Original Article

The impact of usual dietary patterns, selection of significant foods and cuisine choices on changing dietary fat under 'free living' conditions

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Dietary guidelines for the general population and for the management of obesity, diabetes and heart disease suggest a reduction in dietary fat, and in particular dietary saturated fatty acids (SFA). In order to achieve the recommended levels, changes in food choice patterns are required. Foods are consumed in combination with other foods, and these combinations are often recognizable as cuisine patterns. In this study we examined the food choice patterns of a group of 63 adults with existing type 2 diabetes mellitus who completed a 12 month dietary intervention trial aimed at changing dietary fat under 'free living' conditions. In both lower fat (LF, 27%E) and modified fat (MF, 37%E) groups, a reduction in dietary SFA and an increase in polyunsaturated fat were required, with an additional requirement to increase dietary monounsaturated fat in the MF group. The usual diets of the study sample were on average low in total fat (27%E), but high in saturated fat (12%E). Those already consuming total fat at the level concordant with their allocation (LF or MF) achieved targets faster than those with a discordant allocation, but there was no significant effect of usual diet on time of target achievement at 12 months. At 6 months, those achieving dietary fat targets had changed to low fat dairy products and leaner meats, were having more spreads, oils, and nuts and were consuming takeaway meals less than twice a week. Contributions to dietary fat shifted from takeaway foods, meat, dairy products and cakes to spreads, oils and nuts. The modified fat and low fat groups chose more Mediterranean and South East Asian cuisines respectively. In this study sample, usual dietary patterns had an initial impact on change in the diet, but identifiable changes in food choice patterns and the adoption of certain cuisines that combined foods indicative of the dietary guidelines resulted in successful achievement of dietary fat targets.

Key Words: dietary change, dietary fat, food habits, cuisine, Australia

Introduction

In Australia, authoritative references for general health[1] and for the management of obesity,[2] heart disease[3] and type 2 diabetes mellitus[4] suggest moderating fat intake and in particular reducing saturated fat intakes. Because only part of dietary fat is saturated, and not all is visible, a simple 'eat less fat' message may miss the target of a desired fatty acid profile. In the USA a reduction in dietary fat has not been accompanied by a proportionate reduction in saturated fat.[5] Observed shifts in fat intake from animal foods to fried and grain based mixed dishes may provide an explanation,[6] but on a population level, piecing together the relationship is problematic. At the clinical level, an understanding of how changing food choice patterns might address dietary fat profiles has implications for the derivation of advice. In this setting, dietary change is a complex and negotiated process,[7] with usual eating habits the reference point for change. An analysis of these usual (baseline) intakes and of participants' subsequent food choice patterns during a 'free living' intervention trial would provide a means by which the dietary change processes could be exposed.[8]

The context of the study reported here is one such trial where a low saturated fat intake was targeted in both lower fat (27%E) and modified fat (37%E) dietary advice groups. The aims of the study were to a) determine the impact of usual dietary intake on time taken for dietary change, b) identify the changes in food sources of dietary fat in those achieving dietary targets, and c) identify cuisine patterns which appeared linked to successful achievement of dietary fat targets.

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Methods

Subjects

Men and women referred in the previous two years to the Illawarra Diabetes Service, were invited to participate in a 12 month dietary intervention trial. The study was conducted in Wollongong, a major coastal city 70km south of Sydney, Australia, with distinctive features provided by the steel industry, the University and tourist facilities. Exclusion criteria were associated severe illness, inability to take a fully informed and active part in the study, inability to speak and understand written and spoken English, inability to undertake the dietary programs (for reasons of disease or religious or other conviction) and treatment with insulin. As part of their treatment from the Diabetes Service, participants would have received previous general advice based on an 'eat less fat' message. The study was approved by the Human Research Ethics Committee of the University of Wollongong.

