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Protein intake and the use of levodopa in patients with Parkinson's disease
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ABSTRACT
Levodopa is the principal pharmacological treatment for Parkinson’s disease (PD); however the protein content in diet may compromise its effectiveness. The aim of this study was to investigate the relationship of protein intake and the use of levodopa in ambulatory patients with PD. Thirty four PD patients were assessed for protein intake, evaluating the relation energy-protein intake by means of a register. An intake of 1762 kcal/day, 70.9 g of protein/day equivalent to 16.6% of the total energy intake as protein at a level of 1.1 g/kg bw/day. Of all patients, 47.1% took their medications with meals. We conclude that the studied patients consume more protein in their diet than those recommended for PD, with half the sample taking the medications with meals, which may affect the treatment.

Key words: neurodegenerative diseases; high protein diet; drug-food interactions; carbidopa.

INTRODUCTION
Parkinson’s disease (PD) is a disorder caused by degeneration of dopaminergic neurons in the nigrostriatal pathway (1-3), resulting in a decrease of dopamine production in this region (4). The causes of degeneration are not yet fully elucidated. Usually affects people over 50 years, is more prevalent in men and initially presents the following motor symptoms: resting tremor, bradykinesia, muscle rigidity and loss of postural reflexes with shuffling gait (1, 3, 5, 6). Progression of the disease can involve other signs/symptoms such as dementia, memory and speech problems and a motor impairment of tongue, larynx and food retention in pharynx(5). These symptoms may affect food intake of patients with PD and consequently may result in weight loss and malnutrition, impairing the nutritional status of these individuals (1, 7).

The treatment of PD aims to increase dopamine levels and alleviate the symptoms (3). For this purpose, drugs are used such as inhibitors of dopamine degradation, dopaminergic agonists (8), dopamine reuptake inhibitors and anticholinergic drugs (9), as well as a precursor of dopamine, L-DOPA (levodopa), which is the most frequently drug used in the PD treatment(8,10).

Concomitant use of medications and foods can interfere with the pharmacokinetics and pharmacodynamics of drugs, as well as in digestion, absorption and utilization of nutrients (11). In this condition, the administered drug may not have the required drug effect and food not exercise the nutritional function expected. It happens because in some cases the uptake of a nutrient has the same mechanism and absorption site of drug (11), such as amino acids and levodopa that compete for the same active transport mechanism in the gastrointestinal tract and the blood-brain barrier (1).

The principles of PD patients nutrition therapy aims to reduce the interaction between levodopa and aminoacids in the diet. Based on this, the aim of this study was to investigate the adequacy of the protein intake recommendation and the levodopa regimen in patients with PD.
SUBJECTS AND METHOD

This was a descriptive study, with a quantitative approach, performed in the Clinic of Movement Disorders and Dementias of Santa Casa Hospital Complex of Porto Alegre, during October 2010 to August 2011. This research and consent term were approved by the Ethics Committee on Human Research of the Federal University of Health Sciences of Porto Alegre (10/681).

The sample included patients of both sexes, with a clinical diagnosis for Parkinson’s disease. Patients with other parkinsonism form, which were not treated with drugs to PD, no physical condition to perform anthropometric measurements and without cognitive capacity or no care a provider who could report drug/nutrient interactions, were excluded.

Participants were submitted to nutritional assessment with implementation of Mini Nutritional Assessment (MNA) (12), which includes anthropometric measurements of: weight, measured with scales calibrated platform Welmy ® with subdivision between 100 g and maximum 150 Kg; height, estimated by measuring the half-span (HS), due to most patients had postural changes; estimate of body mass index (BMI) by Lipschitz(13), mid-arm circumference (AC) (14) and calf circumference (CC)(14), measured with anthropometric tape. Dietary intake assessment, life condition, health perception and nutritional status were evaluated in patients. Furthermore, they were asked to fill the estimated consumption record (ECR) of food(15) and medications for three days. To assist the ECR filling, in the evaluation day a verbal and visual training was conducted with photographic material support about household sizes and food portions. A copy of this material was given to the participants. After the completed registration, the food intake was calculated using food composition tables and household sizes(16, 17) using Excel ® software. It was done a list of the medications used with the number of drugs administered, the administration schedules and the proximity to meals.

Data were organized into a database and analyzed using absolute and relative frequency. The results of consumer records were described as mean ± standard deviation. Data normality of intake and anthropometry evaluation was analyzed using the Kolmogorov-Smirnov test (KS).

RESULTS

This study included 34 patients, 20 men (58.8%) and 14 women (41.2%). Table 1 presents the profile of the studied population. No patients were classified as under nutrition according to BMI, while 53% presented risk of malnutrition, according to MNA.

In the evaluation of dietary intake (Table 2), the protein intake was higher in the daytime compared to nighttime. That is, between breakfast and afternoon snack, 70.4% (49.5 g) of total daily protein was consumed, and in this period men consumed 70.6% (54.2 g) and women, 70.0% (42.9 g).

The average amount of different drugs taken per day was 3.9 ± 2.2. The men used 4.0 ± 2.5 of different medications while women consumed 3.8 ± 1.9. In this study, a total of six different types of PD treatment medicaments were recorded. All patients received levodopa associated with a peripheral dopa decarboxylase inhibitor (carbidopa or benserazide).

About the time of drugs consumption, approximately half of the sample (47.1%) consumed their medications with meals or used in a range less than the recommended time of 30 minutes before a meal or 2 hours after the same.

DISCUSSION

In most cases, the progression of Parkinson’s disease is accompanied with consequent loss of weight (1, 7, 11, 18, 19). The weight loss is continuous and may begin before the disease diagnosis (1). This can occur due to motor difficulties and increased energy consumption caused by the disease, resulting in a malnutrition status in these patients (18).

