Nutritional Assessment of Patients With Schizophrenia: A Preliminary Study

by Martin Strassnig, Jaspreet Singh Brar, and Rohan Ganguli

Abstract

The prevalence of obesity in the United States population is increasing, and similar trends can be observed among schizophrenia patients. No thorough examination of the actual nutritional composition of the diet of schizophrenia patients in the United States has been carried out. We therefore employed a 24-hour diet recall in 146 schizophrenia outpatients to gather information on different nutritional variables, such as total caloric intake and total fat, protein, carbohydrate, cholesterol, and fiber content. Data were subsequently compared to data for the general population collected in the Third National Health and Nutrition Examination Survey (NHANES III). Schizophrenia patients as a group ate more food when compared to NHANES III subjects, but the relative percentages of calories derived from fat, protein, and carbohydrates were not found to be different. Therefore, it is unlikely that schizophrenia patients make dietary choices different from those of people in the general population. Instead, schizophrenia patients seem to eat more of the same food.

Keywords: Nutrition, caloric intake, diet, BMI, 24-hour recall, schizophrenia.

Schizophrenia Bulletin, **29(2):393–397, 2003.**

The purpose of this study was to evaluate the diet of community-dwelling schizophrenia patients in the United States. It is known that patients with schizophrenia in North America tend to be overweight (Allison et al. 1999). Obesity itself is widely regarded as a major medical hazard (National Task Force on the Prevention and Treatment of Obesity 2000) and is increasing in prevalence (Mokdad et al. 1999). The risks include insulin resistance, diabetes mellitus, hypertriglyceridemia, decreased levels of high-density lipoprotein cholesterol, and increased levels of low-density lipoprotein cholesterol. Obesity is also associated with gallbladder disease as well as sleep apnea, chronic hypoxia and hypercapnia, degenerative joint disease, and certain cancers. Obesity is an independent risk factor for death from coronary heart disease (Pi-Sunyer 1993).

While the etiopathogenesis of weight gain in schizophrenia remains unclear, there is consensus that obesity is primarily a result of poor dietary choices (Brown et al. 1999). There are only a handful of studies that have systematically examined the diet of patients with schizophrenia. In a nutritional assessment among people living in "mental health residential houses" in Sydney, Australia, it was observed that the respondents had a significantly higher prevalence of obesity (including abdominal obesity) than did the general population (Wallace and Tennant 1998). In studies completed in Scotland and Oxford, U.K., it was observed that schizophrenia patients' diet was higher in fat and lower in fiber and vitamins as compared to the healthy controls' diet (McCreadie et al. 1998; Brown et al. 1999). While similar dietary trends may be observed among U.S. schizophrenia patients, systematic studies examining the associations between diet, sociodemographic, and physical characteristics have not been carried out.

Methods

Subjects. Patients with a *DSM–IV* (American Psychiatric Association 1994) diagnosis of schizophrenia, schizoaffective disorder, and psychotic disorder not otherwise specified (NOS) were recruited from the outpatient clinic and partial hospital at the Comprehensive Care Services at the Western Psychiatric Institute and Clinic by their therapists, psychiatrists, and nurses. No attempts to target certain patient groups (i.e., overweight patients) took place, and no randomized recruitment procedures were applied.

Send reprint requests to Dr. R. Ganguli, Professor of Psychiatry, Pathology and Health and Community Systems, Vice Chairman and Chief of Clinical Services, Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center, 3811 O'Hara Street, Pittsburgh, PA 15213; e-mail: gangulir@msx.upmc.edu.

Patients willing to participate in the study were invited to the interview. Diagnoses were confirmed by patient chart review. Assessments were carried out after obtaining written informed consent according to procedures approved by the University of Pittsburgh Biomedical Institutional Review Board. The procedure took about 45 minutes per participant and yielded information in three different domains: (1) sociodemographic data, (2) nutritional information, and (3) anthropometric measures.

