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After completing this CME activity, participants should be able to:
- Describe the lifestyle-related determinants of overweight and obesity in patients with bipolar disorder
- Identify bipolar patients at risk of becoming overweight or obese
- Give basic advice to patients concerning the avoidance of weight gain

Statement of Need and Purpose
This educational activity was designed to meet the needs of physicians who have asked for information about preventing and managing weight gain in patients treated with mood stabilizers. There are no prerequisites for participation in this CME activity.

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Faculty Disclosure
In the spirit of full disclosure and in compliance with all ACCME Essential Areas and Policies, the faculty for this CME activity were asked to complete a full disclosure statement. The information received is as follows:

Drs. Elmslie, Mann, Silverstone, and Romans and Ms. Williams have no significant commercial relationships to disclose relative to the presentation.

Disclosure of Off-Label Usage
The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents has been presented in this article that is outside U.S. Food and Drug Administration–approved labeling.

Determinants of Overweight and Obesity in Patients With Bipolar Disorder

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Objective: To examine lifestyle-related determinants of the excess adiposity observed in patients with bipolar disorder.

Method: Eighty-nine male and female patients with DSM-IV bipolar disorder who were attending a specialist bipolar clinic or another psychiatric outpatient clinic (19% with body mass index [BMI] ≥ 30) and 445 age- and sex-matched reference subjects (12% with BMI ≥ 30) participated in a cross-sectional study of nutrient intake and physical activity. Main outcome measures included macronutrient intakes (assessed with 24-hour recall), percentage of energy derived from various food sources, and physical activity levels (assessed with the Life in New Zealand Questionnaire).

Results: Mean total energy intake was higher in female patients than in reference subjects: 8468 kJ compared with 6980 kJ (95% confidence interval [CI] = 583 to 2392 kJ). Total daily sucrose and percentage of energy from carbohydrate were higher in patients than in reference subjects; for women, 73 g and 49% (95% CI = 20 to 56 g, 3% to 10%) and for men, 89 g and 47% (95% CI = 15 to 59 g, 3% to 9%). Total fluid intake and intake of sweetened drinks were higher in patients than in reference subjects (ratio of geometric means: women, 1.2 and 2.3, respectively [95% CI = 1.1 to 1.4, 1.9 to 2.8]; men, 1.1 and 2.1, respectively [95% CI = 1.0 to 1.23, 1.8 to 2.4]). Patients reported fewer episodes of low- to moderate-intensity and high-intensity physical activity as compared with reference subjects ($p \leq .05$).

Conclusion: This study confirms that drug-induced changes in food preference can lead to an excessive energy intake largely as a result of a high intake of sucrose. Dietary advice regarding the use of energy-rich beverages along with encouragement to increase levels of physical activity may help prevent weight gain in bipolar patients. The findings also have some bearing on dietary advice aimed at avoiding overweight and obesity in the general population.

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The prevalence of obesity in pharmacologically treated psychiatric patients is 2 to 5 times greater than that in the general population.[1,2] This prevalence has been attributed to medication-induced changes in appetite and, in particular, "carbohydrate craving," which results in an increased consumption of sugars and consequent weight gain. However, data claiming to substantiate this theory are derived exclusively from studies, most of which have been poorly controlled or uncontrolled, of patients receiving tricyclic antidepressants.[3–8] Only 1 of these studies used a dietary assessment method appropriate for quantifying nutrient intakes.[8] Furthermore, a substantial body of experimental and epidemiologic evidence suggests that even a relatively high intake of sucrose does not promote weight gain in humans.[9] We recently reported on the frequency of overweight and obesity in a representative group of euthymic patients with bipolar disorder and matched community controls[10] and present here data concerning nutrient intake and physical activity in an attempt to explain the tendency toward weight gain in this group of patients. The identification of lifestyle-related factors associated with obesity might facilitate advice aimed at avoiding weight gain in this vulnerable group.