Dietary intervention

Subjects were randomly allocated to groups receiving individualized advice on low fat (27% fat, 53% carbohydrate, 20% protein; 7% PUFA, 12% MUFA, 8% SFA) or modified fat (37% fat, 43% carbohydrate, 20% protein; 7% PUFA, 22% MUFA, 8% SFA) dietary plans. These plans indicated the number of servings of food groups participants should consume per day, taking into account the patterns of food consumption reported in the diet history. To determine this advice, a food exchange system was established based on data from the Australian Nutrient Database (NUTTAB 1995, Commonwealth Department of Health, 1995) for 4 major fat containing food groups: fats, oils and spreads; meat and equivalents; milk and equivalents; and nuts and equivalents. The dietitian calculated a combined contribution of 50% total energy from these foods with the remaining 50% energy to come from vegetables, fruits and grains. Energy requirements were estimated as 1.4 x BMR, where BMR (basal metabolic rate) was calculated from the Schofields equation,[9] assuming a light-sedentary level of activity. For an estimated energy value, and using the conversion factor of 37kj/g, the percentage energy prescribed for individual fatty acids was converted to grams. A contribution of key foods to this amount of fatty acid was then determined. An example of the dietary modeling is given in Table 1. The dietitian provided participants with 4 x 500g tubs spreads and 3 x 500ml oil during follow up interviews at three months intervals. The dietitian made at least one phone contact during the 3 month interval and participants were encouraged to call for advice at other times. Information was also provided on recipe modifications, reading labels and takeaway food outlets with appropriate foods.

Dietary monitoring

Dietary monitoring using both the diet history (DH) and 3 day food record (FR) was undertaken at baseline and at 3 monthly intervals with the same dietitian over the 12 month period. DH data was used to qualitatively analyse changes in food choice patterns between baseline and 6months. The FR data were used to quantitatively assess the contribution of foods to dietary fat. Dietary data were entered into a nutrient analysis software package (Foodworks version 4, 1995. Xyris software, Highgate Hill, Brisbane, Australia), containing the Australian nutrient database, NUTTAB (Commonwealth Department of Health, 1995). An analysis of the relative validity of the data from DH and FR methods is reported elsewhere.[10] Participants who achieved dietary targets were defined as those reporting <32% fat and $\leq$ 8% SFA in the low fat group and >32% fat and $\leq$ 8% SFA in the modified fat groups. Subjects who achieved or did not achieve targets were further categorized into concordant and discordant groups depending on whether their prescribed diets matched their usual total fat intakes estimated from food records (low fat <30% energy, or modified fat >30% energy).

Data analysis

Qualitative content analysis of diet histories and descriptive statistics were used throughout the study. Kaplan-Meier survival analysis was applied comparing target achievement with concordant and discordant groups with time to first achievement of dietary targets as the dependent variable.

The contribution of a single food to fat intake was determined as the amount of fat provided by the total amount of that single food consumed by all participants, expressed as a percentage of total fat provided by the total amount of all foods consumed by all participants.[11] To reduce the number of food categories, individual foods were further grouped and the percentage contributions summed. The major food sources of total fat (and fatty acids) reported in food records was determined by rank order. Shifts in dietary intake patterns during the intervention were analysed by comparing the data obtained for the contribution of food groups to total fat and fatty acids at baseline with that at 6 months. Compared to baseline dietary data, a negative value indicated the food group

Table 1. Dietary model for a 37% fat diet (P:M:S=7:22:8) with an 7500kJ energy requirement

		Energy (kj)	MUFA (g)	SFA (g)	PUFA (g)
Target		3780	45	16	14
MUFA oil*	5 tsp	1000	25	5	5
MUFA spread*	2tsp	277	5	2	2
Meat group*	100g	900	4	4.5	2.5
Low fat milk	500ml	1200	2	4	1
Extras*	2 serves	315	10	2	4
TOTAL		3692	46	17.5	14.5

*Usually canola or olive oil based product; the meat group options were based on a model of 100g meat 3 times per week, 100g fish twice per week, 60g soybeans and 4Tbsp low fat cheese each once per week. The 'extras' were based on an exchange list of nuts (25g), avocado (1/4) peanut butter (4 tsp), potato chips in MUFA oil (25g) and chips in MUFA oil (75g).

was contributing relatively less fat and a positive value indicated it was contributing relatively more fat to the total diet.