Data Collection. Sociodemographic data were obtained by open-ended questions. When information was missing, patient charts were reviewed. A 24-hour diet recall using standardized food models was used to collect the nutritional information. This method is widely regarded as suitable for ascertaining dietary intake (Young et al. 1952; Madden et al. 1976) and has been employed in the National Health and Nutrition Examination Surveys (NHANES) (Kohlmeier 1992). Weight and height were recorded in kilograms and meters, respectively, and body mass index (BMI) was calculated (kg/m^2). BMI categories adopted by the National Institutes of Health (1998), overweight if BMI 25 to 29.9 kg/m^2, and obese if BMI greater than 30 kg/m^2, were used to categorize individuals in the study sample.

BMI of patients in the study was compared to age-adjusted BMI for the general population from NHANES III (Kuczmarski et al. 1994). Nutritional values (calories, protein, carbohydrate, fat, cholesterol, fiber, caffeine) were computed using the commercially available ESHA (Elizabeth Stuart Hands and Associates) Food Processor Nutrition software 7.5 (Lee et al. 1995) and compared to nutritional data for the general population from NHANES III (Alaimo et al. 1994; McDowell et al. 1994). While several years have elapsed since NHANES III data were collected, they are still commonly used as a reference standard for the U.S. population.

Data Analysis. SPSS (for Windows) software was employed for data analysis. Descriptive analysis including mean, range, and standard deviation for continuous variables was carried out to determine whether each variable was normally distributed, and frequency counts for categorical data (e.g., gender, race) were done to examine the proportions of various sociodemographic characteristics. The measures obtained through the 24-hour recall were examined for the whole group and for groups defined by different demographic characteristics (for males and females, Caucasians and African-Americans). Student *t* tests and, where appropriate, an analysis of variance were employed to look for statistical differences between the means of 2 or more variables. Student *t* tests also were used to compare mean nutritional values of the patient sample to data reported in NHANES III.

Results

One hundred and forty-six patients with a *DSM–IV* diagnosis of schizophrenia, schizoaffective disorder, and psychotic disorder NOS were recruited. Sociodemographic data are shown in table 1.

The BMI of 27 patients (18.5%) was in the healthy range (BMI ≤ 24.9). Thirty-two patients (21.9%) were overweight, with a BMI between 24.9 and 29.9. Eighty-seven patients (59.6%) could be classified as obese, indicated by a BMI of more than 30.

The mean BMI of sample patients was significantly higher when compared to the age-adjusted reference population from NHANES III (mean BMI = 26.3). Similar results were observed among male and female as well as Caucasian and African-American patients.

As a group, sample subjects consumed significantly more total calories, carbohydrates, and fat than the reference population (table 2). The relative percentages of calories derived from the major nutrients (protein, carbohydrates, and fat) were not found to be different from the percentages seen in the general population. No differences in cholesterol or fiber intake were found with respect to the NHANES III data.

Table 1. Sociodemographic data (*n* = 146)

Characteristic	
Age, mean (± SD)	43 (± 8.9)
Gender, *n* (%)	
Male	78 (53.4%)
Female	68 (46.6%)
Ethnicity, *n* (%)	
White	79 (54.1%)
Black	67 (45.9%)
Diagnosis, *n* (%)	
Schizophrenia, paranoid type	69 (47.3%)
Schizoaffective disorder	53 (36.3%)
Psychotic disorder NOS	24 (16.4%)
Marital status, *n* (%)	
Single, divorced, or widowed	134 (91.8%)
Married	12 (8.2%)
Smoking status, *n* (%)	
Smokers	87 (59.6%)
Nonsmokers	59 (40.4%)

Note.—NOS = not otherwise specified; SD = standard deviation.

