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ORIGINAL

Food consumption, anthropometry and body composition of patients diagnosed with Parkinson's disease

Consumo alimentar, antropometria e composição corporal de pacientes diagnosticados com doença de Parkinson

Gleyce Kelly de Araújo BEZERRA[1] 0000-0002-9388-7389
Marcella Campos Lima da LUZ[1] 0000-0001-9226-1387
Maria Goretti Pessoa de Araújo BURGOS[1] 0000-0003-4980-5822
Maria da Conceição Chaves de LEMOS[1] 0000-0003-3292-7209
John Weyk Cosme de SOUZA[1] 0000-0002-5252-5787
Poliana Coelho CABRAL[1] 0000-0002-2709-4823

ABSTRACT

Objective

The aim of the present study was to evaluate the consumption of risk and protective foods for chronic noncommunicable diseases and to investigate associations with anthropometric parameters and body composition in individuals with Parkinson's disease.

Methods

A case-series study was conducted with 79 adult and elderly patients of both genders in outpatient care. Food intake was evaluated using a food frequency questionnaire for the identification of foods with greater daily consumption, stratified by gender. The consumption frequency of each food was converted into scores of two food groups characteristics: risk and protection. The conceptual model took into account sociodemographic, behavioral and anthropometric variables as well as body composition.

[1] Universidade Federal de Pernambuco, Centro de Ciências da Saúde, Departamento de Nutrição. Av. Prof. Moraes Rego, 1235, Cidade Universitária, 50670-901, Recife, PE, Brasil. Correspondence to: PC CABRAL. E-mail: <cabralpc@yahoo.com.br>.

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Results

A total of 72.1% of the participants in the sample had excess weight based on the body mass index and 43.5% had excess body fat. The consumption of protective foods was greater among individuals with a higher body mass index and with a greater rate of body fat.

Conclusion

The data indicate a situation of reverse causality and reveal the complexity of the relationship among food intake, body fat and chronic noncommunicable diseases.

Keywords: Body composition. Eating. Parkinson disease.

RESUMO

Objetivo

Este estudo visou avaliar o consumo de alimentos de risco e proteção para as doenças crônicas não transmissíveis e sua associação com parâmetros antropométricos e de composição corporal em pacientes com doença de Parkinson.

Métodos

Estudo do tipo série de casos, com 79 pacientes adultos e idosos, de ambos os sexos, atendidos ambulatorialmente. O consumo alimentar desses pacientes foi avaliado por um questionário de frequência alimentar, sendo identificados inicialmente os alimentos com maior frequência de consumo diário por sexo e, em seguida, a frequência de consumo de cada alimento foi convertida em escores, sendo constituídos dois grupos de alimentos: risco e proteção. O modelo conceitual considerou variáveis sociodemográficas, comportamentais, antropométricas e de composição corporal.

Resultados

Ao todo, 72,1% dos pacientes apresentaram excesso de peso segundo o índice de massa corporal e 43,5% apresentaram excesso de gordura corporal. O consumo de alimentos protetores foi maior nos pacientes com maior índice de massa corporal e maior percentual de gordura corporal.

Conclusão

Os dados apontam para uma condição de causalidade reversa e revelam a complexidade envolvida na relação entre consumo alimentar, gordura corporal e doenças crônicas não transmissíveis.

Palavras-chave: *Composição corporal. Ingestão de Alimentos. Doença de Parkinson.*

INTRODUCTION

Parkinson's Disease (PD) is a neurodegenerative and progressive disease, with motor and non-motor symptoms such as bradykinesia, resting tremor, rigidity, postural impairment, and gastrointestinal repercussions [1-3].

Changes in body composition of individuals affected with PD are common, namely loss of muscle mass and accumulation of body fat. Physical inactivity and progressive aging may constitute mechanisms associated with these phenomena [4,5]. Altogether, the prevalence of excess weight in the population with PD has been increasing, in contrast with results previously described in the literature [5].

Studies that set the dietary profile of patients with PD, which include the frequency of food consumption of protective or risk foods for chronic comorbidities, are still discreet in the literature, which enhances the need to study these parameters, favoring a more accurate interpretation of dietary and nutritional status factors in the disease progression.

