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NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS
FACULTY OF NURSING

INVESTIGATION OF DAILY LIFE AMONG OLDER ADULTS WITH SARCOPENIA

PANA ANASTASIA

REGISTERED NURSE, BSc, MSc

PHD THESIS

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This project is dedicated to my beloved mother and my late father

who taught me to be an independent and determined person,

without them I would never be able

to achieve my objectives and succeed in life

Ιωάννα Πανά

Εμμανουήλ Πανάς

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Abbreviations

AIS	Athens Insomnia Scale
ALM	Appendicular lean mass
ASM	Appendicular skeletal mass
AWGS	Asian Working Group for Sarcopenia
BI	Barthel index
BIA	Bioelectrical impedance analysis
BMI	Body mass index
CC	Calf circumference
CCI	Charlson comorbidity index
ESPEN	European Society of Clinical Nutrition and Metabolism
EWGSOP	European Working Group on Sarcopenia in Older People
FNIH	Foundation of the National Institutes of Health
FSS	Fatigue severity scale
IWGS	International Working Group on Sarcopenia
PPV	Positive predictive value
NPV	Negative predictive value
SDOC	Sarcopenia Definition and Outcomes Consortium
SIG	Special Interest Groups
SMI	Skeletal mass index
VAS - Fatigue	Visual analogue scale - Fatigue

Introduction

The older population is aging rapidly and worldwide (1). In 2022, globally, the number of people aged 65 years or over was 771 million and women outnumbered men. In the upcoming decades it is estimated that this number will be more than double, rising up to 1.6 billion in 2050. In all the continents, the number of the older population will increase between 2020 and 2050; it is expected to increase from 10% in 2020 to 16% in 2050 (2).

The growth in the relative share of older people may be attributed to the increased life expectancy, which is observed in the last decades. Moreover, the decline in birth rates plays an unequivocally crucial role in this growth (3).

According to the current data, Europe is the first among all the continents in the population of older adults (4). In 2022, the population of Europe (27 countries included, EU-27) was 446.7 million. Older people (aged 65 or over) constituted 21.1% of this population, an increase of about 3.1% compared with 10 years earlier and it is expected to account for 31.3% of the EU-27's population by 2100. Across the EU-27 Member States, in 2022, the older people presented the highest shares in the total population in Italy (23.8%), Portugal (23.7%), Finland (23.1%), and Greece (22.7%), while in Ireland (15%) and Luxembourg (14.8%) were observed the lowest shares (3).

In 2016, the number of people aged 65 or older in the US was 49 million, representing 15% of the population. That number is estimated to reach 71 million by 2030 and 98 million by 2060, when older people will be nearly 1/4 of the whole population in the US (5).

The older population is also growing across the remaining regions, including Africa, Asia, Latin America, the Caribbean, and Oceania, although at varying levels. The older population in Asia and Latin America and the Caribbean will increase with the rapidest pace in all regions, with Asia's older population almost tripling in size from 341.4 million in 2015 to 975.3 million in 2050. In Africa, the population will remain younger than in the rest of the world due to the persisting increased birth rates.

Nevertheless, the older African population in 2050 will be nearly four times as much as in 2015, that is from 40.6 million in 2015 to 150.5 million in 2050 (4).

The population growth of older people has attracted the interest of scientific society. Over the last ten years, a continuously increasing number of studies regarding aging and geriatric medicine have been published. Their objective is to understand thoroughly the mechanisms of primary aging processes and to discover potential ways of early interventions. The ultimate aim is the simultaneous treatment of different age-related conditions with the same intervention. In this way, the delay of multiple geriatric diseases may be achieved (6).

Both the aging population and advancements in health sciences have resulted in extended life expectancy (1). According to the World Health Organization (WHO), current life expectancy at birth is globally 73 years. However, it varies depending on the country, ranging between 50.75 years in Lesotho (Africa) and 84.26 years in Japan (East Asia) (7).

As a consequence of extended life expectancy, older adults often experience simultaneously more than two chronic conditions (1). They contribute to adverse health outcomes, such as morbidity, mortality, institutionalization, poor quality of life, and functional impairment. The term ‘geriatric syndromes’ is suggested by Inouye et al. (8) as ‘those clinical conditions in older persons that do not fit into discrete disease categories’ (p.1). Various underlying factors seem to play a role in the onset of geriatric syndromes (8). Common geriatric syndromes include frailty, urinary incontinence, cognitive impairment, delirium, falls, pressure ulcers, polypharmacy, and sarcopenia (1,8).

In contrast to the past, nowadays, health professionals face the challenge to approach older adults holistically rather than focusing on an organ system, specialty, or disease. When older individuals are considered as patients suffering from a single disease or multiple diseases simultaneously, then they are exposed to the risk of inappropriate treatment due to poor understanding and approaching the clinical conditions as a geriatric syndrome. Treating a geriatric syndrome as a whole and not a defined disease, requires interdisciplinary care offered by various health care professionals (physician, nurse, social worker, case manager, dietician, allied health staff, exercise trainers, etc.), together with the patient, which is needed so that therapy

and improvement can be achieved. Nurses have a significant role in interdisciplinary geriatric syndromes care (9). They can contribute to the early identification of geriatric syndromes through screening and thorough assessments. Furthermore, nurses due to their position have the ability to refer to and cooperate with family and appropriate community resources and disciplines accomplishing the implementation of patient-centered interventions (1).

Over the last three decades, research has turned its attention into understanding and treating sarcopenia. Some researchers consider sarcopenia as an age-related disease, others as a classical syndrome, and others as a geriatric syndrome. The supporters of the last view highlight that sarcopenia is not a disease, since it does not present with single and clear pathophysiological and clinical characteristics, nor a classic syndrome, since classic syndromes present with well-defined symptoms, even though the cause and/or the pathogenesis are not always completely understood (10). Nonetheless, in 2016, sarcopenia was included for the first time in the International Statistical Classification of Diseases and Related Health Problems (ICD-10-CM) list with the code M62.84. According to ICD-10, sarcopenia belongs to muscles disorders (11). Undoubtedly, either as a geriatric syndrome or disorder, sarcopenia is a highly prevalent condition among older adults, with a huge economic and social burden (12).

Still, a major challenge remains to be further investigated and especially the possible associations between sarcopenia and the characteristics, habits, and activities in the daily life of older adults. Demographic characteristics, chronic diseases, medication, functionality, fatigue, and sleep pattern differ in the aging population and may be related to the risk of sarcopenia or even to confirmed sarcopenia.

Health professionals, especially nurses, who spend a lot of time working next to older adults – either in hospital or in the community and long-term care - may detect related factors to sarcopenia and refer these individuals to experts for further examination. The early recognition of signs related to sarcopenia is crucial for the early prevention and management of sarcopenia.

I. LITERATURE REVIEW

Chapter 1

Sarcopenia among older adults

1.1 Definition of sarcopenia

In 1989, Irwin Rosenberg first suggested the Greek term ‘sarcopenia’ (meaning ‘sarx’ for flesh and ‘penia’ for loss) to describe the loss of muscle mass or lean body mass among older people (13). The author proposed that it might be necessary, a Greek word to be used for this condition in parallel with osteoporosis or osteopenia so that it can be taken seriously. However, the first reference about the loss of muscle strength, and even muscle mass, with aging comes back in 1931 (14). Baumgartner et al. proposed an operational definition of sarcopenia in 1998. Sarcopenia was defined as appendicular skeletal muscle mass (ASM) kg/height^2 (m^2), measured by dual-energy X-ray absorptiometry (DXA) being less than two standard deviations below the mean of a young reference group (15). In 2010, the European Working Group on Sarcopenia in Older People (EWGSOP) defined sarcopenia as a syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with a risk of adverse outcomes, including disability and poor quality of life, and proposed the coexistence of two factors: low muscle mass and low muscle function (strength or performance) as the criterion for sarcopenia (16). According to the updated operational definition of sarcopenia (EWGSOP2) by EWGSOP, low muscle strength is suggested as the key characteristic of sarcopenia. Detection of low muscle quantity and quality is used to confirm the sarcopenia diagnosis, and additionally, poor physical performance is indicative of severe sarcopenia (17). This is the only definition endorsed by a range of international scientific societies (European Geriatric Medicine Society; The European Society for Clinical Nutrition and Metabolism; The European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis, and Musculoskeletal Diseases; International Osteoporosis Foundation; and International Association of Gerontology and Geriatrics European Region) for clinical practice and research (18). Other international working

groups on sarcopenia have also published definitions and related diagnostic criteria. By these groups, the most usually met definitions in the literature are those by the Special Interest Groups (SIG) (19), International Working Group on Sarcopenia (IWGS) (20), Society on Sarcopenia, Cachexia and Wasting Disorders (21), Foundation of the National Institutes of Health (FNIH) (22), Asian Working Group for Sarcopenia (AWGS) (23), AWGS2 updated in 2019 (24), and European Society of Clinical Nutrition and Metabolism (ESPEN) (25). Despite the progress and several updates that have been made regarding the definition of sarcopenia, a universally accepted definition as well as consensus on diagnostic criteria are still lacking (26,27)**.**

In 2018, the Sarcopenia Definition and Outcomes Consortium (SDOC) presented thirteen position statements informed by a literature review and SDOC's analyses of eight epidemiologic studies, six randomized clinical trials, four cohort studies of special populations, and two nationally representative population-based studies. These statements were reviewed by an independent international expert panel iteratively and voted on by the panel during the Sarcopenia Position Statement Conference. The panel highlighted the importance of both weakness defined by low grip strength and slowness defined by low usual gait speed to be included in the definition of sarcopenia (28).

1.2 Prevalence of sarcopenia

The prevalence of sarcopenia varies across different population settings, ethnicities, sociodemographic characteristics, and according to the definitions, the diagnostic methods, and the cutoffs used (29,30)**.** In community-dwelling older adults ranges between 1-29% by using the most widely accepted definitions, but reaches 40.4%, when using less common criteria such as the appendicular lean mass divided by weight (ALM/weight). In nursing homes, the prevalence varies between 14% and 73.3%, and among hospitalized older adults between 10% and 24%. Sarcopenia is more prevalent in Oceania depending on the EWGSOP definition, while the lowest prevalence is observed in Europe using the EWGSOP2 definition (30). The results of some recently published systematic reviews and meta-analyses regarding the prevalence of sarcopenia in the whole world are presented in Table 1. Sarcopenia as a

comorbid disease is highly prevalent in individuals with cardiovascular disease (CVD), dementia, diabetes mellitus, and respiratory disease (31).

Table 1. Prevalence of sarcopenia according to significant systematic reviews and meta-analyses

Study	Setting	Definition	Prevalence
Cruz-Jentof et al. 2014 (32) Systematic review	Older adults aged ≥ 50 years old Community-dwelling nursing home/geriatric settings and hospital	EWGSOP1	Prevalence of sarcopenia varied between, 1-29% in community-dwelling populations, 14-33% in nursing homes, and 10% in acute hospitalized older adults (only one study included).
Shafiee et al. 2017 (33) Systematic review and meta-analysis	Community-dwelling older adults aged ≥ 60 years old	According to EWGSOP1, IWGS, and AWGS definitions	The overall estimate of prevalence was 10% (95% CI: 8-12%) in men and 10% (95% CI: 8-13%) in women, respectively. Among the non-Asian population, the prevalence was higher than among Asian older adults, in both genders especially, when BIA was used to measure muscle mass (19% vs 10% in men; 20% vs 11% in women).
Mayhew et al. 2018 (34) Systematic review and meta-analysis	Community-dwelling older adults aged ≥ 60 years old	According to EWGSOP1, AWGS, IWGS, FNIH, and ALM/height, ALM/weight, ALM/BMI	The lowest prevalence estimates were observed for the EWGSOP/AWGS (12.9%, 95% CI: 9.9-15.9%), IWGS (9.9%, 95% CI: 3.2-16.6%), and FNIH (18.6%, 95% CI: 11.8-25.5%) definitions. The highest

		definitions	prevalence estimates were found for the ALM/weight (40.4%, 95% CI: 19.5-61.2%), ALM/height (30.4%, 95% CI: 20.4-40.3%), ALM regressed on height and weight (30.4%, 95% CI: 20.4-40.3%), and ALM/BMI (24.2%, 95% CI: 18.3-30.1%) definitions.
Shen et al. 2018 (35) Systematic review and meta-analysis	Older adults aged ≥ 60 years old Nursing homes	According to EWGSOP1 and SMI criteria	The reported pooled prevalences of sarcopenia based on EWGSOP1 definition and SMI were 41% (95% CI: 32-51%) and 59% (95% CI: 24-93%), respectively. The pooled prevalences of EWGSOP1 defined sarcopenia in women and men were 46% and 43% respectively.
Rodríguez-Rejón et al. 2019 (36) Systematic review	Older adults aged ≥ 60 years old Nursing homes and assisted-living facilities	According to EWGSOP1 and muscle mass estimation (e.g., SMI)	The prevalence of sarcopenia ranged widely between 17.7-73.3% in long term-care homes and between 22-87% in assisted-living facilities.
Papadopoulou et al. 2019 (37) Systematic review and meta-analysis	Older adults aged ≥ 60 years old Community-dwelling nursing home/geriatric settings and	According to EWGSOP1, AWGS, and IWGS definitions	The prevalence of sarcopenia in community-dwelling subjects was 11% (95% CI: 8-13%) in men and 9% (95% CI: 7-11%) in women. The prevalence of sarcopenia in nursing home subjects 51% (95% CI: 37-66%) in men and 31% (95% CI: 22-42%) in women and

	hospitals		in hospitalized subjects was 23% (95% CI: 15-30%) in men and 24% (95% CI: 14-35%) in women.
Fernandes et al. 2021 (38) Systematic review	Community-dwelling older people aged ≥ 60 years	According to EWGSOP1 and EWGSOP2	The sarcopenia prevalence ranged between 6.2-35.3% for the EWGSOP1, and between 3.2-26.3% for the EWGSOP2 definition.
Petermann-Rocha et al. 2022 (30) Systematic review and meta-analysis	Individuals aged ≥ 18 years	According to EWGSOP1, EWGSOP2, AWGS, FNHI, and IWGS definitions and muscle mass estimation	The prevalence ranged from 10 to 27% in individuals ≥ 60 years.
Almohaisen et al. 2022 (39) Systematic review and meta-analysis	Community-dwelling people aged ≥ 50 years	According to EWGSOP1, AWGS definitions and SARC-F	The reported overall prevalence of sarcopenia was 14% (95% CI: 9-20%).

Abbreviations: EWGSOP1, European Working Group on Sarcopenia in Older People 2010; EWGSOP2, updated definition in 2019 by European Working Group on Sarcopenia in Older People; IWGS, International Working Group on Sarcopenia; AWGS, Asian Working Group for Sarcopenia; FNIH, Foundation of the National Institutes of Health; SMI, skeletal muscle index; ALM, appendicular lean mass; BMI, body mass index; BIA, Bioelectrical impedance analysis

Chapter 2

Causes of sarcopenia

2.1 Pathogenesis of sarcopenia

Sarcopenia has a complex and multifactorial pathogenesis. Most researchers agree to the following causal factors: neurodegenerative changes resulting in loss of muscle motor units, oxidative stress, inflammation, changes in hormone levels and sensitivity (e.g., insulin resistance), and altered muscle protein metabolism (increased catabolic stimuli and decreased anabolic stimuli). Additionally, behavior/lifestyle factors, such as poor nutritional status and decreased physical activity are involved in the pathogenesis pathway of sarcopenia. All those factors contribute to the progressive deterioration in skeletal muscle mass and function (40–42).

Some researchers classify sarcopenia regarding the mechanism of pathogenesis into two categories, primary and secondary sarcopenia (41,43). Sarcopenia is considered “primary” (or age-related) when no other evident cause of a gradual onset is present in an older person, while sarcopenia is considered “secondary” when it can be attributable to other causes rather than aging, such as malignancy, organ failure, the consequence of cancer surgery or systemic antineoplastic therapies or due to bed rest because of a chronic disease or hospitalization, endocrine disease, and “nutrition-related sarcopenia”, related to malnutrition, malabsorption, or gastrointestinal disorders (17,40,43).

2.2 Neuromuscular degeneration

Due to aging, atrophy of muscle fibers occurs, mainly type II (fast and glycolytic), along with a gradual decrease in size/volume which lead to a replacement of muscle by fat and connective tissue (40). Myostatin (GDF-8) contributes to this atrophy by causing the formation of the transcription-altering SMAD protein

complex. Also, myostatin seems to hold back the effects of PGC-1α, a transcriptional coactivator that promotes mitochondrial biogenesis and inhibits the transcriptional activity of FoxO (26).

2.3 Oxidative stress

Oxidative stress is characterized by dysfunction in the maintenance of balance in oxidant and antioxidant levels. The aging process is known to predispose skeletal muscle to increased levels of oxidative stress (44). As a consequence of the oxygen consumption in a great amount by the skeletal muscles, reactive species of nitrogen and oxygen (RONS) are generated. Increased RONS production in muscles may be caused by various mechanisms such as mitochondrial dysfunction, the impaired ability of muscle cells to remove dysfunctional mitochondria, and the atrophy of type II fibers, which lead, as above-mentioned to a replacement of muscle by fat and connective tissue (40). Mitochondrial dysfunction occurs due to their reduction, the loss of mitochondrial enzymes, mitochondrial DNA mutations, and, eventually, due to alterations in fatty acid beta-oxidation and the function of the mitochondrial respiratory chain (29). The intracellular oxidative stress results in chronic low-grade inflammation, by inducing the activation of the immune system (40,44) and increases the risk of insulin resistance in aging skeletal muscle (45).

