fat comes to us in two forms, namely, visible and invisible fat. Even though, the consumption of visible fat could be easily determined, it is difficult to assess the invisible fat in the various articles of food consumed. The other reason may be to exactly determine the optimum levels of fat consumption when a wide variation exists in the consumption levels.

Edible oils play an important role in the body as carriers of essential fatty acids (EFA). EFA are not synthesised in the body but are needed through the diet to maintain the integrity of cell membranes. They are also needed for the synthesis of prostaglandins which have many vital functions to perform in the body.

Sources of Edible Oils

Groundnut is our predominant crop covering almost half the total vegetable oil production, whereas, rape/mustard constitutes about a quarter of the vegetable oil production in India. Besides, palm oil, coconut-oil, soyabean oil, safflower oil and sun-flower oil form the remaining part of our total vegetable oil production. Groundnut is a crosspollinated crop and hence genetic engineering may increase its yield. However, presence of aflatoxin in its oilcake has limited its use. Many varieties resistant to mould growth have been developed. Using seed irradiation, mutants with a higher oil yield have been developed brightening the prospects of this groundnut oilseed as a major source of edible oil in India.

Palm kernel and palm oil production is more dependent on climatic factors and hence the crop can grow only in Kerala, Little Andaman Islands and a few other hot humid areas: Sunflower has been considered a very rich source of oil in many developed countries but due to limited bee activity in India the seeds are not fully filled with oil and hence the production of oil is very poor. Soyabean even though, extensively advertised has never been considered a good source of oil due to its poor oil content A (16-18 per cent). The Table No. 1 on supply and demand of Edible Oils in India (1) shows the gravity of the situation.

* Professor and Head, Department of Biochemistry, Krishna Institute of Medical Sciences, Karad-415110.

Table I
Supply and Demand of Edible Oils in India

	1970-71	1976-77	1980-81	1984-85
	(Million Metric Tonnes)			
Supply	2.50	2.54	3.03	-
Demand	3.10	3.45	3.48	-
Deficit	0.6	0.90	1.45	3.6 (estimated)

The presently estimated deficit level is further going to increase to 7.7 million tonnes by the year 2000 A.D.

The variety of vegetable edible oils commonly consumed in India and their production levels are presented in Table 2.

Table 2
Annual Production of Edible Oils in India

Type	Production (in tonnes)
Groundnut Oil	14,00,000
Mustard Oil	6,00,000
Sesame and Coconut-oil	1,50,000
Sunflower Oil	1,00,000
SatHower Oil	25,000
Soyabean Oil	10,000

Nutritional Significance

Studies (2,3,4) on fat consumption levels of different-regional groups in India have revealed that about 13 g. to 20 g. of visible fat is on an average available daily to a resident of this country. This consumption works out to be 8-10% of the total energy supplied by our diet. On comparison to 30-40% of total energy derived daily from fats in the diets of populations from the developed countries with the daily capita levels of fat intake ranging from 70 g. to 150 g., our daily fat intake through the diet is very low. Another major factor to be taken into consideration is animal fats are predominant in the diet of people from the developed countries. The daily dietary allowance of fat recommended by the ICMR is 34g. of fat or about 25% of total calories. However, a wide

variation in the visible fat consumption levels as reported by Achaya (5, 6, 7) ranging from 9.5 g. (Karnataka), 10.5 g. (Tamilnadu), 11.0 g. (Maharashtra), 18.0 g. (Gujarat), 21.7 g. (Kerala) and 25.7 g. (Calcutta) have been observed. These variations may be ascribed to the different income-levels, total calorie intakes and the specific culinary practices in each state.

Studies on Diabetic Subjects

With the background information on the fat consumption pattern of various states in India and the edible oil production position in the country, an attempt is made in this paper to compare the nutrient intake of visible, invisible and total fat in diabetic subjects and in normal healthy individuals.

20 diabetic patients of the out-patient, and in-patient departments of Krishna Hospital and Medical Research Centre, Karad were chosen for the study. Information on the type of their job, urban/rural origin, duration of diabetes mellitus, monthly income, the monthly amount spent on purchase of food, and the type of edible oil used for cooking was collected. A detailed composition of their daily food prior to a referral to the hospital was collected by the oral-questionnaire. The diet-sheet was evaluated for nutrient composition with particular reference to consumption of fat. The figures obtained for nutrient intake were then compared to the standard values of a group of normal healthy individuals who served as controls.

Table 3 gives the average nutrient consumption (in grams) of diabetic subjects.

