GERIATRIC SYNDROMES AND NUTRITION STATUS OF ELDERLY OSTEOARTHRITIS PATIENTS

Tran Viet Luc[1,2,✉], Nguyen Ngoc Tam[1,2]
Nguyen Thi Hoai Thu[1,2], Vu Thi Thanh Huyen[1,2]
[1]National Geriatric Hospital
[2]Hanoi Medical University

This study describes numerous characteristics of comorbidities and geriatric syndromes in elderly osteoarthritis patients at the National Geriatrics Hospital. A cross-sectional study on 184 knee osteoarthritis (OA) patients aged ≥ 60 years old treated at the National Geriatrics Hospital. The mean age of the patients was 73.12 ± 8.62 years, male patients accounted for 83.7%. Most participants (85.9%) had experienced 2 sides of knee OA, more than half of these participants (63.6%) were experiencing moderate pain. There were 73 patients with reduced mobility accounting for 39.7%. The dependency ratio of functional activities on the ADL scale was 32.6%, and on the IADL scale it was 35.9%. The number of participants using less than 5 drugs was 45.7%. More than half of the survey participants used polypharmacy accounting for 54.3%. There was a significant association between nutritional status and reduced physical function (ADLs and IADLs), impaired cognitive function, depression status and sleep disorder. Geriatric syndromes and risk of malnutrition are common in older OA patients, and assessment for them should be done routinely in these patients to early detect impaired physical activities, impaired cognitions, depression problems, sleep disturbances and progressive symptoms of knee osteoarthritis.

Keywords: Knee osteoarthritis, Geriatric syndrome, older patient.

I. INTRODUCTION

Aging is characterized by a gradual loss of normal physiological function, the result of the accumulation of a wide variety of molecular and cellular damage over time, culminating in frailty, a lack of resilience and increased susceptibility to several diseases.[1,2] According to the World Health Organization, aging is a course of biological reality which starts at conception and ends with death.[3] In most of the developed countries, the age of 60 is considered equivalent to retirement age and it is said to be the beginning of old age.[3] According to World Population Prospects (1950 - 2050), the proportion of elderly in developing countries is rising more rapidly, in comparison with developed ones.[4] However, the trend of population aging also entails health problems and the possibility of chronic diseases related to the aging process in old age. The incidence of chronic diseases has been shown to increase rapidly especially among the elderly.[5] In particular, osteoarthritis (OA) is one of the chronic diseases encountered in old age.

Nutrition is defined as the process of taking in food and using it for growth, metabolism, and repair. With age, the process of self-synthesis and regeneration of joint cartilage is greatly reduced. This leads to a lack of nutrients that protect joint cartilage, making it more susceptible to damage and wear. The main changes found in body composition of elderly is reduction of muscle mass, which can

Corresponding author: Tran Viet Luc
National Geriatric Hospital
Email: tranvietluc@hmu.edu.vn
Received: 17/02/2023
Accepted: 20/03/2023

cause non-transmissible chronic diseases and great impact in nutritional status.[5] Older people after 60 years of age are found to have a clear reduction in free adipose muscle mass, usually changes in muscle mass, bone mineral density, causing decreased muscle strength, difficulties in daily life.[6]

Comorbidity may lead to additional impairments that may thus contribute to the development of geriatric syndromes. The extent to which individual disease or comorbidity contributes to the development of geriatric syndromes is still unknown. Diseases affecting old age are noted as high blood pressure, diabetes, osteoporosis, heart failure, hyperlipidemia disease. Aging is associated with a range of changes in the human body, including muscle loss, mild cognitive impairment, and decreased of taste and smell. OA is the most common disease of the joints worldwide, with the knee being the most commonly affected joint in the body.[6] Knee osteoarthritis (OA), also known as degenerative joint disease of the knee, is typically the result of wear and tear and progressive loss of articular cartilage.[7] Epidemiological studies have estimated that symptomatic radiographic knee osteoarthritis (OA) affects 10% of adults > 55 years of age.[7] The aim of the present study was to describe **various** characteristics of nutritional status and geriatric syndromes in elderly osteoarthritis patients at the National Geriatrics Hospital.

