Association between SARC F Questionnaire Score and Functional Performance in Patients with Hip Osteoarthritis

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Article

Association between SARC F Questionnaire Score and Functional Performance in Patients with Hip Osteoarthritis

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Abstract: Background and Objectives: Hip osteoarthritis is the main cause physical disability, also has a serious impact on the efficiency and independence of older people. The aim of the study was to analyze the relationship between hip osteoarthritis and the risk of sarcopenia. Our main hypothesis was whether the risk of sarcopenia, as measured by the SARC F questionnaire , is related to the physical fitness of older people with hip osteoarthritis. Materials and Methods: The study was conducted with the participation of 177 people of aged 65 or more, diagnosed hip osteoarthritis. The subjects were assessed using the SARC F questionnaire, the Short Physical Performance Battery (SPPB) and Timed Up and Go (TUG) test. The subjects were divided into two groups depending on the result they obtained in the SARC F questionnaire (group 1- SARC F <4, group 2 - SARC F ≥ 4). Results: There was a significant correlation between the results in the SARC F and the results of the TUG ($p<0.001$) and the SPPB test, both the SPPB total score ($p<0.001$)and its elements: SBBP chair stand test ($p<0.001$), SPPB balance test ($p<0.001$), SPPB gait speed test ($p<0.001$). Logistic regression of the SPPB and TUG predictors showed that in SARC F more than 4 predicted worse SPPB and TUG outcomes. In the SARC group, F above 4 increases the odds of poorer scores in SPPB OR=1.097; CI 95% 1.053-1.146 and TUG, OR=1.096; CI 95% 1.104-1.266. Conclusion: The study showed that the results obtained in the SARC F questionnaire correlate with the possibilities of physical functioning in patients with hip osteoarthritis SARC F is an inexpensive method that can be used to assess the risk of sarcopenia. Healthcare professionals, especially in primary care, should consider assessing the risk of sarcopenia especially in people with hip osteoarthritis.

Keywords: sarcopenia; hip osteoarthritis; physical functional

1. Introduction

With the aging of people and increased life expectancy, aging and age-related diseases become a major burden and unavoidable challenges around the world. Among the older, osteoarthritis and sarcopenia have become very common problems that increase health care expenditures [1]. Osteoarthritis is the main cause physical disability, also has a serious impact on the efficiency and independence of older people [2]. One of the risk factors that are associated with osteoarthritis is muscle weakness [3]. The pain and stiffness in osteoarthritis cause physical inactivity and a sedentary lifestyle, leading to a loss of muscle strength and mass. On the other hand, weakness deteriorates functioning and a vicious circle is created between muscle weakness and osteoarthritis [4]. The term sarcopenia was first introduced by Rosenberg nearly 30 years ago to describe the age-related loss of skeletal muscle [5]. Since then, a lot of research has been devoted to this issue. Over time, the diagnosis of sarcopenia, based on the measurement of muscle mass, was extended to include muscle strength and function. Since 2018, sarcopenia has been recognized as a disease (ICD 10-MC, code

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M62.84) [1] that is associated with functional decline [6], increased risk of falls and fractures [7], frailty syndrome [8], and increased risk of death [9]. However, the diagnosis of sarcopenia is not easy. For a long time, this condition was only defined as loss of muscle mass. In 2010, the European Working Group on Sarcopenia in Older People (EWGSOP) recommended that diagnostic criteria for sarcopenia should include both low muscle mass and impaired muscle function defined by low muscle strength or reduced physical fitness. The definition of sarcopenia was updated in 2018 by the second edition of EWGSOP2 and published practical guidelines for the screening, diagnosis and treatment of sarcopenia. EWGSOP2 proposed an algorithm to detect sarcopenia. This algorithm uses the path of defining sarcopenia using the Find-Assess-Confirm-Severity Pathway (F-A-C-S) function. Grip strength is first assessed, if the screening test is positive and there is muscle weakness, sarcopenia is suspected and intervention is targeted. Skeletal muscle mass is then assessed, and if there is a decrease, sarcopenia is confirmed. On the other hand, the observed decrease in physical capacity is classified as severe sarcopenia. According to the FACS algorithm for sarcopenia screening, management should be started from using the SARC-F questionnaire [1]. Studies show that the number of patients with sarcopenia will increase significantly in the next 30 years, which poses a serious public health challenge [6]. Early recognition of the risk of sarcopenia should become a priority when assessing the health of older people, especially those with osteoarthritis, as early detection of sarcopenia allows for action prevent negative health effects in the future [10]. The aim of the study was to analyze the relationship between hip osteoarthritis and the risk of sarcopenia. Our main hypothesis was whether the risk of sarcopenia, as measured by the SARC F questionnaire as proposed by EWGSOP2, is related to the physical fitness of older people with hip osteoarthritis.

