

Characteristics of the dietary consumption of patients with probable dementia of alzheimer type, at different stages: Observational study in a public outpatient clinic in são paulo, Brazil

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Abstract

Purpose: to verify the correlation of the ingested diet with the nutritional status of Alzheimer disease (AD) patients; observation of fiber and fluid consumption and intestinal function.

Methods: Cross-sectional study with 77 patients of both genders and their caregivers who were referred to nutritional status care in the three phases (CDR) of the AD. All answered the food anamnesis where it was possible to establish the amount of calories, macronutrients and micronutrients. Anthropometric measurements of weight, height, BMI, AC, TSF and AMC were collected. For the continuous variables, a descriptive statistical analysis was performed and for the analytical statistic the Poisson regression was used.

Results: Most of the patients were eutrophic. The studied macronutrients were found to be adequate, except for the protein intake that was higher in the mild phase. No group achieved fiber intake. It was not found significant correlations between fiber consumption and intestinal function. In relation to micronutrients, adequate consumption of iron, vitamins A and B12 were found. Vitamin C intake did not reach DRI in mild patients and zinc consumption was low for patients who belonged to the group with moderated patients.

Conclusions: Although it does not reflect the nutritional reality of Brazilian patients with probable AD, this study provided important characteristics of the diet composition that already allow us to establish nutritional action strategies.

Abbreviations: AD: Alzheimer's disease; NS: Nutritional Status; CDR: Clinical Dementia Rating; DRI: Dietary Reference Intakes; BMI: Body Mass Index; AC: Arm circumference; TSF: Triceps skinfold; AMC: Arm Muscular Circumference.

Introduction

It was estimated in 2010 that 35.6 million people lived with dementia worldwide and the expectation is that these number doubles every 20 years, reaching 65.7 million in 2030 and 115.4 million in 2050. Within this scenario Latin America (8.5%) has the highest worldwide prevalence of dementia among people over 60 years of age compared to other continents [1].

Most patients with dementia are 60 years old or above and half of them suffer from AD presenting as one of the first clinical symptoms, recent memory loss. As the disease progresses, there are also difficulties in attention and verbal fluency, as well as decreased ability to perform calculations. Visuospatial skills are also affected and there are behavioural disorders associated, such as aggressiveness, hallucinations, hyperactivity, irritability and depression [2,3]. From the anatomical pathological point of view, it is observed diffuse cortical atrophy with predominance of hippocampal reduction.

To treat these symptoms, are used drugs that demonstrate modest but consistent benefits in cognition and behavioural disorders, but it is known that many of these drugs have important adverse effects in the gastrointestinal tract, such as vomiting, constipation, diarrhoea and changes in appetite or weight which will compromise the nutritional status of these patients [4].

In the moderate and severe phases of the disease there is an impairment of the nutritional process: distraction, passivity, refusal of food, difficulty in chewing and swallowing and increase in meal time, which imply the difficulty in maintaining the necessary nutrients supply and also satisfactory nutritional status (NS) [5].

Nutrition care in this context is extremely important as it assesses and establishes a plan of action for the correction of eating disorders.

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The evaluation of nutritional status can be performed by the application of food anamnesis to check for possible gastrointestinal symptoms. Food surveys are also a widely used tool in food assessment, as it allows us to establish a correct dietary plan in nutrients for recovery of nutritional status [6].

For all the reasons presented above, it was justified to carry out the present study that had as objectives to verify the correlation of the ingested diet with the nutritional status performed at the first outpatient visit and also to observe the correlation of the consumption of fibres and liquids with the intestinal habit of these patients.

Methodology

A cross-sectional study was conducted at the Behavioural Neurology Outpatient Clinic of the Federal University of São Paulo (UNIFESP) - Brazil in the years 2014 to 2015, which included all patients of both genders with a minimum age of 50 years, diagnosis of probable AD according to the diagnostic criteria of the National Institute on Aging and the Alzheimer's Association in its three phases: mild (CDR1), moderate (CDR = 2) and severe (CDR = 3), which were referred to nutritional care.

