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Determination of Animals' Fats and Their Consumption by Women of Different Age Groups

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Abstract: Determination of fats in different types of meat was carried out. These results showed that crude fat contents in beef, mutton, poultry and fish were 8.00, 13.04, 12.00 and 8.00 % respectively. Acid value of beef, mutton, poultry and fish was 2.5, 2.72, 1.6 and 8.00 respectively. Saponification number of the fats from these animals was 189, 180, 183 and 185 respectively. Iodine values were 45.3, 46.7, 60.0 and 109.2 respectively. The women of different age groups; 20-40 years, 30-40 years, 40-50 years and 50-60 years consume 9.9, 7.8, 5.4 and 4.6 % of fat through diet per day. This study also indicates that with increase in age dietary fat intakes decrease. By determining the remaining components of food like carbohydrates, proteins, vitamins and minerals, a proactive food chart can be developed that will be helpful to control the complications of diet among the different groups of women.

Key words: Animals' fats, chemical constants, woman, meat

Introduction

Fats are solid at room temperature due to preponderance of long chain fatty acids (Devilin, 1997). Chemically, these are the esters of fatty acids and glycerol. In triacylglycerols all hydroxyl groups are esterified with acids. Fats are contained in butter, margarine, salad dressing, dairy products, nuts and chocolate. Adipocytes synthesize and store them which hydrolyzed into fatty acids and glycerol. Formers directly enter into Krebs's cycle via acetyl-CoA by passing glycolysis and gluconeogenesis (Voet and Voet, 1995). Fats perform several functions: They are responsible to increase palatability of food by retaining flavors and produce satiety due to slow digestion. In body, all cells except erythrocytes and nervous system use fatty acids as source of energy. Ketone bodies which are the derivatives of these acids are used by brain in starvation. Dietary fats facilitate absorption and transportation of fat soluble vitamins (Mayer, 2000; Carola *et al.*, 1991). These are the concentrated source of energy which provides 9 kcal per gram, more than twice as available from an equal mass of carbohydrates and proteins (Zubay, 1998; Schumm, 1988). High accumulation of fat in body develops heart diseases, breast's cancer, and obesity. Obesity causes hypercholesteremia, hypertension, type II diabetes and stroke (Anonymous, 1991). One major factor underlying the etiology of obesity is dietary imbalance and physical inactivity (Khan and Khan, 2004). The association of fat intake with certain types of cancer is still unexplained (Mayer, 2000). Meat and fish are the good natural source of dietary fat, proteins, vitamins and minerals. In an average diet considerable amount of energy is supplied by animal's fats which also provide protection, insulation and fat

soluble vitamins (Huma and Ali, 1996). Chemical analysis of meat is required for its quality control, nutritive assessment, durability and stability. The main aim of this research work is to evaluate fat's status in different types of meat and their daily consumptions by women of different age groups. Moreover, some chemical constants of meats were also determined.

Materials and Methods

The study was carried out in the Department of Chemistry, University of Azad Jammu and Kashmir Muzaffarabad during March to August 2005. For the estimation of fat in animal tissues, sample of fish, freshly slaughtered beef, mutton and poultry were procured from local butchers on different days. After removing fatty tissues and bones, the prepared sample was cut into small pieces and crushed in an electric mincer. Each sample was mixed and kept in dry, clean, airtight jar, labeled and stored in a refrigerator until used. Fat was estimated by using soxhlet extraction technique (AMIF, 1960). Diethyl ether was used during the study; its low boiling point and non-polarity make it useful for crude fat extraction (Cocks and Rede, 1960). Moisture percentage, some chemical constants of the fats such as acid value, Saponification and iodine number were studied according to AOAC methods (1984).

Results and Discussion

Fat content is a variable component in the animal tissues. The amount of fat depends upon the meat cut and the quantity of fat left after cutting and trimming. Soxhlet extraction technique was adopted for fat determination. The average crude fat in beef, mutton, poultry and fish is given in Table 1. The fat contents were found to be higher in mutton (13.04 %) and lower in beef

Table 1: The fat extracted (g %)* from different animals' tissues

Nutrient	Beef	Mutton	Poultry	Fish
Amount of extracted fat	8.00	13.04	12.00	8.00

*Average of three measurements

Table 2: Moisture content (percent) in different animals' tissues

Beef	Mutton	Poultry	Fish
76.79	74.11	73.98	81.12

Table 3: Characterization of fat from different animals' tissues

Constituents	Beef	Mutton	Poultry	Fish
Acid value(mg KOH/g fat)	2.5	2.72	1.6	8.0
Saponification (g/100g fat)	189.0	180.0	183.0	185.0
Iodine value(g/100g fat)	45.3	46.7	60.0	109.2

