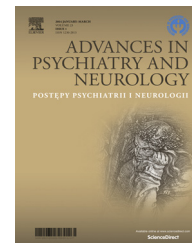


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Changes of nutritional habits in patients with Alzheimer's disease



Zmiany nawyków żywieniowych u osób z chorobą Alzheimera

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ABSTRACT

Background: The aim of the study was to examine changes in food consumption patterns in patients with Alzheimer's disease. **Methods:** A total of 217 patients diagnosed with Alzheimer's disease (AD) were enrolled in the study. Changes in nutritional patterns and eating habits following the onset of AD symptoms were analyzed and tested for associations with age, sex, education and the disease duration. First, a series of analyses of one-way contingency tables were conducted. Subsequently, three groups differing in the main direction of changes in the analyzed parameters were identified using multiple correspondence analysis. Patients were classified into the three groups by means of cluster analysis; the classification was further checked by multiple correspondence analysis. The Freeman-Halton extension of Fisher's exact test and the Kruskal-Wallis H test were used to analyze intergroup differences in nominal and continuous variables, respectively. **Results:** Thirteen percent of cases revealed an increased body weight associated with increased appetite, quicker pace of eating larger portions, and with altered nutritional habits (i.e. changes in the positive direction). In 34% of cases, loss of weight was found in association with slower pace of eating smaller portions and decreased appetite (i.e. changes in the negative direction). The remaining 53% patients under study experienced no changes in their body weight, appetite or eating patterns, with only a relatively small percentage reporting some changes in their culinary tastes. Changes in either direction were noted predominantly in women. Patients manifesting positive changes were significantly older and had a later onset AD. Approximately one in four of them (25.9%) consumed significantly more sweet foods. **Conclusions:** Weight loss affecting a significant percentage of AD patients was associated with their slower eating pace and eating smaller portions. Therefore, in these patients calorie density of consumed meals should be increased and their preference for sweet foods should be utilized.

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Background

Alzheimer's disease has reached epidemic proportions in recent years. The global prevalence of dementia was estimated to be 36.5 million people in the year 2010. According to the most recent prognoses this rate will almost double in the coming two decades [1]. The incidence rate of dementia increases exponentially with age, and Alzheimer's disease (AD) is the most frequent cause of this condition [2]. Since there is no effective treatment for AD and the condition is insidious (i.e. CNS abnormalities occur long before the onset of symptoms) [3], it is considered of utmost importance to prevent or at least delay the onset of first AD symptoms and maintain the patients' self-sufficiency possibly long [4]. Available research findings indicate that achievement of both these purposes depends to a large extent on nutritional patterns among the patients [5, 6]. A diet rich in polyunsaturated fatty acids, antioxidants and vitamins (e.g. the Mediterranean diet) has a protective effect, in contradistinction to diets high in meat, saturated fats and processed sugars [7, 8]. Overweight, obesity and underweight in middle age increase the risk for developing AD in later years, while increased BMI in people aged over 68 is associated with a reduced risk of dementia. BMI <20 at and over the age of 68 is a risk factor for dementia [9-11]. Even the initial stage of AD is characterized by a diet lower in calories and less likely to satisfy the needs for macro- and micro-elements, dietary fiber and unsaturated fatty acids, in comparison to the diet of healthy people [12]. Body weight loss noted in many persons with AD tends to increase with progression of symptom severity [13, 14]. AD patients' nutrition level is directly related to the level of their daily life functioning [15] and to progression of cognitive decline, slower in those with higher BMI [16].

Body weight loss among persons with AD seems to be a risk factor for death [13], while BMI of 23 or higher is a factor reducing the risk of death irrespective of gender, age and co-morbid conditions [17]. Body weight loss and malnutrition may be associated with higher frequency of additional psychopathological factors [18], particularly irritability, psychomotor agitation, aggressiveness, anxiety, depressed mood, and increased nocturnal activity [19]. It should be also noted that dementia is an independent risk factor for body weight reduction, and weight loss may precede the diagnosis of AD by many years [20]. An important role in the maintenance of both appropriate BMI and normal cognitive function is attributed to leptin produced by adipocytes. This hormone is probably not only responsible for regulation of hunger and satiety, but also acts as a neuro-protective factor and through numerous receptors in the limbic system plays an important role in the modulation of the reward system function and in the learning process [21, 22].

Aims and methods

The aim of the study was to assess changes in nutritional habits among persons with a probable diagnosis of

Alzheimer's disease. Participants in the study were 217 outpatients treated for AD at Mental Health Clinics situated in Łódź, neighboring towns, and in Wrocław. Patients enrolled in the study had caregivers who could provide detailed information in response to our questions. A questionnaire developed by the present authors besides items concerning basic data (i.e. age, sex, education, and duration of the disease) included questions about changes in the patient's nutrition and eating habits since the symptom onset. The caregiver was asked about changes in the patient's appetite (increased, decreased, no change), number of meals (higher, lower, no change), portion sizes of commonly consumed foods (smaller, larger, no change), changes in culinary taste (taking into account sweet, sour, and salty foods, meat and other foods), mode of eating (large portions, quick pace, etc.), body weight gain or loss. Responses were registered during a phone interview, and the questionnaire in a printed form was provided to the respondents during their visit to the clinic or, if no other option was available, sent by post (84 respondents were successfully interviewed that way).

Statistical analysis. A series of analyses of one-way contingency tables were conducted to identify relationships between particular pairs of variables. Significance of the relationships was established using the Freeman-Halton extension of Fisher's exact test, or Pearson's chi-square test to confirm co-occurrence of changes in the six nutritional parameters under study, namely: appetite, body weight, number of meals a day, portion size, culinary tastes, mode of eating.

In the next step multiple correspondence analysis was performed covering the 6 parameters listed above. Finally, three groups clustering by the following parameters were distinguished (Tab. I). Subsequently, cluster analysis was used to classify the patients into the three groups previously distinguished by multiple correspondence analysis. The Freeman-Halton extension of Fisher's exact test confirmed statistical significance of intergroup differences in all the parameters.

Further, relationships were examined between the three patient groups distinguished by means of multiple correspondence analysis and demographic variables, the patient's age at onset, and duration of the disease. The Freeman-Halton extension of Fisher's exact test and the Kruskal-Wallis H test (one-way ANOVA on ranks) were used to analyze the significance of intergroup differences in nominal and quantitative variables, respectively.

Table I – Characteristics of three basic symptom groups

	Group I	Group II	Group III
Appetite	decreased	no change	increased
Number of meals	lower	no change	higher
Portion size	smaller	no change	larger
Eating mode	slower	no change	quicker
Body weight	loss	no change	gain
Change in culinary taster	yes	none	yes

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