Seventy-seven patients were included in the interview, and formal caregivers informed about the stage of the disease. In this interview the following questions were asked: maintenance or diminution of appetite, degree of dependence on the patient's diet ingestion, signs of dysphagia, liquid intake (water, teas, juices, soups) measured in litres and intestinal functioning.

To know the food profile of this sample it was used the 24-hour recall in order to know the food consumed the day before the interview. With this reminder it was possible to establish the number of calories, macronutrients (Carbohydrates (fibres), Proteins and Lipids) and the micronutrients (Sodium, Iron, Calcium, Vitamin C, Vitamin B12, Zinc and Vitamin A). For the calculation of the diet it was used the online software AVANUTRI, which is based on the nutritional recommendation, Dietary Reference Intakes (DRI-2002) [7].

The anthropometric evaluation of all these patients was also carried out in order to try to establish a relationship between nutritional status and the ingested diet. The anthropometric measurements were: Weight, Height, Body Mass Index (BMI), arm circumference (AC), triceps skinfold (TSF) and Arm Muscular Circumference (AMC).

The body weight was collected by means of a mechanical scale for adults with a capacity of 150 Kg of the Welmy® brand, and the stature was measured with the aid of a conventional stadiometer (cm), and the equation proposed by CHUMLEA (1985) for the measurement of knee length in order to verify height, was used in patients who failed to maintain themselves in upright posture or wheelchair dependent.

The AC and AMB measurements (expressed in cm) were performed using an inextensible metric tape and TSF with Lange® Skin Folds and expressed in millimetres (mm).

All the relatives responsible for the patients signed the Informed Consent Term, approved by the Ethics and Research Committee under number 0552/06.

For the descriptive statistical analysis of the continuous variables, the simple arithmetic mean (Md) and the standard deviation were used. Absolute and relative frequencies were used to describe the qualitative variables. For the analytical statistic, the Poisson regression was used with robust variance. Crude and adjusted analyses were performed for

CDR, age and water or fibre intake (depending on the independent variable analysed). The results were expressed based on prevalence (PR), together with their 95% confidence interval (95% CI).

The level of significance adopted in the analyses was 5% ($p \leq 0.05$). Data were analysed using SPSS, version 15.0 for Windows (SPSS Incorporation, USA).

Results

A total of 77 patients were evaluated, being 49 women (64.5%) and 27 men (35.5%). The average age of the total sample was 80.3 ± 7.48 . The majority of patients had 4 years of schooling (63.2%). In relation to disease staging, 28.57% of patients were CDR 1 ($n = 22$), 37.66% CDR 2 ($n = 29$) 37.66% and CDR 3 ($n = 25$) 46%. The Table 1 shows these results.

Table 2 shows that the majority of the sample does not require assistance for the meal [$n = 61$ (80.3%)]. Regarding the anthropometric data, in relation to BMI, patients who were in CDR 1 and 2 presented eutrophy while CDR 3 patients presented BMI = 20.8 kg/m². The basal metabolic rate of both groups of patients presented similar values with few differences, as well as daily energy expenditure, both measured in kilocalories (kcal). The consumption of macronutrients, carbohydrates and lipids that was adequate, except for protein consumption that appeared to be higher in the group of CDR1 patients (18%). The consumption of fibre in any group of patients reached the proposed nutritional recommendations for this population of 20 to 30 g/day. Regarding sodium, the patients in the CDR2 and 3 groups had consumption above the current World Health Organization (<2g/day) nutritional recommendations. For micronutrients adequate consumption was found according to IRR for iron, vitamins A and B12. The consumption of vitamin C did not reach DRI in patients with CDR1 and zinc consumption was low for patients belonging to the CDR2 group. All patients did not reach the calcium recommendations of 1200 mg/day.

The Table 3 shows that most patients had a normal intestinal function, except for CDR 3 patients. More than 60% of patients consumed up to one litre of fluid per day, regardless disease stage. There was no evidence of association between water and fibre intake with the prevalence of constipation, both in brute and adjusted analyses.