II. METHODS

1. Subjects

Osteoarthritis of knee patients aged 60 years and older at Geriatric National Hospital from June 31st to October 24th, 2022 were involved in the study.

Inclusion criteria

- Patients 60 years and older were diagnosed knee OA according to the American Society of Rheumatology criteria 1987.[8,9]

- Agreement to participate in the study from the patients and family.

- Had the physical and cognitive abilities to do a face-to-face interview.

Exclusion criteria

- The patient and family declined to participate.

- Patients with the inability to communicate.

- Subjects who had the medical history of chronic inflammatory diseases (such as rheumatoid arthritis), systemic diseases (such as systemic lupus erythematosus, Scleroderma) or neurological diseases unable to answer questions.

- Scoliosis and kyphosis situation.

2. Method

This is a cross-sectional descriptive study with a convenience sampling method.

Variables

General information: gender, age, educational level, marital status.

Body Mass Index (BMI)

The National Institute of Health (NIH) now uses BMI to define a person as underweight, normal weight, overweight, or obese. It is calculated by taking a person's weight, in kilograms, divided by their height, in meters squared, or BMI = weight (in kg)/ height^2 (in m^2).

- Evaluation: The recommended BMI classification for the Asia-Pacific region was used for evaluation of the body status.

- Underweight: BMI < 18.5.
- Normal Range: 18.5 ≤ BMI ≤ 22.9.
- Overweight: BMI ≥ 23.

Activities of Daily Livings (ADLs)

The Katz Index of Independence in Activities

of Daily Living, commonly referred to as the Katz ADL, is the most appropriate instrument to assess functional status as a measurement of the client's ability to perform activities of daily living independently. Clinicians typically use the tool to detect problems in performing activities of daily living and to plan care accordingly. The Index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence, and feeding. Clients are scored yes/no for independence in each of the six functions. A summary score ranges from 0 (impaired function) to 6 (normal function).

- Evaluation: Maximum of a normal healthy person is 6 points; less than 6 point classifies the person as impaired function.

Instrumental Activities of Daily Livings (IADLs)

There were 8 domains of function: Ability to use telephone, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medication and ability to handle finances. Participants are scored according to their highest level of functioning in that category. A summary score ranges from 0 (low function, normal function) to 8 (high function, impaired function).

- Evaluation: Maximum of a normal healthy person is 8 points; less than 8 point classifies the person as impaired function.

Depression - Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. This tool is the depression module, which scores each of the 9 criteria as "0" (not at all) to "3" (nearly every day). This questionnaire asks the patient how emotional difficulties or problems impact work, life at home, or relationships with other people.

- Evaluation: The range of total score is from 0 to 27 points and is divided into 3 levels:

- 0 - 4 points: No depression.
- 5 - 14 points: Mild depression.
- 15+ points: Severe depression.

Assessing nutritional status by using The Mini Nutritional Assessment Short Form (MNA-SF)

The Mini Nutritional Assessment Short Form provides a simple and quick method of identifying elderly persons who are at risk for malnutrition, or who are already malnourished. The questionnaire includes: 6 questions with several answers, nutritional status scores are calculated in total scores.

- Evaluation:

- Malnutrition: (0 - 7 points).
- Risk of malnutrition (8 - 11 points).
- Normal nutritional status (12 - 14 points).

Process of data analysis

The process of data recording, entries into Redcap and analyzed by using Statistical Package for Social Science (SPSS) software version 22 with statically p less than 0.05. Descriptive statistics were adopted to examine characteristic data: frequency, percentage, mean. Inferential statistics was done to perform comparisons between groups, using χ^2.

3. Ethical issues

All data collected was used for research. The results of the study were proposed for improving health of community, not for other purposes and ensure all ethical issues in biological research.