Among evaluated patients, 53% had nutritional risk according to the MNA. As in other studies with PD (7, 19), our sample showed no risk of malnutrition by BMI classification. However, these patients (table 1) have a lower BMI compared with healthy elderly subjects from the same region of the country (BMI = 28.9 kg /m²)(20).Therefore, the BMI elderly rates have limitations and may not be used exclusively, since this indicator assesses only the body mass without defining its distribution (21). This way, for these patients is important to use other nutritional parameter as a MNA, since it is a more sensitive method than BMI and anthropometry for assessing the nutritional status, since it evaluates the individual in global terms and can identify more accurately the nutritional risk in this population.

Energy and protein consumption profile of PD patients was also evaluated and compared to the southern population of the country and other related studies. According to the Household Budget Survey (Pesquisa de Orçamentos Fami-
De Moraes B. y cols.

TABLE 2
Average consumption of energy and protein of PD patients, by calculating the 3-day food record

<table>
<thead>
<tr>
<th></th>
<th>Men (n=20)</th>
<th>Women (n=14)</th>
<th>Total (n=34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total energy (kcal/day)</td>
<td>1797.1 ± 581.4</td>
<td>1711.9 ± 270.4</td>
<td>1762.0 ± 474.6</td>
</tr>
<tr>
<td>Protein total daily (g)</td>
<td>77.2 ± 21.1</td>
<td>62.0 ± 8.3</td>
<td>70.9 ± 18.5</td>
</tr>
<tr>
<td>Protein total/daily (%)*</td>
<td>17.9</td>
<td>14.7</td>
<td>16.6</td>
</tr>
<tr>
<td>Protein g/kg/day**</td>
<td>1.1 ± 0.3</td>
<td>1.0 ± 0.3</td>
<td>1.1 ± 0.3</td>
</tr>
<tr>
<td>Protein g/meal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast</td>
<td>11.7 ± 5.5</td>
<td>9.3 ± 3.0</td>
<td>10.7 ± 4.7</td>
</tr>
<tr>
<td>Morning snack</td>
<td>1.5 ± 3.7</td>
<td>1.2 ± 1.5</td>
<td>1.4 ± 3.0</td>
</tr>
<tr>
<td>Lunch</td>
<td>33.2 ± 10.7</td>
<td>25.2 ± 8.6</td>
<td>29.9 ± 10.5</td>
</tr>
<tr>
<td>Afternoon snack</td>
<td>7.8 ± 5.1</td>
<td>7.2 ± 4.7</td>
<td>7.5 ± 4.9</td>
</tr>
<tr>
<td>Dinner</td>
<td>22.4 ± 11.7</td>
<td>17.9 ± 6.7</td>
<td>20.5 ± 10.0</td>
</tr>
<tr>
<td>Supper</td>
<td>0.2 ± 0.8</td>
<td>0.5 ± 1.3</td>
<td>0.3 ± 1.0</td>
</tr>
</tbody>
</table>

Average ± standard deviation. * Absolute percentage figure. ** KS = -0.1459; IC = 0.97-1.2 g/kg.
Ingesta de proteínas y el uso de la levodopa en pacientes con enfermedad de parkinson

meall (1, 18), and after a meal must occur a minimum break of two hours (25). In this study, 47% of patients consumed some food along with medicine. In the literature this practice is related to the need to prevent some symptoms such as nausea and discomfort(10). The use of low protein content products for renal patients is an alternative for patients who need to redistribute the protein consumption during the day (18, 31).

Rich-protein meals may interfere with the absorption of levodopa, but is not scientifically established the effectiveness of applying a low-protein diet for these patients (10, 26). Anyway, it is recommended a balanced diet and preferably with the protein restriction during a day, controlling the time of drug administration and ingestion of diet to ensure maximization of drug absorption (1, 23, 29). Therefore, it is necessary to know and guide the schedules and intervals of medication intake in relation to meals (23, 28).

According to the recommendations described in the literature about the protein intake and pharmaceutical treatment of PD, our patients consume more protein than the recommendation for this disorder, there is a higher concentration of this nutrient during the day diet, and half of the sample takes the drugs for the treatment of PD with the meal.

In order to improve the proposed treatment, additional studies are needed to evaluate the real effect of protein intake on levodopa bioavailability in patients at different stages of Parkinson’s disease.

RESUMEN
La levodopa es el principal tratamiento farmacológico para la enfermedad de Parkinson, sin embargo, la proteína de la dieta puede comprometer su eficacia. El objetivo de este estudio fue investigar la ingesta de proteínas y el uso de la levodopa en pacientes con enfermedad de Parkinson tratados en régimen ambulatorio, 34 pacientes fueron evaluados. Evaluación de la ingesta de alimentos por los registros, tomas de 1762 kcal/día, 70.9 g/día, el 16,6% del total de energía y 1.1 g/kg/día de energía y proteína, respectivamente, y que la ingesta de proteínas durante el día era 70,4% del total de proteínas diario. Todos los pacientes estaban tomando levodopa y 47,1% consumían sus medicamentos con las comidas. Se concluyó que, según las recomendaciones para la enfermedad de Parkinson, los pacientes estudiados consumían una dieta rica en proteínas y con una mayor concentración de este nutriente durante el día. Aproximadamente la mitad de la muestra ingieren los medicamentos con la comida, costumbre que puede afectar el tratamiento farmacológico de la enfermedad.

Palabras clave: enfermedades neurodegenerativas; dieta hiperproteica; interacciones fármaco-alimento; carbidopa.

REFERENCIAS