Cuisines were identified with reference to a range of publications available to the general public.[12-15] For example, 'Anglo-Australian' was defined as grilled or barbecued meat with vegetables, 'South East Asian' as stir fry vegetables with a little meat and oil served with rice, 'English' as roast dinners, pies, sausages, fried fish and chips, 'Italian' as pasta with meat or tomato based sauce, chicken/beef in tomato sauce, 'Mediterranean' as vegetables with meat/fish cooked in MUFA oil; canned fish with salads and/or bread; legumes with vegetables and/or rice and MUFA oil, and 'Takeaway' as pizza, hamburgers, French Fries, fried fish, meat pies, Chinese takeaway meals, barbecued chicken, kebabs. Changes in food choices were noted by comparing the meal descriptions outlined in the baseline and 6 month diet history data. The dinner meal reported at 6 months was then closely examined. The number of times certain foods and cuisines were consumed on a weekly basis was assessed.

Results

Forty six males and 40 females were recruited from registers of the Diabetes Service, Illawarra Area Health Service. Twenty three participants did not complete the study, citing time constraints, moving from the area, medical and personal reasons. The diet of participants in all groups were similar at baseline and the proportions of dietary saturated fatty acids (SFA) and polyunsaturated fatty acids (PUFA) were respectively higher and lower than the targets prescribed for both groups (Table 2).

The number of subjects achieving targets in both diet groups increased with the progression of time (Table 3). There were nearly twice as many subjects required to increase the total fat content of their diet as there were those required to keep it at the level of their usual intakes (discordant versus concordant dietary prescription). At six months, 54% of subjects on the concordant dietary prescription had achieved target compared with 33% on the discordant prescription, but there was no significant effect of concordance on time to achievement over the 12 month trial (P=0.4). The major single food sources of total fat and fatty acids usually consumed prior to the intervention are presented in Table 4. Not surprisingly, full fat cheese was the major single contributor of total and saturated fat, with olive oil the major contributor to monounsaturated fat intake and polyunsaturated (PUFA) spreads for PUFA intake.

Table 2. Fatty acid targets (expressed as %energy) and mean reported baseline intakes (± SD) for low fat and modified fat diet groups

	PUFA (%)	MUFA (%)	SFA (%)	Total Fat (%)
Low fat targets	7	12	8	27
Low fat group baseline intakes	5±1.5	12±1.5	12± 2.5	29±5.0
Mod fat targets	7	22	8	37
Mod fat group baseline intakes	6±1.5	12±1.5	12±2.1	30±2.2

Table 3. Number of participants achieving dietary targets at 6 and 12 months intervention

Achieved target	Concordant prescription		Discordant prescription	
	6 months	12 months	6 months	12 months
Yes	21	25	12	25
No*	18 (4)	14 (8)	24 (2)	11 (4)

*includes missing data (number of missing data in brackets)

The fat consumed from the foods groups: meat, takeaway foods, milk products, cake and biscuits, spreads and oils, nuts, and fruit/vegetable was calculated. After six months intervention, the total fat contribution to the diet from oils, spreads and nuts (and to a small extent, vegetables) increased whereas the relative amount of fat consumed from the remaining groups was reduced (Table 5). An examination of diet history data from participants who achieved dietary targets revealed a shift in choices of core foods, with possibly the most change occurring at the main meal (dinner). In both diet groups this was reflected in a shift to low fat alternatives and the inclusion of monounsaturated fatty acid (MUFA) food sources. A content analysis of diet histories indicated shifts from full-cream milk to low fat milk, butter to monounsaturated spread, a change in the use of takeaway foods, processed meats and full fat cheese at lunch to sandwiches and salads with fish, avocado, low fat cheese and MUFA oils; and at dinner, a change in the use of take-away meals and frozen dinners, sausages and restaurant meals to stir fry meals, homemade soups and meals containing fish, leaner meats, pasta and legumes. For snacks it was noted that nuts, home-made muffins and avocadoes were replacing biscuits.