The study of the dietary profile of patients with PD has been evidenced [6], being of paramount importance for the development of support defining a more appropriate nutritional behavior for this group

of individuals. Thus, the objective of this study was to evaluate the consumption of risk and protective foods in the case of non-communicable chronic diseases and their association with anthropometric parameters and body composition in patients with PD.

METHODS

A case series study carried out with 79 patients, 59.5% men; a total of 77.2% were older adults, with a mean age of 65.4±8.9 years. Patients were treated as outpatients at two institutions in the city of *Recife* (PE), Brazil, from January to June 2019. The sample selection was based on convenience, and patients were recruited by adherence.

Exclusion criteria included: patients unable to walk or with limitations that made nutritional assessment unfeasible (amputation, injuries), in addition to patients with catabolic diseases such as cancer, heart failure, chronic kidney disease and chronic liver disease were not included in the study's sample.

The interview for data collection and anthropometric measurements (weight and height) and body composition (% of body fat) were carried out according to the availability of the individual on the date of the medical appointment. Socioeconomic and demographic questionnaires were applied, in addition to the clinical assessment and classification of the severity of the disease, using the Hoehn Scale and domains II and III of the Unified Parkinson Disease Rating Scale [7,8].

Anthropometric assessment was performed using the Body Mass Index (BMI) according to the World Health Organization cut-off points [9]. Body composition was evaluated by electrical bioimpedance (Biodynamics equipment, model 310) complying with the recommendations of Heyward and Stolarczyk [10]. To indicate excess body fat levels, the values of Gallagher *et al.* [11] were used.

For the analysis of consumption, a qualitative Food Frequency Questionnaire (FFQ) was applied, developed and validated by Furlan-Viebig and Pastor-Valero [12], for the study of diet and Non-communicable chronic diseases. The FFQ contains 98 items, and adopts the relevant Consumption Frequencies (CF) namely: never consumed (CF1), consumed less than once a month (CF2), consumed once a week (CF3), two to four times a week (CF4), once a day (CF5), and twice or more a day (CF6). Initially, the foods with the highest daily consumption frequency by gender were identified, with the aim of characterizing the patients´ qualitative consumption.

Subsequently, consumption assessment was carried out based on Fornés *et al.* methodology [13]. Thus, in order that the FC of each food could be treated as an annual FC, a weight (S) was assigned to each FC category. Maximum weight (S) was defined as a value equal to 1 for the frequency of two or more times a day (CF6). The other weights were obtained according to the following equation: $Sn=(1/365) \times [(a+b)/2]$ where a and b represented the number of days of the frequency.

From the weights obtained, the dietary CF of each individual was transformed into score corresponding to groups I and II. Group I was formed by risk foods for CNCD and Group II was formed by protective foods for CNCD. After the analysis, the global score of Group I and Group II was obtained. The foods that make up the relevant groups are detailed below:

Group I: Whole milk and whole milk products (whole milk yogurt, cheese, cream); animal fats (butter); vegetable fats (margarine); fried foods and fast food (bar snacks, drumstick, savory mini pie, pizza, sandwich, hamburgers); meats with fat, fried and/or with skin (poultry, beef, pork, liver, chicken and beef

offal); derived products (sausages, beef jerky, bologna, ham, sausage, meat preparations), soft drinks, alcoholic beverages (beer, wine, rum, whiskey), artificial juices, sugars and desserts (candies, sweets, honey, brown sugar , pudding, delicacy, ice cream, cakes).

Group II: Skimmed milk and skimmed milk dairy products (yoghurt, cheese), natural fruits and juices, coconut water, vegetables (raw and cooked), legumes (*mulatinho* beans, carioca beans, black, green and macassar beans), roots and tubers (cassava, yam, potato and sweet potato), cooked lean meats and without skin (poultry and beef), fish and seafood.

The categorization of foods in each group was based on the guidelines of the new food guide for the Brazilian population [14].

Data were reviewed using the SPSS®IBM® (version 13.0) program (SPSS Inc., Chicago, IL, USA). Dietary food frequency scores, as they are variables on an ordinal scale, were described in the form of median and Interquartile Range (IQR). The association between food consumption and explanatory variables was evaluated using the Mann Whitney "U" test (two medians) and the Kruskal Wallis test (more than two medians); the Mann Whitney "U" test was used a posteriori. In the validation of the investigated associations; the value of $p<0.05$ was adopted.