2. Materials and Methods

2.1. Study Population

The study was conducted with the participation of 177 people of both sexes (99 women and 78 men), aged 65 or more, diagnosed with osteoarthritis of the hips, who were Polish community-dwelling older persons in the Wielkopolska region. Written informed consent was obtained from all participants prior to the study. The criterion for inclusion in the study was the age of 65, hip osteoarthritis, independent movement and no cognitive impairment determined on the basis of the Mini-Cog test [11].

2.2. Physical Measurements

The following anamnestic and demographic data were collected: sex, age (years), height (cm), weight (kg), assistance in walking (yes/no). The subjects were assessed using the SARC F questionnaire (SARC-F is used to screen for sarcopenia) and physical fitness was assessed using the Short Physical Performance Battery (SPPB) and Timed Up and Go (TUG) tests.

The SARC-F questionnaire consists of 5 questions that evaluate 5 items: strength, assistance in walking, rising from a chair, climbing stairs, and falls. For each item, the test subject can receive from 0 to 2 points. The total result of the questionnaire ranges from 0 (worst) to 10 points (best). A score of 0 to 3 points indicate, no risk of sarcopenia, and 4 or more indicates sarcopenia [12]. The subjects were divided into two groups depending on the result they obtained in the SARC F questionnaire (group 1 below 4 points in SARC F and group 2 - SARC F - 4 and more points)

The Short Physical Performance Battery (SPPB) test was used to assess physical performance. It analyzes lower limb function and consists of three parts: SPPB chair stand test - stand up from a chair without using your arms five times. SPPB balance test evaluates the balance in three positions Side-by-Side Stand, Semi-Tandem Stand and Tandem Stand, SPPB gait speed test - walk a short distance (3m). For each part, the participant receives from 0 to 4 points. The maximum score for SPPB is 12 points 27. SPPB ≤ 8 point score indicates problems with physical functioning [13].

Timed Up and Go (TUG) test was used to assess the risk of falls. If the subject moves using a cane or crutch/crutches, they perform the test using them. It is assumed that if the time required to perform the test (distance 3m) exceeds 13.5 seconds then the risk of falling is increased [14].

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2.3. Statistical Analysis

Statistical analysis was conducted using the Statistica 13.3 software (StatSoft). A Shapiro-Wilk's test was used to test normal distribution. In the absence of normal distribution of the investigated variables, the Mann–Whitney test was used to compare the groups.. Correlation analysis was performed using the Spearman rank correlation. Logistic regression was used to determine predictors of change in SPPB and TUG, which were considered to be dependent variables. The p-value of <0.05 was considered statistically significant.

3. Results

Study group: We included 177 patients with hip osteoarthritis in the statistical analysis. The mean age of all subjects was 72 ± 7,5 years. There were 99 females and 78 males in the study group. The characteristics of the study groups are presented in Table 1.

Table 1. Baseline characteristics of groups.

	Total (n=177)	SARC-F<4 (n= 88)	SARC-F≥4 (n= 89)	p-value
Age (Mean SD)	72 ± 7.5	72 ± 6.3	72 ± 7.6	0.437
Sex n(%)				0.051
women	99 (56)	48 (54)	51 (57)	
men	78 (44)	40 (45)	38 (42)	
BMI (Mean SD)	28.6 ± 5.7	28.1 ± 5.1	29.1 ± 6.3	0.109
SPPB (Mean SD)	9.5±3,6	11.2 ± 1.6	5.0 ±3.5	0.001
SBBP chair stand (points) (Mean SD)	2,4±1.1	3.6 ± 0.9	1.3 ± 1.2	0.001
SPPB balance (points)	2,5±1.2	3.7 ± 0.6	1.7 ± 1.4	0.001
SPPB gait speed (points)	2.7±0.9	3.8 ± 0.5	2.0 ± 1.1	0.001
TUG (Mean SD)	17.25 ± 7.44	13.7 ± 6.1	18.7 ± 8.2	0.005

The subjects were divided into two groups depending on the result obtained in the SARC F questionnaire. SARC F group below 4 points and SARC F group equal to or more than 4 points. Statistical differences were noted depending on the SARC F result in relation to the results obtained in the SPPB total test and its individual elements (p <0.001) as well as in the result of the TUG test p<(0.001). Subjects from the SARC F group below 4 obtained statistically significantly better results. (Table 1).

