NUTRITIONAL STATUS IN OLDER PATIENTS WITH PARKINSON'S DISEASE AND ASSOCIATED FACTORS

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This study was conducted to assess factors related to the nutrition status among older patients with Parkinson's disease (PD) in 2023. A cross-sectional study was conducted on participants aged over 60 years old having PD at the National Geriatric Hospital from February 2023 to October 2023. The nutritional status was assessed using Mini Nutritional Assessment Short Form (MNA – SF) questionnaires. A total of 200 study participants diagnosed for PD with the mean age of 68.7 ± 5.2 years old and the female/male ratio was approximately 1.5. The prevalence of malnourished and at risk of malnutrition were 7.5%, 41.5%, respectively. Multiple logistic regression analysis showed that female (OR = 2.34, 95% CI 1.18 – 4.63, p = 0.014), dopamine agonist (OR = 0.36, 95% CI 0.16 – 0.82, p = 0.009) and depressive symptom (OR = 2.11, 95% CI 1.02 - 4.40, p = 0.044) were risk factors for malnutrition in older patients with PD. Screening for malnutrition is necessary among older patients with PD, especially in female, using dopamine agonist, and having depressive symptoms.

Keywords: MNA-SF, Parkinson disease, nutritional status.

I. INTRODUCTION

Parkinson's disease (PD) is the second most common central nervous system (CNS) degenerative disease in people over the age of 50, following Alzheimer's.[1,2] PD is one of the leading causes of disability worldwide.[3] The cost of treating and caring for Parkinson's patients is very high, however the results remain restricted.

Weight loss is a prevalent characteristic of PD.[3] People with PD have a higher risk of malnutrition and weight loss than people of the same age.[4] Weight loss is associated with higher energy expenditure in these individuals due to excessive muscular activity, characterized by tremors, rigidity, and dyskinesia. Furthermore, symptoms that reduce food intake, such as neuropsychiatric symptoms (anorexia, cognitive impairment, and depression) and gastrointestinal symptoms (dysphagia, nausea, reflux, constipation, and delayed stomach emptying), contribute to increased satiety and lower nutritional absorption.[5-7] Malnutrition is associated with increased mortality, prolonged hospital stays and re-hospitalization, functional impairment, decreased immunity, worsening quality of life, loss of independence,[8] and increase the risk of problems such as depression and anxiety disorders. Early detection of the risk of malnutrition in patients, as well as prompt intervention, may reduce these consequences and improve patient health and quality of life.

For a chronic disease that requires long-term treatment, attention to nutritional status and related problems plays an important role in the treatment and care of the patient. Thus, assessing the nutritional status of Parkinson's patients helps to improve the quality and effectiveness of treatment, as well as decreasing complications, improving nutritional status, and

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enhancing patients' quality of life. There has been research on the nutritional status of PD patients around the world. In Vietnam, there is very little research on the nutritional status of Parkinson's patients, most of the research is related to gastrointestinal symptoms such as dysphagia, constipation, delayed stomach emptying. Therefore, this study was conducted to *identify factors related to nutritional status in older patients with Parkinson disease.*

II. SUBJECTS AND METHODS

1. Subject

Inclusion criteria:

(1) Aged 60 years old and over;

(2) Diagnosed with Parkinson's according to UK Parkinson's Disease Society Brain Bank's Clinical Criteria.

Exclusion criteria:

(1) Patients with acute and malignant diseases (advanced cancers, end-stage chronic diseases, acute myocardial infarction, stroke...), or in severe conditions such asrespiratory failure, using ventilator....;

(2) Patients with severe vision or hearing impairment or limited communication ability (level 3, 4) according to interRal's public health assessment scale;

(3) Patients who were unwilling to participate in the study.

2. Methods

Study design

Cross-sectional study.

Location

National Geriatric Hospital.

Time

from February to October, 2023.