Table 1. Demographic data the sample studied – São Paulo – SP 2014-2015

Variable	Total	CDR		
		Mild	Moderate	Severe
Clinical Dementia Rating (CDR) [n (%)]				
Mild	22 (28,9%)			
Moderate	29 (38,2%)			
Severe	25 (32,9%)			
Total sample age (years) [$\bar{x}(s)$]	80,3 (7,48%)	79,7 (6,7%)	81,3 (5,9%)	79,8 (9,6%)
Gender [n (%)]				
Male	27 (35,5%)	9 (40,9%)	11 (37,9%)	7 (28,0%)
Female	49 (64,5%)	13 (59,1%)	18 (62,1%)	18 (72,0%)
Years of schooling [n (%)]				
0	10 (13,2%)	3 (13,6%)	4 (13,8%)	3 (12,0%)
1 a 4	48 (63,2%)	12 (54,5%)	20 (69,0%)	16 (64,0%)
5 a 8	10 (13,2%)	3 (18,2%)	4 (13,8%)	2 (8,0%)
>8	8 (10,4%)	3 (13,7%)	1 (3,4%)	4 (16,0%)

Table 2. Nutritional and anthropometric characteristics of patients with probable Alzheimer's disease. São Paulo - SP 2014-2015

Variable	Total	CDR		
		Mild	Moderate	Grave
Auxiliar for alimentation [n = (%)]				
Yes	15 (19,7)	-	3 (10,3)	12 (48,0)
No	61 (80,3)	22 (100,0)	26 (89,7)	13 (52,0)
Antropometric data [\bar{x} (s)]				
Weight (kg)	58,1 (14,2)	63,7 (10,2)	59,2 (13,7)	51,8 (15,8)
Height (cm)	156,5 (9,4)	159,2 (9,8)	153,8 (9,4)	157,2 (8,4)
BMI (kg/m ²)	23,6 (5,0)	25,1 (3,4)	24,9 (4,3)	20,8 (5,9)
Arm Circumference (AC) (cm)	25,1 (3,9)	25,9 (2,9)	25,7 (4,0)	23,7 (4,4)
Triceps Skinfold (TSF) (mm)	13,9 (6,0)	15,2 (5,7)	15,0 (6,1)	11,5 (5,5)
Arm Muscle Circumference (AMC) (cm)	20,8 (3,0)	21,1 (2,1)	21,0 (2,9)	20,3 (3,8)
Basal Metabolic Rate (BMR) (Kcal) [\bar{x} +s)]	1200,7 (173,0)	1257,1 (176,7)	1178,9 (177,9)	1176,4 (158,7)
Daily Energy Expenditure (Kcal) [\bar{x} +s)]	1726,9 (266,8)	1760,9 (217,1)	1653,1 (233,2)	1782,4 (326,9)
Intake [\bar{x} (s)]				
Energy (Kcal)	1715,3 (492,3)	1537,9 (471,2)	1862,6 (578,2)	1700,6 (343,0)
Carbohydrates				
In grams (g)	238,3 (74,4)	204,4 (65,0)	263,5 (85,6)	238,7 (56,6)
In percentage (%)	55,9 (9,0)	53,2 (7,1)	57,4 (9,4)	56,7 (9,8)
Protein				
In grams (g)	72,6 (30,1)	66,8 (20,2)	81,8 (39,7)	67,0 (21,5)
In percentage (%)	17,2 (5,5)	18,0 (5,2)	17,7 (6,5)	15,8 (4,4)
Lipids				
In grams (g)	52,4 (23,9)	50,4 (23,1)	53,5 (27,9)	53,1 (20,0)
In percentage (%)	26,9 (7,7)	28,8 (6,5)	24,9 (7,9)	27,5 (8,0)
Fiber (g)	13,0 (5,7)	12,0 (5,9)	13,5 (6,5)	13,3 (4,6)
Sódium (mg)	2327,8 (1859,0)	1470,1 (866,2)	2241,3 (1603,1)	3183,1 (2387,3)
Iron (mg)	14,2 (28,9)	9,9 (4,5)	20,1 (46,3)	11,1 (5,0)
Calcium (mg)	435,9 (290,3)	386,9 (236,7)	427,6 (293,6)	488,6 (329,5)
Zinc (mg)	8,3 (6,7)	8,1 (5,9)	7,5 (4,8)	9,3 (9,2)
A Vitamin	1210,4 (2700,5)	1859,1 (4730,0)	837,5 (1134,1)	1072,2 (1067,3)
B12 Vitamin (mcg)	9,6 (28,6)	16,2 (49,8)	2,6 (5,8)	11,8 (15,8)
C Vitamiin (mg)	111,0 (1163,9)	64,0 (65,4)	142,5 (233,6)	115,9 (115,2)