The results obtained by the subjects in the five elements of the SARC F test were also analyzed. Participants who were in the SARC F group below 4 had statistically significantly better results in all areas of the questionnaire (p<0.001) (Table 2).

Table 2. Characteristics of patients in SARC F.

Parameters	SARC- F <4		SARC- F ≥4		
	Mean	± SD	Mean	± SD	p-value
SARC-F strength	0.2	0.6	1.2	0.6	0.001
SARC-F assistance in walking	0.0	0.0	0.8	0.6	0.001
SARC-F rising from a chair	0.0	0.0	1.2	0.5	0.001
SARC-F climbing stairs	0.0	0.0	1.0	0.7	0.001
SARC-F falls	0.2	0.5	0.9	0.9	0.035
SARC-F total score	0.6	0.9	5.0	1.5	0.001

The correlations that occur in the study groups between the results obtained in the SARC F questionnaire and physical fitness assessed using the SPPB test and the TUG test were also analyzed. There was a statistically significant correlation between the results obtained in the SARC F test and the results of the SPPB test, both the SPPB total score (p<0.001)and its individual elements: SBBP chair

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stand test (p<0.001), SPPB balance test (p<0.001), SPPB gait speed test (p<0.001) the results show that the better the SARC F test result, the better the performance in the SPPB test. And also, the better the score in the SARC F questionnaire, the shorter the time obtained in the TUG test (p<0.001) (Table 3).

Table 3. Correlation between the SARC-F each domain and total score and other related measurements.

Parameters	strength		assistance in walking		rising from a chair		climbing stairs		falls		total score	
	correlation	p-value	correlation	p-value	correlation	p-value	correlation	p-value	correlation	p-value	correlation	p-value
SBBP chair stand test (points)	-0.49	0.001	-0.51	0.001	-0.51	0.001	-0.506	0.001	-0.25	0.07	-0.71	0.001
SPPB balance test (points)	-0.23	0.067	0.11	0.399	-0.18	0.14	-0.15	0.21	-0.24	0.05	-0.64	0.001
SPPB gait speed test (points)	-0.54	0.001	-0.57	0.001	-0.65	0.001	-0.58	0.001	-0.32	0.01	-0.75	0.001
SPPB total score (points)	-0.31	0.011	-0.26	0.033	-0.41	0.001	-0.32	0.010	-0.21	0.08	-0.71	0.001
BMI (kg/m²)	-0.49	0.001	-0.54	0.001	-0.59	0.001	-0.57	0.001	-0.24	0.05	-0.35	0.003
TUG (second)	-0.58	0.001	-0.99	0.001	-0.86	0.001	-0.95	0.001	-0.06	0.65	-0.65	0.001

SARC F as a predictor of physical fitness in patients with hip osteoarthritis.

Logistic regression of the SPPB and TUG predictors showed that in SARC F more than 4 predicted worse SPPB and TUG outcomes. In the SARC group, F above 4 increases the odds of poorer scores in SPPB OR=1.097; CI 95% 1.053-1.146 and TUG, OR=1.096; CI 95% 1.104-1.266.

4. Discussion

The aim of the study was to analyze whether the SARC F questionnaire correlates with the physical fitness of patients with osteoarthritis. Osteoarthritis of the hip causes a number of adverse effects, including: pain, limited physical activity and reduced quality of life [15]. Clynes et al. [16] showed that osteoarthritis can negatively affect the functioning of patients. Due to pain, swelling and inflammation, patients with osteoarthritis suffer from limited independence in activities of daily living. In Poland, the waiting time for elective hip replacement surgery often exceeds a year [17]. Long waiting times for surgery may potentially intensify negative symptoms, and thus reduce patients' independence in everyday activities.

The SARC F questionnaire was recommended by EWGOSP2 as the first step in the sarcopenia assessment procedure. Not only EWGSOP2 as well AWGS2 recommend the use of the SARC-F for the screening of sarcopenia [1,18]. Similarly, the Society for Sarcopenia, Cachexia and Wasting Disorders also recommends the use of the SARC-F [19].