Table 4: Statistical evaluation of the results

Age (Year)	Beef (g)	Mutton (g)	Poultry (g)	Fish (g)	Total fats (g) Intake/day by Women
20	0.78	-	1.37	-	2.15
22	-	0.71	0.68	1.20	2.59
23	0.39	-	1.37	-	1.76
26	-	0.71	-	0.80	1.51
28	0.39	-	6.86	2.40	9.65
30	-	-	2.74	0.40	3.14
21	3.50	4.24	6.17	0.80	14.71
24	3.11	5.31	2.74	1.60	12.76
26	1.94	2.83	1.37	1.60	7.74
28	6.99	4.25	16.80	4.00	32.04
30	4.30	-	16.80	-	21.10
31	-	0.35	1.37	0.40	2.12
32	0.39	3.35	2.74	-	3.48
35	-	-	2.74	0.40	3.14
37	-	0.35	1.37	-	1.72
40	0.78	-	0.68	0.40	1.86
32	2.33	3.18	3.43	1.60	10.54
31	5.83	3.18	2.74	0.40	12.15
34	6.99	3.18	-	1.60	11.77
39	7.77	5.66	4.11	1.60	19.14
38	9.32	5.66	4.01	0.40	19.38
40	-	-	-	0.80	0.80
42	0.39	1.06	2.06	0.40	3.91
43	-	-	-	0.80	0.80
45	-	0.71	1.37	0.40	2.48
47	0.39	0.71	1.37	-	2.47
40	3.11	1.42	2.74	-	7.27
41	3.88	4.25	-	0.80	8.93
44	-	-	8.23	1.20	9.43
46	-	-	8.23	0.40	8.63
50	2.33	1.42	2.74	0.80	7.26
50	-	-	2.06	0.80	2.86
55	-	0.71	2.06	-	2.77
57	-	-	1.37	2.40	3.77
51	2.33	1.42	2.74	0.80	7.29
54	-	-	2.06	0.80	2.86
58	-	2.83	1.37	-	4.20
59	1.16	1.42	4.11	-	6.69

and fish i.e; 8% in each case. The fat contents in poultry were 12%. The fat determined in beef is closed to the previous values (Forrest *et al.*, 1975; Romans and Ziegler, 1977; Ono *et al.*, 1986; Pettinati and Swift, 1977). The fat amounts in mutton and poultry are closed to the

values obtained by Forrest *et al.* (1975) but differed the results of Ziauddin *et al.* (1996). In fish, estimated average fat is in good agreement with the values reported by Jafri (1973) and Lawrie (1979). Minor variations may be due to sex, age, anthropometry, breeding, environments, and nutrition.

Moisture content like fats is one of the most variable components of animals' tissues and differs among their Species. The calculated mean values of moisture in beef, mutton, poultry and fish are 76.79, 74.11, 73.98 and 81.12 percent respectively, table 2. Moisture in beef and mutton were closed the previous results (Chichester *et al.*, 1980; Forrest *et al.*, 1975 and Lawrie, 1979). Its percentage in poultry and fish are comparable with the results given by Essary (1979) and Jafri (1973). Acid value in beef, mutton, poultry and fish fats (Table 3) is 2.5, 2.72, 1.6 and 8.0 mg KOH / g fat respectively. Acid value depends upon the degree of rancidity which is used as an index of freshness. Acid value of beef fat comparable with the results reported by Hood and Allen (1971). The acid values of mutton, poultry and fish are in agreement with the data reported by Pearson (1976). The acid value of fish was higher because it hydrolyzed easily on storage (Huma and Ali, 1996). The Saponification value of beef, mutton, poultry and fish are 189, 180, 183 and 185 mg KOH / g fat respectively, given in Table 3. These values fall within the standard range (Cocks and Rede, 1960), variations between the Saponification numbers of different fats may be attributed to their fatty acid composition. The iodine value of the analyzed samples of beef, mutton, poultry and fish were found to be 45.3, 46.7, 60.0 and 109.2 g/ 100g fat respectively, Table 3. Differences in the iodine value are due to the degree of unsaturation which depends upon the diet of the animals (Westerling and Hedrick, 1979. George *et al.* (1971) reported that grass-fed animals contained more saturated fats as compared to grain-fed. Substantial amounts of unsaturated fatty acids present in fish muscles which are readily oxidized to lipid hydro peroxide (Watanabe *et al.*, 1996). The iodine value of beef and fish is closed to the results reported by Lawrie (1979).

Data (Table 4) also indicate that on the average with increase in age dietary fat intakes decrease. This also shows that women of different age groups viz; 20-30 years, 30-40 years, 40-50 years and 50-60 years consume dietary fats 9.9g, 7.8g, 5.4g and 4.6g respectively. There is no RDA value for fats (Wardlaw and Insel, 1996). There abnormalities (cholesterol elevation and obesity) can be controlled by increasing energy expenditure through physical activity and at the same time by consuming balanced intake of fats (Khan and Khan, 2004). In Pakistan, particularly in Azad Jammu and Kashmir no work has been done to assess the status of food intake among different population groups. However, it is suggested that by analyzing the

remaining food components such as carbohydrates, proteins, vitamins and minerals, imbalances of diet can be overcome. Moreover, it is likely that our results will provide base line reference value for the future studies.

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