

Eating Habits of Obese Patients in The Netherlands: A Comparison Between Various Subgroups and the General Dutch Population

M.L. Drent and H.P.F. Koppeschaar

It is still uncertain whether subgroups of obese subjects demonstrate different eating patterns. The aim of this report is to compare data on dietary intake obtained by different methods (dietary history and dietary diary) in several groups of obese patients in which the effects of weight-reducing agents were investigated. In our first and our second study, the latter part of an international multicenter study, we investigated the weight-reducing potential of lipase inhibition, a novel concept in the treatment of obesity, in healthy moderately obese subjects. In the third study, part of a national multicenter study, we investigated the effect of a serotonergic drug (dexfenfluramine) on eating habits in moderately obese people who considered themselves snackers. Eating habits of the third group seem to be different from those of the other two groups in both men and women. These patients have a greater total energy intake due to a greater carbohydrate and fat intake. In our second study, little difference is found when results obtained by dietary history are compared with those obtained by dietary diaries. Our comparisons indicate that groups of obese patients with different patterns of eating behavior may exist and that obese snackers have a significantly greater energy intake. Therefore, various therapeutic strategies for weight reduction may be useful for patients with different types of eating behaviors. Furthermore, the methods by which data on dietary intake are obtained seem to show comparable results and therefore at least suggest accuracy.

Copyright © 1995 by W.B. Saunders Company

THERE IS CONSIDERABLE debate as to whether obese subjects exhibit eating patterns different from those of lean subjects. This debate arises from many uncertain factors in our knowledge on the cause of obesity as a result of difficulties in obtaining reliable data on food intake.

It is obvious that weight gain is the result of an imbalance between energy intake and energy expenditure. However, it is still controversial as to whether weight-stable obese subjects really have a greater energy intake than lean individuals, or only during periods of weight gain.¹ On the other hand, it is not certain whether a thermogenic defect exists in obesity, and if so, whether this is a primary or secondary defect.²⁻¹³ One explanation for the inconsistencies may be a lack of standardization of calorimetric measurements, which makes results difficult to interpret. Another problem is how to validate information about energy intake in an ambulatory setting. The difficulties in obtaining reliable data on food intake by dietary interviews or diaries are well known, but so far better methods are not available.¹⁴⁻¹⁸ It is also possible that different types of obese patients exist with different causes for their overweight and who therefore need different types of treatment. In industrialized countries, daily consumption of fat is high and favors development of obesity. The principle of gastrointestinal lipase inhibition may therefore be promising as a therapeutic approach for weight reduction.¹⁹ Serotonergic drugs are thought by some investigators to exert their anorectic effects by mimicking the effect of carbohydrate intake, and

may therefore be useful in decreasing carbohydrate intake in obese patients with an overconsumption of carbohydrate-rich snacks.²⁰⁻²⁸

In the last few years, we have conducted three trials that measure the effect of two different pharmacologic agents on weight reduction and/or eating habits. For these studies, we collected data on food intake by dietary history (study I), dietary history and diet diary (study II), and diary only (study III).

The aim of this report is to compare data obtained by various methods in our own patient groups with those published in other Dutch obesity studies and with data on the intake of the general population in The Netherlands. We deliberately omitted sophisticated statistics, since we realize the limitations and pitfalls of all kinds of meta-analyses.²⁹