Table 3. Prevalence of constipation and prevalence ratios, according to water and fiber intake. São Paulo - SP 2014-2015

Variables	Constipation		PR (CI 95%) Brute	PR (CI 95%) Adjusted*
	N	%		
Liquid ingestion (in ml)				
≤500	6	30,0	1,00	1,00
501 a 1000	14	45,2	1,51 (0,69; 3,26)	1,65 (0,76; 3,59)
1001 a 1500	4	26,7	0,89 (0,30; 2,60)	0,80 (0,27; 2,35)
>1500	5	50,0	1,67 (0,67; 4,15)	1,86 (0,80; 4,33)
Fiber (g)			1,00 (0,95; 1,05)	1,00 (0,94; 1,07)

*PR adjusted for CDR, age and fiber ingestion or liquid.

Discussion

The sample studied showed predominance of the female gender. These findings are repeated in a study developed in Italy by Buffa et al., (2014) 95 with patients with probable AD in their different phases [8]. One of the possible explanations for the higher percentage of women in the research comes from their greater longevity, since, among other

causes, these have less exposure to risk factors, such as smoking and alcoholism, besides the differences in attitude in relation to treatment and disease control.

Regarding the staging of the disease, our population was balanced in its three phases, but with a slight predominance for patients who were in the moderate phase of the disease (CDR 2) [9]. We emphasize this result due to the fact that the major complaints of significant behavioral changes, which may interfere in the feeding process, such as forgetfulness, food voracity, loss of appetite, difficulty in handling cutlery, and the onset of the first symptoms of dysphagia [10]. At this stage of the disease, the relatives or caregivers monitor the patient more carefully, and this may be the reason for the results found in the present study regarding nutritional aspects of feeding [11].

Although most studies indicate the presence of malnutrition in patients with probable AD, the results show that most of our sample was found to be eutrophic (patients with CDR 1 and 2) by Body Mass Index (BMI), as found Machado (2009) at an economic setting similar to ours [12]. Other studies carried out in Brazil with the elderly presenting different types of pathologies, in poorer regions of Brazil found a higher incidence of malnutrition [13,14]. Still in relation to NS, the only group of patients studied that presented malnutrition, were those that already had the severe form of the disease (CDR 3). The BMI presented by this group was 20.8 kg/m², classifying them with thinness, and this fact is consistent with the stage of the disease. Patients in the severe phase have dysphagia, loss of appetite and most of them total dependency to the feeding process. Salva et al., (2009) when studying a cohort with dementia also had similar findings to ours in relation to malnutrition and food dependence [15].

The results of eutrophy found in most of the sample is a consequence of the adequate intake of calories recommended for the age. The average energy intake of the patients reached 100% of daily energy expenditure and 2% in excess of the recommended protein requirements, characterizing this diet as norm caloric and hyperproteic.

The average energy intake of all our patients, including those who were in the severe phase, was 1726, 9 Kcal/day. Another study carried out in Brazil presented results of energy consumption similar to ours, different from the findings of Allen et al. (2013), who verified in their sample composed of patients from the United Kingdom an energy consumption of 1238.9 Kcal / day [16]. This difference can perhaps be explained by the fact that the dietary habits of the patients studied by those researchers are different from ours because of their food culture.