METHOD

Patients and Reference Subjects

Eighty-nine participants aged 18 to 65 years were recruited from 109 eligible bipolar patients attending the specialist bipolar clinic or other psychiatric outpatient clinics in Dunedin Hospital (Dunedin, New Zealand). They were required to be euthymic at the time of study and not suffering from any major concurrent physical illness. All fulfilled the DSM-IV diagnostic criteria for bipolar disorder. The majority were attending the bipolar clinic and learned about the study during their scheduled outpatient visits. They were subsequently contacted by 1 of the authors (J.L.E.) if they were prepared to participate. Reasons for nonparticipation included refusal to consent (N = 12), postpartum status (N = 2), loss of contact with bipolar clinic (N = 4), multiple sclerosis (N = 1), and head injury (N = 1).

A reference group (N = 445), matched for sex and within the same 5-year age group, was selected randomly from a national database of subjects (originally recruited from the national electoral roll to provide a representative sample of the New Zealand population). Reference subjects were members of the general public and not recruited from a health care facility. They had all participated in the Life in New Zealand (LINZ) Survey, a national health survey designed to assess the overall health of all New Zealanders.[11] Data on anthropometry, blood pressure, blood lipid levels, low back pain, smoking, alcohol consumption, psychological stress, and chronic physical illnesses such as diabetes, arthritis, asthma, heart disease, and migraine were also available for this sample.

Most patients (N = 77) were receiving pharmacotherapy. Lithium alone (26%) or lithium in combination with an antipsychotic (19%) were more frequently prescribed than other medication regimens, and most patients had been receiving the same treatment for longer than 6 months. Overweight and obesity (body mass indices of 25.0–29.9 and ≥ 30.0) were significantly more frequent among female patients (44% and 20% compared with 25% and 13% in female reference subjects). In men, rates of obesity were greater in patients (19% compared with 10% in reference subjects), but rates of overweight were not. Waist:hip ratio was significantly greater in male and female patients than in reference subjects. These differences remained significant after adjustment for socioeconomic and smoking status.[10] The study was approved by the Otago Ethics Committee of the Southern Regional Health Authority. All participants gave written informed consent.

Dietary Assessment

All participants completed a 24-hour diet recall.[12] Patients also completed a 4-day estimated diet record.[13] Quantities of food were assessed with food models, photographs, cups, and measuring spoons. The reliability of the methods used in the patient population was established in a pilot study (N = 20).

Nutrient Analysis

Nutrient analysis was performed with the diet analysis batch processor Diet Cruncher[14] to access the New Zealand Department of Scientific and Industrial Research food composition database FOODfiles.[15] In instances in which nutrient information for particular items was missing, an item of similar composition was substituted. For food group analyses, foods were classified according to the system used in the LINZ study.[12]

Dietary Underreporting

Basal energy requirements were calculated for all subjects from height, weight, age, and sex data using the equations developed by Schofield.[16] Individual energy intakes too low to maintain body weight were defined using the cutoffs developed by Goldberg et al.[17] and used to identify underreporting subjects.

Activity Patterns

Habitual activity patterns were assessed using the LINZ Questionnaire. This validated instrument was used in the LINZ study and includes questions about occupational and leisure activities in the last 4 weeks.[18]

Statistical Methods

Data were analyzed using SPSS-X version 4.0.1 (SPSS Inc., Chicago, Ill.). The statistical significance level was set at $\alpha = .05$. Preliminary comparisons showed that exclusion of subjects who reported energy intakes below their estimated energy requirements had a negligible effect on the size of the observed differences in mean macronutrient intake between patients and reference subjects, so data from all subjects were included in further statistical analyses. Data for men and women were analyzed separately. Drinking data were log transformed to normalize a highly skewed distribution. All other variables were untransformed because preliminary analyses showed that log transformation made little difference in the strength of the statistical inferences. Continuous data were compared using 2-tailed, unpaired, Student t tests. Differences in drinking patterns were examined using Poisson regression, and the Mann-Whitney U test was

Table 1. Macronutrient Intake: Patients and Reference Subjects[a]