MATERIALS AND METHODS

Between 1989 and 1992, we performed three studies in the outpatient clinic of the Free University Hospital in Amsterdam to obtain information on the effect on body weight or eating habits of two different weight-reducing pharmacologic agents. In the first study (I) and the second study (II), part of an international multicenter study, we investigated the weight-reducing potential of gastrointestinal lipase inhibition, a novel concept in the treatment of obesity.¹⁹ We recruited patients by advertisement in a local newspaper in which healthy, moderately obese people were asked to participate in a weight-reducing study protocol. During the third study (III), part of a national multicenter study, we investigated the effect of a serotonergic drug (dexfenfluramine) on eating habits. For this study, patients were also recruited by advertisement, but this time we asked for healthy, moderately obese people who considered themselves snackers. In neither of the studies was payment offered to the patients. In the first study, we included patients aged 18 to 55 years with body weights 20% to 50% above ideal for their body frame, as measured by elbow breadth, according to the 1983 Metropolitan Life Insurance Tables. Patients were included in the second study if they were aged 25 to 60 years and had a body mass index of 27.8 to 35.0 kg/m² for men and 27.3 to 35.0 kg/m² for women and a waist to hip ratio of ≥ 0.9 for men and ≥ 0.8 for women. For the first two studies, no inclusion criteria were formulated for eating habits. In the third study, only patients

From the Department of Endocrinology, Free University Hospital, Amsterdam; and Department of Endocrinology, Universit  Hospital, Utrecht, The Netherlands.

Adapted from a chapter of the doctoral thesis of M.L.D., Free University, Amsterdam, The Netherlands, 1993.

Address reprint requests to M.L. Drent, MD, PhD, Department of Endocrinology, Free University Hospital, PO Box 7057, 1007 MB Amsterdam, The Netherlands.

*Copyright   1995 by W.B. Saunders Company
0026-0495/95/4402-2010\$03.00/0*

Table 1. Total Daily Energy Intake and Macronutrient Intake in Obese Men

	Study I (history)	Study II		Study III (diary)
		History	Diary	
No. of patients	9	16		18
Age (yr)	39.7 ± 10.2	42.3 ± 9.9		46.3 ± 8.8
Body mass index (kg/m ²)	31.1 ± 2.7	32.9 ± 2.8		32.2 ± 2.0
Total daily intake (kcal)	2,262 ± 784	2,226 ± 616	1,933 ± 370	2,839 ± 1,140
Carbohydrates				
kcal	908 ± 231	875 ± 344	818 ± 221	1,194 ± 519
% of total	42 ± 7	39 ± 8	42 ± 7	42 ± 5
Fat				
kcal	816 ± 427	808 ± 229	653 ± 158	1,169 ± 516
% of total	34 ± 10	37 ± 6	34 ± 4	41 ± 5
Protein				
kcal	459 ± 170	379 ± 111	318 ± 58	424 ± 143
% of total	20 ± 4	17 ± 3	17 ± 3	16 ± 3

who reported an overconsumption of snacks were included. This was defined as consumption of more than five snacks that provided a total of more than 500 kcal/d and/or consumption of more than 25% of total daily caloric intake in the form of snacks. The other inclusion and exclusion criteria for the three studies were comparable. In the first study, data on eating habits were obtained by dietary history. In the second study, data were obtained not only by dietary history, but also by a daily diet diary for 1 week. In the third study, data were obtained only by a diet diary for 4 days, 3 working days and 1 weekend day, all in the same week. All data were obtained and calculated by trained dietitians.

RESULTS

Characteristics, total energy intake, and macronutrient intake of the three study populations are listed in Table 1 for men and in Table 2 for women. Because alcohol consumption was not included and numbers were rounded off, the tables do not add up to 100% exactly. Eating habits of the third group of patients seem to be different from those of the other two groups in both men and women. These patients have a greater total energy intake as a result of a greater carbohydrate and fat intake. Protein intake of the third group is comparable to that of groups I and II in the absolute number of calories, but is less when expressed as a percentage of total energy intake. The other two groups show less difference when compared with each other. Only

protein intake is greater in the first group as compared with the second group. This is the case for men when expressed as the absolute number of calories and as a percentage of total energy intake, and for women when expressed as the absolute number of calories. In study II, little difference is found when results obtained by dietary history are compared with those obtained by dietary diaries. In men, the only discrepancy is in the absolute number of fat calories. In women, there are discrepancies in protein calories expressed both as absolute number and as percentage of total intake. In all these cases, results of data obtained by dietary history are found to be higher than those obtained by diaries.