Our research has shown that the results of the SARC F questionnaire are a predictor of the performance of patients with hip osteoarthritis. Patients with a better result in SARC F (less than 4 points) obtained better results in the SPPB test, where lower limb strength, balance and gait speed are assessed, all these activities are necessary for independent functioning. Authors Peng at al. show that osteoarthritis and sarcopenia are related and can influence each other's course of the disease [20]. The authors argue that sarcopenia impairs rehabilitation outcomes and increases the risk of adverse events in patients undergoing hip surgery. However, not only osteoarthritis may be associated with sarcopenia. Osteosarcopenia, a recently identified medical condition, involves the convergence of two age-related musculoskeletal disorders: sarcopenia and osteopenia, or osteoporosis. The term "osteosarcopenia" has been coined to emphasize the considerable overlap and interplay between the two conditions. Sarcopenia and osteoporosis share common risk factors and biological pathways, including hormonal regulation. Individuals with osteosarcopenia are at increased risk of adverse outcomes, including falls, fractures, hospitalizations, debilitation, and even mortality [21,22]. Osteosarcopenia is likely to impact outcomes after hip replacement surgery [22]. For this study, patients those with hip osteoarthritis and had a better SARC F score are more fit patients who have a lower risk of sarcopenia than those with a high SARC F score.

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A study by Cesari et al suggests that SARC-F is a rapid, question-based clinical tool that may be a useful sarcopenia screening test for primary care physicians. This would then allow SARC-F positive individuals to be referred for further evaluation and involved in resistance exercise programs. According to our research, this is particularly important because patients with hip osteoarthritis show problems with physical fitness [23]. According to our research, patients with a higher SARC F score showed greater problems with physical fitness, which shows the need diagnosis and to implement intervention programs.

A study by Lovett et al showed the prevalence of patients at risk of sarcopenia based on the SARC-F questionnaire was highest in the population with hip osteoarthritis at 72.3% compared to 63.2% in the population with knee osteoarthritis and 71.3% in the multiple joint population.

High incidence in patients with OA may be partly related to reporting difficulty walking, climbing stairs, and falling (all components of SARC-F) secondary to pain. In addition, the authors show that SARC-F is a case finding tool, not a diagnosis of sarcopenia, leading to a higher prevalence of at-risk patients. The diagnosis of sarcopenia is confirmed by measurement low muscle mass and function [24]. However, the SARC-F is closely related to the future decline in physical functioning, thus the SARC-F has the same significance as the direct assessment of sarcopenia [10]. In terms of predictive ability for future decline in physical function, the SARC-F and sarcopenia assessed by EWGSOP, AWGS, and IWGS criteria were almost equal regarding predictive ability [10]. A meta-analysis of five observational studies by Ida at al. reported that the pooled hazard ratio for the SARC-F questionnaire positivity and mortality was 1.87 ($p<0.0001$) [25]. These findings suggest that the SARC-F is very important in daily practice. An article by Beaudart et al. proposed several user-friendly and inexpensive methods that can be used to assess sarcopenia. Healthcare professionals, especially in primary care, should consider evaluating sarcopenia in an individual at increased risk; the proposed risk assessment tools are the red flag method, the SARC-F questionnaire, SMI method or various predictive activities. The authors argue that treatment of sarcopenia should be primarily patient-centered and include a combination of resistance and endurance exercise-based activity programs, with or without dietary intervention [26]. Our study confirms the need to introduce sarcopenia risk diagnostics into pimary medical practice, as it is often associated with poorer physical functioning

This study has some limitations. The first limitation is group selection. Due to the design of the study and the chosen tools for measuring outcomes, patients with possible cognitive dysfunctions were excluded. Our decision to exclude patients with an MMSE score below 23, suggestive of dementia, was also driven by doubts about whether these people would remember their physiotherapist's recommendations for exercise. Following these recommendations is essential for cooperation with the rehabilitation team and allows the patient to achieve positive functional effects

5. Conclusions

The study showed that the results obtained in the SARC F questionnaire correlate with the possibilities of physical functioning in patients with hip osteoarthritis SARC F is an inexpensive method that can be used to assess the risk of sarcopenia. Healthcare professionals, especially in primary care, should consider assessing the risk of sarcopenia especially in people with hip osteoarthritis.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data used in this study are available upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest

Abbreviations

F-A-C-S	Find-Assess-Confirm-Severity Pathway
EWGSOP	European Working Group on Sarcopenia in Older People
BMI	body mass index
SPPB	Short physical performance battery test
TUG	Timed - up and go test
SD	standard deviations

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