Sampling and sample size

Applying the sample formula to calculate the proportion:

$$n = Z^2_{1-\alpha/2} * [p*(1-p)/d^2]$$

(with n: the smallest sample to study has significance, $Z_{(1-\alpha/2)} = 1.96$ with 95% confidence intervals, p = 66%, The proportion of elderly people with PD who have nutritional disorders, d = 0.07 is random error). Thus, the minimum sample size was calculated as n = 176. We recruited 200 participants in the study.

Variables:

+ *Nutritional status:* Nutritional status was assessed by the Mini Nutritional Assessment Short Form (MNA-SF) questionnaire [9]. Six-question with a maximum of 14 points. After assessment, patients will be classified into one of three groups based on MNA-SF scores: Patients will be divided into 2 groups based on MNA-SF scores: Malnourished/At risk of malnutrition (MNA-SF < 12), Normal nutrition (MNA-SF ≥ 12)

+ Factors associated with nutritional status

* *Demographic characteristics:* Age; Gender, Educational levels; Occupation: Patient's current occupation: Retired (at home, retirement) and working (famer, worker, office staff, teacher, healthcare staff); Living status: The patient currently live with: Family (wife/ husband/ child/ grandchild), Caregiver (professional/ hourly), Alone.

* *Medical history:* Smoking; Alcohol/beer use; Pesticide

* *Characteristics of PD:*

(1) Age of Onset;

(2) Duration: divided into 4 groups: ≤ 2 years, 3 – 4 years, 5 – 10 years, > 10 years;

(3) Severity: PD is divided into 5 stages according to the Hoehn and Yahr classification scale (table 1.1), of which: Stage 1 and 2: Mild, Stage 3-5: Moderate and Severe. (3) Motor symptoms: Assess motor symptoms according

to the Unified Parkinson's Rating Scale (MDS-UPDRS III);

(4) Gastrointestinal symptoms: difficulty swallowing/choking, increase salivation, dysphagia, early abdominal fullness, constipation;

(5) Medicine to treat Parkinson disease: List the PD medications the patient is using for treatment.

** Geriatric characteristics:*

Cognitive function: Assessment using the MOCA (Montreal Cognitive Assessment) scale includes 8 items: 26-30 points: Normal. 0-25 points: Cognitive impairment.

Depressive symptom: Assessment using the Geriatric Depression Scale (GDS-15): < 5 points: No depression; ≥ 5 points: sign of depression.

Sleep quality: Assess sleep quality based on Pittsburgh Sleep Quality Index (PSQI) questionnaire. The total score of PSQI was less than 5 indicating good sleeping quality, more than and equal 5 indicating sleep disorder.

Functional independences:

(1) Activities of Daily Living (ADLs): The maximum score for a normal healthy person is 6 points; below 6 points there is impairment in daily functioning.

(2) The Lawton Instrument Activity of Daily Living scale (IADL). The maximum score for a normal healthy person is 8 points; Below 8 points means there is impairment in daily activities using tools and equipment.

Polypharmacy: A patient is defined as polypharmacy when using 5 or more drugs simultaneously (including vitamins and herbs) within the last 1 month. Evaluation by asking research subjects, caregivers, prescriptions and consulting medical records.

3. Data analysis

Data analysis was performed using Statistical Package for Social Sciences (SPSS) 20.0 software. Identifying some factors related to nutritional status in elderly PD patients through univariate logistic regression and multivariable logistic regression. Statistical significance is accepted at the 95% confidence level ($p < 0.05$).

4. Ethical considerations

Study subjects were explained clearly about the purpose of the study. The questionnaires were just given with the agreement of participants. The right of withdrawing at any time was explained clearly to the participants. Study tools were not involved in sensitive or intimate problems, and did not affect participant subjective emotion.

III. RESULTS

Of the total 200 PD patients participating in the study, the average age was 68.73 ± 5.15 years old with the youngest patient being 60 years old and the oldest being 80 years old. The majority of participants were female, accounting for 60.5%. Only 5 patients currently live alone (2.5%), most of patients lived with family (97.5%).