2.4 Inflammation

It is already known that older adults may have increased serum levels of inflammatory markers, such as tumor necrosis factor-alpha (TNF-α), interleukin (IL)-6, IL-1, and C-reactive protein (CRP) (40). Also, increased concentrations of the inflammatory cytokines IL-6 and TNF-α have been found in sarcopenic older adults, proposing that chronic inflammation has an active role in the pathogenesis of sarcopenia (26). That has been attributed to both direct catabolic effects and indirect mechanisms. Pro-inflammatory cytokines such as TNF-α have a significant impact on appetite, leading to anorexia and weight loss (44). Also, inflammation promotes skeletal muscle insulin resistance, as suggested in animal studies (45).

2.5 Changes in hormone levels

Sarcopenia and aging share common alterations in hormone levels. That possibly explains the decline of sex hormones (e.g., testosterone and dehydroepiandrosterone [DHEA]), growth hormone (GH), and IGF-1, observed in sarcopenic patients (40). Testosterone declines in men with aging contributing to the decrease in muscle mass and bone strength (26,46). Estrogen reduction seems to be associated with low muscle strength in women after age 55 (26). Reduced levels of GH and IGF-1 are responsible for the increase in visceral fat and decrease in lean body mass (LBM) as well as bone mineral density (BMD) (40).

The relationship between sarcopenia and insulin seems to be based on a vicious circle. In older adults, skeletal muscle protein synthesis is hindered by resistance to the anabolic action of insulin (46). Inversely, decreased skeletal muscle mass and strength caused by sarcopenia can increase the risk of insulin resistance in aging skeletal muscle, as it has been found in animal studies by using myostatin inhibitors, which improved sarcopenia (45).

Moreover, in several studies, it has been found that vitamin D deficiency is associated with decreased muscle strength and low physical activity (46). In the aging process cortisol levels increase, a condition known as hypercortisolism. That has been found especially in evening cortisol measurements in male older individuals. Increased exposure to corticosteroids – together with the reduction of the lipolytic effects of declining GH levels – may contribute to the age-dependent increase of visceral fat and decreased LBM and BMD (47).

2.6 Muscle protein metabolism

Proteins are the main component of muscle mass, reaching 88% in concentration by dry weight. Therefore, muscle mass depends to a great degree on the balance between protein synthesis and degradation. When this balance is disrupted and remains over chronic periods, then muscle mass dysfunction occurs. In

sarcopenia, it seems that muscle proteolysis exceeds muscle protein synthesis, leading gradually to loss of muscle mass (48).

2.7 Behavior/lifestyle factors

Changes in behavioral factors are common in older people, contributing to the onset of sarcopenia, but they can possibly be reversed. Anorexia of aging has an impact on appetite, food intake, and protein consumption, in particular. Anorexia is caused by age-related loss of appetite, sense of taste and smell, poor oral health, gastrointestinal changes (i.e., delay in gastric emptying and elevated cholecystokinin levels), dementia, depression, disability, and social environment (40). Except for anorexia, malabsorption, limited access to healthy foods or limited ability to eat can also cause sarcopenia. Physical inactivity promotes sarcopenia either due to a usual sedentary lifestyle or to disease-related impaired mobility (17).

Chapter 3

Identifying older adults at risk for sarcopenia

3.1 Case finding

Identification of potential sarcopenic older adults is the first step in a pathway towards the implementation of strategies aiming at inhibition of disability and other adverse consequences (49)**.**

In clinical practice, when older individuals present with symptoms indicative of sarcopenia, such as falling, feeling weak, slow walking speed, difficulty rising from a chair, or weight loss/muscle wasting, then further investigation for sarcopenia is recommended. EWGSOP2 recommends the use of the SARC-F questionnaire as a screening tool for sarcopenia, but other various screening tools also exist in clinical or research practice (17).

3.2 Screening tools

Seven validated screening tools are found more frequently in the literature, that have been developed to identify older adults at risk for sarcopenia (50,51). Those are the two-step algorithm of the EWGSOP1 (16), the SARC-F questionnaire by Malmstrom et al. (52), a shorter version of SARC-F by Woo et al. (53) the Mini Sarcopenia Risk Assessment (MRSA) by Rossi et al. (54), the screening grid from Goodman et al. (55), the score chart of Ishii et al. (56), and the prediction equation of Yu et al. (57).

The two-step algorithm of the EWGSOP1 relies on gait speed measurement as the easiest and most reliable way to begin sarcopenia case finding or screening in practice. If gait speed is too slow (≤ 0.8 m/s), muscle mass must be estimated. If gait speed is > 0.8 m/s, then the assessment of grip strength follows. If grip strength is low, then muscle mass must be estimated (16). The updated EWGSOP2 definition has

replaced the two-step algorithm and suggests now the SARC-F as a screening tool for sarcopenia (17).

The SARC-F questionnaire is widely used and consists of 5 items: Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls. The scores range from 0 to 10, with 0 to 2 points for each component. A score equal to or greater than 4 is predictive of sarcopenia and poor outcomes (52). SARC-F is an easy-to-use, inexpensive tool, useful in clinical practice. It has been translated and validated into multiple different languages. SARC-F has a low-to-moderate sensitivity and a very high specificity to predict low muscle strength (Table 2). Therefore, SARC-F will mostly detect severe cases of sarcopenia (17). Because of its low sensitivity, some researchers suggest it to be used in specific populations such as adults in hospitals or nursing homes (58). Also, a shorter version of SARC-F with 3 questions (strength, stair climbing, and assistance with walking) is available (SARC-F-3) by Woo et al. (53). Other researchers propose the SARC-F in combination with the measurement of calf circumference (CC) as a screening tool for sarcopenia (51).

Table 2. Validation results of SARC-F in different languages

SARC-F	Sensitivity	Specificity	PPV	NPV
Italian (59)	11-36%	77.3-100%	/	/
Japanese (60)	47%	78%	69%	58%
Polish (61)	33.3-50%	84.6-85.2%	30-36.7%	83.1-93.1%
Thai (62)	21.5%	93.7%	50%	80.3%
Polish (63)	92.9%	98.1%	92.9%	98.1%
Romanian (64)	65%	68.3%	40.6%	85.4%
German (65)	50-75%	47-67%	7-68%	74-94%
Japanese (66)	5.3-8%	97-97.5%	16.7-41.7%	77.9-90.3%
Spanish (67)	78.3-81.3%	48.7-50.8%	25.5-35.3%	87.2-92.3%
Turkish (68)	25-50%	81.4-82.4%	/	/
Korean (69)	17.9-43.5%	90.6-92.6%	8.1-36.6%	88.8-98.8%
French (70)	22.1-75%	84.9-87.1%	17.3-44.2%	68.1-98.8%
Portuguese (71)	58.9%	82.1%	69.4%	74.4%
Mexican (72)	28.3-35.6%	82.2-83.3%	17-30.8%	81.6-92.6%

Chinese (73)	Men 3.8-4.8% Women 8.2-9.9%	Men 98.7-99.1% Women 94.2-94.6%	Men 25.8-54.8% Women 8.4-25.2%	Men 78.4-91% Women 82.2-94.9%

MSRA is a questionnaire either with 5-items (MSRA-5) or 7-items (MSRA-7). The first version of MSRA-7 consists of the following items: age, hospitalization in the preceding year, level of activity, regularity of meals, daily dairy consumption, daily calorie consumption, and weight loss ≥ 2 kg in the preceding year. In the short version of MSRA-5, dairy and calorie consumption have been excluded. A score of 30 and 45 on MSRA-7 and MSRA-5, respectively, indicates sarcopenia (54).

The score chart of Ishii et al. specific for each sex, estimates with high accuracy the probability of sarcopenia based on age, grip strength, and CC. It has reasonable sensitivity and specificity, but it requires specific measurements. Score in men is calculated as follows: 0.62×(age-64)-3.09×(grip strength-50)-4.64×(calf circumference-42). Probability in men: 1/1[1+e-(sum score/10-11.9)]. Score in women: 0.80×(age-64)-5.09×(grip strength-34)-3.28×(calf circumference-42). Probability in women:1/1[1+e-(sum score/10-12.5)] (56).

Goodman et al. proposed the identification of probable sarcopenia primarily in those with low body mass index (BMI) specific to age and sex, as a screening tool in clinical practice. It provides, according to the age and the BMI of the subject, the probability (%) of low muscle mass. Subjects with a probability (given by the grid) above 70% in men and above 80% in women are considered as having low muscle mass and therefore, they are at risk of sarcopenia (55).

Yu et al. proposed the use of an anthropometric prediction equation (PE), together with a performance measure (e.g., gait speed) as part of a "rule-out" screening test for sarcopenia. Anthropometric PE is based on four parameters: weight, BMI, age, and sex. ASM predicted by the following equation: 10.05+0.35(weight)-0.62(BMI)-0.02(age)+5.10(if male). Subjects presenting a score, derived from the PE, below the 20th percentile value were considered at risk of sarcopenia (57).

Chapter 4

Diagnosis of sarcopenia

4.1 Introduction

The evaluation of sarcopenia requires objective measurements of its components, namely, muscle strength, muscle mass, and physical performance. Several methods of evaluating sarcopenia currently used include walking speed for evaluation of physical performance, grip strength for the muscle strength assessment, and CC, bioelectrical impedance analysis (BIA), DXA, and imaging methods (computerized tomography-CT and magnetic resonance imaging-MRI) for measuring muscle mass (Table 3). None of these methods are very sensitive or specific for evaluating sarcopenia. Consequently, to date, there is no consensus method to diagnose sarcopenia (74). According to the above-mentioned definitions of sarcopenia, there have been also developed the following available diagnostic criteria (Table 4).

Table 3. Methods for measurement of muscle mass, muscle strength, and physical performance

Muscle mass	**Muscle strength**	**Physical performance**
Anthropometry (e.g., CC)	Grip strength	Usual gait speed
Dual-energy X-ray absorptiometry (DXA)	Knee flexion/extension	Short physical performance battery (SPPB)
Bioelectrical impedance analysis (BIA)	Repeated chair stand test (CST)	Timed get-up-and-go test (TUG)
Computed tomography (CT)		
Magnetic resonance imaging (MRI)		

Table 4. Diagnostic criteria of sarcopenia according to international working groups in chronological order

International working groups	Sarcopenia definition
European Working Group on Sarcopenia in Older people - EWGSOP1 (16)	Diagnosis is based on documentation of low muscle mass (technique-specific cut-points, DXA or BIA) plus low muscle strength (grip strength < 30 kg in men and < 20 kg in women) or low physical performance (gait speed ≤ 0.8 m/s).
Special Interest Groups - SIG (19)	Low muscle mass (≥ 2 SDs below the mean measured in young adults of the same sex and ethnic background) plus low physical function (gait speed < 0.8 m/s).
International Working Group on Sarcopenia -IWGS (20)	Low muscle mass, ALM/height^2 (≤ 7.23 kg/m^2 in men and ≤ 5.67 kg/m^2 in women) and physical performance (gait speed ≤ 1m/s).
Society on Sarcopenia, Cachexia and Wasting Disorders (21)	Low physical function (gait speed ≤ 1.0 m/s or < 400 meters walked during 6 min) plus low ALM (≥ 2 SDs below the mean measured in healthy persons aged 20-30 years old from the same ethnic group).
Foundation of the National Institutes of Health -FNIH (22)	As per the EWGSOP definition, using cut-points for grip strength and ALM adjusted for BMI. Low muscle mass (ALM < 19.75 kg in men and < 15.02 kg in women, or ALM_{BMI} < 0.789 in men and < 0.512 in women with DXA) plus low muscle strength (grip strength < 26 kg in men and < 16 kg in women).
Asian Working Group for Sarcopenia - AWGS (23)	Describes sarcopenia as low muscle mass (7.0 kg/m^2 for men and 5.4 kg/m^2 for women by using DXA and 7.0 kg/m^2 for

	men and 5.7 kg/m^2 for women by BIA) plus low muscle strength (< 26 kg for men and < 18 kg for women) and/or low physical performance (gait speed < 0.8 m/s).
European Society of Clinical Nutrition and Metabolism - ESPEN (25)	Endorsement of the EWGSOP definition.
EWGSOP updated as EWGSOP2 (17)	Probable sarcopenia is identified by low muscle strength (grip strength < 27 kg for men and < 16 kg for women, or > 15s for five rises in CST. Diagnosis is confirmed by low muscle quantity or quality (ASM < 20 kg for men and < 15 kg for women, or ASM/height^2 < 7.0 kg/m^2 for men and < 5.5 kg/m^2 for women. DXA or if not possible BIA in clinical practice and MRI or CT in research. If low physical performance is present, then sarcopenia is considered severe (gait speed < 0.8 m/s or SPPB ≤ 8 points score or TUG ≥ 20s or 400 m walk test no completed or ≥ 6 min for completion. The SARC-F questionnaire is recommended as a screening tool for sarcopenia risk.
AWGS2 updated as AWGS 2019 (24)	Retains the previous definition of sarcopenia but revises the diagnostic algorithm, and criteria for low muscle strength (< 28 kg for men and < 18 kg for women) and low physical performance (6-m walk < 1.0 m/s, SPPB score ≤ 9, or 5-time CST ≥ 12 seconds. Also proposes separate algorithms for community vs hospital settings and introduces "possible sarcopenia," defined by either low muscle strength or low physical performance only.

Sarcopenia Definition and Outcomes Consortium – SDOC (28)	The SDOC defined sarcopenia based only on muscle strength and function. The cutoff for grip strength is < 20 kg for women and < 35.5 kg for men. The cutoff for gait speed is in aggrement with many other consensus groups at < 0.8 m/s.

Abbreviations: DXA, dual-energy X-ray absorptiometry; BIA, bioelectrical impedance analysis; ALM, appendicular lean mass; BMI, body mass index; CST, chair stand test; ASM, appendicular skeletal muscle mass; MRI, magnetic resonance imaging; CT, computed tomography, SPPB, short physical performance battery; TUG, timed up and go test

4.2 Estimation of muscle mass

4.2.1 Anthropometry

In primary care, as well as in the community is neither feasible nor practical the use of imaging techniques for the measurement of muscle mass. Therefore, anthropometry offers an indication of both health and nutritional status. Mid-arm muscle circumference (MAMC) and CC have been used for the screening, but not for the diagnosis of sarcopenia (75).

4.2.2 Mid-arm muscle circumference (MAMC)

The mid-arm circumference is measured using a standard flexible measuring tape on the dominant upper arm, at the mid-point between the olecranon process of the shoulder. Triceps skinfold thickness is measured using a conventional skinfold caliper. MAMC is then calculated by the formula: MAMC=mid-arm circumference–(3.14×triceps skinfold thickness) (75,76).

4.2.3 Calf circumference (CC)

CC is measured using an inelastic tape, with a resolution of 1 mm. CC can be recommended to measure on either side in the standing position regardless of the dominant hand for screening sarcopenia in community-dwelling ambulatory older adults (77). Other researchers suggest that CC is measured on the left leg (or the right leg for left-handed persons) with the person in a sitting position with the knee and ankle at a right angle, and the feet resting on the floor (75). Two cutoff points are the most usually used in the existing literature: CC ≤ 31 cm for both sexes or CC ≤ 33 cm for women and CC ≤ 34 cm for men (78).

4.2.4 Imaging techniques

There are several imaging techniques for the estimation of muscle mass. There are classified according to their reliability, applicability in different settings, and the cost-benefit relationship.

4.2.5 Dual-energy X-ray absorptiometry (DXA)

DXA measures the absorption of two X-ray photon energies, typically near 40–47 keV and 70–80 keV. The measurement of transmitted intensities at two photon energies makes possible the differentiation of bone, fat mass, and soft tissue lean mass (non-bone and non-fat soft tissue), based on different X-ray attenuation of tissues. Also, using DXA the amount of fat and lean tissue in each body part, such as the left arm or right leg can be measured separately. The ALM value (which is the sum of the upper and lower limbs' lean mass) is generally used to measure muscle mass with DXA. Additional advantages of DXA are the relatively low radiation exposure, low cost as compared to those of a CT scan, its ease of use, and the simultaneous evaluation of bone issues (79–81).

Limitations of DXA include a lack of portability, a lack of accuracy in estimating truncal fat and muscle, and difficulty to measure trunk muscles, such as chest and back muscles. Therefore, measurements of fat mass and muscle mass are

generally derived from arms and legs, which might over/underestimate the extent of sarcopenia and obesity. Also, hydration status and the presence of edema can influence the measured values. Nevertheless, the ability to evaluate the whole body (trunk and extremities) very easily is the most attractive characteristic of DXA as compared to CT and MRI (79–81).

4.2.6 Bioelectrical impedance analysis (BIA)

Bioelectrical impedance analysis (BIA) is a widely used method for evaluating body composition, through specific electrical characteristics (i.e. impedance ¼ Z and phase angle ¼ PhA) of the human body (82). Actually, BIA estimates indirect muscle mass via whole-body electrical conductivity (18). Regarding body compartments, fat-free mass (FFM), skeletal muscle mass (SM), or ASM can be accessed by means of predictive equations including BIA variables and almost always age, height, and weight (82). BIA's advantages are that it is portable, affordable, and well tolerated, easy to use tool, being useful for epidemiological, clinical, and follow-up studies. BIA has been considered to have a high concurrent validity in the muscle mass estimation, in people with normal hydration status and weight. The method has a good mean-group level accuracy but shows a large variability at the individual level. The necessary use of an adequate equation/BIA device and the use of adopted population-specific cutoff points pose a risk to the right measurement and the interpretation of the results (83).

4.2.7 Computed tomography (CT) and Magnetic resonance imaging (MRI)

Both methods provide high accuracy and reproducible results in estimating muscle mass, enabling as well as the body mass composition differentiation. Additionally, MRI can detect muscle edema and changes in muscle structure. MRI is not allowed for some patients due to specific contraindications. In contrast to MRI, CT exposes the examined persons to high radiation. The absence of validated thresholds for both techniques, the lack of portability, the high cost, and the complex post-processing are their main disadvantages (79,81).

