tional status of patients with PD in Taiwan. If we were to find that PD patients had lower nutritional levels, supplementation of nutrients or anti-oxidative vitamins might be helpful in improving their nutritional status. The purpose of this study was to examine the nutritional status and nutrient intake of individuals with PD.

METHODS

Twenty-six subjects with idiopathic Parkinson's disease who were regularly attending a neurology clinic at the Taipei Medical University Hospital and who showed no clinical fluctuations in response to levodopa therapy were studied. Those with significant weight loss during the most recent 3 months were excluded from this study.

The following anthropometric data were recorded for each subject: height, weight, triceps skinfold thickness (TSF), and mid-arm circumference (MAC). All measurements were recorded by the same observer. Subjects were weighed to the nearest 0.1 kg in light indoor clothing without footwear. Body mass index (BMI) was calculated. TSF was measured to the nearest 0.1 mm using calipers (Cambridge Scientific Instruments, Cambridge, MS); the mean of 3 measurements was recorded as the value. MAC was measured twice on each side, and the mean of all 4 measurements was recorded as the average. Arm muscle circumference (AMC) was calculated from the formula: AMC = MAC - (TSF × 0.314). We used the values of a Taiwan population survey[4] to evaluate the anthropometric level of patients. If the TSF values of the patients were < 8.3, 8.3-11.4, or >11.4 mm in men, we defined them as the < 25 percentile, 25-50 percentile, or > 50 percentile, respectively. The criteria of TSF for women were < 12.9, 12.9-18.2, or > 18.2 mm. If the MAC values of the patients were < 24.9, 24.9-27.2 or > 27.2 cm in women, we defined them as the < 25 percentile, 25-50 percentile, or > 50 percentile, respectively. The criteria of MAC for men were < 26.4, 26.4-28.8, and > 28.8 cm.

Each subject was interviewed and examined, and the following clinical information was recorded: time since diagnosis (years), clinical disease stage (Hoehn and Yahr grading) with grades of 1-5, and swallowing and chewing difficulties. A single recall may lead to more variability and thus decreased the usefulness of detecting the relationships between diet and other predictor variables. Multiple days of dietary assessment would minimize intra-individual variability and provide a more reliable estimate of an individual typical dietary consumption. Patients with PD who did not complete more than three 24-h recalls were excluded from the analysis of their dietary intake. Comprehensive diet histories, including 24-h dietary recalls (> 3 times) and frequency of meals and snacks, were carried out during a 6-month period. Diets were analyzed using the DIET computer program.[5]

The statistical software package SPSS/PC (Statistical Package for the Social Sciences, Chicago, IL) was used for all analyses. Results of anthropometric indices of patients were analyzed separately for males and females because normal indices for the 2 sexes differ. Statistical significance was defined as $p < 0.05$.

RESULTS

Half of the participants were men and half were women. The average ages for men and women were 68 8 and 73 ± 4 years old, respectively. The average height for men was 162.2 ± 7.7 cm, and the average body weight was 59.2 ± 12.2 kg. The average height and weight for women were 153.9 ± 5.7 cm and 56.7 ± 9.4 kg, respectively. There were only a few patients (4/26) underweight according to the criterion of obesity of Huang et al.[6] A total of 14 patients had other illnesses (i.e., hyperlipidemia, hypercholesterolemia, diabetes mellitus, etc.). Factors that could affect food intake such as physical problems of chewing or swallowing are shown in Table 1. Thirteen patients reported no problems with GI functions. Only 2 patients reported a significant loss of appetite after the onset of disease, while 5 patients had a slightly reduced amount of food intake. Thirty-six percent of patients had the habit of snacking between meals. Every patient lived with his/her spouse or son or daughter family.

The average anthropometric indices in the PD pa-