Table 3
Daily Nutrient Intake of Diabetic Subjects

Nutrients	Average Consumption gm
Carbohydrates	231
Proteins	47
Fibre	6
Total Fat	28
Calories (Kcal.)	1364

The average daily calorie intake of 1364 Kcal. in a group of diabetic subjects is, well within the calorie restriction of a diabetic diet reflecting thereby the adequacy of carbohydrates, proteins and fibre content of the diet. The total daily fat consumption of 28g. even though, less than the ICMR recommendations for healthy individuals is again in keeping with the calorie intake for a diabetic diet. In a study (5) on daily total fat intake of the populations of some states in India, the fat intakes come to 36.1 g. in Gujarat, 42.1 g.

in Calcutta, 41.3 g. in Punjab and 49.5 g. in Kerala constituting 17, 27, 13 and 23 per cent, respectively averaging 20 per cent, of total .calorie intakes in those areas.

Calorie-wise daily average intake of nutrients of diabetic subjects is presented in Table 4. It is seen that as the calorie intake increases there is also a proportionate rise in the intake of carbohydrates, proteins, total fat and fibre. With regard to fat intake, it fully supports the findings of a study by Achaya (5) on fat intakes of two groups of families with different income levels having a food expenditure ratio of about 1: 3. The fat consumption in our diabetic subjects reveals a similar trend showing thereby that as the income goes up, so does the consumption of calories and almost proportionately the consumption of fat.

Table 4
Calorie-wise Daily Nutrient Intake of Nutrients of Diabetic Subjects (g/day.)

Group	Calories (Kcal)	Carbohydrates	Proteins	Total Fat	Fibre
Upto 1000 Kcal Between	873	134	33	22	4.06
1000-1500 Kcal.	1333	224	42	30	4.09
Above 1500 Kcal.	1884	335	65	34	9.36

Quality of Fat

Different States in India have preferences for different fats. Hence, the specific edible oil consumption is variable in each State. Kerala consumes coconut-oil, Calcutta City rape/mustard oil, whereas, Maharashtra and Gujarat prefer groundnut oil. Hence, the edible fatty acids derived from visible fat differ region-wise. With this in view, it was thought worthwhile to study the quality of fat intake of visible, invisible and total fat of diabetic subjects.

The diet sheets of the diabetic patients were evaluated for their daily average visible fat intake which amounted to 11 g. on the basis of the values of daily total fat and visible fat consumption, the theoretical value of invisible fat was calculated which amounted to 17 g. Visible fats constitute half of our total fat intake and hence the part played by invisible fats arising out of cereals and pulses which are generally high in linoleic acid (40 to 60 per cent.) play an important part in our diet. Eggs, milk and fish are generally low in linoleic acid (2 to 8 per cent).

Fatty acid intake through all the fats in the common diet of the population in the country shows that linoleic acid is derived mainly from the invisible fat constituting 17 to 28 per

cent with an average of 22 percent of total fatty acid intake. In the diabetic subjects the daily average linoleic acid from the invisible fat calculated on the theoretical basis worked out to be 6.8 g, which is 24 per cent of the total intake of fatty acid and fits in well in the percentage range reported above for different population groups of the country. The saturated fatty acids constitute 23 to 60 per cent with an average of 40 per cent of the total intake of fatty acids. In diabetic subjects the theoretical value worked out to be 70 per cent of the total fat consumption.

Summary

An attempt is made in the present paper to evaluate the edible oil position with regard to its production, demand and supply, preferences by the regional groups in the country and its nutritional significance. The daily nutrient intake of diabetic subjects with special references to fat consumption showed that it was lower than the figures quoted for general population. Calorie wise fat consumption of the diabetics showed that as the income goes up so does the consumption of calories and almost proportionately the consumption of fat. The quality of edible fats judged on the basis of its linoleic acid content fell well within the percentage range of total fatty acid intake of the diabetic subjects. In general, the diabetic subjects followed the same pattern of edible oil consumption as the general population. The lower values of edible oil consumption is mainly due to the calorie restricted diet.

References

1. National Institute of Nutrition. Nutritional significance of unconventional edible oils. Nutrition News. (1985) 6, No. 1 January.
2. Protein Foods Association of India, Bombay. Food habits survey in Gujarat and Maharashtra, 1969.
3. Protein. Foods Association of India, Bombay. Food habits survey conducted in Southern India, 1972.
4. Hindustan Thompson Associates Ltd., Calcutta. A survey of food habits in Calcutta U.S. Agency for International Development, New Delhi, 1972.
5. Achaya, K.T. Pattern of fat intake in developing countries. Ind. J. Nutr. Dietet (1979). 16, 215-218.
6. Achaya; K.T. How short are we of edible oil? Bulletin of the Nutrition Foundation of India., January, 1981.
7. Achaya, K.T. Fats in our Food. Ind. Food. Ind., (1984). 3, 13-16.