A focus on the main meal indicated that those achieving dietary targets were including certain foods and selecting certain cuisines for their meals in a reasonably consistent fashion. On average, red meat was consumed twice a week in both modified fat and low fat diets whereas fish was selected twice a week in the modified fat diet and once a week on the low fat diet. Monoun-saturated (MUFA) oils were consumed more often on the modified fat diet (average 6 times per week), compared with 4 times per week on the low fat diet, but MUFA spreads were consumed at this meal less frequently in both groups (twice and once per week respectively).

Both groups consumed meat and vegetables on average once a week (slightly more often in the modified fat group), but neither consumed takeaway food more than once per 2 weeks. In contrast, almost three quarters of those retaining a high saturated fat intake were con-suming takeaway meals at least once a week. While each diet group selected from a wide range of cuisines (up to 18 were identified), the most common choice in the modified fat groups were the Mediterranean (twice per week compared to once per week on the low fat diet), and in the low fat group, South East Asian (once a week, and less than once a week in the modified fat groups).

Discussion

Drawing on the context of a particular dietary inter-vention trial, this analysis has provided insights into how usual diet, changes in food choices and selection of

Table 4. Top food sources of total fat and fatty acids at baseline for the study sample

Food	Total fat (% contribution)	SFA (% contribution)	MUFA (% contribution)	PUFA (% contribution)
Cheddar cheese	9.12	17.04	6.63	
PUFA spread	8.26	4.73	6.63	32.32
Olive oil	5.98	2.48	12.24	
Sausages	3.22	4.65	4.3	
Tuna in oil				6.08
Peanuts	2.23		2.99	5.13
MUFA spread	2.41		3.42	3.80
Milk		2.56 (full fat) 2.71 (reduced fat)		

Table 5. Change in percent contribution to dietary fat by food groups in modified fat and low fat diet intervention groups

Food group	Change in fat contribution (%)							
	Low fat diet				Modified fat diet			
	total	SFA	MFA	PFA	total	SFA	MFA	PFA
Meat and eggs	-9.7	-9.3	-13.8	-2.7	-19.5	-12.6	-18.9	-5.2
Takeaway foods	-2.7	-2.7	-3.3	-1.9	-6.7	-5.7	-7.8	-3.5
Milk, cheese, yoghurt	-3.6	-1.7	-3.4	1.3	-6.6	-8.8	-6.6	-1.2
Cakes, biscuits	-2.6	-0.6	-3.4	-1.7	1.0	5.8	0.7	1.6
Spreads, oils	10.7	11.1	21.8	9.6	22.3	15.6	25.9	-4.3
Nuts	7.8	5.3	10.2	12.0	15.7	7.4	12.2	22.2
Vegetables, fruits, pulses	3.0	1.5	3.9	1.4	0.1	0.02	3.6	0.04

cuisine patterns may impact on dietary fat intake. The findings were all the more intriguing, as these were people with existing diet related health problems volunteering for a study and receiving detailed personalized advice with some food supplements. This all suggests high levels of support and motivation to change. The fact that some people still had problems attests to the complexity of the task.

There were a number of limitations to the study. As in all research on dietary intake, the assessment methods were subject to bias. Of the two chosen here, food records may have affected food intake,[16] and the diet histories were dependent on memory.[17] However, previous research in this area,[18,19] resulted in our diet history incorporating recognized cognitive advantages of meal based reporting,[20] and delimited interview strategies to reduce respondent burden.[21] In addition, a separate analysis of bias and responsiveness to change indicated the data were reasonable.[22] Likewise, analyses of food patterns are limited by the way in which categories are defined,[23] but in our case the food groups were those similar to the Australian Guide to Healthy Eating[1] and therefore held a certain face validity. In the same sense, the cuisine patterns were openly defined. The categories were appropriate by virtue of their presence in the nutrition education and recipe book literature, and have currency because they can be referred to in deriving dietary advice.