III. RESULTS

1. Characteristics of participants

We conducted a cross-sectional study that included 184 patients with OA of knee at National Geriatric Hospital. The interviews took place from June 31st to October 12nd, 2022.

2. Social-demographic

Table 1. Social demographic characteristics (n = 184)

Characteristics		Frequency (n)	Percentage (%)
Age group (year)	60 - 69	66	35.9
	70 - 79	70	38.0
	≥ 80	48	26.1
Gender	Male	30	16.3
	Female	154	83.1
Occupation	Working	33	17.9
	Retired	151	82.1
Educational level	Below high school	101	54.9
	High school	44	23.9
	Above high school	39	21.2
Marital status	Married	137	74.5
	Divorced/ widow	47	25.5
Living with	Family	169	91.8
	Living Alone	15	8.2
Living area	City	119	64.7
	Rural area	65	35.3
Drink alcohol	No	160	87.0
	Yes	24	13.0
Smoking	No	168	91.3
	Yes	16	8.7
		$\bar{x}$ ± SD	
Mean Age		73.57 ± 8.26	
Mean BMI		23.15 ± 3.03	

The mean age of the study participants was 73.12 ± 8.62 years old with the maximum age of 94 and the minimum age of 60 years old. In which, Age was distributed in 3 groups: patients in the age group 60 - 69 years accounted for 35.9%, patients in the age group 70 - 79 years old accounted for 38% and patients over 80 years old accounted for 26.1%. Among the study participants, female patients accounted for the majority with 154 people (83.7%) while male patients accounted for 30 people (16.3%). More than half of patients did not graduate from high school (54.9%). The number of patients graduating from high school was 44 (23.9%). There were 39 patients (21.2%) who have graduated from university and higher

educational levels. Most of the patients were retired, 151 patients (82.1%) and there were only 33 patients (17.9%) still employed. Almost all the participants resided in the city (64.7%) and there were 65 participants (35.3%) in the rural area.

3. Clinical characteristics of knee osteoarthritis

Table 2. Clinical characteristics of knee osteoarthritis (n = 184)

		Frequency (n)	Percentage (%)
Knee OA sides	1 knee	26	14.2
	Both 2 knees	158	85.9
Pain level (VAS)	Mild	48	26.1
	Moderate	117	63.6
	Severe	19	10.3
Symptoms	Pain	174	94.6
	Crunching	47	25.5
	Swelling	31	16.8
	Reduced range of motion	73	39.7

Most participants (85.9%) had experienced 2 sides of knee OA. Only 26 patients (15.2%) had 1 side of knee OA. According to VAS scores, more than half of these participants (63.6%) were experiencing moderate pain. Meanwhile, mild pain and severe pain accounted for 26.1% and 10.3%, respectively. Nearly all of the participants had knee pain, accounting for 94.6%. There were 73 patients with reduced mobility (eg, flexion/extension) accounting for 39.7%. The number of patients with crunching and swelling accounted for a smaller proportion of 25.5%, 16.8%, respectively. These are the symptoms seen most often in the study participants.

4. Geriatric characteristics

Table 3. Geriatric characteristics in the study group (n = 184)

		Frequency (n)	Percentage (%)
Physical function (ADLs)	Normal	124	67.4
	Impaired	60	32.6
Physical function (IADLs)	Normal	119	64.7
	Impaired	65	35.3
Cognitive function (MMSE)	Normal	146	79.3
	Impaired	38	20.7

		Frequency (n)	Percentage (%)
Depression Symptoms (PHQ-9)	Normal	95	51.6
	Mild depression	82	44.6
	Severe depression	7	3.8
Sleep disorder (PSQI)	Normal	51	27.7
	Sleep disorder	133	72.3
Polypharmacy	≥ 5 type	100	54.3
	< 5 types	84	45.7
	Mean number of medications	4.67 ± 2.33	

The dependency ratio of functional activities on the ADLs scale was 32.6%, and on the IADLs scale it was 35.9%. According to the MMSE scale, most participants had normal cognitive function (79.3%). A small number of participants had severe depression accounted for 3.8%. More than a half of them had no depression (51.6%). Signs of mild depression were present in 44.6%. Participants with sleep disorders were high at 72.3%. The number of participants using less than 5 drugs was 84 (45.7%), More than half of the survey participants used polypharmacy accounting for 54.3%.