The protocol of this study was approved by the Human Research Ethics Committee under nº 98691118.2.0000.8807. The individuals were informed of the investigation objectives, as well as the methods adopted and, upon voluntary consent, signed the free and informed consent form.

RESULTS

Data from 79 patients of low socioeconomic status were reviewed, and 77.9% subsisted with a family income of up to two minimum wages. As for the clinical evaluation, 57.1% were diagnosed with PD during more than 5 years. Considering the staging of the disease, 51.9% of the cases were classified as moderate or severe PD according to the Hohen-Yahr Scale; in terms of severity, the average classification in domains II and III of the Unified Parkinson Disease Rating Scale was 12.3±6.5 and 25.3±12.8 points, respectively.

Regarding the classification of nutritional status by BMI, 72.1% patients were overweight according to BMI classification and, in all, 27.8% were obese. The total number of obese patients according to %BF revealed a frequency of 43.5%.

In the CF analysis of foods by gender, coffee/tea (74.5%), rice (70.0%), soybean oil (66.0%), sugar (59.6%) and bread (57.5 %) were the most consumed foods by the male gender. Fruits were not included among the ten daily most consumed foods by men. Among women, coffee/tea (68.8%) was also consumed in a larger rate, followed by sugar (65.0%), rice (53.1%), fruit juice (46.9%) and soybean oil (46.9%). Milk (42.5%) and cheese (38.2%) were in the 7th and 8th rank in CF among men. Among the ten foods most consumed by women, three made up the fruit group: bananas (34.3%), oranges (31.3%) and mangoes (31.3%), but occupying the 8th to 10th position, respectively (Figures 1 and 2).

Obese patients by BMI and %BF had higher median scores for consumption of protective foods (p=0.000), when compared to malnourished, eutrophic and overweight or pre-obese patients. For the other variables, there was a similarity in the distribution of medians of food consumption scores between the two groups (I and II) (Table 1).