Table 1. Association between demographic characteristics and nutritional status

Chracteristics	Mal/At risk (MNA-SF < 12) (N=98)	Normal (MNA-SF ≥ 12) (N=102)	OR (95% CI)	p
	n (%)	n (%)		
Age				
60 - 69	55 (56.1)	64 (67.2)	1.31 (0.74 – 2.31)	0.341
≥ 70	43 (43.9)	38 (37.3)		
Gender				
Male	32 (32.7)	47 (46.1)	1.76 (0.99 – 3.13)	0.053
Female	66 (67.3)	55 (53.9)		
Occupation				
Retired	71 (72.4)	82 (80.4)	1.55 (0.81 – 3.01)	0.187
Working	27 (27.6)	20 (19.6)		
Educational level				
Undergraduate high school	58 (59.2)	45 (44.1)	1	
Graduated high school	34 (34.7)	47 (46.1)	1.78 (0.98 – 3.02)	0.054
Graduated college/ university and higher	6 (6.1)	10 (9.8)	2.14 (0.72 – 6.35)	0.167
Living status				
Family (wife/ husband/ child/ grandchild).	95 (97.5)	100 (98.0)	1.57 (0.25 – 9.65)	0.621
Alone	5 (2.5)	2 (2.0)		
Smoking				
No	88 (89.8)	92 (90.2)	1.04 (0.41 – 2.36)	0.925
Yes	10 (10.2)	10 (9.8)		
Alcohol/beer				
No	80 (81.6)	76 (74.5)	0.65 (0.33 – 1.29)	0.226
Yes	18 (18.4)	26 (25.5)		
Exposure to pesticide				
No	60 (61.2)	75 (73.5)	1.75 (0.96 – 3.20)	0.064
Yes	38 (32.5)	27 (26.5)		

The differences were not statistical significance between the age, gender, occupation, education level and living status in the older PD patients with nutritional status (p > 0.05).

The differences were not statistical significance between smoking, alcohol/beer and chemicals exposure with the nutritional status (p > 0.05).

Table 2. Association between characteristics of Parkinson's disease and nutritional status (N=200)

Characteristics	Mal/At risk (MNA-SF < 12) (N=98)	Normal (MNA-SF ≥ 12) (N=102)	OR (95% CI)	p
	n (%)	n (%)		
Age of onset				
50 – 59	28 (28.5)	41 (40.1)	1	0.085
≥60	70 (81.5)	61 (59.9)	1.68 (0.93 – 3.03)	
Severity				
Stage 1-2	51 (52.0)	67 (65.7)	1.76 (0.99 – 3.11)	0.051
Stage 3-5	47 (48.0)	35 (34.3)		
Motor symptoms score				
Mean SD	50.74 11.08	47.11 12.27	1.02 (1.01 – 1.05)	0.031
Difficult swallowing/choking				
No	34 (34.7)	50 (49.0)	**1.81 (1.02 – 3.19)**	**0.041**
Yes	64 (65.3)	52 (51.0)		
Increasing salivation				
No	58 (59.2)	68 (66.7)	1.37 (0.77 – 2.45)	0.274
Yes	40 (40.8)	34 (33.3)		
Early abdominal fullness				
No	38 (38.8)	56 (54.9)	**1.92 (1.09 – 3.37)**	**0.023**
Yes	60 (61.2)	46 (45.1)		
Constipation				
No	17 (17.3)	23 (22.5)	1.38 (0.68 – 2.79)	0.359
Yes	81 (82.7)	79 (77.5)		

The average motor symptoms score in the nutritional disorder and normal patient groups was 50.74 ± 11.09 and 47.11 ± 12.27, respectively, with a statistically significant difference between the 2 groups ($p < 0.05$). Results estimated that each additional UPDRS - III point was associated with a 2% (OR 1.02; 95% CI 1.01 – 1.05) increased risk of malnourished/risk of malnutrition.