4.3 Evaluation of muscle strength

The most commonly used techniques to evaluate muscle strength include grip strength (or handgrip), lower limb muscle strength, and repeated CST. Grip strength and knee extension (as a measure of lower limb muscle strength) are highly correlated. However, lower limb disabilities and age-related functional impairment may have an impact on leg strength. In addition, measurement of grip strength is more feasible and inexpensive and can be applied also in bedridden individuals. Therefore, it is preferred to be used in study populations, where older adults are included. The most common method for measuring muscle strength is using a hand dynamometer. Patients are considered to have weak strength if they cannot exert an appropriate grip force on the hand-held device (84)**.** CST is a time-consuming test that requires participants to rise from a chair without using their arms and return to the seated position, consecutively, five times. It seems that it provides a reasonably reliable and valid indication of lower body strength (85).

4.4 Assessment of physical performance

The estimation of gait speed is the most commonly used method for the assessment of physical performance, performed by the majority of clinicians. It is practicable, without requiring special equipment (85). Various working groups on sarcopenia have proposed the usual gait speed < 0.8 or 1.0 m/s as one of the diagnostic criteria for sarcopenia (Table 4).

Gait speed can be performed alone or as part of a test battery, the most popular of which is the SPPB. The SPPB is a composite of three separate tests, an assessment of gait speed (over 3–4 m), a balance test, and a repeated CST. A maximum score of 12 points can be achieved (85). The test is indicative of functional outcomes in clinical trials for frail older persons and it can also be used as an effective standard measure of physical performance in clinical settings (49).

TUG is another usual test of physical performance, that examines the time required to accomplish a series of functionally critical tasks (86). Those tasks include standing up from a chair, walking a specific distance, turning around, walking back,

and sitting down again. It is a measure of dynamic balance and is estimated on a five-point scale (49).

Chapter 5

Consequences of sarcopenia

5.1 Introduction

Sarcopenia is a risk factor for falls, fractures, disability, dependency, poor quality of life, cognitive impairment, depression, institutionalization, hospitalization, and mortality (42,87,88). The high prevalence of sarcopenia among nursing home residents, as described above, is indicative of an association between sarcopenia and institutionalization. Researchers came to these findings after conducting several cohort studies, systematic reviews, and meta-analyses. The main findings of the related systematic reviews and meta-analyses are shown in Tables 5 – 10. In the last years, the impact on quality of life can be evaluated with the disease-specific, self-administrated sarcopenia-related QoL questionnaire, the SarQoL questionnaire. This instrument includes 22 questions and seven domains of dysfunction: Physical and Mental Health, Locomotion, Body composition, Functionality, Activities of daily living, Leisure activities, and Fear (89). However, a systematic review or a meta-analysis based on this instrument is still lacking in the literature.

5.2 Falls and fractures

Table 5. Sarcopenia and falls/fractures

Study	Results
Beaudart et al. 2017 (90) Systematic review and meta-analysis	Regarding falls and recurrent falls, association with sarcopenia was found in the two included studies [HR 3.23 (95% CI: 1.25–8.29) and OR 2.38 (95% CI: 1.75–3.23)]. The impact of sarcopenia on the incidence of fractures was less clear (only 1/2 studies showed an association). In this one study the HRs varied from 3.75 (95% CI: 2.64–5.32) for men

	to 2.8 (95% CI: 1.72–4.58) for women in the crude model and from 3.79 (95% CI: 2.65–5.41) for men and 2.27 (95% CI: 1.37–3.76) for women in the multivariable adjusted model.
Yeung et al. 2019 (91) Systematic review and meta-analysis	Sarcopenic subjects had a significant higher risk of falls (cross-sectional studies: OR 1.60; 95% CI: 1.37–1.86, p < 0.001, I^2 = 34%; prospective studies: OR 1.89; 95% CI: 1.33–2.68, p < 0.001, I^2 = 37%) and fractures (cross-sectional studies: OR 1.84; 95% CI: 1.30–2.62, p = 0.001, I^2 = 91%; prospective studies: OR 1.71; 95% CI: 1.44–2.03, p = 0.011, I^2 = 0%) compared with non-sarcopenic subjects.
Wong et al. 2019 Systematic review (92)	The prevalence of sarcopenia after fragility fracture ranged from 12.4–95% in men to 18.3–67.7% in women.
Zhang et al. 2020 (93) Systematic review and meta-analysis	Sarcopenia was associated with falls among community-dwelling adults (OR 1.69; 95% CI: 1.43-2.00), but not among nursing home older individuals.

*HR, hazard ratio; OR, odds ratio; CI, confidence interval; I^2, I-squared statistic; p, p value

5.3 Mortality

Table 6. Sarcopenia and mortality

Study	**Results**
Chang and Lin 2016 (94) Systematic review and meta-analysis	The result suggested that the risk of mortality in the sarcopenic persons was higher than that in the non-sarcopenic persons (HR 1.87; 95% CI: 1.61–2.18).
Liu et al. 2017 (95) Systematic review and meta-analysis	The pooled HRs of all-cause mortality from the combination of included studies suggested subjects with sarcopenia had a significantly higher rate of mortality (pooled HR 1.60; 95% CI: 1.24–2.06, I^2 = 27.8%, p = 0.216) than subjects without sarcopenia.
Beaudart et al. 2017 (90)	The results showed a higher rate of mortality among

Systematic review and meta-analysis	sarcopenic subjects (pooled OR 3.596; 95% CI: 2.96–4.37) than nonsarcopenic.
Zhang et al. 2018 (96) Systematic review and meta-analysis	Sarcopenia was significantly associated with a higher risk for all-cause mortality among nursing home residents (pooled HR 1.86; 95% CI: 1.42–2.45, $I^2 = 0\%$, $p < 0.001$).

*HR, hazard ratio; OR, odds ratio; CI, confidence interval; I2, I-squared statistic; p, p value

5.4 Impaired functionality

Table 7. Sarcopenia and disability or functional decline or dependency

Study	Results
Visser and Schaap, 2011 (97) Review	Poor muscle functioning, as indicated by poor muscle strength or poor muscle power, compared with low muscle mass increased the risk of functional decline.
Beaudart et al. 2017 (90) Systematic review and meta-analysis	Sarcopenia was associated with functional decline (pooled OR of 6 studies 3.03; 95% CI: 1.80–5.12).

*OR, odds ratio; CI, confidence interval

5.5 Hospitalization or length of stay

Table 8. Sarcopenia and hospitalization or length of stay

Study	Results
Beaudart et al. 2017 (90) Systematic review and meta-analysis	Sarcopenia was associated with hospitalization in the one included study. The risk of hospitalization was higher in sarcopenic participants, with a crude HR of 1.57 (95% CI: 1.09–2.26) and a fully adjusted HR (adjusted for age, gender, comorbidities, BMI, education, and hemoglobin) of 1.57 (95% CI: 1.03–2.41). The impact of sarcopenia on the length of hospital stay was less clear (only 1/2

	studies showed an association for).
Zhang et al. 2018 (98) Systematic review and meta-analysis	Pooled results demonstrated that sarcopenic older persons were at an increased risk of hospitalization (pooled HR 1.57; 95% CI: 1.26–1.94, I^2 = 4.5%, p = 0.000) compared to those without sarcopenia. In subgroup analyses was found that hospitalized patients with sarcopenia had a higher rate of hospitalization (HR = 2.01; 95% CI: 1.41-2.88, p = 0.000) versus patients without sarcopenia. Similarly, community-dwelling older persons with sarcopenia had a higher rate of hospitalization than those without sarcopenia (HR 1.40; 95% CI: 1.05-1.88, p = 0.023).
Zhao et al. 2019 (99) Systematic review and meta-analysis	Sarcopenia was significantly associated with future hospitalization (RR 1.40; 95% CI: 1.04–1.89, p = 0.029; data from 8 studies). In a subgroup analysis, it was found that the associations between sarcopenia and readmission in hospitalized old patients were statistically significant (RR 1.75; 95% CI: 1.01–3.03, p = 0.044). However, this association were not found in the community-dwelling older individuals (RR 1.08; 95% CI: 0.74–1.57, p = 0.688), uncertain in nursing home residents. The association of sarcopenia and length of stay was not statistically significant (OR 1.21; 95% CI: 0.90–1.63, p = 0.20) in community-dwelling residents.

*HR, hazard ratio; OR, odds ratio; CI, confidence interval; I2, I-squared statistic; p, p value; RR, relative risk

5.6 Cognitive impairment and depression

Table 9. Sarcopenia and cognitive impairment and depression

Study	Results
Chang et al. 2016 (100) Systematic review and meta-analysis	Sarcopenia was independently associated with cognitive impairment. The crude and adjusted OR were 2.926 (95% CI: 2.297-3.728) and 2.246 (95% CI: 1.210-4.168), respectively.
Cabett Cipolli et al. 2019 (101) Systematic review and meta-analysis	Sarcopenia was significantly associated with cognitive impairment (pooled OR 2.50; 95% CI: 1.26-4.92, p = 0.008).
Peng et al. 2020 (102) Systematic review and meta-analysis	The pooled OR for cognitive impairment for individuals with sarcopenia compared with individuals without sarcopenia was 2.85 (95% CI: 2.19-3.72) in the unadjusted analysis and 2.25 (95% CI: 1.70-2.97) in the adjusted meta-analysis.
Chen et al. 2022 (87) Systematic review and meta-analysis	The risk of developing cognitive impairment was significantly higher in persons with sarcopenia than in those without sarcopenia (OR 1.75; 95% CI: 1.57-1.95, p < 0.00001).
Yang et al. 2022 (103) Systematic review and meta-analysis	The overall prevalence of sarcopenia with mild cognitive impairment was 9.1% (95% CI: 0.047–0.134, p < 0.001; I^2 = 93.0%). The overall adjusted OR between mild cognitive impairment and sarcopenia was 1.46 (95% CI: 1.31–1.62).
Li et al. 2022 (88) Systematic review and meta-analysis	The overall adjusted OR between sarcopenia and depression was 1.57 (95% CI: 1.32–1.86).

*HR, hazard ratio; OR, odds ratio; CI, confidence interval; I2, I-squared statistic; p, p value

5.7 Poor quality of life

Table 10. Sarcopenia and quality of life

Study	Results
Woo et al. 2016 (104) Systematic review	Sarcopenia was associated with poor health-related quality of life in both genders. In a high-quality longitudinal study, it was found that better physical performance and muscle strength were associated with a slower rate of decline in health-related quality of life over six years. Muscle strength and performance were associated with health-related quality of life but the same was not found for muscle mass in cross-sectional studies.
Tsekoura et al. 2017 (105) Review	Quality of life (QoL) level was measured using generic self-reported tools; the Medical Outcomes Survey Short-form General Health Survey (SF-36) in four studies and EuroQol-5D instrument (EQ-5D) in two studies. A significantly high proportion of problems relating to several dimensions of QoL was found in subjects with sarcopenia.

Chapter 6

Management of sarcopenia

6.1 Introduction

Sarcopenia is a multifactorial condition that also requires a multimodal management approach. Combination of a healthy nutrition with sufficient physical activity is the key to maintaining energy homeostasis and balance in body composition (27,29). This combined intervention is the most effective in increasing muscle quality, strength, and physical performance. However, since there is evidence that exercise alone improves muscle strength and physical performance, and nutrition alone increases muscle strength, older adults can choose exercise or nutrition alone regarding their condition, as the next best option (106). Several pharmacological agents are currently under investigation but still not approved for the treatment of sarcopenia (27,74,107).

6.2 Physical activity

Different kinds of exercise have been studied for the prevention and treatment of sarcopenia in older adults. It seems that especially the high-intensity resistance training program and following the low-intensity resistance training, multimodal exercises, and blood flow restriction resistance training improve muscle mass, muscle strength, and physical performance in older adults (108). Physical exercise programs should be individually adjusted to the disorder level and the general health status. Older adults may show difficulty in maintaining adherence to intensive exercise programs (29). The added effect of nutritional supplementation for resistance training on muscle function remains limited (108).

Exercise acts directly in muscle by resisting age-related processes such as reduced insulin sensitivity, inflammation, mitochondrial damage, impairment of cellular quality control mechanisms, and acceleration of myonuclear apoptosis. Additionally, it seems that exercise potentiates protein muscle synthesis, likely through stimulation of the phosphatidylinositol 3-kinase (PI3K)/protein kinase B (PKB or Akt)/mammalian target of rapamycin (mTOR) pathway (107).

6.3 Nutrition

Nutritional deficits are prevalent in sarcopenic older adults and their meeting is a priority for treating sarcopenia (49).

Increased protein intake

In sarcopenic older adults daily protein intake > 1.2 g per kg of body weight, with an exception for persons with significant kidney dysfunction is recommended (49), while in healthy older adults, the diet should provide at least 1.0-1.2 g protein per kg body weight (109). A combination of plant and animal-based proteins promotes gut microbiota eubiosis and muscle-protein synthesis (110). Older adults are encouraged to consume especially protein sources containing a relatively high proportion of amino acids – the so-called high-quality proteins because they induce protein synthesis (40).

Vitamin D supplementation

Vitamin D deficiency is prevalent in 50% of healthy older adults, while it increases to over 80% in older adults with hip fracture. Vitamin D is defined as 25(OH)D concertation in blood. Levels between 20 and 30 ng/ml (50–75 nmol/l) are considered to prevent from falls and fractures (111). The correction of vitamin D deficiency is also recommended for proper muscle function but there is a controversy about the recommended threshold to begin supplementation optimal effects in sarcopenia (40,49).

Omega-3 fatty acids

Omega-3 polyunsaturated fatty acids (PUFAs) are a promising therapeutic supplementation for sarcopenia due to their anti-inflammatory properties. In addition, omega-3 PUFAs may also have an anabolic effect on muscle through activation of the mTOR signaling and decrease of insulin resistance, inducing an increase in muscle mass and improvement of muscle function. However, further research is needed related to the exact dosage, frequency, and use (alone or combined) in the treatment and prevention of sarcopenia (112).

Creatine supplementation combined with resistance training and supplementation with 2–3 g per day of the leucine downstream metabolite β-hydroxy β-methylbutyrate, and some milk-based proteins have been shown to improve both muscle mass and strength in older adults (26,49,107).

Plant-derived natural products

Plant-derived natural products such as curcumin, resveratrol, catechin, soy protein, and ginseng might have a beneficial effect on various components of sarcopenia without any significant side effects. However, due to the lack of trials on humans, the clinical benefits of plant-derived natural products need still further research (113).

6.4 Medical treatment options

Medical agents such as myostatin inhibitors, espindolol, hormone replacement therapy, testosterone, selective androgen receptor modulators, AMP-activated protein kinase (AMPK) agonists, insulin growth factor 1 analogues, and ghrelin-modulating agents are used in trials, but they have not been yet approved for the treatment of sarcopenia (26,49,107).

Myostatin inhibitors may contribute to the increase in muscle mass. Growth hormone has a positive effect muscle protein synthesis and increases muscle mass, but it seems to not affect muscle strength or function. Anabolic steroid supplementation

was found to act differently between genders. Men who consumed anabolic steroids demonstrated increased weight and lean body mass, while women demonstrated increased weight, largely due to increased fat mass. Testosterone supplementation seems to act positively on muscle strength and mass (114).

Chapter 7

Relevance to other disease states

7.1 Sarcopenia and osteoporosis

Osteopenia/osteoporosis is characterized by the age-related decline in BMD and microarchitecture. Both osteoporosis and sarcopenia are risk factors for falls and fractures (115) leading to significant public health burdens. The coexistence of osteoporosis and sarcopenia has been recently considered in some groups as a syndrome termed ‘osteosarcopenia’. Studies over the past decades have revealed that the prevalence of sarcopenia in osteoporotic individuals is higher, as well as, the prevalence of osteoporosis is higher in sarcopenic individuals than in nonsarcopenic (116). According to a meta-analysis, the prevalence of osteosarcopenia varied (5–37%) depending on the definition used for sarcopenia and whether participants were classified initially according to sarcopenia or osteoporosis (117).

Sarcopenia and osteoporosis share some important similarities except that both are age-related: a. polymorphisms of some genes family are common b. myostatin promotes protein muscle atrophy and inhibits osteoblastic differentiation in bone c. physical activity fosters muscle mass, strength, and physical functioning, as well as bone mass d. bed rest/disuse predisposes decrease of muscle mass and function as well as decrease of bone mass e. changes in hormones levels such as estrogen and testosterone influence both conditions f. vitamin D deficiency is a risk factor for both g. common inflammatory factors contribute to sarcopenia and osteoporosis (115).

7.2 Sarcopenia and obesity

In older adults, the decrease in the components of total energy expenditure due to the aging process (such as, resting metabolic rates, thermic effect of food, and physical activity) are responsible partially for the increase in body fat (118).

The term ‘sarcopenic obesity’ has been attributed to the coexistence of increased fat mass, known as obesity, and sarcopenia. It is a silent, progressive condition, associated with poor quality of life and increased mortality (119). Many definitions of sarcopenic obesity have been proposed, but a clear and totally accepted definition is still lacking (120), as well as a consensus definition for sarcopenia. A vicious cycle has been proposed between these two conditions since their underlying causes interact with each other. Because of sarcopenia, older people have limited physical activity, which leads to decreased energy expenditure and increases the risk of obesity. Hereupon, the increased visceral fat triggers inflammation, which is also a main pathogenetic mechanism of sarcopenia (86). Sarcopenia and obesity share except for inflammation other common pathophysiological mechanisms such as oxidative stress, insulin resistance, and hormonal changes (e.g. in testosterone and estrogen levels), and decreased physical activity (86,118).

7.3 Cachexia

The term cachexia is derived from the Greek words kako`s (bad) and he´xis (condition) (19). Cachexia is defined as a complex metabolic syndrome associated with an underlying illness and characterized by loss of muscle with or without loss of fat mass. The most common symptom of cachexia is weight loss in adults (corrected for fluid retention) or growth failure in children (excluding endocrine disorders) (121). Known underlying illnesses are cancer, chronic infection, chronic obstructive pulmonary disease, and chronic heart failure (122). Anorexia contributes to the onset of cachexia (19).