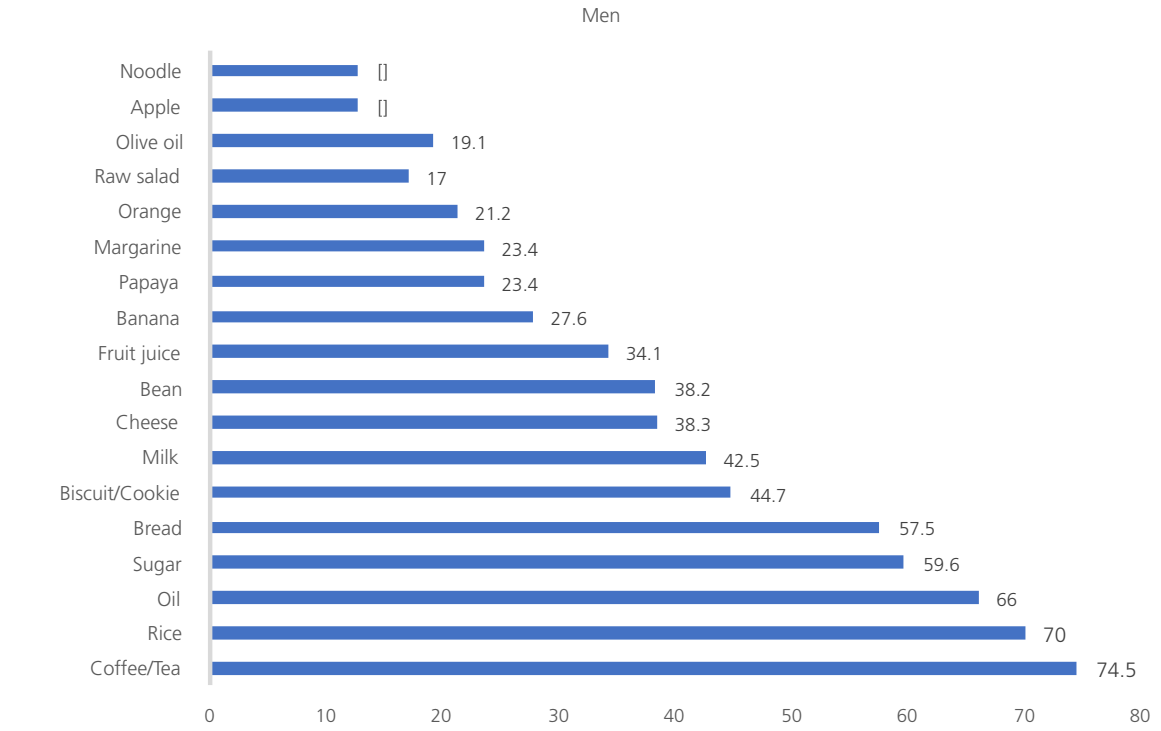

Figure 1 – Foods most frequently consumed on a daily basis in male patients diagnosed with Parkinson's Disease. *Recife* (PE), Brazil, 2019.
Note: Foods cited in the risk group: crackers/cookies, margarine, bread, oil, sugar. Foods mentioned in the protection group: avocado, melon, passion fruit, acerola, apple, oat, papaya, olive oil, mango, orange, banana, milk, fruit juice, rice, coffee, tea.

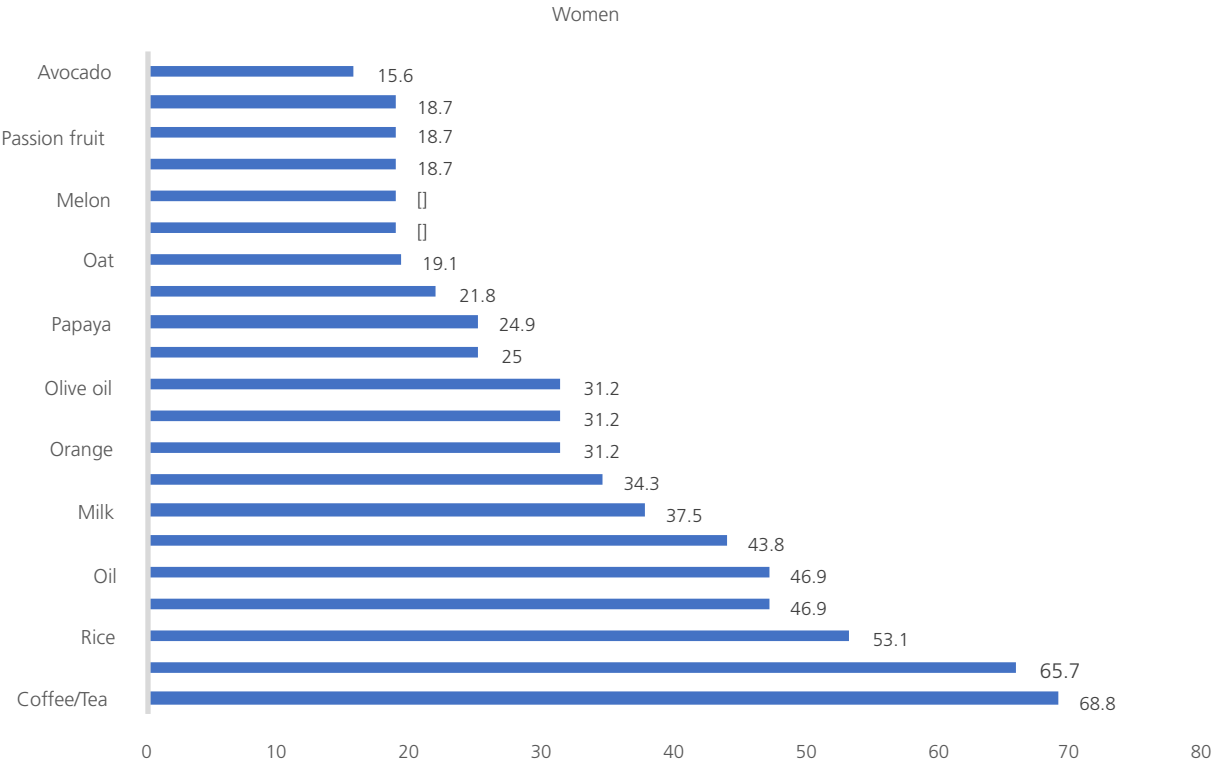

Figure 2 – Foods most frequently consumed on a daily basis in female patients diagnosed with Parkinson's Disease. *Recife* (PE), Brazil, 2019.
Note: Foods cited in the risk group: crackers/cookies, margarine, bread, oil, sugar. Foods mentioned in the protection group: avocado, melon, passion fruit, acerola, apple, oat, papaya, olive oil, mango, orange, banana, milk, fruit juice, rice, coffee, tea.