There was a relationship between symptoms of difficult swallowing/choking, early abdominal fullness and nutritional status. Patients with difficult swallowing/choking had a 1.81 times higher malnourished/risk of malnutrition (95% CI 1.02-3.19) than asymptomatic patient. Patient with early abdominal fullness had a 1.92 times higher malnourished/risk of malnutrition (95% CI 1.09-3.37) than asymptomatic patient.

Table 3. Association between medicines and nutritional status (N=200)

Medicines	Mal/At risk (MNA-SF < 12) (N=98)	Normal (MNA-SF ≥ 12) (N=102)	OR (95% CI)	p
	n (%)	n (%)		
Levodopa				
No	4 (4.1)	6 (5.9)	1.46 (0.42 – 5.37)	0.561
Yes	94 (95.9)	96 (94.1)		
Dopamine agonist				
No	33 (33.7)	21 (20.6)	**0.51 (0.27 – 0.96)**	**0.039**
Yes	65 (66.3)	81 (79.4)		
Anticholinergic				
No	64 (65.3)	58 (56.9)	0.70 (0.39 – 1.24)	0.222
Yes	34 (34.7)	44 (43.1)		
MAO – B inhibitors				
No	87 (88.8)	98 (96.1)	3.09 (0.95 – 10.08)	0.06
Yes	11 (11.2)	4 (3.9)		
COMT inhibitors				
No	96 (98.0)	101 (99.0)	2.10 (0.18 – 23.58)	0.546
Yes	2 (2.0)	1 (1.0)		

There was a statistically significant difference in nutritional status in the group of patients using dopamine agonists ($p < 0.05$). Patient using dopamine agonists were 0.51 times less likely to be malnourished/risk of malnutrition (95% CI 0.27 – 0.96) than those who was not.

Table 4. Association between geriatric characteristics and nutritional status

Characteristics	Mal/At risk (MNA-SF < 12) *(N=98)*	Normal (MNA-SF ≥ 12) *(N=102)*	OR (95% CI)	p
	n (%)	n (%)		
ADLs				
Normal	38 (38.8)	63 (61.8)	**2.55 (1.44 – 4.51)**	**0.001**
Impaired	60 (61.2)	39 (38.2)		
IADLs				
Normal	31 (31.6)	48 (47.1)	**1.92 (1.07 - 3.41)**	**0.026**
Impaired	67 (68.4)	54 (52.9)		
Depressive symptom				
No depression	25 (25.5)	47 (46.1)	**2.49 (1.37 – 4.53)**	**0.003**
Sign of depression	73 (74.5)	55 (53.9)		
Sleep quality				
Normal	10 (10.2)	19 (18.6)	2.01 (0.88 – 4.58)	0.095
Poor sleep	88 (89.8)	83 (81.4)		
Cognitive function				
Normal	45 (45.9)	71 (69.6)	**2.69 (1.51 – 4.81)**	**0.001**
Impaired	53 (54.1)	31 (30.4)		
Polypharmacy				
< 5 types	26 (26.5)	27 (26.5)	0.99 (0.53 – 1.86)	0.992
≥ 5 types	72 (73.5)	75 (73.5)		

ADL, IADLs disability, depression and cognitive function have a statistically significant association with nutritional status ($p < 0.05$).

Table 5. Association between related factors and nutritional status: Multivariate logistic regression

Variables	Multivariate logistic regression		
	OR	95% CI	p
Female	2.34	1.18 - 4.63	0.014
Living status	1.09	0.15 - 7.70	0.931

Variables	Multivariate logistic regression		
	OR	95% CI	p
Age of onset	1.61	0.77 - 3.33	0.200
Severity of Parkinson's disease	1.48	0.87 - 2.50	0.143
Dopamine agonist	0.36	0.16 - 0.77	0.009
Motor symptoms	0.99	0.94 - 1.03	0.715
Gastrointestinal symptoms	2.45	0.39 - 15.36	0.339
Cognitive function	1.37	0.67 - 2.76	0.379
Sleep quality	1.91	0.74 - 4.90	0.176
Depressive symptom	2.11	1.02 - 4.40	0.044
ADLs	1.95	0.83 - 4.58	0.122
IADLs	0.79	0.33 - 1.89	0.599
Polypharmacy	0.75	0.36 - 1.56	0.453