As a group, participants entering the study reported consuming a low fat diet (≤30%fat), but not necessarily a low saturated fat diet (Table 2). This suggests that approaches to dietary advice that contain the general 'eat less fat' message achieve reductions in total fat consumption, but this may result in an undesirable fatty acid consumption pattern. In our case, the saturated fat composition of the diet was still above recommended levels for the study population (12 ± 2% compared with 8%). It was therefore likely that amongst the delimited foods were important sources of unsaturated fatty acids, and that the overall diet still contained many foods with a high saturated fat content. This concurs with published research on low fat diets in 'free living' conditions demonstrating a substantially decreased consumption of spreads and oils.[24]

In our study, each intervention group was required to reduce dietary saturated fat, with the modified fat groups required to concomitantly increase dietary monounsaturated fat (and thereby total fat). Despite detailed dietary advice, it was apparent that shifting to a higher fat diet was likely to be problematic in the first 6 months. Fewer participants with a discordant dietary prescription were able to achieve targets, compared with those consuming their usual level of fat (Table 3). Although there was no significant effect of concordance on time to achievement over the 12 month trial ($P = 0.04$), the trend suggests that shifting the total amount of dietary fat in the diet may require some effort. The reasons may well be cuisine based. Requiring a change in choice from some foods to others seems simple enough, but it must be considered in the context of food combinations that constitute attractive and interesting meals.

To further explore this we found participants who achieved targets were making appropriate substitutions for foods with a high saturated fat content, such as reduced fat milk for full cream milk, speads and oils for butter, and leaner meats for sausages. Foods were also being prepared with monounsaturated oils. In a similar study, consumption of major fat containing food groups was shown to be decreased, with a concomitant increase in lower fat food groups including poultry (assumed skinless) and low fat milk.[24] Foods, however, are not consumed in isolation, so we sought to identify the food combinations, or cuisines, chosen by participants. Bearing in mind that dietary goals were based on modifying participants' usual eating patterns, it was not surprising to see the popular steak and vegetable menu arise on a regular basis, albeit amongst a variety of cuisine choices. However, takeaway meals could not be accommodated more than once every 2 weeks if targets for saturated fat were to be achieved. Based on these data, if a reduction in the consumption of saturated fat is required, the fatty acid composition of this readily available cuisine needs to be modified.

It is not surprising that the most common cuisine choice for those who achieved target for the modified fat diet was the Mediterranean cuisine. Characterised by monounsaturated oils as the major source of monounsaturated fat, with relatively more low fat foods (legumes, cereals, fruits and vegetables) and fewer sources of saturated fat (meat and milk products),[25,26] the resultant meal patterns compared well with the dietary prescription. In contrast, for the low fat group, where less oil was accommodated in the diet, the stir-fry meal (South East Asian cuisine) was relatively more popular. In either case, the very wide range of cuisines chosen for main meals reflected the highly varied Australian food supply. As people tend to consume combinations of foods at meals there is a need to distinguish between cuisines which are more or less on target for dietary goals. In this context is not feasible to promote a single cuisine,[27] but rather - at least for the main meals - to ensure the inclusion of those which support dietary targets.

