

Research and Professional Briefs

Food Choice and Diet Variety in Weight-Restored Patients with Anorexia Nervosa

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ABSTRACT

Anorexia nervosa is a serious psychiatric illness associated with substantial morbidity and mortality. Weight-restored females with anorexia nervosa with limited diet variety, assessed by a diet variety score, have been reported to have poor outcomes. Using the same patient cohort, the objective of the current study was to provide a detailed description of the types of foods from which patients restrict variety in their diets. Forty-one weight-restored patients, hospitalized between June 2000 and July 2005, who completed a 4-day food record before discharge were followed for up to 1 year. Patient outcomes were categorized as a success (n=29) or failure (n=12) using Morgan-Russell criteria. Although the total number of foods selected did not differ between the success and failure groups (73±14 vs 74±13, respectively; $P=0.741$), a significant difference in the total number of different foods was observed: the failure group selected fewer and the success group selected more (43±9 vs 51±7; $P=0.005$). Outcomes groups also differed significantly in the variety of foods selected from 5 of 17 food groups. Results suggest that a diet limited in total variety and specifically limited in variety from five food groups

may be associated with relapse in patients with anorexia nervosa.

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Anorexia nervosa is a serious psychiatric illness associated with substantial morbidity (1) and mortality (2,3). Treatment programs are largely successful in the restoration of body weight; however, recidivism is common, and the rate of relapse is estimated to be as high as 50% (4). Patients with anorexia nervosa restrict their food consumption, leading to decreased energy and nutrient intakes. In addition, these individuals characteristically restrict food choice (5-9), affecting variety in the diet, both across and within food groups. Inpatient programs typically provide varied diets of sufficient energy content to promote the restoration of a healthy body weight. Nevertheless, the high relapse rate suggests that many patients have difficulty maintaining a healthful diet after hospital discharge.

In normal weight, overweight, and obese individuals, increased diet variety is associated with increased energy intake (10-17), and limited diet variety is associated with decreased energy intake (18-20) and weight loss (19,21). Limited diet variety can lead to food monotony and decreased energy intake (20). Highly palatable foods are more resistant to the monotony effect, whereas less palatable foods tend to amplify this effect (22,23). Clinical observation suggests that patients with anorexia nervosa generally consume a limited number of less palatable foods and simultaneously avoid those that are generally more palatable. Few studies, however, have obtained objective measures to assess such behavior.

It was previously reported that limited diet variety, assessed by a diet variety score, was associated with worse outcomes during the 1-year period immediately after inpatient weight restoration (24). Using the same patient cohort, the objective of the current study was to provide a detailed description of the types of foods from which patients restrict variety in their diets.

METHODS

Participants

This study is a secondary analysis of data reported previously (24). Participants were 41 women with anorexia nervosa between the ages of 18 and 45 years who were hospitalized for treatment on the Eating Disorders Service of the New York State Psychiatric Institute at Columbia University Medical Center between June 2000 and July 2005. The Institutional Review Board of the

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New York State Psychiatric Institute approved this secondary data analysis.

Participants met the anorexia nervosa criteria (except amenorrhea) of the fourth edition of *Diagnostic and Statistical Manual for Mental Disorders* (DSM-IV) (25). The amenorrhea criterion of DSM-IV was not strictly applied because few differences in illness history, treatment response, and general psychopathology have been observed between women with anorexia nervosa and women meeting all of the criteria of the DSM-IV for anorexia nervosa except amenorrhea (26). Moreover, it is currently proposed that the amenorrhea criterion be deleted from the upcoming DSM-5 (27).

Inpatient treatment was described previously (24) and consisted of a structured behavioral program aimed at normalizing eating behavior and restoring body weight to a minimum of 90% ideal body weight (IBW) (1,28), approximately equal to a body mass index (BMI; calculated as kg/m²) of 20. Patients were prescribed three meals and one snack daily and were to gain ≥ 1 kg per week. Additional calories from Ensure Plus (Abbott Nutrition, White Plains, NY) were provided if energy intake was not sufficient. Initially, patients were prescribed an 1,800-kcal, 30%-fat diet that was selected by the hospital's clinical registered dietitian; all meals and snacks were eaten under supervision. Calorie prescriptions were increased to approximately 3,000 kcal/day during 2.5 weeks.