5. Malnutrition status of participants

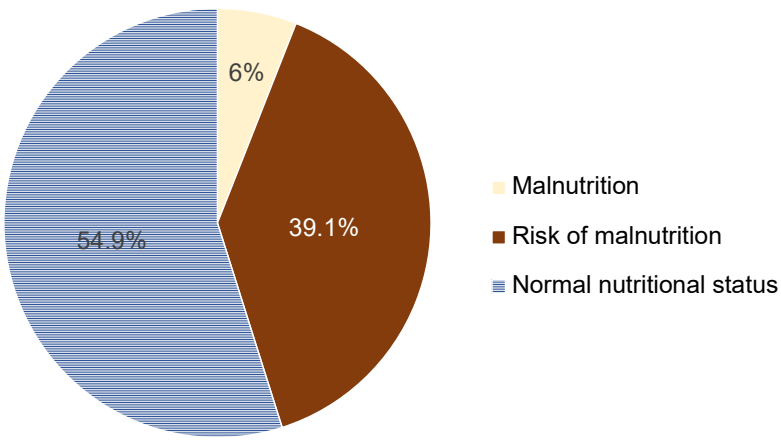

Figure 1. Nutritional status distribution according to MNASF (n = 184)

The figure 1 showed the distribution of nutritional status of the elderly with knee osteoarthritis. Among these, the participants with normal nutritional status accounted for the largest proportion of 54.69%. Nearly half of the participants were at risk of malnutrition, accounting for 39.13%. Malnutrition was the lowest, at 5.98% respectively. Mean score of MNASF is 11.45 ± 2.33.

6. Nutritional status and geriatric characteristics in OA patients

There was a significant difference between nutritional status and physical function (ADLs and IADLs), patients who had normal physical

Table 4. Nutritional status and geriatric characteristics in OA patients (n = 184)

Factor	Items	Malnutrition		Risk of Malnutrition		Normal		p-value
		n	%	n	%	n	%	
Physical function (ADLs)	Normal	3	1.6	45	24.5	75	41.3	< 0.05
	Impaired	8	4.3	27	14.7	25	13.6	
Physical function (IADLs)	Normal	4	2.2	41	22.3	74	40.2	< 0.05
	Impaired	7	3.8	31	16.8	27	14.7	
Cognitive function (MMSE)	Normal	6	3.3	47	25.5	93	50.5	< 0.05
	Impaired	5	2.7	25	13.6	8	4.3	
Depression Status (PHQ-9)	Normal	2	1.1	24	13.0	69	37.5	< 0.05
	Mild depression	5	2.7	45	24.5	32	17.4	
	Severe depression	4	2.2	3	1.6	0	0.0	
Sleep disorder (PSQI)	Normal	1	0.5	14	7.6	36	19.6	< 0.05
	Sleep disorder	10	5.4	58	31.5	65	35.3	
Polypharmacy	≥ 5 type	6	3.3	34	18.5	60	32.6	> 0.05
	< 5 types	5	2.7	38	20.7	41	22.3	

function had better nutritional status. Patients with normal cognitive function had better nutritional status and conversely, those with impaired cognitive function were at greater risk of malnutrition. About depression, there was a significant deficiency in nutritional status in depressed patients, the more severe depression status, the worse nutritional status. There was also a significant correlation between nutritional status and sleep disorder. Patients with sleep disorder had more malnutrition and risk of malnutrition than normal nutritional status. There was no significant difference between the nutritional status and polypharmacy status.