Table 2. Nutritional data[1]

	All ($n = 146$)	Male ($n = 78$)	Female ($n = 68$)	White ($n = 79$)	Black ($n = 67$)
Weight (kg)	94.8 ± 23.1	96.1 ± 23.1	93.4 ± 23.2	96.9 ± 26.4	92.4 ± 18.4
Body mass index (kg/m^2)	32.7 ± 7.9***	30.8 ± 7.2***	34.8 ± 8.1***	33.3 ± 8.6***	31.9 ± 6.9***
Total calories	3,057 ± 1,132**	3,201 ± 1,084	2,891 ± 1,171***	3,021 ± 1169**	3,098 ± 1094**
Protein (g)					
% of calories	95 ± 40	100 ± 40	90 ± 40*	95 ± 41	95 ± 40
	12.8 ± 3.8	12.7 ± 4	12.8 ± 3.7	12.9 ± 3.7	12.6 ± 4
Carbohydrate (g)					
% of calories	394 ± 166***	413 ± 53	372 ± 178***	390 ± 159***	398 ± 175***
	51.8 ± 10.6	52.5 ± 11.7	51.1 ± 9.1	52.2 ± 9.4	51.4 ± 11.8
Fat (g)					
% of calories	121 ± 61*	126 ± 66.8	116 ± 53**	120 ± 65*	123 ± 56*
	35.1 ± 9.2	34.3 ± 0.1	36 ± 8.2	34.9 ± 8.5	35.3 ± 10.1
Cholesterol (mg)	341 ± 241	365 ± 68	313 ± 204	327 ± 245	357 ± 236
Total fiber (g)	21.17 ± 11.6	21.6 ± 11	20.7 ± 12.3*	21.1 ± 10.4	21.3 ± 12.9*

[1] Compared to data for the general population from the Third National Health and Nutrition Examination Survey (Alaimo et al. 1994; McDowell et al. 1994).

* $p \leq 0.05$; ** $p \leq 0.005$; *** $p \leq 0.0005$

However, diets of male patients did not differ significantly from the diet of the age-adjusted general population reported in the NHANES III study. Only carbohydrate intake came close to reaching significance ($p = 0.0502$, $t = 1.96$). In contrast, female participants consumed significantly more total calories, protein, carbohydrate, and fat than the reference population of the NHANES III survey. Female participants also consumed more fiber than females in the general population.

Regarding caffeine intake, white schizophrenia patients (619 mg ± 708) consumed significantly more caffeine ($p \leq 0.005$, $t = 3.62$) than African-American patients did (298 mg ± 320). Caffeine intake was also significantly higher ($p \leq 0.05$, $t = 2.84$) in smokers (571.8 mg ± 675) than in nonsmokers (324 mg ± 376). There were no comparable NHANES III data to compare our findings on caffeine with.

Only 6 patients in the study reported consumption of alcoholic beverages during the previous 24 hours. Because of this small number, no reliable analysis could be carried out.

Limitations

Socioeconomic factors are known to influence the prevalence of obesity. Therefore, the inclusion of a matched control group to correct for several socioeconomic factors (i.e., educational level, income) would have improved the value of the results. Although having a locally collected control group would have improved the study methodologically, the study funding did not allow for such an expense. It should also be noted that the findings can be confidently extrapolated to only similar clinical populations: community-dwelling remitted individuals with diagnoses of schizophrenia and schizoaffective disorder. Fortunately, the majority of people with these disorders would fall into the above category.

Conclusions

As a group, schizophrenia patients in this study ate more calories and nutrients (protein, carbohydrates, fat) compared to subjects in the NHANES III study, because the absolute amounts of calories derived from these nutrients were higher. However, the relative percentages of intake for protein, carbohydrates, and fat were not found to be different from the pattern observed in the general population. Therefore, it is unlikely that schizophrenia patients make dietary choices different from the choices that subjects in the population would make. Instead, they seem to eat more of the same food.