Variable	Women			Men		
	Patients (N = 41)	Reference Subjects (N = 205)	Mean Difference (95% confidence interval)	Patients (N = 48)	Reference Subjects (N = 240)	Mean Difference (95% confidence interval)
Age, y	40 (12)	40 (11)	0 (–3 to 4)	39 (12)	39 (12)	1 (–3 to 5)
Body mass index[b]	26.7 (5.3)	24.9 (5.0)	1.7 (0.02 to 3.4)	26.2 (3.9)	26.0 (4.6)	–0.08 (–1.3 to 1.1)
Energy, kJ	8468 (2565)	6980 (2707)	1487 (583 to 2392)	11,241 (4118)	10,436 (4491)	536 (–822 to 1894)
Energy from fat, %	36 (8)	38 (10)	–2 (–5 to 2)	36 (8)	39 (10)	–2 (–5 to 1)
Energy from protein, %	15 (4)	17 (6)	–2 (–4 to 0)	15 (3)	16 (5)	–1 (–3 to –1)
Energy from alcohol, %	1 (2)	3 (8)	–2 (–4 to –1)	2 (5)	4 (8)	–2 (–4 to 0)
Energy from carbohydrate, %	49 (9)	42 (11)	7 (3 to 10)	47 (10)	41 (11)	6 (3 to 9)
Energy from sucrose, %	15 (11)	8 (4)	7 (3 to 10)	12 (7)	8 (5)	4 (2 to 6)
Available carbohydrates, g	256 (87)	183 (84)	73 (45 to 102)	329 (134)	262 (120)	62 (24 to 101)
Sucrose, g	73 (56)	36 (23)	37 (20 to 56)	89 (67)	51 (45)	37 (15 to 59)
Dietary fiber, g	20 (10)	19 (11)	1 (–3 to 5)	25 (11)	25 (17)	–2 (–6 to 2)

[a]All values reported as mean (SD) unless noted otherwise.
[b]Adjusted for smoking and socioeconomic status.

used to analyze differences in the frequencies of participation in physical activity. The Z test was used to examine differences in food sources of the macronutrients, and p values were derived from this analysis. Medication-related differences in sucrose intake were compared using analysis of variance after reducing the number of medication categories to 3 (antipsychotics with or without other medications, other medications, and no medication).

RESULTS

Dietary Intakes

Age, body mass index, total energy, and macronutrient intakes are presented in Table 1. In women, total energy intake was greater for patients than for reference subjects. In both sexes, mean percentage of energy from carbohydrate, total available carbohydrate, and total daily sucrose were higher among patients. In patients, group mean intakes of total energy and macronutrients calculated from the diet record did not differ significantly from those obtained with the diet recall. Patients consumed more nonalcoholic beverages, cakes, and sweets than reference subjects did (Table 2). Sucrose intakes were higher in patients receiving antipsychotic medications than in those receiving other or no medications (Table 3). This finding was statistically significant in women ($p \leq .05$).

Drinking Patterns

Drinking patterns are summarized in Table 4. Total number of drinks consumed and number of sweetened drinks consumed were higher in patients than in reference subjects (ratio of geometric means: women, 1.2 and 2.3, respectively [95% confidence interval [CI] = 1.1 to 1.4, 1.9 to 2.8], men, 1.1 and 2.1, respectively [95% CI = 1.0 to 1.23, 1.8 to 2.4]).

Table 2. Percentages of Total Energy Derived From Various Food Sources[a]

Food	Women		Food	Men	
	Patients (N = 41)	Reference Subjects (N = 205)		Patients (N = 48)	Reference Subjects (N = 240)
Milk	9	7	Bread	12	12
Bread	8	12*	Milk	9	6
Fruit	6	6	Cakes	6	2*
Nonalcoholic beverages	6	1*	Cheese	5	3
			Sugar/sweets	5	4
Sugar/sweets	5	3	Beef	4	7*
Cakes	5	3	Sausages	4	4
Fried potatoes	5	2	Vegetables	4	2
Grains/pasta	5	2*	Fruit	4	3
Cheese	4	4	Other potatoes (not fried)	4	3
Other potatoes (not fried)	3	3	Nonalcoholic beverages	3	2
Dairy products	3	2	Meat pies and pasties	3	5*
Fish	3	2	Margarine	3	3
Beef	3	5			

[a]Food groupings based on Horwath et al.[12]
*$p \leq .05$, Z test.