Sarcopenia and cachexia share many mechanistic and clinical similarities, including decreased muscle mass, mitochondrial dysfunction, insulin resistance, and altered protein metabolism. Inflammation is more prominent in cachexia. Fat mass in cachexia is decreased, while in sarcopenia increased (122). Weight loss and anorexia are more predominated in cachexia and not sarcopenia, providing a point of separation between the two diseases conditions (121,122).

7.4 Frailty

Frailty, as a condition/syndrome, can be described as a state of vulnerability to common stressors factors, which contributes to many multiple interrelated health problems, increasing the probability of functional impairment, hospitalization, or death (50). Different frailty definitions exist but two forms have mainly prevailed (123). One is when an accumulation of deficits (symptoms, signs, diseases, and disabilities) leads to an increased risk for adverse health outcomes (124). The other one defines frailty as a clinical syndrome in which three or more of the following criteria can be identified: unintentional weight loss (10 lbs in the past year), self-reported exhaustion, weakness (grip strength), slow walking speed, and low physical activity (125). Frailty presents substantial overlaps with sarcopenia. Both share the components of low grip strength and slow walking speed (26) and weight loss is a major diagnostic criterion for frailty, while it is a significant etiologic factor for sarcopenia (17). Many of the poor health outcomes of frailty are probably mediated by sarcopenia (40), which may be considered a contributor to the development of physical frailty (17).

7.5 Dysmobility syndrome

The term ‘dysmobility syndrome’ was proposed by Binkley et al., paralleling metabolic syndrome to describe as a whole, multiple conditions such as osteoporosis, sarcopenia, or obesity, that contribute to falls and fractures. At least three of the following six factors must be present for the diagnosis of dysmobility syndrome: osteoporosis, low lean mass, history of falls within one year, slow gait speed, low grip strength, and high fat mass (126). The relevance of sarcopenia to this syndrome has been also highlighted in the systematic review by Hill et al. (127).

Chapter 8

Sarcopenia and associated factors in daily life

8.1 Daily activities

More than 46 percent of older people aged 60 years and over have disabilities and more than 250 million older people experience moderate to severe disability. This incidence is expected to increase since life expectancy in general increases (128). Disability can be regarded as experiencing difficulty in activities of daily living (ADL), instrumental ADL (IADL), or a combination of both. (129). The ability to perform personal care activities and household activities changes across the lifespan. According to Eurostat data, regarding EU-28, more than two-thirds of people aged 65 or over present with physical and sensory functional limitations. Moreover, more than one-fifth of people aged 65 and over reported limitations in personal care activities and more than 4 out of 10 persons limitations in household activities (130).

Several studies have investigated the impact of sarcopenia on different dimensions of functional status, such as mobility performance, self-reported functional limitations, disability, and difficulty in performing daily activities. Based on the results of an early review the association between sarcopenia and functional status is unclear. This review, including epidemiologic studies conducted in large samples of older men and women, concluded that poor muscle functioning, as indicated by poor muscle strength or poor muscle power, increases the risk of functional decline. In contrast, low muscle mass demonstrates weak or no associations with functional status (97).

After adjusting for covariates, it seems that sarcopenia is independently associated with functional decline, described by either the ADLs or IADLs among community-dwelling older adults (131–133). In a recent cross-sectional study the association between the risk of sarcopenia, assessed by SARC-F, and the dependence in ADL, assessed by Barthel Index (BI) was statistically significant (OR 2.2; 95% CI

1.3-4.0, p = 0.006) (134). Further research is required because of the observed inconsistency in the literature concerning the relationship between sarcopenia and functionality.

8.2 Sleep

As with many other physiologic processes, age-related changes in sleep are also observed across the lifespan (135)**.** Some well-described changes in sleep architecture are: (1) advanced sleep timing (i.e., earlier bedtimes and rise times, (2) longer sleep-onset latency (i.e., the number of minutes need for someone to fall asleep from the time reported getting into bed), (3) decreased total hours of sleep per night, (4) increased sleep fragmentation (i.e., less consolidated sleep with more awakenings, arousals, or transitions to lighter sleep stages), (5) more fragile sleep (i.e., higher likelihood of being woken by external sensory stimuli), (6) reduced amount of deeper NREM (non-rapid eye movement) sleep known as slow wave sleep (SWS), (7) increased time spent in lighter NREM stages 1 and 2, (8) shorter and fewer NREM-REM sleep cycles, (9) longer duration of wake after sleep onset (WASO), and (10) excessive daytime sleepiness and daytime napping. Older adults are more prone to these sleep disturbances than younger people, but every older person may response in a different way to these changes (136,137). Nonetheless, healthy older adults are less likely to complain about sleep problems (136).

The causes of sleep disturbances in older adults are multifactorial and include medical, psychiatric disorders, primary sleep disorders, and environmental changes, social engagement, and lifestyle (136). Sleep problems such as insomnia are associated with poor quality of life (138)**.** Apart from the aging process other specific coexisting medical conditions may cause sleep disturbances in older adults. Among these conditions, the most well-described are pain related to musculoskeletal disorders (including arthritis), nocturia, obstructive lung disease, gastrointestinal reflux, and congestive heart failure. These conditions require foremost appropriate treatment and then sleep efficiency can be achieved (139).

The decline in nocturnal GH with aging, the elevated nocturnal cortisol level, the age-related decline in melatonin secretion, and other age-related changes in

hormone levels have an impact on sleep patterns. The circadian system regulates several human physiological functions, including sleep-wake rhythm. It is believed that circadian rhythms become less robust with aging, which usually is expressed as an advance in circadian timing, a reduction in circadian amplitude, and a decreased ability to adjust to phase shifting (changes in the phase of circadian rhythms) (136).

Sleep may influence muscle protein metabolism. Reduced sleep duration, poor sleep quality, and increases in the prevalence of circadian rhythm and sleep disorders with age may induce proteolysis, modify body composition and increase the risk of insulin resistance, all of which have been associated with sarcopenia. Moreover, age-related sleep problems potentially interfere intracellularly by inhibiting anabolic hormones and enhancing catabolism in the skeletal muscle. Sleep homeostasis is one of the substantial targets aiming at the preservation or recovery of muscle health in older adults (140).

The most common method of sleep assessment is using questionnaires, scales, or sleep diaries. As an alternative, actigraphy measures sleep parameters objectively and it can feasibly be used in large studies, whereas questionnaires, scales, or sleep diaries offer a subjective assessment of sleep parameters, enhancing the development of bias. Polysomnography (PSG) is considered the gold standard for the objective assessment of sleep. However, it is an expensive method, and its ecologic validity is sometimes questionable (84).

Recently, a systematic review (84) and meta-analyses (141,142) have been published and their findings highlight the existence of a relationship between sarcopenia or its components and sleep duration or quality. A high prevalence of sarcopenia among older adults with both long and short sleep duration was shown. However, prevalence values were higher in those with inadequate sleep ($p < 0.00001$). Also, sarcopenia was more prevalent in men (OR 1.61; 95% CI 0.82–3.16; $Q = 11.80$; $p = 0.0189$) compared to women (OR 0.77; 95% CI 0.29–2.03; $Q = 21.35$; $p = 0.0003$). Therefore, it seems that sarcopenia is associated with sleep quality, with higher prevalence values in older adults who have inadequate sleep (141). Likewise, in another meta-analysis, it seems that the lowest category of sleep duration (under 6 h) versus the reference category (6–8 h) was significantly related to increased risk of sarcopenia (OR 1.71; 95% CI 1.11–2.64). Pooled OR also indicated that the highest

category (more than 8 h) of sleep duration versus the reference category (6–8 h) was significantly associated with an increased risk of sarcopenia (OR 1.52; 95% CI 1.23–1.88). Moreover, it was found that women were affected by both short and long sleep while men were only affected by long sleep duration. The nonlinear dose-response meta-analysis revealed a U-shaped relationship between sleep duration and the risk of sarcopenia, with a nadir at 8 h per day (142). Finally, results of a systematic review support that although there is strong evidence of the association between weak muscle strength and poor sleep quality and duration among middle-aged and older adults, the findings for the gender-specific association and the impact of short or long sleep duration were inconclusive (84).

The findings of the above-mentioned studies are crucial for health professionals because they enhance the need for an appropriate geriatric assessment in community practice and geriatric settings, taking into consideration the existing association between sarcopenia and sleep. Identification of sleep problems among older adults in clinical practice may help as well in the early detection of sarcopenia (84).

8.3 Fatigue

Fatigue could be described both as a symptom and a subjective feeling (143). It is a multidimensional concept, prevalent among older adults. However, due to the lack of consensus on a totally accepted instrument for its assessment, data about its prevalence vary (144). Fatigue can be met in the literature alternatively with other words such as decreased vitality, loss of energy, anergia, exhaustion, tiredness, weakness, and lassitude (145). Ream and Richardson (146) proposed a clarified definition for nursing usage (p.9): ‘Fatigue is a subjective, unpleasant symptom which incorporates total body feelings ranging from tiredness to exhaustion creating an unrelenting overall condition which interferes with individuals’ ability to function to their normal capacity’. Pain and fatigue frequently co-occur in the older population (147). Fatigue affects considerably the older women causing disability (148). Exhaustion, among the European older population, as one of the five criteria of frailty status (Fried phenotype), seems to contribute most to frailty in relation to the rest criteria (149).

Moreover, fatigue can be classified as physical, ‘muscle fatigue’ defined as a decline in the maximum force-generating capacity of the muscle and its failure to maintain the required force, as a result of muscle activity (150), or mental, which is defined as a psychobiological state characterized by prolonged periods of demanding cognitive effort expressed by changes in mood, motivation and task performance (151). Another concept of fatigue is fatigability which is defined as the relationship between a person’s self-reported fatigue and the level of activity (physical or cognitive) which causes this fatigue (152).

Self-reported or perceived fatigue in comparison to muscle and mental fatigue is more feasible and convenient to be assessed among inpatients or community-dwelling older adults (153). Questionnaires, validated scales (or specific statements from scales), and visual analogue scales are used for the evaluation of subjective fatigue. Measurement of fatigue in older people is particularly challenging due to the concurrent co-existence of other symptoms such as pain, depression, sleepiness, and physical weakness (154). Nevertheless, self-reported or perceived fatigue is associated with falls among older adults which is one of the main consequences of sarcopenia (153). However, most published studies highlight the association between muscle fatigue and sarcopenia (155,156), whereas data in the literature regarding the relationship between self-reported fatigue and sarcopenia among older adults are lacking. Domains of self-reported fatigue are associated with poor performance and sarcopenia, estimated only by muscle strength, among older Scottish adults (157). Gait speed, as well as abnormal handgrip strength, are associated with self-reported fatigue (adjusted OR 1.41; 95% CI 1.05–1.90, $p = 0.02$, OR 1.40; 95% CI 1.02–1.93, $p = 0.04$, respectively), while sarcopenia and fatigue are not associated in Colombian older adults (158). Self-reported fatigue is associated with the risk of sarcopenia, as assessed by the SARC-F questionnaire (OR 1.583; 95% CI 1.262–1.986, $p = 0.001$) and with gait speed (OR 0.011; 95% CI 0.001 –0.168, $p = 0.001$) among elderly in Malaysia (159). The relationship between sarcopenia and fatigue was evaluated among Turkish, geriatric outpatients using different self-reported fatigue assessment scales, but only the Fatigue Impact Scale total was associated with sarcopenia in multivariate logistic regression (OR 1.161; 95% CI 1.084–1.242, $p < 0.001$) (160).

II. RESEARCH

Chapter 9

Methods

9.1 Aim of the study

The aim of this study was to investigate the relationship between sarcopenia and health indicators and factors of daily life among a sample of Greek community-dwelling older adults.

9.1.1 Objectives

More specifically this study aimed to:

1. translate and validate the SARC-F in Greek
2. explore the association between probable sarcopenia, as indicated by muscle strength, confirmed sarcopenia, and SARC-F with demographic data, chronic health disorders, prescribed medication, along with other clinical data, such as smoking status, history of falls, and physical exercise.
3. investigate the association between probable sarcopenia, as indicated by muscle strength, confirmed sarcopenia, and SARC-F with the functional status in daily life.
4. examine the association between probable sarcopenia, as indicated by muscle strength, confirmed sarcopenia, and SARC-F with self-reported fatigue.
5. explore the association between probable sarcopenia, as indicated by muscle strength, confirmed sarcopenia, and SARC-F with sleep difficulties.

9.2 Study design and data collection

This study began as part of a larger multicenter study, in collaboration with the Hellenic Association of Gerontology and Geriatrics (HAGG). A cross-sectional study was conducted from July 2020 to October 2022 (recruitment was temporarily paused due to Covid-19 restrictions) in a convenience sample of community-dwelling older adults living in greater Athens conurbation. Participants were recruited either as outpatients or their companions in a General Hospital in Athens or community settings and organizations such as a Women's association, a choral group, or church.

Individuals who met the following criteria were included; (1) aged 65 years or older; (2) able to walk but may use any aid; (3) able to communicate in the Greek language; (4) willing to complete the survey; and (5) provided written consent to participate.

The exclusion criteria were individuals with the following conditions: (1) severe cognitive disorder, making unable the communication or data collection; (2) an implanted pacemaker or defibrillator; (3) bedridden; (4) unable to communicate with the researcher; (5) acute or chronic health disease influencing the response to the interview, laboratory values or the ability to perform the required measurements. All participants signed a written informed consent form. Participant information was collected through face-to-face interviews by the researcher. The anthropometric measurements, muscle mass measurement, gait speed test, and grip strength test were also performed by the same researcher who was trained. Blood sampling was done in the involved hospital or the private diagnostic center of the participant's choice.

9.2.2 Demographic characteristics

Demographic characteristics included age, sex, annual income, educational level, smoking status, medication use, medical history and conditions, Charlson Comorbidity Index (CCI), family history of osteoporosis and fractures, alcohol, coffee, and tea consumption, and activity status. Medical history and/or conditions included cardiovascular diseases, chronic obstructive pulmonary disease (COPD), cancer history, hypertension, diabetes, connective tissue diseases, urolithiasis,

osteoporosis, arthritis, fragile fractures, falls, incontinence, and thymus disorders. Participants were also asked about the number and the kind of medications taken daily on a regular basis.

9.2.3 Blood tests

Blood samples were collected to measure complete blood count (CBC), calcium, phosphorus, and albumin concentration in blood, C-reactive protein (CRP), 25-hydroxy vitamin D, and parathyroid hormone (PTH) levels. As it has been previously described in the literature review of this study, these biomarkers that characterize the aging process, may be involved in the sarcopenia pathway as well.

9.2.4 Anthropometric measurements

Height and weight were measured using a stadiometer and a Bioelectrical impedance analysis (BIA) device, respectively. Body mass index (BMI) was calculated as weight (kg) divided by height^2 (m^2). Calf circumference (CC) at the widest part, middle arm, waist, and hip circumferences were measured with the participant in the standing posture, with a millimeter-graded tape. CC measures < 31 cm is considered indicative of low muscle mass (161).

9.2.5 Measurement of muscle strength

Muscle strength was assessed by grip strength, which was measured using a digital handgrip dynamometer (Figure 1). The grip strength of each hand was measured once standing with full elbow extension and then with 90˚ elbow flexion. Participants were asked to hold the dynamometer as strongly as possible. Between each measurement, at least 30 s resting intervals were allowed. The maximal measured grip strength was selected for analysis.

Figure 1. An older person holding a digital handgrip dynamometer

9.2.6 Measurement of muscle mass

Muscle mass was measured using a BIA device (Tanita RD-545). The measurement was performed with the participant in a standing position grasping the electrodes with both hands abducted from the mid-bod (Figure 2). Before doing the measurement, participants were asked to follow these instructions: (1) no previous physical exercise; (2) 2–3 h of fasting; (3) no alcohol or a large amount of water intake; (4) urinating 30 min before. Muscle masses of the total body, arms, and legs were calculated separately. Appendicular skeletal mass (ASM), equivalent to appendicular lean mass (ALM) is the sum of the lean mass of the arms and legs. ASM was standardized by height squared (ASM/height^2) and BMI (ASM/BMI).

Finally, ASM was calculated using the following equation to obtain an ASM value by BIA close to that measured by DXA: ASM/ht^2 $_{(DXA)}$ = 0.04*BMI – 0.58*Women +0.69*ASM/ht^2. Variables in the equation; Sex: female = 1, male = 0, BMI (kg/m^2), ASM/ht$^2_{BIA}$= ASM/height^2 as measured by BIA (162,163).

Figure 2. An older person grasping the electrodes of the BIA device

9.2.7 Measurement of physical performance

For the usual gait speed test, participants were instructed to walk a total of 8 meters at a comfortable, usual, walking speed in a flat indoor space. The time of the 4-m distance from standing to the first footstep at the 4-m line was measured by using a standard digital stopwatch and excluding an acceleration and deceleration interval of 2 m, respectively (164). Finally, the usual gait speed (m/s) was calculated as the time taken to walk 4 m (m/s). Walkers and canes were accepted when walking, if necessary.