The distribution of macronutrients did not present significant changes in the evolution of the disease, being in average: 55.9% of carbohydrates, 17.2% of proteins and 26.9% of lipids. This distribution is within the parameters of the WHO for the age, but they disagree of data obtained in other poorer regions of the country, in which the ingestion is not adequate [12].

A high sodium intake (2327.8 g/day) was observed in all three stages of the disease. A study conducted in the USA with 6,426 cognitively intact women aged 65-79 years to correlate sodium intake with the development of cognitive decline found that sodium intake did not modify the risk of cognitive decline in these women but increased risk of hypertension, heart disease and stroke as well as Makin et al. (2017) in a systematic literature review [17,18].

The low calcium intake observed in this population is alarming. Malta et al., (2013), when evaluating the diet of elderly people in São Paulo, also obtained results similar to ours. It is known that the

insufficient consumption of milks and derivatives is of concern, since the adequate consumption of calcium has been shown to be efficient in the prevention of bone loss in the elderly [19].

The consumption of iron, vitamin B12 and zinc are consistent with protein consumption, since the main sources of these vitamins are proteins of animal origin. However, when zinc consumption is only observed in the group with CDR 2, it is verified that the consumption of zinc is inadequate. This inadequacy can be found in this group, because although all have reached the protein recommendations for age, this group may have used other sources of proteins, such as those of low biological value that do not provide the same amount of zinc as a protein of high biological value.

Consumption of vitamins A and C were within the acceptable for the age range, and as for their efficacy in the prevention or treatment of AD, for lack of consistent data, supplementation over the usual diet should be discouraged, unless there is any specific disability [20].

In elderly patients, intestinal complaints are common, among them intestinal constipation, which should not be treated as a physiological consequence of normal aging, but rather as a multifactorial problem, associated with comorbidities, reduced mobility, reduced intake of food sources of fiber, liquids and the use of medicines [21,22]. The values of water intake found in our sample were worrisome, 31% of our sample consumed up to 1,000 ml of liquid per day. Silva et al., (2010) when studying elderly people living in a long-term institution also obtained results similar to ours [23]. This number is well below recommended values. The daily average water intake recommended for adults and the elderly is 1,500 to 3,000 ml/day or around 30 to 40ml/kg of body weight [24].

When we observed the number of patients with constipation, it was found that these patients had water intake <500 ml/day, leading us to believe that low fluid intake may have been one of the factors influencing the constipation of these patients.

All patients in this study had a low fiber intake (mean+13 g/day) and did not reach the recommendations of the DRIs-2002 1for age group. Gavanski, et al., (2015) studying 22 elderly people from Central-West Brazil also found results similar to ours [25]. This study, when quantifying the total fibers consumed in one day, found that the constipated group consumed 14.92 g/fiber/day and the non-constipated group consumed 14.48 g/day, leading us to try to find the causes of constipation in the elderly.

Although we know the direct impact on the intestine of the combination of low water intake and reduced fiber intake, in our population we did not find a statistically significant relationship between the intake of these two nutrients and intestinal functioning.

Most of our sample (61.8%) did not present constipation, as did Sandri et al., (2012) in her study as women attending an Elderly Citizens Group in Southern Brazil [26].

However, 29% of the patients studied presented constipation and this fact is worth noting because most of the patients who presented constipation in the study were in the severe phase of dementia. As already mentioned, this result can be explained by the patient's lack of mobility, along with the low fluid and fiber intake and the use of drugs.

Conclusion

Although this study does not reflect the nutritional reality of most Brazilian patients with probable AD, this study provided us with

important characteristics of diet and diet composition of a small group of patients, which already allows us to establish nutritional strategies to avoid malnutrition, but it is emphasized that more studies in this area must be performed given the heterogeneity of the population attended.

Declarations

Ethics approval and consent to participate

This research was submitted and evaluated to be performed with outpatients by the Ethics and Research Committee of the Federal University of São Paulo/Escola Paulista de Medicina under the number: 0552/06.

Because it is a pathology that requires the presence of companions, all patients and their caregivers signed the informed consent form.

Consent for publication

All the researchers consent this publication

Competing interests

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