Physical Activity Patterns

Differences in physical activity patterns are summarized in Table 5. Patients reported fewer episodes of low- to moderate-intensity and high-intensity physical activity than reference subjects. Male patients were significantly less likely than reference subjects to walk to work, run/jog, or attend aerobics classes. Female patients spent less time than reference subjects running, jogging, or bicycling.

Table 3. Macronutrient Intake: Patients in 3 Treatment Regimens[a]

Nutrient	Women: Antipsychotics With or Without Other Medications (N = 14)	Women: Other Medications Only (N = 22)	Women: No Medication (N = 5)	Men: Antipsychotics With or Without Other Medications (N = 16)	Men: Other Medications Only (N = 26)	Men: No Medication (N = 6)
Energy, kJ	7502 (2034)	9314 (284)	7450 (1094)	10,900 (4917)	11,699 (3901)	10,166 (2812)
Energy from fat, %	33 (20)	36 (7)	40 (6)	36 (10)	37 (7)	35 (3)
Energy from protein, %	15 (5)	15 (3)	15 (2)	15 (3)	14 (4)	16 (2)
Energy from alcohol, %	1 (2)	1 (3)	1 (2)	0	3 (7)	2 (4)
Energy from carbohydrates, %	52 (11)	48 (8)	44 (8)	49 (12)	46 (8)	49 (5)
Energy from starch, %	18 (8)	23 (5)	26 (7)	24 (7)	24 (7)	26 (3)
Energy from sugars, %	33 (16)	24 (10)	18 (5)	25 (9)	21 (10)	23 (7)
Energy from sucrose, %	23 (16)*	11 (6)	9 (3)	14 (9)	12 (7)	11 (4)
Available carbohydrates, g	239 (77)	278 (95)	204 (43)	326 (162)	334 (127)	314 (103)
Available sugars, g	146 (73)	75 (45)	84 (27)	158 (76)	164 (104)	149 (71)
Available starch, g	87 (44)	133 (44)	119 (34)	162 (93)	166 (60)	165 (51)
Sucrose, g	97 (72)*	67 (45)	40 (17)	89 (65)	93 (74)	74 (38)
Dietary fiber, g	19 (10)	21 (10)	16 (6)	26 (11)	24 (12)	23 (11)

[a]All values reported as mean (SD).
*$p \leq .05$, analysis of variance.

Table 4. Beverage Consumption Patterns: Patients and Reference Subjects[a]

Beverage Type	Women: Patients (N = 41)	Women: Reference Subjects (N = 205)	Women: Ratio (95% CI)	Men: Patients (N = 48)	Men: Reference Subjects (N = 240)	Men: Ratio (95% CI)
Water, N (%)	19 (46)	102 (50)	…	13 (27)	96 (40)	…
Tea, N (%)	27 (66)	148 (72)	…	29 (60)	158 (66)	…
Coffee, N (%)	32 (78)	120 (59)	…	33 (69)	158 (66)	…
Sweet drinks,[b] N (%)	33 (80)	112 (55)	…	40 (83)	155 (65)	…
Sweet drinks consumed[c]	2.4	1.0	2.3 (1.9, 2.8)	3.1	1.4	2.1 (1.8, 2.4)
Total no. of drinks consumed[c]	7.7	6.4	1.2 (1.1, 1.4)	7.2	7.8	1.1 (1.0, 1.23)

[a]One drink = 250 mL. Abbreviation: CI = confidence interval.
[b]Sweet drinks include powdered drinks, cordials, soft drinks, fruit juice, milkshakes, and sweetened chocolate-based drinks.
[c]Ratio of geometric means (min, max).