DISCUSSION

Our comparisons indicate that groups of obese patients with different patterns of eating behavior may exist. Both total energy intake and macronutrient intake are different between the first two groups on one hand and the third study group on the other. It appears that the patients of the third group have recognized themselves as being snackers, considering the fact that they responded to the advertisement in the newspaper in which we especially asked for snackers, in contrast to the advertisement used for recruitment of patients in the other two studies. We hardly had to

Table 2. Total Daily Energy Intake and Macronutrient Intake in Obese Women

	Study I (history)	Study II		Study III (diary)
		History	Diary	
No. of patients	43	32		29
Age (yr)	42.5 ± 7.9	39.8 ± 8.7		41.1 ± 11.2
Body mass index (kg/m ²)	31.8 ± 3.3	31.7 ± 2.0		31.6 ± 1.9
Total daily intake (kcal)	1,868 ± 523	1,704 ± 482	1,655 ± 442	2,398 ± 626
Carbohydrates				
kcal	772 ± 235	712 ± 187	703 ± 183	1,072 ± 331
% of total	42 ± 7	43 ± 7	43 ± 5	45 ± 6
Fat				
kcal	733 ± 285	660 ± 284	635 ± 229	935 ± 321
% of total	38 ± 7	37 ± 9	38 ± 5	39 ± 5
Protein				
kcal	324 ± 99	307 ± 68	268 ± 55	336 ± 72
% of total	18 ± 4	18 ± 3	17 ± 3	15 ± 3

select them any further because in all studies almost all responders appeared to fulfill the inclusion criteria. It is interesting that the mean body mass indices in all three groups of patients are similar, whereas the third group exhibits a significantly greater daily energy intake. This can be explained by differences in metabolic rate, stability of the obese state, or accuracy of the data obtained on energy intake. It is not easy to sort out the correct explanation: in neither of the studies was basal or postprandial metabolic rate measured. Moreover, a stable body weight for at least 3 months was one of the inclusion criteria for all three studies, and the consistency in results between the first and second studies and between the two methods of data collection in the second study at least suggests accuracy. On the other hand, it is possible that the patients of the first two study groups underestimated their energy intake and/or that the patients of the third group overestimated their energy intake, because the aims of the studies and consequently the advertisements for recruitment were different. In the first two studies, the weight-reducing potential of drug therapy was investigated, whereas in the third study the potential of changing eating habits was investigated.

When we compare the results on energy intake in our obese patients with the results on energy intake in lean and obese subgroups of the Dutch population, some interesting facts come to light. De Boer et al³⁰ reported on the energy intake of 29 lean women (mean \pm SEM: age, 28.1 ± 1.3 years; body mass index, 20.7 ± 0.4 kg/m²) and 18 overweight women (age, 33.5 ± 1.8 years; body mass index, 33.5 ± 1.6 kg/m²). The daily energy intake of the subjects, as measured by dietary records and compared with 24-hour energy expenditure, was 2,122 and 2,419 kcal/d, respectively. Compared with the women in our study, who are older (Table 2), it can be concluded that their obese group is comparable to our third study group but that our first and second groups demonstrate a lower energy intake even when compared with their lean subjects. Kromhout et al³¹ compared the energy intake of two groups of men aged 40 to 59 years in 1960 and 1985, respectively. When we compare their results of 1985 with our male study groups (Table 1), it can be again concluded that their results on energy intake, as obtained by dietary history ($N = 51$; body weight, 79.7 ± 10.1 kg; daily energy intake, $2,836 \pm 753$ kcal/d, $42.0\% \pm 5.8\%$ carbohydrates, $39.0\% \pm 5.9\%$ fat,