The high mean BMI among the study sample is consistent with the findings of other studies (Gopalaswamy and Morgan 1985; Stedman and Welham 1993). When subjects were divided by race and gender, black females had the highest relative fat intake (37.5% of total calories) as well as the highest BMI (36.1 ± 6.2). The prevalence of high BMI in black females has been previously reported in

samples of the general population (Allison et al. 1997; Holmes et al. 1998) and is consistent with an increased risk for medical problems in this subgroup (Cowie et al. 1993; Winkleby et al. 1999). It may be necessary to plan for gender- and culture-specific approaches to address the problem of obesity among black females. Medication also may contribute to the high mean BMI (Ganguli 1999), possibly through increased appetite or sedation, and therefore less energy expenditure or endocrinological side effects (Ackerman and Nolan 1998). We plan to investigate the possible contribution of medication to weight gain in the future.

The high percentage of smokers in the study sample (59.6%), combined with the high prevalence of obesity, suggests that schizophrenia patients are at particular risk of developing serious medical problems associated with higher mortality, which has been previously noted (Simpson and Tsuang 1996).

Most patients in the sample reported that they were concerned with their body weight and aware of the fact that weight loss would be beneficial to their health. However, patients also complained about the virtual nonexistence of structured weight loss programs to support their needs. Therefore, health care providers need to develop and implement weight management programs to help these patients change their eating patterns, lose weight, feel more self-confident, and most important, reduce morbidity and mortality from physical health problems. However, sustained weight reduction is a challenge even in non–psychiatrically ill individuals and may take considerable effort to achieve.

References

Ackerman, S., and Nolan, L.J. Bodyweight gain induced by psychotropic drugs. *CNS Drugs,* 9(2):135–141, 1998.

Alaimo, K.; McDowell, M.A.; Briefel, R.R.; Bischof, A.M.; Caughman, C.R.; Loria, C.M.; and Johnson, C.L. *Dietary Intake of Vitamins, Minerals, and Fiber of Persons Ages 2 Months and Over in the United States: Third National Health and Nutrition Examination Survey, Phase 1, 1998–91. Advance Data From Vital and Health Statistics. No 258.* Hyattsville, MD: National Center for Health Statistics, 1994.

Allison, D.B.; Edlen-Nezin, L.; and Clay-Williams, G. Obesity among African American women: Prevalence, consequences, causes, and developing research. *Women's Health,* 3(3–4):243–274, 1997.

Allison, D.B.; Fontaine, K.R.; Heo, M.; Mentore, J.L.; Cappelleri, J.C.; Chandler, L.P.; Weiden, P.J.; and Cheskin, L.J. The distribution of body mass index among individuals with and without schizophrenia. *Journal of Clinical Psychiatry,* 60(4):215–220, 1999.

American Psychiatric Association. *DSM–IV: Diagnostic and Statistical Manual of Mental Disorders.* 4th ed. Washington, DC: APA, 1994.

Brown, S.; Birthwistle, J.; Roe, L.; and Thompson, C. The unhealthy lifestyle of people with schizophrenia. *Psychological Medicine,* 29(3):697–701, 1999.

Cowie, C.C.; Harris, M.I.; Silverman, R.E.; Johnson, E.W.; and Rust, K.F. Effect of multiple risk factors on differences between blacks and whites in the prevalence of non-insulin-dependent diabetes mellitus in the United States. *American Journal of Epidemiology,* 137(7):719–732, 1993.

Ganguli, R. Weight gain associated with antipsychotic drugs. *Journal of Clinical Psychiatry,* 60:20–24, 1999.

Gopalaswamy, A.K., and Morgan, R. Too many chronic mentally disabled patients are too fat. *Acta Psychiatrica Scandinavica,* 72(3):254–258, 1985.

Holmes, M.D.; Stampfer, M.J.; Wolf, A.M.; Jones, C.P.; Spiegelman, D.; Manson, J.E.; and Colditz, G.A. Can behavioral risk factors explain the difference in body mass index between African-American and European-American women? *Ethnicity & Disease,* 8(3):331–339, 1998.

Kohlmeier, L. Dietary methodology considerations for NHANES III. *Vital and Health Statistics—Series 4: Documents and Committee Reports,* 27:81–84, 1992.

Kuczmarski, R.J.; Flegal, K.; Campell, S.M.; and Johnson, C.L. Increasing prevalence of overweight among U.S. adults: The National Health and Nutrition Examination Surveys, 1960 to 1991. *JAMA,* 272(3):205–211, 1994.