Table 5. Involvement in Physical Activity During the 4 Weeks Preceding the Interview, N (%)[a]

Frequency	Women: Patients: High-Intensity Activity[b]* (N = 41)	Women: Patients: Low- to Moderate-Intensity Activity[c]* (N = 41)	Women: Reference Subjects: High-Intensity Activity[b] (N = 188)	Women: Reference Subjects: Low- to Moderate-Intensity Activity[c] (N = 194)	Men: Patients: High-Intensity Activity[b]* (N = 47)	Men: Patients: Low- to Moderate-Intensity Activity[c]* (N = 47)	Men: Reference Subjects: High-Intensity Activity[b] (N = 231)	Men: Reference Subjects: Low- to Moderate-Intensity Activity[c] (N = 233)
None	29 (71)	13 (32)	65 (35)	20 (10)	32 (68)	13 (28)	77 (33)	17 (7)
Once	2 (5)	6 (15)	6 (3)	9 (5)	2 (4)	3 (6)	10 (4)	5 (2)
< Once a week	3 (7)	4 (10)	17 (9)	20 (10)	1 (2)	5 (11)	19 (8)	12 (5)
Once a week	2 (5)	6 (15)	26 (14)	84 (43)	0	12 (26)	29 (13)	70 (30)
A few times a week	3 (7)	8 (20)	44 (23)	57 (29)	6 (13)	6 (13)	55 (24)	96 (41)
Once or more a day	2 (5)	3 (7)	30 (16)	4 (2)	6 (13)	8 (17)	41 (18)	33 (14)

[a]Data from subjects who provided incomplete information have been omitted from this table.
[b]Exercises at home, running/jogging, fitness classes, bicycling.
[c]Going for a walk, gardening, cleaning a car or a bike, renovating/painting a house (and related activities), mowing a lawn.
*$p \leq .05$, Wilcoxon signed rank test.

DISCUSSION

These findings provide, for the first time, convincing evidence that a higher energy intake from carbohydrates contributes to the increased prevalence of overweight and obesity in patients with bipolar disorder compared with reference subjects. The findings were not confounded by differences in socioeconomic status, and the differences were present even after exclusion of subjects who appeared to have underreported food intake. Sucrose derived from nonalcoholic beverages accounted for most of the difference in energy intake. The patients also exercised less frequently and less intensely than the reference subjects. Earlier studies attempting to explain weight gain in psychiatric patients have been inconclusive, since their dietary instruments were insensitive and none included appropriately matched controls.

Previous studies that examined the association between dietary intake and anthropometric measures in patients with psychiatric illness have produced equivocal results. An uncontrolled study[1] in patients with schizophrenia found that obesity was not significantly associated with intakes of a limited number of food items (beverages, sugar, and salt). However, this study failed to evaluate patients' overall dietary intakes or to quantify the contributions to total energy intake of the food items studied. Two studies[7,8] concerning the contribution to weight gain of carbohydrates and fat in patients receiving antidepressants produced conflicting results. Only one of the studies, though, used a dietary assessment instrument suitable for quantifying nutrient intakes.[8] We found no increase in intakes of fat among the bipolar patients in our study. Rather, we found an increased energy intake among the patient group, which is largely explained by a relatively high intake of sucrose, derived to a considerable extent (especially among women) from nonalcoholic beverages.

Dry mouth and increased thirst are well-established side effects of treatment with antipsychotics, tricyclic antidepressants, and lithium.[19] Our findings, which are based on a quantitative estimation of the contribution of beverages to total energy intake, are consistent with those reported by Vendesborg et al.[20] They found, in an uncontrolled study, that increased thirst was associated with weight gain in patients receiving lithium. In our study, female patients reported significantly higher intakes of sugar from nonalcoholic beverages than women in the reference group, and this was reflected in the relative frequencies of overweight and obesity in the 2 groups.[10] It would have been helpful to quantify the effects on dietary intake of individual medications. However, the number of subjects in each medication category was too small to allow us to draw definitive conclusions about the contribution of specific medications to the prevalence of overweight and obesity among our study participants. To overcome the statistical problems of small numbers of subjects and a large number of medication categories, we assigned the patients to 3 groups, which is consistent with another report from this study: antipsychotics alone or with other medication, other medication, and no medication.[10] Analysis of these data showed that female patients receiving antipsychotic medication alone or in combination with other drugs had significantly higher overall sugar intakes than other patients. This finding is in agreement with our previous observations concerning the prevalence of overweight and obesity in bipolar patients.[10] It was also impossible to quantify precisely the contribution of physical inactivity to the prevalence of overweight and obesity we observed. However, our findings are consistent with the adverse effect profiles of the medications used to treat bipolar illness, which are often sedating and may affect motivation and coordination.[21–23]