Table 3. Intake Patterns of the General Dutch Population

	Aged 22-49 Years		Aged 50-64 Years	
	Men	Women	Men	Women
No. of subjects	1,296	1,286	431	460
Total daily intake (kcal)	2,844	2,111	2,564	1,946
Carbohydrates				
g	294.1	220.0	255.5	198.5
% of total	41.7	42.1	40.2	41.2
Fat				
g	127.5	97.5	118.7	91.1
% of total	39.9	40.7	41.2	41.1
Protein				
g	90.6	71.7	85.4	69.8
% of total	13.0	14.1	13.7	14.9

NOTE. Adapted from Wat eet Nederland.³²

$14.5\% \pm 2.9\%$ protein) are comparable to the results of our third study group and greater than those of our first two study groups.

In 1987 and 1988, the Dutch Ministries of Health and Agriculture gave orders to investigate the eating habits of the general Dutch population by dietary records of 5,898 subjects from all age groups.³² When we compare the results of our men (Table 1) with the results of the general Dutch male population (Table 3), we can conclude once again that the energy intake is comparable in our third study group and lower in our first two groups. In the women, the situation is slightly different. Our third study group (Table 2) consumed more than the general population (Table 3), but again the first two groups consumed somewhat less.

This study shows that various groups of obese patients with different eating habits seem to exist and that obese snackers have a significantly greater energy intake. From this vantage point, various therapeutic strategies for weight reduction may be useful for patients with different types of eating behaviors. Furthermore, the results indicate that in different types of obesity or at different stages of the obese state a marked difference in energy intake may be present, and that the energy intake of obese patients does not necessarily exceed that of lean subjects. This finding may be explained by altered metabolic rates in obesity. However, it cannot be excluded that the differences found are at least partly the result of methodologic problems.

REFERENCES

1. Kromhout D: Energy and macronutrient intake in lean and obese middle-aged men (the Zutphen study). *Am J Clin Nutr* 37:295-299, 1983
2. Verga S, Buscemi S, Bompiani G: Glucose-induced thermogenesis in obese subjects with or without familial history of obesity. *Eur J Clin Nutr* 44:397-404, 1990
3. Thörne A, Näslund I, Wahren J: Meal-induced thermogenesis in previously obese patients. *Clin Physiol* 10:99-109, 1990
4. Bukkens SG, McNeill G, Smith JS, et al: Postprandial thermogenesis in post-obese women and weight-matched controls. *Int J Obes* 15:147-154, 1991
5. Segal KR, Edaño A, Thomas MB: Thermic effect of a meal over 3 and 6 hours in lean and obese men. *Metabolism* 39:985-992, 1990
6. Weststrate JA, Dekker J, Stoel M, et al: Resting energy expenditure in women: Impact of obesity and body-fat distribution. *Metabolism* 39:11-17, 1990
7. Golay A, Schutz Y, Felber JP, et al: Blunted glucose-induced thermogenesis in "overweight" patients: A factor contributing to relapse of obesity. *Int J Obes* 13:767-775, 1989
8. De Palo C, Macor C, Siculo N, et al: Dietary induced thermogenesis in obesity. Response to mixed and carbohydrate meals. *Acta Diabetol Lat* 26:155-162, 1989
9. Pittet PL, Chappuis PL, Acheson K, et al: Thermic effect of glucose in obese subjects by direct or indirect calorimetry. *Br J Nutr* 35:281-292, 1976
10. Welle SL, Campbell RG: Normal thermic effect of glucose in obese women. *Am J Clin Nutr* 37:87-92, 1983