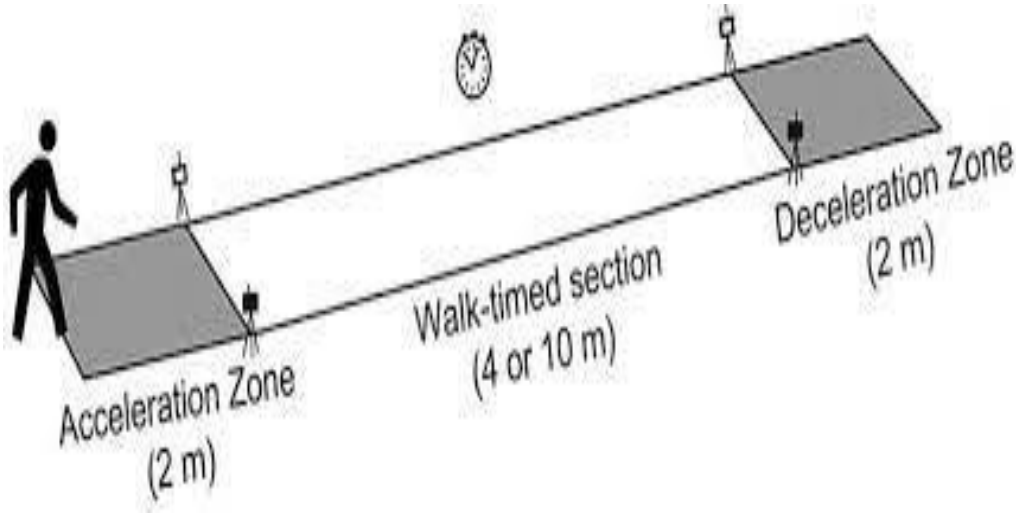

Figure 3. 4-m walking test *(164)*

9.2.8 Assessment of probable and confirmed sarcopenia

In this study, the EWGSOP2 recommendations for the sarcopenia assessment were followed. According to them, muscle strength is the principal determinant of sarcopenia. Sarcopenia is probable when low muscle strength is detected. Cutoff points for muscle strength by grip strength are < 27 kg and < 16 kg for men and women, respectively. A sarcopenia diagnosis is confirmed by the presence of low muscle quantity or quality. When low muscle strength, low muscle quantity/quality, and low physical performance are all detected, sarcopenia is considered severe. Cutoff points for muscle mass are ASM < 20 kg or ASM/height^2 < 7 kg/h^2 for men and ASM < 15 kg or ASM/height^2 < 5.5 kg/h^2 for women. The cutoff point for physical performance measured by gait speed is ≤ 0.8 m/s.

9.3 Sarcopenia screening

The SARC-F questionnaire is recommended by EWGSOP2 as a screening tool for sarcopenia risk. In this study, SARC-F was translated and validated in Greek following steps suggested in the methodological report by European Union Geriatric Medicine Society (EUGMS) Sarcopenia Special Interest Group (165). According to this report a sample of between 50 and 100 community-living subjects aged 65 years or older should participate in the study of validation.

For the translation and adaptation of SARC-F, the following steps were followed:

1. The original SARC-F was translated into Greek by one bilingual geriatric nurse - expert.

2. Two other bilingual nurses with experience in translation and validation of instruments and the first forward translator reviewed the translation and agreed on a final version. Because of the metric system used in Greece, the first question of the SARC-F questionnaire “How much difficulty do you have in lifting and carrying 10 pounds?” was modified to: “How much difficulty do you have in lifting and carrying about 5 kilograms?”

3. The Greek-translated questionnaire was back-translated from Greek to English by a native English speaker blinded to the original version of the questionnaire.

4. The involved experts reviewed all the translations and reached a consensus regarding the final version of the Greek questionnaire.

5. The back-translated version was e-mailed to John Morley, one of the authors of the original instrument, for his approval (March 3, 2020).

6. The Greek SARC-F version was administered face-to-face to 5 male and 5 female older adults to ensure comprehension and cultural relevance of the questionnaire. This was the 'pretest step'. A footnote corresponds to carrying 2.5 kilos of potatoes and 2.5 kilos of tomatoes with two hands was introduced as an example for 5 kg, as previously described in other language translations (65,69).

7. Afterward, two independent geriatric nurses applied the SARC-F questionnaire to 22 participants in separate rooms in order to assess 'inter-rater reliability'.

8. Finally, one of these nurses applied the SARC-F questionnaire by phone to these 22 participants 2 weeks later in order to evaluate 'test–retest reliability'.

For the validation of SARC-F its sensitivity, specificity, and positive and negative predictive values (PPV, NPV, respectively) were assessed against four definitions of sarcopenia; EWGSOP2 (17), FNIH2 and FNH3 (22,166), IWGS (20)]. EWGSOP2 criteria are described above. According to the FNIH, the definition of sarcopenia depends either on two criteria (FNIH2; low muscle strength and mass) or on three criteria (FNIH3; slowness with low muscle strength and mass). Cutoff points for muscle strength by grip strength are < 26 kg and < 16 kg for men and women, respectively. Cutoff points for muscle mass are ASM/BMI < 0.789 for men and < 0.512 for women. The cutoff point for physical performance measured by gait speed is ≤ 0.8 m/s. According to the IWGS definition, sarcopenia is confirmed when both low muscle mass and low physical performance exist. Cutoff points for muscle mass are ASM/height^2 < 7.23 kg/h^2 for men and ASM/height^2 < 5.67 kg/h^2 for women. The

cutoff point for physical performance measured by gait speed is < 1.0 m/s. Finally, SARC-F was assessed against probable sarcopenia, as defined above.

Afterward, we attempted to test if adding CC to SARC-F would improve the diagnostic value of SARC-F in the Greek population. The SARC-Calf was developed as a new variable. CC item was scored as 0 point if the CC was ≥ 31 cm and as 10 points if it was < 31 cm (68). SARC-F was scored as described above. By adding the CC score to the SARC-F score, the SARC-Calf variable was developed. A final score of 11 or more, was classified as a risk for sarcopenia, and a score less than 11 was classified as no risk for sarcopenia. SARC-Calf was assessed against the above-mentioned definitions of sarcopenia and probable sarcopenia.

9.4 Functional evaluation

Barthel index (BI) of activities of daily living was used to evaluate the functional status and the independence level of the subjects. BI was developed in 1995 as a simple index of independence to score the ability of subjects with a neuromuscular or musculoskeletal disorder to care for themselves (167). It consists of 10 items, which evaluate the ability of a person to perform specific daily activities. The score for each item can range between 0-15. The total score can be between 0-100. A higher score indicates a higher level of dependency on daily activities. The score for each item is more meaningful than the total score since the first indicates exactly to which activity is the response insufficient. BI has been translated and validated in Greek (168).

9.5 Fatigue assessment

The Fatigue Severity Scale (FSS), developed by Krupp et al. (169), was used to assess fatigue over the last two weeks. FSS measures the severity of fatigue and its influence on daily life in patients with a variety of disorders. FSS contains nine statements, each is scored from 0 to 7. The minimum score is 9 and the maximum score is 63. A higher score is indicative of greater fatigue severity. The more common way of scoring is the calculation of the mean of all the scores with the minimum score

being 1 and the maximum score being 7. Mean (SD) FSS scores for healthy individuals; 2.3 (0.7). The cutoff score of 4 or more is considered indicative of problematic fatigue. FSS has been translated and validated in Greek (170).

Moreover, fatigue over the last two weeks was assessed by the visual analogue scale (VAS) (171,172). The zero point at the left end of the line was scored as 0, indicating no fatigue at all, and the 10 at the right end of the line was scored as 10, indicating the worst possible fatigue one could feel. The higher the score, the more fatigue the participant reported.

9.6 Sleep assessment

Sleep difficulty was assessed with the Athens Insomnia Scale (AIS) (173,174). AIS is a self-assessment psychometric tool that measures the intensity of sleep-related problems, but also it can be used as a screening tool in the diagnosis of insomnia. Participants were asked about sleep difficulty they experienced at least three times per week during the last month and excluding particular cases e.g., the announcement of a sad event. AIS consists of eight items: the first five pertain to sleep induction, awakenings during the night, final awakening, total sleep duration, and sleep quality; while the last three refer to well-being, functioning capacity, and sleepiness during the day. The score for each item ranges between 0-3, (with 0 corresponding to no problem at all and 3 to very serious problem); thus, the total score ranges from 0 (absence of any sleep difficulty) to 24 (the most severe degree of insomnia). AIS has been translated and validated in Greek by Soldatos, Dikeos, and Paparrigopoulos (173). A score of ≥ 6 on the AIS is used to establish the diagnosis of insomnia (174).

Self-reported sleep duration was ascertained by one single question: “During the past month, how many hours of sleep did you get at night, from the time falling asleep until opening your eyes and not sleeping again (average hours for one night)?”

9.7 Ethical issues

The study was conducted in accordance with the principles of the Declaration of Helsinki (1964) on biomedical research, the General Regulation for the Protection of

Personal Data and the ethical standards and laws of the country. Information was provided to all the participants regarding the purpose of the study, the voluntary participation, the procedure they would be asked to follow, the right to withdraw from the study at any time, without any penalty, as well as the observance of strict confidentiality in the management of their personal data. Written informed consent for participation in the study was obtained from all the participants. Data collection was followed by their pseudonymization. The correspondence of names with patient data as well as the completed consent forms are kept in a separate place, where only the main researcher and the supervisor have access. No personal data of the participants will be disclosed in publications related to this study. No adverse effects or complications were expected in the participants due to the intervention. The blood sample may rarely cause mild pain, minor bleeding, bruising, slight dizziness, and infection at the point where the needle enters the body. Approval for conducting the study was obtained by the Research Ethics Committee of the Nursing Department of the National and Kapodistrian University of Athens (number protocol 316/2020) and the Scientific Council of the involved hospital.

9.8 Statistical analysis

Demographic, anthropometric characteristics, and clinical features were analyzed by descriptive statistics and are presented using mean and standard deviation for continuous variables; frequency and percentage were reported for dichotomous/string variables.

The characteristics of patients were compared according to gender, muscle strength, the presence of probable sarcopenia and confirmed sarcopenia, and the SARC-F questionnaire using Student’s t-test or Pearson coefficient for continuous variables with normal distribution, Mann–Whitney U test or Spearman coefficient for continuous variables with asymmetric distribution, and Pearson’s Chi-square test (or Fisher's Exact test or Anova test) for categorical variables.

The variables significantly related to the prevalence of probable, confirmed sarcopenia, and SARC-F score (as a dichotomous variable) were included in a multivariable logistic regression analysis and the results were reported as odds ratio

and 95% confidence interval (OR; 95% CI). The variables significantly related to muscle strength were included in multiple linear regression analysis and the results were reported as unstandardized coefficients b and 95% confidence interval for b. P value < 0.05 was considered statistically significant.

For the translation and cross-cultural adaption of the SARC-F, reliability, and test–retest reliability was assessed by kappa statistics considering SARC-F item scores (e.g., none, some, unable) and SARC-F outcome (dichotomized to represent sarcopenia vs. healthy status) as ordinal/categorical variable. The level of agreement assessed by kappa coefficient was defined as follows: kappa coefficient [0.90: almost perfect agreement, between 0.80 and 0.90: strong agreement, 0.60–0.79: moderate agreement, 0.40–0.59: weak agreement, 0.21–0.39: minimal agreement, and 0.00–0.20: no agreement. Internal consistency was tested by Cronbach's alpha coefficient. A coefficient value greater than 0.70 indicates a high level of internal consistency (165).

For the clinical validation of the SARC-F questionnaire, the sample was divided between sarcopenic and non-sarcopenic, diagnosed according to the SARC-F questionnaire. The sample characteristics were presented according to the SARC-F classification. P values were assessed with Student's t-test, Mann–Whitney U test for continuous or Pearson's Chi-square test (or Fisher's Exact test) for categorical variables. P value < 0.05 was considered statistically significant. The difference in diagnosis between the SARC-F and the 4 operational definitions of sarcopenia was tested by a Pearson's Chi-square test. Finally, sensitivity, specificity, PPV, and NPV values of the SARC-F according to the 4 operational definitions of sarcopenia and the probable sarcopenia were assessed. Afterward, the same procedure was followed for the validation of the SARC-Calf. Sensitivity was calculated as the proportion of participants with sarcopenia based on the reference clinical diagnosis when identified as positive by the screening test, and specificity as the proportion of participants without sarcopenia based on the reference clinical diagnosis when identified as negative by the screening test. The PPV represents the probability of actually presenting sarcopenia when the test is positive, and NPV is the probability of actually not presenting sarcopenia when the test is negative (165). Statistical analyses were performed using SPSS 28.

Chapter 10

Results

10.1 Sample characteristics

Adults aged ≥ 55 years old (n = 119) were provided with the opportunity to participate in a larger multicenter study conducted by HAGG. A total of 111 adults accepted to participate (response rate 93.3%). The reasons for refusal were psychological stress and fear of blood sampling. For the purpose of the present study, data from 100 community-dwelling older adults, aged ≥ 65 years old, recruited in an outpatient or community setting were analysed. The age range for all the participants was 65–91 years. The median age of the whole study population was 72.50 ± 9 years old, and 59 participants (59%) were women. The descriptive characteristics and differences between men and women are shown in Table 11.

Based on the EWGSOP2 algorithm, the prevalence of sarcopenia was 10% in the whole study population, 7% men and 3% women. One person (woman) had severe sarcopenia. Probable sarcopenia, as recommended by EWGSOP2 was identified in 19% of the participants, 11% men and 8% women. Among men, 26.8% had probable sarcopenia and among women 13.6%.

Table 11. Characteristics of the study participants according to gender

Characteristics	**Total (n = 100)**	**Men* (n = 41)**	**Women* (n = 59)**	**P value†**
Age (years)	73.05 ± 6.73 Median 72.50 ± 9	74.49 ± 7.42 Median 74 ± 11	Mean 72.05 ± 6.07 Median 72 ± 9	0.114[a]
Educational Level				0.115[b]
Primary School	39 (39%)	12 (29.3%)	27 (45.8%)	
High school	28 (28%)	10 (24.4%)	18 (30.5%)	
IEK	14 (14%)	9 (22%)	5 (8.5%)	
University/TEI	18 (18%)	10 (24.4%)	8 (13.6%)	
Master/PhD	1 (1%)	0 (0%)	1 (1.7%)	
Annual Income				**< 0.001[b]**
< 8.000 €	36 (36%)	6 (14.6%)	30 (50.8%)	
8.000 -15.000 €	42 (42%)	21 (51.2%)	21 (35.6%)	
> 15.000 €	22 (22%)	14 (34.1%)	8 (13.6%)	
CCI	0.57 ± 0.29	0.51 ± 0.33	0.62 ± 0.25	0.122[a]
Height (m)	1.63 ± 0.09	1.71 ± 0.06	1.58 ± 0.06	**< 0.001[c]**
Weight (kg)	77.17 ± 14.70	82.16 ± 12.69	73.70 ± 15.09	**0.004[c]**
BMI (kg/m^2)	28.99 ± 5.23	28.17 ± 3.97	29.56 ± 5.91	0.375[a]
Waist Circumference (cm)	98.13 ± 13.78	103.17 ± 10.30	94.63 ± 14.86	**0.002[c]**
Pelvis Circumference (cm)	109.36 ± 13.72	104.59 ± 6.83	112.68 ± 16.18	**0.003[a]**
Calf Circumference - CC (cm)	36.87 ± 4.15	36.54 ± 3.52	37.10 ± 4.56	0.765[a]
Middle Arm Circumference (cm)	31.25 ± 4.35	30.66 ± 3.77	31.66 ± 4.71	0.354[a]
Muscle Strength (kg)	26.56 ± 9.33	34.21 ± 8.76	21.24 ± 5.05	**< 0.001[a]**
Muscle Mass – ASM/ht^2 (kg/m^2)	6.31 ± 1.08	7.00 ± 0.83	5.83 ± 0.97	**< 0.001[c]**

Physical Performance (m/s)	0.89 ± 0.30	0.94 ± 0.34	0.86 ± 0.27	0.213[c]
Smoking Status				0.447[b]
No	61 (61%)	22 (53.7%)	39 (66.1%)	
Current	22 (22%)	11 (26.8%)	11 (18.6%)	
Former	17 (17%)	8 (19.5%)	9 (15.3%)	
Number of Falls in the last year				0.206[b]
0	75 (75%)	31 (75,6%)	44 (74.6%)	
1	21 (21%)	10 (24.4%)	11 (18.6)	
2 or more	4 (4%)	0 (0%)	4 (6.8%)	
Fractures	20 (20%)	6 (14.6%)	14 (23.7%)	0.263[b]
Fractures among fallers	15 (75%)	4 (66.7%)	11 (78.6%)	0.613[d]
Instability	33 (33%)	17 (41.5%)	16 (27.1%)	0.134[b]
Total number of medications	3.5 ± 2.58	3.07 ± 1.93	3.80 ± 2.92	0.409[a]
Polypharmacy (≥ 5 drugs daily)	23 (23%)	6 (14.6%)	17 (28.8%)	0.097[b]
Daily coffee Consumption (cups)	1.46 ± 0.85	1.41 ± 0.77	1.49 ± 0.90	0.797[a]
Daily tea consumption (cups)	0.35 ± 0.50	0.34 ± 0.48	0.36 ± 0.52	0.973[a]
Alcohol consumption per week (ml)				**0.012[b]**
> 700 or 0	64 (64%)	23 (56.1%)	41 (69.5%)	
600	12 (12%)	7 (17.1%)	5 (8.5%)	
500	1 (1%)	0 (0%)	1 (1.7%)	
400	2 (2%)	2 (4.9%)	0 (0%)	
300	5 (5%)	5 (12.2%)	0 (0%)	
< 300	16 (16%)	4 (9.8%)	12 (20.3%)	
Exercise frequency				0.557[b]
Never	69 (69%)	26 (63.4%)	43 (72.9%)	

Rarely	4 (4%)	1 (2.4%)	3 (5.1%)	
1-2 hours/per week	10 (10%)	5 (12.2%)	5 (8.5%)	
More than 2 hours per week	17 (17%)	9 (22%)	8 (13.6%)	
Walking frequency				0.416[b]
Never	41 (41%)	20 (48.8%)	21 (35.6%)	
Less than 3 times per week	8 (8%)	3 (7.3%)	5 (8.5%)	
More than 3 times per week for at least 15 minutes	51 (51%)	18 (43.9%)	33 (55.9%)	
Blood tests ‡				
25(OH) D3 Vitamin	27.06 ± 10.18	29.91 ± 9.73	24.98 ± 10.08	**0.019[c]**
Platelets/Lymphocytes ratio	126.30 ± 52.07	113.19 ± 48.38	135.88 ± 53.02	**0.043[c]**
Neutrophils/Lymphocytes ratio	2.51 ± 2.24	2.54 ± 1.46	2.49 ± 2.69	0.192[a]
CRP	4.20 ± 4.32	4.86 ± 5.08	3.72 ± 3.64	0.145[a]
Albumin	4.34 ± 0.42	4.34 ± 0.31	4.34 ± 0.48	0.896[c]
Calcium	9.64 ± 0.56	9.59 ± 0.37	9.68 ± 0.67	0.516[c]
Phosphorus	3.42 ± 0.54	3.29 ± 0.47	3.51 ± 0.57	0.051[c]
Parathormone	74.15 ± 40.25	76.13 ± 35.02	72.71 ± 44	0.404[a]

a Mann-Whitney U Test

b Pearson's Chi-square test

c t-Test

d Fisher's exact test

*Percentages are presented within gender.