Our findings appear to be in contrast to epidemiologic data based on the general population and some experimental data, which do not support an association between sucrose intake and obesity. Cross-sectional studies suggest an inverse association between obesity and sucrose intake,[24,25] and prospective studies do not show a subsequent increased risk of becoming overweight or obese in subjects reporting high intakes of sucrose. Steadily increasing obesity rates in many countries have not been accompanied by a parallel increase in intakes of sucrose, perhaps because high intakes of sugars are associated with a lower overall energy density.[25,26] These observations are supported by results from short-term experimental studies showing that de novo lipogenesis does not occur when high-carbohydrate diets are consumed.[27,28] Thus, while sucrose may not play an important role in the etiology of obesity in the population at large, it would seem that in this relatively sedentary population an excessive intake of carbohydrates and sucrose in particular can predispose to weight gain. These findings may also apply to some populations (e.g., Italians, rural Africans) whose fat intakes are low but among whom low levels of physical activity and high intakes of sucrose may be major predisposing factors for weight gain.[29]

This study has some potential limitations. Dietary intakes are notoriously difficult to assess in noninstitutionalized individuals, and the diet recall method has been criticized because it does not assess habitual intakes of

individuals. However, the findings regarding dietary intake were virtually identical in the randomly selected reference group as in the entire LINZ population (1702 individuals),[11] and in the patient group, intakes were comparable when comparing recall data with dietary information derived from a diet record. Dietary underreporting might also be expected to reduce the strength of our findings. The differences remained, though, even after exclusion of subjects who appeared to have underreported food intake. Although the patient population was attending an outpatient clinic and therefore is not representative of all bipolar patients in the community, Dunedin Hospital is the only public hospital in the area to which such patients are referred, and a high proportion of eligible individuals agreed to participate. Smoking and socioeconomic status are other well-established determinants of obesity prevalence and potential confounders in any study investigating the effect of other lifestyle-related variables on overweight and obesity. However, an earlier report documenting the prevalence of excess adiposity in our study population confirmed that the difference in rates of overweight and obesity between reference subjects and patients remained after controlling for the effects of smoking and socioeconomic status.[10]

People with bipolar disorder usually require lifelong pharmacotherapy and as a consequence may maintain substantially higher body weight than that considered optimal for the avoidance of chronic illnesses such as diabetes and coronary heart disease. Furthermore, weight gain may adversely affect medication compliance. This study confirms the hypothesis that drug-induced changes in food preference can lead to an excessive energy intake largely as a result of a high intake of sucrose. Whether this is a consequence of carbohydrate craving or thirst has not been established, but simple dietary advice regarding the use of energy-rich beverages along with encouragement to increase levels of physical activity seems likely to help prevent weight gain in this group of patients. The findings also have bearing on dietary advice aimed at avoiding overweight and obesity in the general population.

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All replies and results are confidential. Answer sheets, once graded, will not be returned. Unanswered questions will be considered incorrect and so scored. Your exact score can be ascertained by comparing your answers with the correct answers to the posttest, which will be printed in the *Journal* issue after the submission deadline. The Physicians Postgraduate Press, Inc. Office of Continuing Medical Education will keep only a record of participation, which indicates the completion of the activity and the designated number of Category 1 credit hours that have been awarded.

1. What was the purpose of this study?
- a. To quantify levels of physical activity in patients with bipolar disorder
- b. To determine the frequency of overweight and obesity in patients with bipolar disorder
- c. To examine the lifestyle-related determinants of excess adiposity in patients with bipolar disorder
- d. To determine whether overweight and obesity are associated with specific medications in pharmacologically treated patients with bipolar disorder

2. Why is this study different from earlier studies that attempted to explain the association between dietary intake and excess adiposity in patients with psychiatric illness?
- a. Earlier studies did not use dietary assessment methods appropriate for quantifying nutrient intakes or include appropriately matched controls
- b. Earlier studies did not use dietary assessment methods appropriate for quantifying nutrient intakes
- c. Earlier studies failed to control for age and socioeconomic status.
- d. The patients in earlier studies were hospitalized.