Lee, R.D.; Nieman, D.C.; and Rainwater, M. Comparison of eight microcomputer dietary analysis programs with the USDA Nutrient Data Base for Standard Reference. *Journal of the American Dietetic Association,* 95:858–867, 1995.

Madden, J.P.; Goodman, S.J.; and Guthrie, H.A. Validity of the 24-hr. recall: Analysis of data obtained from elderly subjects. *Journal of the American Dietetic Association,* 68(2):143–147, 1976.

McCreadie, R.; Macdonald, E.; Blacklock, C.; Tilak-Singh, D.; Wiles, D.; Halliday, J.; and Paterson, J. Dietary intake of schizophrenic patients in Nithsdale, Scotland: Case-control study. *British Medical Journal,* 317:784–785, 1998.

McDowell, M.A.; Briefel, R.R.; Alaimo, K.; Bischof, A.M.; Caughman, C.R.; Carroll, M.D.; Loria, C.M.; and Johnson, C.L. *Energy and Macronutrient Intakes of Persons Ages 2 Months and Over in the United States: Third National Health and Nutrition Examination Survey, Phase 1, 1988–91. Advance Data From Vital and Health Statistics. No 255.* Hyattsville, MD: National Center for Health Statistics, 1994.

Mokdad, A.H.; Serdula, M.K.; Dietz, W.H.; Bowman, B.A.; Marks, J.S.; and Koplan, J.P. The spread of the obesity epidemic in the United States, 1991–1998. *JAMA,* 282(16):1519–1522, 1999.

National Institutes of Health, National Heart, Lung, and Blood Institute. *Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults: The Evidence Report.* Bethesda, MD: National Institutes of Health, 1998.

National Task Force on the Prevention and Treatment of Obesity. Overweight, obesity and health risk. *Archives of Internal Medicine,* 160:898–904, 2000.

Pi-Sunyer, F.X. Medical hazards of obesity. *Annals of Internal Medicine,* 119(7 pt 2):655–660, 1993.

Simpson, J.C., and Tsuang, M.T. Mortality among patients with schizophrenia. *Schizophrenia Bulletin,* 22(3):485–499, 1996.

Stedman, T., and Welham, J. The distribution of adipose tissue in female in-patients receiving psychotropic drugs. *British Journal of Psychiatry,* 162:249–250, 1993.

Wallace, B., and Tennant, C. Nutrition and obesity in the chronic mentally ill. *Australian and New Zealand Journal of Psychiatry,* 32:82–85, 1998.

Winkleby, M.A.; Robinson, T.N.; Sundquist, J.; and Kraemer, H.C. Ethnic variation in cardiovascular disease risk factors among children and young adults: Findings from the Third National Health and Nutrition Examination Survey, 1988–1994. *JAMA,* 281(11):1006–1013, 1999.

Young, M.; Hagan, G.C.; Tucker, R.E.; and Foster, W.E. A comparison of dietary study methods: II. Dietary history vs. seven-day record vs. 24-hr. recall. [Letter]. *Journal of the American Dietetic Association,* 28:218, 1952.

Acknowledgments

Funding for this study was provided by the Trunzo Family Fund at the University of Pittsburgh. The authors wish to acknowledge the assistance of Ms. Hattye Board, R.D., M.P.H., in the design of the study and nutritional assessment methodologies; and Robert Wirth, R.N., and the staff of Comprehensive Care Services and the Schizophrenia Treatment and Research Center at Western Psychiatric Institute and Clinic, in subject recruitment.

The Authors

Martin Strassnig, M.D., is Psychiatric Resident in Training; Jaspreet Singh Brar, M.D., M.P.H., is Research Assistant Professor; and Rohan Ganguli, M.D., is Professor of Psychiatry, Pathology, and Health and Community Systems, and Vice Chairman and Chief of Clinical Services, Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center, Pittsburgh, PA.