11. Bessard T, Schutz Y, Jéquier E: Energy expenditure and postprandial thermogenesis in obese women before and after weight loss. *Am J Clin Nutr* 38:680-693, 1983
12. Ravussin E, Burnand B, Schutz Y, et al: Twenty-four-hour energy expenditure and resting metabolic rate in obese, moderately obese, and control subjects. *Am J Clin Nutr* 35:566-573, 1982
13. Schutz Y, Bessard T, Jéquier E: Diet-induced thermogenesis measured over a whole day in obese and nonobese women. *Am J Clin Nutr* 40:542-552, 1984
14. Livingstone MBE, Prentice AM, Strain JJ, et al: Accuracy of weighed dietary records in studies of diet and health. *Br Med J* 300:708-712, 1990
15. Mertz W, Tsui JC, Judd JT, et al: What are people really eating? The relation between intake derived from estimated diet records and intake determined to maintain body weight. *Am J Clin Nutr* 54:291-295, 1991
16. Roberts SB, Ferland G, Young VR, et al: Objective verification of dietary intake by measurement of urine osmolality. *Am J Clin Nutr* 54:774-782, 1991
17. Drougas HJ, Reed G, Hill JO: Comparison of dietary self-reports with energy expenditure measured using a whole-room indirect calorimeter. *J Am Diet Assoc* 92:1073-1077, 1992
18. Lichtman SW, Pisarska K, Berman ER, et al: Discrepancy between self-reported and actual caloric intake and exercise in obese subjects. *N Engl J Med* 327:1893-1898, 1992
19. Drent ML, Van der Veen EA: Lipase inhibition: A novel concept in the treatment of obesity. *Int J Obes* 17:241-244, 1993
20. Wurtman J, Wurtman R, Reynolds S, et al: Fenfluramine suppresses snack intake among carbohydrate cravers but not among noncarbohydrate cravers. *Int J Eating Dis* 6:687-699, 1987
21. Silverstone T, Goodall E: Serotonergic mechanisms in human feeding: The pharmacological evidence. *Appetite* 7:85-97, 1986 (suppl)
22. Garattini S, Bizzi A, Caccia S, et al: Progress in assessing the role of serotonin in the control of food intake. *Clin Neuropharmacol* 11:S8-S32, 1988 (suppl 1)
23. Wurtman RJ, Wurtman JJ: Carbohydrate craving, obesity and brain serotonin. *Appetite* 7:99-103, 1986 (suppl)
24. Wurtman JJ: The involvement of brain serotonin in excessive carbohydrate snacking by obese carbohydrate cravers. *J Am Diet Assoc* 84:1004-1007, 1984
25. Wurtman J, Wurtman R, Mark S, et al: D-Fenfluramine selectively suppresses carbohydrate snacking by obese subjects. *Int J Eating Disord* 4:89-99, 1985
26. Blundell JE, Hill AJ: Do serotonergic drugs decrease energy intake by reducing fat or carbohydrate intake? Effect of D-fenfluramine with supplemented weight-increasing diets. *Pharmacol Biochem Behav* 31:773-778, 1988
27. Guy-Grand B, Crepaldi G, Lefebvre P, et al: International trial of long-term dexfenfluramine in obesity. *Lancet* 1142-1145, 1989
28. Wurtman JJ, Wurtman RJ: D-Fenfluramine selectively decreases carbohydrate but not protein intake in obese subjects. *Int J Obes* 8:79-84, 1984 (suppl 1)
29. Thompson SG, Pocock SJ: Can meta-analyses be trusted? *Lancet* 338:1127-1130, 1991
30. De Boer JO, Van Es AJH, Van Raaij JMA, et al: Energy requirements and energy expenditure of lean and overweight women, measured by indirect calorimetry. *Am J Clin Nutr* 46:13-21, 1987
31. Kromhout D, De Lezenne Coulander C, Obermann-De Boer GL, et al: Changes in food and nutrient intake in middle-aged men from 1960 to 1985 (the Zutphen study). *Am J Clin Nutr* 51:123-129, 1990
32. Wat eet Nederland: Resultaten van de voedselconsumptiepeiling 1987-1988. Rijswijk, The Netherlands, Ministerie van Welzijn, Volksgezondheid en Cultuur en het Ministerie van Landbouw en Visserij, 1988 (in Dutch)