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Table 1 – Medians and interquartile ranges of food consumption scores, according to demographic, socioeconomic, clinical, anthropometric and body composition characteristics of patients with Parkinson's disease. *Recife* (PE), Brazil, 2019.

Variables	Food group			
	Group I (Risk)		Group II (Protection)	
	Mdn	IQR	Mdn	IQR
Gender				
Male	0.164	0.109-0.281	0.158	0.085-0.223
Female	0.130	0.069-0.223	0.147	0.080-0.259
p-value*	0.214		0.301	
Age range (years)				
<60 (adults)	0.167	0.102-0.231	0.144	0.061-0.223
≥60 (elderly)	0.178	0.112-0.240	0.149	0.060-0.251
p-value*	0.243		0.126	
Origin				
Capital	0.157	0.113-0.263	0.154	0.091-0.274
Metropolitan Region	0.151	0.105-0.251	0.148	0.082-0.263
Interior	0.142	0.067-0.198	0.150	0.075-0.261
p-value**	0.091		0.564	
Family Income (Minimum Wage)				
≤2	0.163	0.074-0.231	0.139	0.072-0.265
>2	0.142	0.064-0.222	0.157	0.071-0.271
p-value*	0.078		0.094	
Disease time (years)				
≤5	0.156	0.114-0.235	0.152	0.078-0.241
>5	0.125	0.064-0.221	0.146	0.062-0.289
p-value*	0.421		0.538	
Disease Staging				
I (mild)	0.163	0.064-0.222	0.142	0.064-0.222
II (mild)	0.171	0.117-0.255	0.156	0.117-0.255
III (moderate)	0.139	0.065-0.235	0.139	0.065-0.235
IV (severe)	0.135	0.071-0.213	0.135	0.071-0.213
p-value**	0.588		0.588	
Body Mass Index (BMI)				
Low Weight	0.135	0.081-0.239	0.141[a]	0.061-0.267
Eutrophy	0.147	0.077-0.232	0.149[a]	0.064-0.277
Overweight	0.139	0.068-0.211	0.152[a]	0.068-0.281
Obesity	0.144	0.108-0.247	0.181[b]	0.101-0.321
p-value**	0.231		0.000	
Percentage of Body Fat				
Malnutrition	0.172	0.072-0.289	0.141[a]	0.066-0.267
Eutrophy	0.163	0.062-0.254	0.139[a]	0.072-0.271
Pre-obese	0.171	0.095-0.273	0.147[a]	0.064-0.274
Obese	0.161	0.091-0.211	0.178[b]	0.104-0.311
p-value**	0.411		0.000	

Note: *Mann Whitney "U" test; **Kruskal Wallis test. [a,b]: Different letters different meaning. A posteriori test: Mann Whitney "U" test. IQR: Interquartile Range; Mdn: Median.

DISCUSSION

The assessment of dietary patterns has been used in investigations intended to outline a risk or protective dietary consumption for CNCD patients. In the sample assessed, obese patients by BMI and with

a high BF rate had higher median scores for consumption of protective foods. One of the potential causes may be the "reverse causality", that is, the overweight group could well be following nutritional behaviors aimed at weight loss that implies the intake of healthy foods. Azevedo *et al.* [15] found similar results and reverse causality was suggested as they faced a high percentage of patients on a weight loss diet.

In studies with patients already diagnosed with PD, the CF of food portions considered protective against CNCD, such as fruits and vegetables, are still scarcely reported, or are far below optimal reporting. The current scenario of nutritional transition brings a dietary profile rich in processed and ultra-processed foods, which contributes to an increase in NCD. In the most recent review of the population food consumption carried out by the Household Budget Survey (HBF 2017-2018), the annual per capita purchase of foodstuffs such as flour, pasta and bakery products amounted to just under 30.0 kg in one year, which points to the magnitude of the frequency of these foods in Brazilian homes [16,17]. In this study, in both genders, coffee and tea consumption had a significant daily frequency, which is consistent with the data from the 2017-2018 HBS, which show that, in the Northeast Region, the consumption of beverages and infusions, such as coffee and tea, is around 67,517 kg per year, 29% above the national average. The consumption of these items was also evidenced in the study by Barichella *et al.* [18], with 600 patients with PD.