† Statistically significant differences are marked in bold

‡ Missing values are excluded

Abbreviations: BMI, body mass index; CCI, Charlson comorbidity index; ASM, appendicular skeletal mass; CRP, C-Reactive protein

10.2 Greek translation and cross-cultural adaption of SARC-F

The steps described above were performed for translation and cross-cultural adaption of SARC-F. For the pre-test step, 10 older adults, 5 men and 5 women, aged 65 years or older, free of acute conditions affecting their functionality, without significant cognitive problems, from different educational levels were recruited in order to assess comprehension and cultural relevance of the questionnaire. Afterward, a second population consisted of 22 older adults, 11 men and 11 women (≥ 65 years, median 71, range 65-97, 54.5% primary school graduates, 9.1% high school or college graduates, 36.4% university graduates) was recruited to evaluate the 'inter-rater reliability' and 'test-retest reliability' (Table 12). Inter-rater and test-retest reliability both showed a total kappa index of $k = 1$; $p < 0.001$ (perfect agreement). Internal consistency by Cronbach's alpha was 0.657 which indicates an acceptable level of consistency.

Table 12. 'Inter-rater reliability' and 'test-retest reliability' of the Greek version of the SARC-F questionnaire

SARC-F Item	**Inter-rater reliability (kappa index)**	**p-value**	**Test-retest reliability (after 2 weeks) (kappa index)**	**p-value**
Muscle strength	0.788	< 0.001	0.637	< 0.001
Assistance in walking	1	< 0.001	1	< 0.001
Rise from a chair	0.914	< 0.001	0.648	< 0.001
Climb stairs	1	< 0.001	1	< 0.001
Falls	1	< 0.001	1	< 0.001
Total Outcome	1	< 0.001	1	< 0.001
Cronbach's alpha = 0.657				

10.3 Clinical validation of the Greek SARC-F and SARC-Calf

Among the 100 individuals, the SARC-F identified 19 (19%) at high risk for sarcopenia. The prevalence rate of sarcopenia based on the SARC-F was 6 (6%) in men and 13 (13%) in women. Table 13 displays the average, baseline characteristics of the participants who were grouped according to their SARC-F score/group. A total score of 4 points and greater was classified as having a high risk for sarcopenia. A statistically significant relationship was found between SARC-F score and number of medications/polypharmacy ($p = 0.044$, $p = 0.037$, respectively), CCI ($p = 0.042$), instability ($p < 0.001$), walking frequency ($p = 0.008$), and the number of falls in the last year ($p = 0.019$). Moreover, a statistically significant relationship was found between SARC-F score and muscle strength ($p = 0.016$) and physical performance ($p < 0.001$). The participants in the SARC-F ≥ 4 group had a lower mean muscle strength and gait speed. Afterward, probable sarcopenia, as detected via muscle strength, was statistically associated with the SARC-F questionnaire ($p = 0.008$).

Table 13. Baseline population characteristics based on the SARC-F questionnaire

Characteristics (n = 100)	**SARC-F < 4 (n = 81)**	**SARC-F ≥ 4 (n = 19)**	**P value**
Gender			0.354[a]
Men	35 (43.2%)	6 (31.6%)	
Women	46 (56.8%)	13 (68.4%)	
Age	72.5 ± 6.47	75.5 ± 7.40	0.074[b]
CCI	0.60 ± 0.27	0.43 ± 0.34	**0.042[c]**
Total number of medications	3.22 ± 2.38	4.68 ± 3.09	**0.044[c]**
Polypharmacy (≥ 5 drugs daily)	15 (18.5%)	8 (42.1%)	**0.037[d]**
Waist circumference (cm)	98.00 ± 14.48	98.68 ± 10.60	0.847[b]
Pelvis circumference (cm)	109.79 ± 14.48	107.53 ± 9.93	0.520[b]
Calf circumference – CC (cm)	37.22 ± 4.22	35.37 ± 3.56	0.080[b]
Middle arm circumference (cm)	31.09 ± 4.12	31.95 ± 5.28	0.440[b]
Height (m^2)	1.64 ± 0.09	1.60 ± 0.08	0.068[b]
Weight (kg)	77.91 ± 15.52	74.01 ± 10.21	0.300[b]
BMI (kg/ m^2)	29.0 ± 5.59	28.95 ± 3.36	0.970[b]
Probable sarcopenia	11 (13.6%)	8 (42.1%)	**0.008[d]**
Muscle strength (kg)	27.63 ± 9.31	21.97 ± 8.17	**0.016[b]**
Muscle mass - ASM/ht^2 (kg/m^2)	6.43 ± 1.07	6.14 ± 1.04	0.922[b]
Physical performance (m/s)	0.95 ± 0.28	0.63 ± 0.26	**< 0.001[b]**
Number of falls in the last year			**0.019[e]**
0	64 (79%)	11 (57.9%)	

1	16 (19,8%)	5 (26.3%)	
2 or more	1 (1.2%)	3 (15.8%)	
Fractures among fallers	11 (73.3%)	4 (80%)	1[d]
Instability	20 (24.7%)	13 (68.4%)	**< 0.001[a]**
Exercise frequency			0.724[e]
Never	54 (66.7%)	15 (78.9%)	
Rarely	4 (4.9%)	0 (0%)	
1-2 hours/per week	8 (9.9%)	2 (10.5%)	
More than 2 hours per week	15 (18.5%)	2 (10.5%)	
Walking frequency			**0.008[e]**
Never	29 (35.8%)	12 (63.2%)	
Less than 3 times per week	5 (6.2%)	3 (15.8%)	
More than 3 times per week for at least 15 minutes	47 (58%)	4 (21.1%)	
Osteoporosis			0.431[d]
No	37 (45.7%)	11 (57.9%)	
Yes	10 (12.3%)	1 (5.3%)	
Don't know	34 (42%)	7 (36.8%)	

a Pearson's Chi-square test

b t-Test

c Mann-Whitney U Test

d Fisher's exact test

e Fisher-Freeman-Halton Exact Test

Statistically significant differences are marked in bold

Abbreviations: BMI, body mass index; CCI, Charlson comorbidity index; ASM, appendicular skeletal mass

Depending on the definition used, the prevalence of sarcopenia varied from 10% (EWGSOP2, FNIH3) to 37% (IWGS) (Table 14). Table 15 summarizes the values of sensitivity, specificity, PPV, and NPV, for the SARC-F questionnaire, using EWGSOP2, FNIH2, FNIH3, and IWGS criteria consecutively as reference standards. The sensitivity of this tool ranged from 27% (IWGS) to 50% (FNIH3) and the specificity from 82.2% (EWGSOP2) to 85.7% (IWGS). Furthermore, all the PPVs, which indicated the probability of presenting sarcopenia in case of a positive screening test, were always below 60%, with a minimum of 15.8% (EWGSOP2) and a maximum of 52.6% (IWGS). NPV values ranged between 66.7% (IWGS) to 93.8% (FNIH3) indicating a high probability of actually not presenting sarcopenia when the SARC-F is negative. Also, SARC-F was assessed against probable sarcopenia, indicating 42.1% sensitivity, 86.4% specificity, 42.1% PPV, and 86.4% NPV.

Afterward, SARC-Calf was assessed against the same definitions of sarcopenia and its validity results were compared to SARC-F (Table 15). Sensitivity was lower than that of SARC-F. Specificity was improved, ranging from 95.6 to 98.4%. PPV was much higher in all cases except for the FNIH3 definition. NPV was similar to that of SARC-F. The same findings regarding sensitivity, specificity, and NPV were found when SARC-Calf and SARC-F were compared against probable sarcopenia. However, PPV was similar to that of SARC-F.

Table 14. Sarcopenia classification according to different definitions

Sarcopenia Classification	**Total (n = 100)**	**Men* (n = 41)**	**Women* (n = 59)**	**P value**
Probable Sarcopenia	19 (19%)	11 (26.8%)	8 (13.6%)	0.096[a]
SARC-F	19 (19%)	6 (14.6%)	13 (22%)	0.354[a]
EWGSOP2	10 (10%)	7 (17.1%)	3 (5.1%)	0.086[b]
FNIH2	13 (13%)	9 (22%)	4 (6.8%)	**0.035[a]**
FNIH3	10 (10%)	7 (17.1%)	3 (5.1%)	0.086[b]
IWGS	37 (37%)	15 (36.6%)	22 (37.3%)	0.943[a]

a Pearson's Chi-square test

b Fisher's exact test

*Percentages are presented within gender. Statistically significant differences are marked in bold

Abbreviations: EWGSOP2, the European Working Group on Sarcopenia in Older People 2; FNIH, the Foundation for the National Institutes of Health with 2 or 3 criteria, respectively; IWGS, the International Working Group on Sarcopenia

Table 15. SARC-F and SARC-Calf validated against different sarcopenia definitions and probable sarcopenia

	Sensitivity (%)	**Specificity (%)**	**PPV (%)**	**NPV (%)**
EWGSOP2				
SARC-F	30	82.2	15.8	91.4
SARC-Calf	20	96.7	40	91.6
FNIH2				
SARC-F	38.5	83.9	26.3	90.1
SARC-Calf	15.4	96.6	40	88.4
FNIH3				
SARC-F	50	84.4	26.3	93.8
SARC-Calf	10	95.6	20	90.5
IWGS				
SARC-F	27	85.7	52.6	66.7
SARC-Calf	10.8	98.4	80	65.3
Probable sarcopenia				
SARC-F	42.1	86.4	42.1	86.4
SARC-Calf	10.5	96.3	40	82.1

Abbreviations: PPV, positive predictive value; NPV, negative predictive value; EWGSOP2, the European Working Group on Sarcopenia in Older People 2; FNIH, the Foundation for the National Institutes of Health with 2 or 3 criteria, respectively; IWGS, the International Working Group on Sarcopenia

10.4 The relationship between the SARC-F questionnaire and demographic characteristics and factors in daily life

Afterwards, considering the SARC-F questionnaire as a dichotomous variable (two groups scoring < 4, or ≥ 4, respectively), the relationship between SARC-F and demographic characteristics and factors in daily life was examined. Table 16 shows the observed bivariate relationships.

Table 16. Bivariate relationships between demographic characteristics and factors in daily life and SARC-F questionnaire (reference category: control group)

Characteristics	**SARC-F questionnaire**				**P value[†]**
	< 4		**≥ 4**		
	N	**%**	**N**	**%**	
Age[a]	72.5	6.47	75.5	7.40	0.074[b]
Gender					0.354[c]
Men	35	85.4	6	14.6	
Women	46	78	13	22	
Education level					0.851[d]
Primary school	30	76.9	9	23.1	
High school	24	85.7	4	14.3	
IEK	12	85.7	2	14.3	
University, TEI	14	77.8	4	22.2	
Master, PhD	1	100	0	0	
Annual income					0.139[d]
< 8.000 euro	31	86.1	5	13.9	
8.000 – 15.000 euro	30	71.4	12	28.6	
> 15.000 euro	20	90.9	2	9.1	
CCI[a]	0.60	0.27	0.43	0.34	**0.042[e]**
BMI (kg/h^2)	29.00	5.59	28.95	3.36	0.970[b]
Muscle mass (ASM/h^2)	6.31	1.10	6.33	1.01	0.922[b]

Physical performance (m/s)	0.95	0.28	0.63	0.26	**< 0.001[b]**
Osteoporosis					0.431[f]
Diagnosed osteoporosis	10	90.9	1	9.1	
Absence of osteoporosis	37	77.1	11	22.9	
Number of medications[a]	3.22	2.38	4.68	3.09	**0.044[e]**
Polypharmacy					**0.037[f]**
Yes	15	65.2	8	34.8	
No	66	85.7	11	14.3	
Number of falls					**0.019[d]**
None	64	85.3	11	14.7	
One	16	76.2	5	23.8	
2 or more	1	25	3	75	
BI[a]	98.09	3.22	87.37	15.03	**< 0.001[e]**
FSS[a]	2.34	1.14	3.78	1.53	**< 0.001[b]**
VAS[a]	3.93	2.58	6.42	2.24	**< 0.001[b]**
AIS[a]	3.99	3.19	8.11	4.58	**< 0.001[e]**
Sleep duration[a]	6.77	1.25	6.53	1.58	0.477[b]
Sleep medication					**0.031[d]**
No	60	87	9	13	
Daily	12	60	8	40	
Occasionally	9	81.8	2	18.2	
Exercise frequency					0.724[d]
Never	54	78.3	15	21.7	
Rarely	4	100	0	0	
1-2 hours/per week	8	80	2	20	
More than 2 hours per week	15	88.2	2	11.8	
Walking frequency					**0.008[d]**
Never	29	70.7	12	29.3	

Less than 3 times per week	5	62.5	3	37.5	
More than 3 times per week for at least 15 minutes	47	92.2	4	7.8	
Coffee consumption per day[a]	1.44	0.79	1.53	1.07	0.861[e]
Tea consumption per day[a]	0.32	0.5	0.47	0.51	0.191[e]
Alcohol consumption per week					0.433[d]
0	52	81.3	12	18.8	
> 600	10	83.3	2	16.7	
500	0	0	1	100	
400	2	100	0	0	
300	5	100	0	0	
< 300	12	75	4	25	
Instability					**< 0.001[c]**
Yes	20	60.6	13	39.4	
No	61	91	6	9	
Number of cigarettes per day[a]	3.06	7.54	3.05	6.51	0.667[e]

a Mean, standard deviation

b t-Test

c Pearson's Chi-square test

d Fisher-Freeman-Halton Exact Test

e Mann-Whitney U Test

f Fisher's exact test

†Statistically significant differences at the level 0.05 are marked in bold

Abbreviations: BMI, body mass index; CCI, Charlson comorbidity index; ASM, appendicular skeletal mass; BI, Barthel index; FSS; Fatigue severity scale; VAS, visual analogue scale; AIS, Athens insomnia scale

After the bivariate analysis, a statistically significant relationship at the level of 0.20 ($p < 0.20$) emerged between the dependent variable 'SARC-F questionnaire' and 15 independent variables. For this reason, multivariate logistic regression was applied, the results of which are presented in Table 17. If the p-value is less than 0.05, then the variable is significant at the 5% level. According to the multivariate logistic regression seems that:

1. Increased performance in daily activities according to the BI was associated with a reduced likelihood of having risk for sarcopenia based on the SARC-F questionnaire.
2. Increasing self-reported fatigue according to VAS was associated with an increased likelihood of having risk for sarcopenia based on the SARC-F questionnaire.
3. Having increased sleep difficulties according to AIS was associated with an increased likelihood of having risk for sarcopenia based on the SARC-F questionnaire.
4. The explained variation in the dependent variable based on this model was 56.6% (Nagelkerke R Square).

Table 17. Multivariate logistic regression with SARC-F questionnaire as dependent variable (reference category: control group)

Independent Variable	**Coefficient b**	**Odds Ratio**	**95% Confidence Interval for Odds Ratio**	**P value†**
BI Score	-0.321	0.725	0.595 – 0.884	**0.001**
VAS Fatigue	0.361	1.435	1.064 – 1.936	**0.018**
AIS Score	0.267	1.306	1.053 – 1.620	**0.015**

†Statistically significant differences at the level 0.05 are marked in bold

Abbreviations: BI, Barthel index; VAS, visual analogue scale; AIS, Athens insomnia scale

10.5 The relationship between muscle strength and demographic characteristics and factors in daily life

The relationship between demographic characteristics, factors in daily life, and muscle strength was examined in the sample of older adults. A statistically significant relationship was found between muscle strength (kg) and age ($p = 0.016$), gender ($p < 0.001$), educational level ($p = 0.004$), number of medications ($p < 0.001$), polypharmacy ($p < 0.001$), BI ($p = 0.017$), FSS ($p < 0.001$), VAS ($p = 0.001$), AIS ($p = 0.024$), use of sleep medication ($p = 0.002$), and alcohol consumption ($p = 0.007$) (Table 18).