IV. DISCUSSION

In this study, the age group from 70 to 79 years old accounted for the highest proportion (38%), followed by the age group from 60 to 69 years old (35.9%) and the group 80 years old and older accounted for 26.1%. Subject's age range was from 60 to 94 years with mean of 73.12 ± 8.62. This figure is higher than the study by Brin and Dibble in which the median age range is 42 to 91 years old.[10]

According to VAS scores, more than half of these participants (63.6%) were experiencing moderate pain. Meanwhile, mild pain and severe pain accounted for 26.1% and 10.3%, respectively. Nearly all of the participants had knee pain, accounting for 94.6%. There were 73 patients with reduced mobility (e.g., flexion/extension) accounting for 39.7%. The number of patients with crunching and swelling accounted for a smaller proportion of 25.5%, 16.8%, respectively. These are the symptoms seen most often in the study participants.

The dependency ratio of functional

activities on the ADLs scale was 32.6%, and on the IADLs scale it was 35.9%. There are 60 participants with impairment in daily functioning on the ADLs scale, accounting for 32.6%. At the same time, there were also 65 participants with daily functional decline in IADLs, accounting for 35.3%. Cognitive function is measured by MMSE scale, in general, the majority of participants are assessed as normal, accounting for 79.3%. Only 38 participants, accounting for 20.7% of the survey, found cognitive impairment. Depression symptoms suggested that nearly half of the participants might be clinically depressed. Of the total interview participants, 95 people were not depressed, accounting for 51.6%. There were 82 participants with mild depression with a rate of 44.6%. The number of participants with severe depression accounted for a tiny fraction of 3.8%. Participants with sleep disorders were high at 72.3%.

The proportion of patients using 5 or more drugs accounted for 54.3%. Meanwhile, patients using less than 5 drugs also accounted for a significant 45.7%. But overall, polypharmacy is common, consistent with previous findings.[11] Polypharmacy has been and always will be common among the elderly population due to the need to treat the various disease states that develop with age. Unfortunately, with this increase in the use of multiple medications comes an increased risk for negative health outcomes such as higher healthcare costs, ADEs, drug-interactions, medication non-adherence, decreased functional status and geriatric syndromes.[11] A study conducted in Sweden reported that those taking 5 or more medications had a 6.2% increase in prescription drug expenditure and those taking 10 or more medications had a 7.3% increase.[12] In a population-based study, outpatients taking 5 or more medications had an 88% increased risk of experiencing an adverse drug event compared to those who were taking fewer medications.[13] In nursing home residents, rates of adverse drug events have been noted to be twice as high in patients taking 9 or more medications compared to those taking less.[14] A prospective cohort study found that 50% of those taking 10 or more medications were found to be malnourished or at risk of malnourishment.[15] A survey of community-dwelling elders older adults found that polypharmacy was associated with a reduced intake of fiber, fat-soluble and B vitamins, and minerals as well as an increased intake of cholesterol, glucose, and sodium. In a prospective cohort study of 294 elders, 22% percent of patients taking 5 or less medications were found to have impaired cognition as opposed to 33% of patients taking 6-9 medications and 54% in patients taking 10 or more medications.[15] A study in older adult outpatients as the number of medications increased, the falls risk index score increased and the duration of the one-leg standing test duration decreased.[16] In a prospective cohort study, the use of 4 or more medications was associated with increased risk of falling and the risk of recurrent falls. A study in elderly patients with dementia reported that those patients who reported a fall had an increased prevalence of polypharmacy.[17] In a study of institutionalized older adults, the risk of experiencing a fall within the previous 30 days was by 7% for each additional medication.[18]

We found that physical functional status (ADLs and IADLs), cognitive impairment, depressive symptoms and sleep disturbance were independently associated with malnutrition in elderly patients with knee osteoarthritis.

Patients who had normal physical function got better nutritional status. Patients with normal cognitive function got better nutritional status

and conversely, those with impaired cognitive function were at greater risk of malnutrition.

About depression status, the more severe depression status, the worse nutritional status. The prevalence of malnutrition in knee osteoarthritis patients with mild and severe depression was 4.9%, 4 times higher than in other patients without depression. The prevalence of malnutrition in patients with sleep disorders was many times higher than in other patients (5.4%). There was no significant difference between nutritional status and polypharmacy status.