3. Which statement best describes the patients in this study?
- a. Living in a psychiatric hospital
- b. Nonhospitalized euthymic bipolar patients attending a specialist psychiatric outpatient clinic
- c. Nonhospitalized euthymic bipolar patients recruited from their general practitioner
- d. A mixture of hospitalized and nonhospitalized patients

4. The diagnosis of bipolar disorder in this study was based on:
- a. Research Diagnostic Criteria
- b. DSM-IV criteria
- c. ICD-9 criteria
- d. Schedule for Affective Disorders and Schizophrenia

5. Which patients reported the highest intakes of sucrose?
- a. Male patients taking lithium
- b. Patients not taking medication
- c. Male patients taking antipsychotics with or without other medications
- d. Female patients taking antipsychotics with or without other medications

6. Excess energy intakes in female patients were derived largely from:
- a. Sugar/sweets
- b. Cakes
- c. Nonalcoholic beverages
- d. Fruit

7. The patients in this study reported:
- a. Fewer episodes of low- to moderate-intensity physical activity than reference subjects
- b. More episodes of high-intensity physical activity than reference subjects
- c. Fewer episodes of low- to moderate-intensity physical activity than reference subjects and more episodes of high-intensity physical activity than reference subjects
- d. Fewer episodes of low- to moderate-intensity and high-intensity physical activity than reference subjects

8. How do the findings in this study contrast with those in the general population?
- a. High sucrose intakes are not associated with overweight and obesity in the general population.
- b. Activity levels in the general population are higher than in patients with bipolar illness.
- c. Patients with bipolar illness require psychotropic medication.
- d. Patients with bipolar illness have a low metabolic rate.

Note: Because the expiration date for *The Journal of Clinical Psychiatry* CME activities has been extended from 6 months to 1 year, no answers will be published until July 2001.

Circle the one correct answer for each question.

1.	a	b	c	d	5.	a	b	c	d
2.	a	b	c	d	6.	a	b	c	d
3.	a	b	c	d	7.	a	b	c	d
4.	a	b	c	d	8.	a	b	c	d

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For a credit certificate to be issued, please fax or mail this Registration Form and payment no later than May 31, 2002. You will receive your credit certificate within 6 to 8 weeks.

Keeping a copy for your files

Retain a copy of your answers and compare them with the correct answers, which will be published after the submission deadline.

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Please evaluate the effectiveness of this CME activity by answering the following questions.

1. Was the educational content relevant to the stated educational objectives? ❑ Yes ❑ No
2. Did this activity provide information that is useful in your clinical practice? ❑ Yes ❑ No
3. Was the format of this activity appropriate for the content being presented? ❑ Yes ❑ No
4. Did the method of presentation hold your interest and make the material easy to understand? ❑ Yes ❑ No
5. Achievement of educational objectives:
   A. Enabled me to describe the lifestyle-related determinants of overweight and obesity in patients with bipolar disorder. ❑ Yes ❑ No
   B. Enabled me to identify bipolar patients at risk of becoming overweight or obese. ❑ Yes ❑ No
   C. Enabled me to give basic advice to patients concerning the avoidance of weight gain. ❑ Yes ❑ No
6. Did this CME activity provide a balanced, scientifically rigorous presentation of therapeutic options related to the topic, without commercial bias? ❑ Yes ❑ No
7. Does the information you received from this CME activity confirm the way you presently manage your patients? ❑ Yes ❑ No
8. Does the information you received from this CME activity change the way you will manage your patients in the future? ❑ Yes ❑ No
9. Please offer comments and/or suggested topics for future CME activities.

   _____

   _____

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10. How much time did you spend completing this CME activity? _____
11. Please rank the format for future activities in order of your preference (1 is most preferred):

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    ___ Internet ___ E-Mail ___ Symposium
    ___ Journal ___ Supplement to Journal
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