Table 18. Bivariate relationships between demographic characteristics and factors in daily life and muscle strength value

Characteristics	**Mean**	**Standard deviation**	**P value**[†]
Age		-0.241[a]	**0.016**[a]
Gender			**< 0.001**[b]
Men	34.21	8.8	
Women	21.24	5.0	
Education level			**0.004**[c]
Primary school	23.44	7.8	
High school	25.41	7.6	
IEK	30.46	9.6	
University, TEI	32.35	11.6	
Master, PhD	21.10		.
Annual income			0.111[c]
< 8.000 euro	24.45	7.31	
8.000 – 15.000 euro	26.70	9.38	
> 15.000 euro	29.73	11.47	
CCI		0.108[d]	0.287[d]
BMI (kg/h^2)		0.009[a]	0.933[a]
Muscle mass (ASM/h^2)		0.464[a]	**< 0.001**[a]
Physical performance (m/s)		0.412[a]	**< 0.001**[a]

Osteoporosis			0.338[b]
Diagnosed osteoporosis	20.64	6.7	
Absence of osteoporosis	22.94	7.2	
Number of medications		-0.337[d]	**< 0.001**[d]
Polypharmacy			**< 0.001**[b]
Yes	20.93	5.9	
No	28.24	9.6	
Number of falls			0.517[c]
None	26.89	9.8	
One	26.36	8.0	
2 or more	21.38	6.7	
BI		0.238[d]	**0.017**[d]
FSS		-0.363[a]	**< 0.001**[a]
VAS		-0.322[a]	**0.001**[a]
AIS		-0.023[d]	**0.024**[d]
Sleep duration		-0.130[a]	0.196[a]
Sleep medication			**0.002**[c]
No	28.73	9.7	
Daily	21.06	6.1	
Occasionally	22.90	6.8	
Exercise frequency			0.834[c]
Never	26.00	9.6	
Rarely	26.88	8.0	
1-2 hours/per week	27.41	10.6	
More than 2 hours per week	28.24	8.1	
Walking frequency			0.506[c]
Never	26.77	9.8	
Less than 3 times per week	22.85	7.3	
More than 3 times per week for at least 15minutes	26.97	9.3	
Coffee consumption per day		0.041[d]	0.685[d]
Tea consumption per day		0.021[d]	0.834[d]

Alcohol consumption per week			**0.007**[c]
0	26.02	9.2	
> 600	32.17	9.6	
500	25.10	-	
400	38.95	0.1	
300	32.44	7.5	
< 300	21.21	6.9	
Instability			0.910[b]
Yes	26.71	10.4	
No	26.48	8.9	
Number of cigarettes per day		0.060[d]	0.553[d]

a Pearson coefficient

b t-Test

c Anova test

d Spearman coefficient

†Statistically significant differences at the level 0.05 are marked in bold

Abbreviations: BMI, body mass index; CCI, Charlson comorbidity index; ASM, appendicular skeletal mass; BI, Barthel index; FSS; Fatigue severity scale; VAS, visual analogue scale; AIS, Athens insomnia scale

After bivariate analysis, a statistically significant relationship at the level of 0.20 ($p < 0.20$) emerged between the muscle strength and 15 independent variables. For this reason, multiple linear regression was applied, the results of which are presented in Table 19. If the p-value is less than 0.05, then the variable is significant at the 5% level. According to the multiple linear regression seems that:

1. Older age was statistically significant associated with lower muscle strength.
2. Men had higher muscle strength than women.
3. Higher muscle mass was statistically associated with higher muscle strength.

4. Better physical performance was statistically associated with higher muscle strength.
5. The higher number of medications was statistically associated with lower muscle strength.
6. Alcohol consumption more than 300 ml per week but less than 600 ml was statistically associated with higher muscle strength.
7. The explained variation in the dependent variable based on this model was 69.7% (adjusted R Square).

Table 19. Multiple linear regression with muscle strength value as dependent variable

Independent Variable	Unstandardized Coefficients b	95% Confidence Interval for b		P value†
Age	-0.356	-0.523 –	-0.190	**< 0.001**
Gender	-11.107	-13.738 –	-8.475	**< 0.001**
Muscle mass	1.200	0.051 –	2.349	**0.041**
Physical performance	6.969	3.357 –	10.581	**< 0.001**
Total number of medications	-0.560	-0.990 –	-0.130	**0.011**
Alcohol consumption less than 300ml/week	-3.633	-6.467 –	-0.798	**0.013**

†Statistically significant differences at the level 0.05 are marked in bold

10.6 The relationship between probable sarcopenia and demographic characteristics and factors in daily life

Afterwards, the relationship between demographic characteristics and factors in daily life and the probable sarcopenia among the older adults was examined. A

statistically significant association was observed between probable sarcopenia and age ($p < 0.001$), CCI ($p = 0.003$), the number of medications ($p = 0.002$), polypharmacy ($p = 0.037$), walking frequency ($p = 0.042$), and instability ($p = 0.043$) (Table 20).

Table 20. Bivariate relationships between demographic characteristics and factors in daily life and probable sarcopenia (reference category: control group)

Characteristics	**Probable Sarcopenia**				**P value†**
	No		**Yes**		
	N	**%**	**N**	**%**	
Age[a]	71.52	5.56	79.58	7.47	**< 0.001[b]**
Gender					0.096[c]
Men	30	73.2	11	26.8	
Women	51	86.4	8	13.6	
Education level					0.799[d]
Primary school	31	79.5	8	20.5	
High school	24	85.7	4	14.3	
IEK	10	71.4	4	28.6	
University, TEI	15	83.3	3	16.7	
Master, PhD	1	100	0	0	.
Annual income					**0.024[d]**
< 8.000 euro	34	94.4	2	5.6	
8.000 – 15.000 euro	30	71.4	12	28.6	
> 15.000 euro	17	77.3	5	22.7	
CCI[a]	0.62	0.26	0.37	0.33	**0.003[e]**
BMI (kg/h^2)	29.25	5.58	27.89	3.22	0.307[b]
Muscle mass (ASM/h^2)	6.29	1.14	6.41	0.81	0.663[b]
Physical performance (m/s)	0.93	0.28	0.71	0.34	**0.004[b]**
Osteoporosis					1[f]
Diagnosed osteoporosis	9	81.8	2	18.2	

Absence of osteoporosis	40	83.3	8	16.7	
Number of medications[a]	3.20	2.59	4.79	2.12	**0.002[e]**
Polypharmacy					**0.037[f]**
Yes	15	65.2	8	34.8	
No	66	85.7	11	14.3	
Number of falls					0.897[d]
None	61	81.3	14	18.7	
One	17	81	4	19	
2 or more	3	75	1	25	
BI[a]	97.16	5.47	91.32	14.42	0.054[e]
FSS[a]	2.53	1.23	2.96	1.71	0.207[b]
VAS[a]	4.33	2.68	4.68	2.81	0.612[b]
AIS[a]	4.43	3.44	6.21	5.04	0.172[e]
Sleep duration[a]	6.60	1.24	7.21	1.51	0.070[b]
Sleep medication					1[d]
No	56	81.2	13	18.8	
Daily	16	80	4	20	
Occasionally	9	81.8	2	18.2	
Exercise frequency					1[d]
Never	55	79.7	14	20.3	
Rarely	4	100	0	0	
1-2 hours/per week	8	80	2	20	
More than 2 hours per week	14	82.4	3	17.6	
Walking frequency					**0.042[d]**
Never	29	70.7	12	29.3	
Less than 3 times per week	6	75	2	25	
More than 3 times per week for at least	46	90.2	5	9.8	

15 minutes					
Coffee consumption per day[a]	1.53	0.84	1.16	0.83	0.092[e]
Tea consumption per day[a]	0.36	0.51	0.32	0.48	0.781[e]
Alcohol consumption per week					0.398[d]
0	53	82.8	11	17.2	
> 600	11	91.7	1	8.3	
500	1	100	0	0	
400	2	100	0	0	
300	4	80	1	20	
< 300	10	62.5	6	37.5	
Instability					**0.043[c]**
Yes	23	69.7	10	30.3	
No	58	86.6	9	13.4	
Number of cigarettes per day[a]	3.33	7.75	1.89	5.10	0.471[e]

a Mean, standard deviation

b t-Test

c Pearson's Chi-square test

d Fisher-Freeman-Halton Exact Test

e Mann-Whitney U Test

f Fisher's exact test

†Statistically significant differences at the level 0.05 are marked in bold

Abbreviations: BMI, body mass index; CCI, Charlson comorbidity index; ASM, appendicular skeletal mass; BI, Barthel index; FSS; Fatigue severity scale; VAS, visual analogue scale; AIS, Athens insomnia scale

After the bivariate analysis, a statistically significant relationship at the level of 0.20 ($p < 0.20$) emerged between the dependent variable 'probable sarcopenia' and 13

independent variables. For this reason, multivariate logistic regression was applied, the results of which are presented in Table 21. If the p-value is less than 0.05, then the variable is significant at the 5% level. According to the multivariate logistic regression seems that:

1. Older age was a statistically significant predictor of probable sarcopenia.
2. Older adults who walked more than 3 times per week for at least 15 minutes were less likely to have probable sarcopenia.
3. The explained variation in the dependent variable based on this model was 44.9% (Nagelkerke R Square).

Table 21. Multivariate logistic regression with probable sarcopenia as dependent variable (reference category: control group)

Independent Variable	**Coefficient b**	**Odds Ratio**	**95% Confidence Interval for Odds Ratio**	**P value†**
Age	0.186	1.205	1.090 – 1.333	**< 0.001**
Physical performance	-1.871	0.154	0.020 – 1.177	0.071
Sleep duration	0.414	1.513	0.943 – 2.429	0.086
Walking frequency				0.121
Walking frequency / Less than 3 times per week	-0.829	0.437	0.049 – 3.867	0.456
Walking frequency / More than 3 times per week for at least 15 minutes	-1.464	0.231	0.057 – 0.943	**0.041**

†Statistically significant differences at the level 0.05 are marked in bold

10.7 The relationship between confirmed sarcopenia and demographic characteristics and factors in daily life

The relationship between confirmed sarcopenia, according to EWGSOP2 criteria, and demographic characteristics and factors in daily life was investigated and the bivariate relationships are shown in Table 22. Confirmed sarcopenia was statistically significant associated with age ($p < 0.001$).

Table 22. Bivariate relationships between demographic characteristics and factors in daily life and confirmed sarcopenia (reference category: control group)

Characteristics	**Confirmed Sarcopenia**				**P value**[†]
	No		**Yes**		
	N	**%**	**N**	**%**	
Age[a]	72.12	6.03	81.40	7.20	**< 0.001**[b]
Gender					0.086[c]
Men	34	82.9	7	17.1	
Women	56	94.9	3	5.1	
Education level					0.090[d]
Primary school	35	89.7	4	10.3	
High school	28	100	0	0	
IEK	11	78.6	3	21.4	
University, TEI	15	83.3	3	16.7	
Master, PhD	1	100	0	0	
Annual income					0.162[d]
< 8.000 euro	35	97.2	1	2.8	
8.000 – 15.000 euro	36	85.7	6	14.3	
> 15.000 euro	19	86.4	3	13.6	
CCI[a]	0.59	0.28	0.43	0.33	0.114[e]
BMI (kg/h^2)	29.33	5.37	26.01	2.18	0.057[b]
Muscle mass (ASM/h^2)	6.32	1.11	6.20	0.77	0.741[b]
Physical performance (m/s)	0.90	0.29	0.84	0.39	0.576[b]

Osteoporosis					0.572[c]
Diagnosed osteoporosis	10	90.9	1	9.1	
Absence of osteoporosis	45	93.8	3	6.3	
Number of medications[a]	3.42	2.68	4.20	1.23	0.074[e]
Polypharmacy					0.692[c]
Yes	20	87	3	13	
No	70	90.9	7	9.1	
Number of falls					0.243[d]
None	69	92	6	8	
One	18	85.7	3	14.3	
2 or more	3	75	1	25	
BI[a]	96.22	8.22	94.50	8.32	0.656[e]
FSS[a]	2.67	1.35	2.17	1.20	0.265[b]
VAS[a]	4.51	2.71	3.40	2.46	0.218[b]
AIS[a]	4.71	3.90	5.30	3.27	0.425[e]
Sleep duration[a]	6,67	1,33	7.20	1.03	0.224[b]
Sleep medication					1[d]
No	62	89.9	7	10.1	
Daily	18	90	2	10	
Occasionally	10	90.9	1	9.1	
Exercise frequency					0.617[d]
Never	63	91.3	6	8.7	
Rarely	4	100	0	0	
1-2 hours/per week	8	80	2	20	
More than 2 hours per week	15	88.2	2	11.8	
Walking frequency					0.328[d]
Never	35	85.4	6	14.6	
Less than 3 times per week	7	87.5	1	12.5	
More than 3 times per week for at least 15	48	94.1	3	5.9	

minutes					
Coffee consumption per day[a]	1.49	0.84	1.20	0.92	0.281[e]
Tea consumption per day[a]	0.36	0.50	0.30	0.48	0.764[e]
Alcohol consumption per week					0.611[d]
0	57	89.1	7	10.9	
> 600	12	100	0	0	
500	1	100	0	0	
400	2	100	0	0	
300	5	100	0	0	
< 300	13	81.3	3	18.8	
Instability					0.726[c]
Yes	29	87.9	4	12.1	
No	61	91	6	9	
Number of cigarettes per day[a]	3.18	7.45	2.00	6.32	0.383[e]

a Mean, standard deviation

b t-Test

c Fisher's exact test

d Fisher-Freeman-Halton Exact Test

e Mann-Whitney U Test

†Statistically significant differences at the level 0.05 are marked in bold

Abbreviations: BMI, body mass index; CCI, Charlson comorbidity index; ASM, appendicular skeletal mass; BI, Barthel index; FSS; Fatigue severity scale; VAS, visual analogue scale; AIS, Athens insomnia scale

After the bivariate analysis, a statistically significant relationship at the level of 0.20 ($p < 0.20$) was found between the dependent variable 'confirmed sarcopenia' and 7 independent variables. For this reason, multivariate logistic regression was applied, the results of which are presented in Table 23. If the p-value is less than 0.05, then the variable is significant at the 5% level. According to the multivariate logistic regression seems that:

1. The older age was statistically significant associated with confirmed sarcopenia.
2. The explained variation in the dependent variable based on this model was 35.1% (Nagelkerke R Square).

Table 23. Multivariate logistic regression with confirmed sarcopenia as dependent variable (reference category: control group)

Independent Variable	**Coefficient b**	**Odds Ratio**	**95% Confidence Interval for Odds Ratio**	**P value†**
Age	0.175	1.192	1.078 – 1.317	**< 0.001**
BMI	-0.188	0.829	0.671 – 1.023	0.081

†Statistically significant differences at the level 0.05 are marked in bold

Abbreviation: BMI, body mass index

Chapter 11

Discussion

This study attempted to investigate the relationship between daily life and sarcopenia among Greek older adults. In addition, the translation, cross-cultural adaptation, and validation of the SARC-F questionnaire into Greek, according to the recommendations by EUGMS, were performed. The translated and culturally adapted version of the SARC-F for the Greek language showed perfect agreement for inter-rater and test-retest reliability and an acceptable level of internal consistency, indicating that this version can be used with confidence by health professionals.

The results of the validation analysis indicated that SARC-F has a low sensitivity but a high specificity and high NPV. The PPV was low but even very good tests have poor PPV when applied to low-prevalence populations (175). These findings indicate that SARC-F is an appropriate tool for use in Greek older adults for ruling out those without sarcopenia. This represents a positive property of a screening test, since when older adults score < 4 in SARC-F, it is considered strongly possible that they are no sarcopenic. Therefore, it eliminates the need for various cost and time-consuming device measurements such as muscle assessment by DXA or BIA and attributes to SARC-F the ability to be used as a feasible and suitable tool in community clinical settings.

The SARC-F has previously been translated and validated into Greek by Tsekoura et al. (176). In that validation process, the SARC-F questionnaire was assessed against only one definition (sensitivity 34.4%, specificity 93.2%, PPV 26.4, and NPV 66.6%) and proved to be reliable in detecting with precision the absence of sarcopenia. These findings, except NPV, are in line with the findings of the present study. However, the current study enhances the validity of SARC-F since it is assessed additionally against three sarcopenia definitions. One more difference between the two studies is that the samples were recruited from different cities which may explain possible differences in sample characteristics.

Results regarding the validation of the SARC-F among community-dwelling older adults in other languages are similar, highlighting the low sensitivity and PPV, and the high specificity and NPV (59,61,62,66,69,70,72). The different validation results in other studies may be due to different methodology or sample characteristics. In the Romanian validation, older adults were recruited from nursing homes but there were strict inclusion criteria, and were considered community-dwelling (64). The mean age of participants in the German (79.1 ± 5.2 years) and the Spanish (Spain) populations (81.4 ± 5.9 years) was much higher than the present study (65,72). The findings of the current study are consistent with those in a recent meta-analysis aiming at evaluating the diagnostic accuracy of SARC-F. Depending on the definition used, the sensitivity ranged from 27 to 77%, and the specificity from 63 to 91% (177). The authors concluded that despite some limitations, SARC-F, because of the high practicability and specificity remains an effective screening tool for sarcopenia in the older population.

The findings of the present study revealed that SARC-F is superior to SARC-Calf regarding sensitivity. However, SARC-Calf indicated higher specificity and PPV than SARC-F (except for FNIH3 definition) and similar NPV. Bahat et al. found similar results when they compared SARC-F with SARC-Calf in a sample of the Turkish population (68). On the other hand, other studies indicated improved sensitivity of SARC-Calf in comparison with SARC-F (60,71,178). The different prevalence of sarcopenia or the average age of the participants between these studies and the current study may explain their improved, but not perfect sensitivity. The performance of SARC-Calf among other populations e.g., nursing residents, or other settings e.g., hospitals, where the prevalence of sarcopenia is higher, remains to be further investigated.

The bivariate analysis revealed differences in the grip strength and gait speed demonstrating that in the case of the SARC-F ≥ 4 group, muscle strength and physical performance, both basic components of sarcopenia, were statistically significant correlated with SARC-F, enhancing the value of SARC-F as a screening tool for sarcopenia. The risk of probable sarcopenia, assessed by muscle strength, was higher in the group of older adults with SARC-F score ≥ 4, highlighting the significant relationship between probable sarcopenia and SARC-F. There was also a statistically significant association between the SARC-F ≥ 4 group and the number of medications

(polypharmacy). The number of comorbidities, measured by CCI, the number of falls, and instability were statistically significantly associated with SARC-F, indicating that sarcopenic older adults may have more than one chronic disease at the same time and a higher risk for falls. Also, walking frequency (minutes/week) seems to be low in participants with risk for sarcopenia, enhancing the important role of physical activity in the prevention of sarcopenia.