V. CONCLUSION

The prevalence of malnourished in OA patients was high. Geriatric syndromes are common in older OA patients, and assessment should be done routinely to detect impaired physical activities, impaired cognitions, depression problems, sleep disturbances, nutritional status and progressive symptoms of knee osteoarthritis as early as possible to improve the health of the elderly.

REFERENCES

1. Zenin A, Tsepilov Y, Sharapov S, et al. Identification of 12 genetic loci associated with human healthspan. *Commun Biol*. 2019;2:41. doi:10.1038/s42003-019-0290-0

2. Lagunas-Rangel FA. SIRT7 in the aging process. *Cell Mol Life Sci*. 2022;79(6):297. doi:10.1007/s00018-022-04342-x

3. Amarya S, Singh K, Sabharwal M. Ageing process and physiological changes. *Gerontology*. IntechOpen; 2018.

4. Dobriansky PJ, Suzman RM, Hodes RJ. Why population aging matters: A global perspective. *National Institute on Aging, National Institutes of Health, US Department of Health and Human Services, US Department of State*. 2007:1-32.

5. Mwangi J, Kulane A, Van Hoi L. Chronic diseases among the elderly in a rural Vietnam: prevalence, associated socio-demographic factors and healthcare expenditures. *Int J Equity Health*. 2015;14:134. doi:10.1186/s12939-015-0266-8

6. Michael JW, Schlüter-Brust KU, Eysel P. The epidemiology, etiology, diagnosis, and treatment of osteoarthritis of the knee. *Dtsch Arztebl Int*. 2010;107(9):152-62. doi:10.3238/arztebl.2010.0152

7. Bedson J, Jordan K, Croft P. The prevalence and history of knee osteoarthritis in general practice: a case-control study. *Family practice*. 2005;22(1):103-108.

8. Brandt KD. *Osteoarthritis*. Harrison's Principles of Internal Medicine, McGraw-Hill, New York. 1994;1692-1698.

9. Altman RD. Criteria for classification of clinical osteoarthritis. *J Rheumatol*. 1991;27:10-2.

10. Brin M, Dibble MV, Peel A, et al. Some preliminary findings on the nutritional status of the aged in Onondaga County, New York. *American Journal of Clinical Nutrition*. 1965;17:240-258.

11. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert opinion on drug safety*. 2014;13(1):57-65.

12. Hovstadius B, Petersson G. The impact of increasing polypharmacy on prescribed drug expenditure - a register-based study in Sweden 2005 - 2009. *Health Policy*. 2013;109(2):166-174.

13. Nguyen JK, Fouts MM, Kotabe SE, et al. Polypharmacy as a risk factor for adverse drug reactions in geriatric nursing home residents. *The American journal of geriatric pharmacotherapy*. 2006;4(1):36-41.

14. Jyrkkä J, Enlund H, Lavikainen P, et al. Association of polypharmacy with nutritional status, functional ability and cognitive capacity over a three-year period in an elderly population. *Pharmacoepidemiology and drug safety*. 2011;20(5):514-522.

15. Bourgeois FT, Shannon MW, Valim C, et al. Adverse drug events in the outpatient setting: An 11-year national analysis. *Pharmacoepidemiology and drug safety*. 2010;19(9):901-910.

16. Kojima T, Akishita M, Nakamura T, et al. Association of polypharmacy with fall risk among geriatric outpatients. *Geriatrics & gerontology international*. 2011;11(4):438-444.

17. Lee CY, Chen LK, Lo YK, et al. Urinary incontinence: An under-recognized risk factor for falls among elderly dementia patients. *Neurourology and urodynamics*. 2011;30(7):1286-1290.

18. Damián J, Pastor-Barriuso R, Valderrama-Gama E, et al. Factors associated with falls among older adults living in institutions. *BMC geriatrics*. 2013;13(1):1-9.