Using the FFQ as an instrument, a population-based study in Minas Gerais evaluated the dietary profile of 402 elderly people. Among women, there was a 14.3% greater chance of consuming a dietary pattern composed of sources of fats and sugars. On the other hand, the consumption of protective foods in patterns that included fruits, leafy vegetables and fish, had as a common characteristic: the level of education equal to or greater than 5 years schooling in both genders [19]. The preference for westernized food sources was also noticed in the investigation by Palavra *et al.* [20], which showed a higher intake of carbohydrates, especially those derived from simple sugars in patients diagnosed with PD, when compared to the control group.

Considering that the food profile of the population has been globally modified, the CF assessment of foods considered "risk foods" for CNCD is necessary, since it allows planning and evaluation of prevention and control actions for these diseases so prevalent in the population [21]. In fact, the lack of standardization for the definition of food consumption patterns makes it difficult to compare the studies published.

Thus, it is necessary to know better the validity and reliability of dietary patterns, especially in the methodology for obtaining the patterns *a posteriori* (factor analysis or cluster analysis). This is because the investigator makes decisions that can affect the number and types of patterns and their ability to predict chronic diseases [22]. As an example, the study by Neumann *et al.* [23] identified that foods considered risk foods for CNCD were part of different food patterns. As well as in the study by Perozzo *et al.* [24] in which foods considered to be protective (vegetables and fruits) were part of different consumption patterns

Excess weight and high %BF observed in this group of patients may be due to the association of change in body composition that went from fat-free tissue to a predominance of adipose mass [5]. This condition is justified by the fact that most patients are elderly and, at this stage of life, changes in body composition are more evident, and with the predominance, as already mentioned, of a progressive reduction of lean mass and increase of fat mass, and negatively favoring the diagnosis of sarcopenia and sarcopenic obesity in the population [25]. In addition, as already explained, eating habits influenced by a more westernized diet profile may also be contributing to the change in body composition of neurodegenerative diseases patients.

Fernandez *et al.* [26], when assessing the pattern of food consumption in patients with PD, found a proportion of 42.5% overweight, which was associated with a high consumption of red meat and processed foods. The study also suggested a relationship between the dietary pattern found and the patients' financial condition, which would make access to protective foods difficult.

The scarcity of studies on food consumption by patients with PD enhances the importance of other studies to identify the dietary profile and associated factors in this group of patients. In addition, it should be considered that, given the multifactorial complexity that characterizes the PD pathology and the fact that this is a disease with increasing incidence with advancing age, there is a difficulty in differentiating which clinical and nutritional factors would be exclusively dependent on the disease or would be secondary to the senescence physiological conditions. Thus, studies comparing adults and elderly people with PD are welcome.

CONCLUSION

In this study, we could observe excess weight by BMI and a greater percentage of body fat in the patients studied. However, the consumption pattern showed a preference for foods that protect against CNCD. New investigations that set the profile of food consumption, anthropometry and body composition of patients with PD should be encouraged to allow understanding of the complexity of these factors in the pathophysiology of the disease, and how therapeutic strategies can be applied to positively impact the quality of life of individuals affected with this neurodegenerative condition.

CONTRIBUTORS

GKA BEZERRA was responsible for the design and planning of the article, analysis, interpretation and discussion of data, in addition to writing and final review of the manuscript. MCL LUZ contributed to the design and planning of this article, as well as the analysis, interpretation and discussion of data and the critical review of the final manuscript. MGPA BURGOS participated in the planning of the article, guidance of the work, interpretation of data and critical review of the final manuscript. MCC LEMOS contributed to the design and planning of the article as well as to the analysis, interpretation and discussion of data and critical review of the final manuscript. JCC SOUZA contributed to data collection and analysis, literature review and critical review of the final manuscript. PC CABRAL, research advisor, participated in the design and planning of the article, work guidance, analysis and interpretation of data, critical review of the final manuscript.

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