At 80% IBW, patients were permitted to make their own food choices from the hospital menu. At 90% IBW, patients were eligible for and encouraged to eat meals during passes outside the hospital. Meal passes were reviewed in advance by the registered dietitian and approved by the treatment team; however, compliance with the prescribed diet was not monitored when meals were eaten outside the hospital.

Diet Assessment

Patients completed a prospective 4-day food record after maintaining $\geq 90\%$ IBW for 2 to 4 weeks. A trained research assistant provided detailed verbal and written instructions on estimation of food portions and a pictorial. Completed records, reviewed for accuracy and completeness by a registered dietitian, were entered into NUTRITIONIST PRO software (version 1.2.207, 2003, First DataBank, Inc, San Bruno, CA). Analyses were conducted without knowledge of patients' treatment outcomes.

The food records were manually coded by a registered dietitian to determine total food choice; this is referred to as the total number of food items selected. A food item was counted each time it was selected, regardless of quantity. The food records were also coded to determine total diet variety; this is referred to as the total number of different/unique food items selected. Even if consumed on multiple occasions, a food item was counted only once (10,29), regardless of quantity (10,30). To determine the degree to which foods were repeatedly chosen, a ratio was calculated to compare the total number of food items selected to the total number of different/unique food items selected.

The food records were also reviewed to determine the variety of foods selected from 17 food groups: total complex carbohydrate and three carbohydrate subgroups

Outcome	Definition
Full	No DSM-IV ^a criteria for a minimum of 8 weeks
Good	Body mass index ≥ 18.5 ; normal menses
Fair	May have some binge eating or purging behaviors or psychological symptoms of anorexia nervosa
Poor	Body mass index ≥ 18.5 ; amenorrhea
	Body mass index < 18.5

Figure. Definition of modified Morgan-Russell criteria for patients with anorexia nervosa. ^a*Diagnostic and Statistical Manual of Mental Disorders*, 4th ed (DSM-IV). Washington, DC: American Psychiatric Association; 1964.

(breads, cereals, starches); total protein and two protein subgroups (animal, vegetable); casseroles and mixed entrees; fruits; vegetables; yogurt and cheese; desserts and sweet snacks; savory snacks; added fats; added sugars; miscellaneous foods; and caloric beverages. Food groups were based on established guidelines for patients' meal planning used at the New York State Psychiatric Institute. A specific food was counted as a distinct item if it was prepared in an obviously different manner (eg, mashed or baked potato) or was of a different variety (eg, brown or white rice). Each vegetable was counted as a distinct item; however, it was counted once if prepared in a fat-free manner (eg, boiled) and counted a second time if prepared with the addition of fat (eg, stir-fried). Likewise, a specific cut of meat or poultry or a specific type of fish was counted once if prepared in a fat-free manner (eg, grilled) and counted a second time if prepared with the addition of fat (eg, deep-fried). Different varieties of juice were distinct, as were different forms of the same fruit (eg, fresh or canned). Casseroles and mixed entrees (eg, pizza) were counted as a complete unit and were not broken down to component ingredients. Distinct types of nutritive sweeteners (eg, granulated or brown sugar) were each counted once, as were distinct types of added fats (eg, mayonnaise, butter). Noncaloric fluids (eg, black coffee, water), non-nutritive sweeteners (eg, aspartame, saccharin), and condiments (eg, salt, pepper, ketchup, mustard) were not counted.

Post-Hospitalization Follow-Up

As described previously (24), weight-restored patients were assessed in the hospital and followed for up to 1-year post-discharge. A research psychiatrist using the modified Morgan-Russell criteria (2,31) (Figure) determined participant outcomes at study termination. Consistent with previous reports (24,32-34), patients who met Morgan-Russell criteria for full, good, or fair outcomes were included in the treatment success group (n=29) and those who met Morgan-Russell criteria for poor outcomes were included in the treatment failure group (n=12). All between-group comparisons were based on this method of dichotomizing treatment outcomes.

Statistical Analyses

The Student's *t* test was used to compare total food choice and total diet variety between the success (n=29) and

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