Studies of cuisine patterns are helpful, but cuisines are not static and one of the major challenges in manipulating dietary fatty acids remains in achieving the best combinations of foods, where each individual food may provide varying amounts of fatty acids. For example, both cheese and polyunsaturated spread provided nearly the same amount of total fat and monounsaturated fat in the diets of participants at baseline, but cheese contributed substantially more to the saturated fat component, whereas PUFA spread made a very large contribution to overall PUFA intakes (Table 4). Gastronomy aside, removing cheese in the diet may also compromise the overall nutritional intake - a concern expressed more generally by others.[28] Clearly there is a certain amount of fat to be accommodated in the diet, but this has to be managed judiciously. After 6 months in our study, those who achieved dietary targets reported a decrease in the contribution of cheese (and other animal foods) to the total fat and MUFA content of both diet groups, accompanied by an increase in the contributions by spreads and oils (Table 5). The differences were greater in the modified fat group, bearing in mind that an increase in total and monounsaturated fat intake was required. The trend in the cakes and biscuits group was different for the modified fat diet group because recipes were provided to make these foods with appropriate spreads and oils. The positive contribution of nuts, and to a lesser extent, vegetables, to the total and unsaturated fat components of the diet was noticeable. Our study of 'free living' food choices confirms the utility of foods such as oils, avocados, and nuts in the achievement of high MUFA diets in Western societies.[29] Bearing in mind that there was no significant difference in weight after 12 months on the diets in both groups,[30] our data also shows that oils and nuts play a very important role in low fat diets. Although this may appear counter-intuitive, it must be remembered that, for at risk individuals, fat quality is just as important a dietary consideration as total fat.[31]

Food pattern studies provide a useful description of intervention outcomes not always seen in dietary studies.[32] This detailed analysis of food habits in an intervention context has shown that changing dietary fat profiles takes time even when subjects are provided with key foods. One of the reasons may be that shifts are required in the total cuisine not just in single foods, which is perhaps a more complex change than appears the case at first glance. Behaviour change strategies would also come into play,[33,34] bearing in mind that in the first instance, it is useful to know exactly what needs to be changed.

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References

1. Commonwealth Department of Health and Family Services. The Australian Guide to Healthy Eating. Canberra. Commonwealth of Australia, 1998.
2. National Health and Medical Research Council. Draft Clinical Guidelines for Weight Control and Obesity Management in Adults. Canberra. AGPS. 2003.
3. National Heart Foundation of Australia. A review of the relationship between dietary fat and cardiovascular disease. Australian Journal of Nutrition and Dietetics 1999; 56: Supplement.
4. Diabetes Australia Guideline Development Consortium. National Evidence Based Guidelines for the Management of Type 2 Diabetes Mellitus. Sydney: Australian Centre for Diabetes Strategies, 2000.
5. Allred JB. Too much of a good thing? An over-emphasis on eating low-fat foods may be contributing to the alarming increase in overweight among US adults. JADA 1995; 417-8.
6. Popkin BM, Siega-Riz AM, Haines PS, Jahns L. Where's the fat? Trends in US diets 1965-1996. Prev Med 2001; 32: 245-54.
7. Tapsell LC. Client-centred practice: an interactional case study of dietary counseling. Health 1997;1:107-20.
8. Glanz K. Behavioural research contributions and needs in cancer prevention control: dietary change. Prev Med 1997; 26: S43-S55.