Some factors leading to malnourished/risk of malnutrition in older PD patients were: ***female*** (OR = 2.34, 95% CI 1.18 – 4.63, p = 0.014), ***dopamine agonist*** (OR = 0.36, 95% CI 0.1–0.82, p = 0.009) and ***depressive symptom*** (OR = 2.11, 95% CI 1.02 - 4.40, p = 0.044).

IV. DISCUSSION

Our study did not find a statistically significant association between age of disease onset, disease duration and nutritional status of Parkinson's patients (p > 0.05). Similar to the research of Ongun (2018)[10] , age has no significant relationship with nutritional status. However, their study showed that the duration of illness was significantly related to nutritional status, the group of patients with malnutrition/ at risk of malnutrition had a longer illness duration (p < 0.05). Comparing the severity of PD according to the H&Y stage classification showed no statistically significant association with nutritional status (p > 0.05). However, J. Van Steijn (2014)[11] showed that the severity according to the H&Y scale was related to the nutritional status (p < 0.05). Research by Yang T (2020)[12] also shows that the relationship between H&Y stage and the nutritional status was statistically significant.

The results estimated that each additional UPDRS - III point was associated with a 2 fold increased risk of malnourished/risk of malnutrition. Similarly, with meta-analysis by Ji Fu (2022),[13] it was demonstrated that UPDRS – III scores were significantly higher in the malnourished/at risk of malnutrition group compared to the normal nutrition group. Higher UPDRS - III scores mean more severe motor symptoms. This reduces hand-mouth coordination and makes it difficult to make delicate movements, such as those needed for utensils. Motor symptoms such as bradykinesia, akinesia, rigidity, and tremors can reduce the ability to function and make it difficult to walk, shop, and feed independently.

We found that patients with difficult swallowing/choking and early abdominal fullness symptoms had higher odd of having malnutrition. Our results are similar to the study

of J. Van Steijn (2014),[11] there is a significant relationship between swallowing disorders and nutritional status ($p < 0.05$), there is no significant relationship between constipation and nutritional status. However, this same study also showed that increased salivation and nutritional status are related ($p < 0.0.5$). There was a significant difference between patients using dopamine agonists and nutritional status ($p < 0.05$). Patient using dopamine agonists reduced the risk of malnutrition/at risk of malnutrition by 0.51 times compared to patient who did not use it.

Female gender increased the risk of malnutrition/risk of malnutrition in older Parkinson's patients. This might be related to variables such as women's roles in society and financial dependency, both of which impact nutritional status. Patient usage of dopamine agonists, on the other hand, may result in changes in eating behaviour, such as binge eating, leading to weight gain.[14] Depression is a typical symptom among PD patients, particularly in the elderly. This disorder can interfere with the release of neurotransmitters and hormones in the body, resulting in intestinal dysfunction, constipation, and nutrition absorption issues.[15] In Parkinson's patients, decreased food intake may result from losing interest in everyday activities. Food restriction, weight loss, and psychological issues can all lead to a downward spiral.

This was one of the first studies in Vietnam to assess the nutritional status in older patients with PD. Our screening tools were widely-used, effective and feasible in the study population. We acknowledge some limitations to this work. First, our study was a cross-sectional research so we cannot explain the causality of the relationship between nutritional status and related factors in the study group. Second, the study was conducted in only one healthcare setting, so the result might not be representative of nutritional status in general. Finally, although our study was in line with several studies worldwide, we could not compare our results with similar studies in Vietnam due to the lack of references.

V. CONCLUSION

Among patients with PD, female, using dopamine agonist and having depressive symptoms were related with malnourishment or at risk for malnourishment. A well-conducted longitudinal study will be necessary to evaluate the risk factors for malnourishment in a larger study population.

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