9. Schofield WN. Predicting basal metabolic rate. New standards and review of previous work. Hum Nutr Clin Nutr 1985; 39: 5-41.
10. Martin GS, Tapsell LC, Denmeade S, Batterham MJ. Relative validity of a diet history interview in an intervention trial manipulating dietary fat in the management of Type II diabetes mellitus. Prev Med 2003; 36: 420-428.
11. Krebs-Smith SM, Cronin .J, Haytowitz DB. Food sources of energy, macronutrients, cholesterol, and fiber in diets of women. JADA 1992; 92: 168-74.
12. Gallegos D, Perry EA. World of Food : A Manual to Assist in the Provision of Culturally Appropriate Meals. Canberra: Commonwealth Department of Human Services and Health, 1995.
13. Grigson, J (ed). The World Atlas of Food. London: Galley Press, 1984.
14. Moore I (ed). Supercook's Worldwide Cookbook. London: Marshall Cavendish, 1977
15. Wardlaw GM. Perspectives in Nutrition. 4th Ed. Boston: McGaw Hill, 1999.
16. Goris AHC, Westerterp-Platenga MS, Westerterp KR. Undereating and underrecording of habitual food intake in obese men: selective underreporting of fat intake. Am J Clin Nutr 2000; 71: 130-4.
17. Blundell JE. What foods do people habitually eat? A dilemma for nutrition, an enigma for psychology. Am J Clin Nutr 2000; 71:3-5.
18. Tapsell LC, Pettengell K, Denmeade SL. Assessment of a narrative approach to the diet history. Public Health Nutrition 1999; 2: 61-7.
19. Tapsell LC, Brenninger V, Barnard J. Applying conversation analysis to support accurate reporting in the diet history interview. JADA 2000; 100: 818-24.
20. Kohlmeier L. Gaps in dietary assessment methodology: meal vs list-based methods. Am J Clin Nutr 1994; 59: 175S-9S.
21. Elmstahl S, Riboli E, Lindgarde F, Gullberg B, Saracci R. The Malmo food study: the relative validity of a modified diet history method and an extensive food frequency questionnaire for measuring food intake. Eur J Clin Nutr. 1996; 50, 143-51.
22. Martin GS, Tapsell LC, Batterham MJ, Russell KJ. Relative bias in diet history measurements: a quality control technique for dietary intervention trials. Public Health Nutrition 2002; 5: 537-45.
23. Wirfalt AKE, Jeffery RW. Using cluster analysis to examine dietary patterns: nutrient intakes, gender, and weight status differ across food pattern clusters. J Am Diet Assoc 1997; 97: 272-9.
24. Buzzard M, Asp EH, Chlebowski RT, Boyar AP, Jeffery RW, Nixon DW, Blackburn G., Jochimson PR, Scanlon EF, Insull WJr, Elashoff RM, Butrum R, Wynder EL Diet intervention methods to reduce fat intake: nutrient and food group composition of self-selected low-fat diets. J Am Diet Assoc 1990; 90: 42-54.
25. Trichopolou A, Lagiou P. Healthy traditional Mediterranean diet: an expression of culture, history, and lifestyle. Nutr Rev 1997; 55: 383-9.
26. Lasheras C, Fernandez S, Petterson AM. Mediterranean diet and age with respect to overall survival in institutionalized, nonsmoking elderly people. Am J Clin Nutr 2000; 71: 987-92.
27. Kouris-Blazos A. Can the Mediterranean diet be adapted for the prevention of chronic diseases outside the Mediterranean region? International Conference on the Mediterranean Diet. Palma de Mallorca, Spain, 2000. Oct 4; 22. Abstract.
28. Mer B. Low fat diet may be imprudent in some, say opponents of population cholesterol control. JAMA 1986; 256: 2779.
29. Kris-Etherton PM, Zhao G, Pelkman CL, Fishell VK, Coval SM. Beneficial effects of a diet high in monounsaturated fatty acids on risk factors for cardiovascular disease. Nutr Clin Care 2000; 3: 153-62.
30. Tapsell LC, Calvert GD, Martin GS, Batterham M, Denmeade S. High carbohydrate and high monounsaturated fat dietary targets produce similar outcomes in the management of type 2 diabetes mellitus with concomitant reduced saturated fat intakes. APJCN 2001; 25: S86.
31. Tapsell LC, Calvert GD, Meyer BJ, Storlien LH. Energy balance: fats and fallacies. Aust J Nutr Diet 1998; 55: S29-31.
32. Flegal KM. Evaluating epidemiologic evidence of the effects of food and nutrient exposures. Am J Clin Nutr 1991; 54: 136-40.
33. Rosal MC, Ebbeling CB, Lofgren I, Ockene JK, Ockene IS, Hebert JR. Facilitating dietary change: The patient-centred counseling model. J Am Diet Assoc 2001; 101: 332-41.
34. Anderson A. How to implement dietary changes to prevent the development of metabolic syndrome. Br J Nutr 2000; 83: S165-8.