Afterward, aiming to investigate the possible factors in daily life that predict the risk for sarcopenia, using the SARC-F questionnaire, a multivariate logistic regression was performed. Finally, a statistically significant association was found between BI, VAS, and AIS scores and the risk of sarcopenia, based on the SARC-F cutoff point. BI score was negatively associated with SARC-F, indicating that the functional decline in daily activities increases the risk of sarcopenia among older adults. It is already known that sarcopenia is associated with increased risk for functional disability, assessed by various methods (179). The reverse relationship and especially the relationship between functional status and the SARC-F questionnaire is less examined in the literature. Being dependent on ADL, based on BI score, and IADL were found to be independent factors for sarcopenia according to SARC-F among community-dwelling older adults living in the Eastern Black Sea region of Turkey (134). Functional limitation, assessed by the Older American Resources and Services questionnaire contributed to an increased risk for sarcopenia (SARC-F) during the COVID-19 pandemic in older Brazilian adults (180). In contrast, nonsignificant association was found between Modified Barthel Index (MBI) and SARC-F among older outpatients, although robust patients were generally more independent, suggesting that conventional MBI alone is not multidimensional enough to identify those at risk of sarcopenia (181).

This study found a positive relationship between self-reported fatigue, as assessed by VAS but not with FSS, and the risk for sarcopenia, based on SARC-F questionnaire. Although, the association between self-reported fatigue and incidence or risk of falls, which are the mayor consequence of sarcopenia, is well established, research on the correlation between self-perceived fatigue and sarcopenia is lacking. In the multivariate logistic regression analysis, fatigue as evaluated by the Fatigue Impact Scale total was determined to be associated with sarcopenia among geriatric outpatients in Turkey (160). Interestingly, fatigue was rated among the five most

important sarcopenia outcomes in a sample of 216 sarcopenic older adults (182), confirming the need for fatigue management as a priority in the sarcopenia treatment.

The findings of this study show that the increased prevalence of sleep difficulties can lead to a higher risk for sarcopenia. As earlier presented, there is a strong relationship between sleep duration/quality and sarcopenia prevalence (141). However, the association between the risk for sarcopenia, as evaluated by the SARC-F, and the various sleep patterns is not well documented. Among older outpatients with diabetes a statistically significant association was found between sleep quality and sarcopenia using SARC-F (183). Also, Huang et al. highlight the positive association between SARC-F and wake time but not bedtime and midsleep time among community-dwelling older adults (184). Moreover, SARC-F was positively correlated with poor sleep quality among outpatients in Turkey (185). Interestingly, poor sleep quality based on AIS was associated with sarcopenia in normal sleepers, but not in long Japanese older sleepers (186).

The investigation of muscle strength-related factors indicated the well-established in literature impact of age and sex in muscle strength. The older age and the female gender were associated with lower muscle strength after adjusting for various covariates. To the same conclusion came in their review de Lima et al, Doherty, and a study among older Chinese, confirming the same age- and sex-related differences in muscle strength (187–189).

Afterwards, in this study, a positive correlation between muscle strength, as a dependent variable, and mass was found. Earlier studies evaluating muscle strength and mass with different methods (e.g. grip strength or quadriceps strength, BIA or DXA, respectively) and after adjusting for age and sex have concluded that there is a positive correlation between muscle strength and mass, but without performing a regression model in all cases (190–193).

In the current study, a positive association between physical performance and muscle strength was observed, indicating that the measurement of the usual gait speed could predict the muscle strength, in settings where equipment for the assessment of muscle strength (e.g., a hand dynamometer) is lacking. Across the literature, the researchers have used various methods for exploring the relationship between muscle strength (knee extension, grip strength, flexion strength) and physical performance

(gait speed, time required for five repeated chair stands, TUG, SPPB) (190,193–196). Their findings show a positive significant relationship as well between muscle strength and physical performance among older adults (190,193–196).

The relationship between sarcopenia and polypharmacy or the number of medications has been widely explored by many researchers, indicating an association between sarcopenia or risk for sarcopenia and polypharmacy or the number of medications in community-dwelling older adults (197,198). However, only a few have studied the relationship between muscle strength (component of sarcopenia) and polypharmacy or the number of medications. In this study, after the multiple linear regression, a statistically significant negative relationship between muscle strength and the daily number of medications was found. This agrees with previous findings by Manjavong et al. in a sample of Thai older adults. Nevertheless, most studies highlight the statistically significant association between muscle strength (or probable sarcopenia, defined by muscle strength) and polypharmacy, not just the number of medications (199,200). However, polypharmacy depends on the definition used in each study and there are plenty of definitions met across the literature (201), while the number of medications is a more objective criterion. Contrary to the aforementioned studies, no significant association between muscle strength and polypharmacy was found after multivariable adjustment among German older persons (202). This could be explained by the fact that they recruited old and very old as well as a great proportion of chronically ill persons and they averaged three efforts of handgrip measurements instead of using the maximal value as in most studies (202).

According to the present study, moderate alcohol consumption, more than 300 ml per week was associated with higher muscle strength among older adults. Based on the Mediterranean food pattern, alcohol consumption for adults less than 700 ml per day can be protective against cardiovascular diseases (203). Therefore, it seems that among older adults moderate alcohol consumption may act beneficial for their muscle function. However, the findings in the literature about alcohol consumption and its relationship with muscle strength among older adults are limited and inconclusive. Compared with current moderate drinkers, non-drinkers had significantly poorer function (including muscle strength) among a sample of older women (204). Doyev et al. found no association between alcohol consumption and muscle strength among older persons in Israel (205). In another study with no primary focus on the

investigation of the abovementioned relationship, alcohol consumption was independently associated with hand grip strength in the older population (206). However, a meta-analysis concludes that alcohol consumption is not a risk factor for sarcopenia (muscle strength included) and even more it could have a protective role against sarcopenia (207). Nevertheless, it is not easy to evaluate alcohol consumption due to an important variability and a lack of objectivity in the description of alcohol exposure (207).

In this study, age was found to be a predictor of probable and confirmed sarcopenia, as it is well described in the whole literature. Probable sarcopenia depends on muscle strength cutoff points, as discussed above. Sarcopenia has long been associated with advanced age and characterized as an age-related disease (26). However, the development of sarcopenia has recently been recognized to begin earlier in life (17). A systematic review and meta-analysis revealed that the overall prevalence increased with increasing age in years; however, this was not statistically significant (30).

Last but not least, the current study demonstrates that walking more than 3 times per week for at least 15 minutes was statistically associated with decreased risk of probable sarcopenia. Although the protective role of physical activity against sarcopenia development and probable sarcopenia has been widely documented (208–210); studies focusing on the association between probable sarcopenia and walking frequency are not sufficient. Iwasaka et al. suggested that 8000 steps per day could prevent sarcopenia (211). The decreased sum of walking as physical activity and utilitarian walking proved to contribute to a higher risk of sarcopenia (based on SARC-F) in older adults during the COVID-19 pandemic (180). On the other hand, sedentary behavior through perpetuating the anabolic resistance, may precipitate the decline of muscle mass and, eventually, muscle strength or function, a combination that leads to sarcopenia (212). In contrast, walking, described as low physical activity by the International Physical Activity Questionnaire Short Form (IPAQ-SF) is not associated with the risk of sarcopenia among Chinese community-dwelling older adults living alone (213). Low-intensity activities such as slow walking and light household chores may not act sufficiently as physiological stimuli for muscle strength maintenance among older adults; therefore, they may have no impact on the risk of probable sarcopenia (214). In addition, self-reported difficulty in walking 400 m is

related to a significantly higher risk of probable sarcopenia (215) which may explain the low walking frequency in some cases.

The present study offers evidence of possible relationships between different concepts of sarcopenia and characteristic and factors in daily life among older adults. Through a comprehensive geriatric assessment, health professionals may identify early signs of sarcopenia and proceed with successful management. Especially, nurses, due to the plenty of time spending with older adults in all settings, have a key role in the early detection of sarcopenia, using screening tools such as SARC-F (216). The reliability of SARC-Calf remains under consideration. Therefore, it must be further assessed in different populations. In addition, the recognition of possible related factors in daily life may help them refer earlier the persons at risk to a specialized medical team. However, future research needs to include large samples of older adults and use multiple methods for the assessment of related factors in daily life so that sarcopenia can precisely be related to specific, possibly reversed, modified factors.

11.1 Strengths and limitations of the study

Strengths of this study include the novelty of investigating the relationship between various aspects of sarcopenia and important daily life factors among community-dwelling older Greeks. Moreover, this study is the first in Greece which examines the validity of SARC-F against four currently agreed and commonly used definitions of sarcopenia. In addition, the combination of SARC-F with the measurement of CC was attempted and its validity was compared with that of SARC-F alone. On the other hand, this study has some limitations. Due to the small size of a convenience sample, the findings regarding the relationship between sarcopenia and daily life factors cannot be generalized to all older Greeks. Also, a BIA device for the assessment of muscle mass was used, instead of more precise, but expensive and less convenient techniques. Nevertheless, a BIA equation was used and BIA remains under some circumstances an acceptable method for the estimation of muscle mass (83). In addition, the measurement of CC may in some cases hide possible sarcopenic

obesity due to the intramuscular or subcutaneous adipose tissue deposition in obese subjects (71). Moreover, fatigue and sleep difficulties were self-reported, based on subjective criteria. Nevertheless, validated scales were used. Although objective methods of fatigue and sleep assessment exist, remain reliable but not always feasible and convenient (84,153).

Chapter 12

Conclusions

The increase in life expectancy brings older people more and more faced with age-related conditions. Sarcopenia is prevalent among older people and may lead to adverse health outcomes. Therefore, there is a critical need for researchers to investigate effective ways for the prevention, early detection, and treatment of sarcopenia. This study gave valuable insights into early sarcopenia screening and the existence of possible connections between risk for sarcopenia or probable sarcopenia and usual factors in everyday life. Health professionals in the community and multiple geriatric settings may consider these factors in their daily practice and assist in this way in the effective management of sarcopenia.

Health professionals and especially nurses could contribute to the early detection of sarcopenia, using the SARC-F screening tool. The Greek version of SARC-F could identify with accuracy community-dwelling older adults without sarcopenia. Those at risk for sarcopenia may then be referred for further examination. Thus, the older adults without risk for sarcopenia avoid the inconvenience involved in the diagnosis procedure (e.g., BIA measurement, DXA exam, blood tests). Moreover, the burden cost of this procedure is confined only for those in need. The functional status, self-reported fatigue, and sleep difficulties may predict the risk for sarcopenia. The higher walking frequency was associated with a lower incidence of probable sarcopenia. Aging seemed to be a risk factor for both probable, confirmed sarcopenia, and lower muscle strength. In addition, muscle strength, the basic characteristic of sarcopenia, was associated with factors such as gender, muscle mass, physical performance, number of medications, and alcohol consumption.

Recommendations for future research

There are a number of gaps in our knowledge around sarcopenia among older adults in research that follow from this study and would benefit from further research. First of all, consensus on the definition of sarcopenia is required to be reached by the scientific society, involved in the research for sarcopenia. Otherwise, the estimation of the sarcopenia prevalence and the investigation of relationships between sarcopenia and other factors will remain difficult. The utility of SARC-Calf needs to be further studied in more vulnerable populations, where the prevalence of sarcopenia is higher. For example, the assessment of SARC-Calf in nursing home residents may enhance its sensitivity.

Future research needs to include larger and different populations of older adults, to confirm associations between sarcopenia and demographic characteristics, chronic health disorders, prescribed medication, lifestyle factors, and habits in everyday life. It is already known that such factors are related to the mechanisms involved in sarcopenia pathway, but it remains not well understood how they exactly influence the beginning and the evolution of sarcopenia. Moreover, future research should clarify the causal relationship between sarcopenia and chronic health disorders and daily life factors such as functionality, fatigue, and sleep difficulties. This study explored if these factors could predict or contribute to sarcopenia. However, there is evidence that sarcopenia may lead to changes in sleep patterns or self-perceived fatigue. Therefore, prospective studies are needed to focus on the causal relationship between sarcopenia and daily life factors. These studies should also take into consideration the different population specificities such as the frailty status among nursing home residents or the gene expression, and the different diet, which characterize the different ethnicities.

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INVESTIGATION OF DAILY LIFE AMONG OLDER ADULTS WITH SARCOPENIA

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Abstract

Background: Sarcopenia is a muscle disorder, prevalent in the aging population. Sarcopenia leads to adverse health outcomes, such as falls, fractures, impaired functionality, and poor quality of life. Health professionals may prevent, delay, treat, and sometimes even reverse sarcopenia by way of early detection and evidence-based interventions. Nurses spend a lot of time working next to older adults. Therefore, their role in managing sarcopenia and the screening process is of great importance.

Objective: To investigate the relationship between sarcopenia and health indicators and factors of daily life in a sample of the Greek older population. More specifically

this study aims to translate and validate the SARC-F screening tool in Greek and explore the relationship between different concepts of sarcopenia and functionality, fatigue, and sleep patterns.

Methods: For the translation and validation of SARC-F the recommended steps by European Union Geriatric Medicine Society (EUGMS) Sarcopenia Special Interest Group were followed. The SARC-Calf tool was created by the combination of SARC-F and calf circumference. A cross-sectional study was conducted among community-dwelling older adults, using a convenience sampling method. The participants were recruited from July 2020 to October 2022, either as outpatients or their companions in a Greek public hospital or community settings and organizations. They were included in the study if they were ≥ 65 years old, able to walk with or without the use of an aid, able to communicate in Greek, willing to complete the survey, and provided written consent to participate. Individuals were excluded if they met the following criteria: severe cognitive disorders, making unreliable the communication and the information retrieval, having a pacemaker or implanted defibrillator due to the use of a bioimpedance analysis (BIA) device, suffering from acute or chronic health problems that do not allow them to answer questionnaires and perform the required measurements, providing no writing consent. Participant information was collected through face-to-face interviews. For the diagnosis of sarcopenia muscle strength was assessed by a digital hand-grip dynamometer, muscle mass by a BIA device, and physical performance by the 4-m walking test. Data were collected about demographic characteristics, medical history, medication use, and lifestyle factors. Barthel index (BI) was used to evaluate functional status. Self-reported fatigue was assessed using the Fatigue Severity Scale (FSS) and the Visual Analogue Scale (VAS). Sleep difficulties were retrieved by the Athens Insomnia Scale (AIS) and the sleep duration was self-reported.

Results: SARC-F was translated and cross-cultural adapted in Greek. In the pre-test 10 persons were recruited aged ≥ 65 years, 5 men and 5 women. The second population consisted of 22 persons aged ≥ 65 years, median age 71, range 65-97, 11 men, 11 women. Inter-rater and test-retest reliability determined by kappa index, both showed a total kappa index of $k = 1$; $p < 0.001$ (perfect agreement). Internal consistency by Cronbach's alpha was 0.657 which indicates an acceptable level of consistency. For the clinical validation of SARC-F and the investigation of possible

relationships between sarcopenia and factors in daily life, 100 community-dwelling older adults (median age 72.50 ± 9 years old, 59% women) were recruited. Based on the updated European Working Group on Sarcopenia in Older People definition (EWGSOP2), the prevalence of sarcopenia was 10% in the whole study population, 7% men and 3% women. The Greek version of SARC-F was assessed against four operational definitions of sarcopenia and probable sarcopenia. Based on the definition used for sarcopenia, its sensitivity ranged from 27 to 50%, specificity from 82.2 to 85.7%, negative predictive values (NPVs) between 66.7 and 93.8%, and positive predictive values (PPVs) were always below 60%. The SARC-Calf demonstrated improved specificity (95.6 to 98.4%) but lower sensitivity (10 to 20%) than SARC-F. NPV was similar to that of SARC-F, but PPV was much higher in all cases except for the definition by the Foundation of the National Institutes of Health (FNIH/3 criteria). SARC-F, against probable sarcopenia, demonstrated 42.1% sensitivity, 86.4% specificity, 42.1% PPV, and 86.4% NPV. SARC-Calf, against probable sarcopenia, indicated in contrast to SARC-F, lower sensitivity (10.5%), improved specificity (96.3%), similar NPV (82.1%), and PPV (40%). After the multivariate logistic regression, BI (OR 0.725; 95% CI 0.595 – 0.884, p = 0.001), VAS fatigue (OR 1.435; 95% CI 1.064 – 1.936, p = 0.018), and AIS (OR 1.306; 95% CI 1.053 – 1.620, p = 0.015) seem to predict SARC-F score. A positive association was found between age and probable sarcopenia (OR 1.205; 95% 1.090 – 1.333, p < 0.001) and confirmed sarcopenia (OR 1.192; 95% CI 1.078 – 1.317, p < 0.001). Walking frequency was found to be associated with probable sarcopenia (OR 0.231; 95% CI 0.057 – 0.943, p = 0.041). After multiple linear regression, muscle strength, the key characteristic of sarcopenia, was associated with age (coefficient b -0.356, 95% CI -0.523 – -0.190, p < 0.001), gender (coefficient b -11.107, 95% CI -13.738 – -8.475, p < 0.001), muscle mass (coefficient b 1.200, 95% CI 0.051 – 2.349, p = 0.041), physical performance (coefficient b 6.969, 95% CI 3.357 – 10.581, p < 0.001), number of medications (coefficient b -0.560, 95% CI -0.990 – -0.130, p = 0.011), and alcohol consumption (coefficient b -3.633, 95% CI -6.467 – -0.798, p = 0.013).

Conclusions: The Greek version of SARC-F demonstrated perfect inter-rater and test-retest reliability and an acceptable level of consistency. SARC-F appears to be a useful screening tool for nurses, precisely to rule out community-dwelling older adults without sarcopenia. Factors in daily life such as functional status, self-reported

fatigue, and sleep difficulties were associated with risk for sarcopenia, based on SARC-F questionnaire. Age was a risk factor for lower muscle strength, probable and confirmed sarcopenia. Walking frequency demonstrated a negative association with probable sarcopenia. Gender, muscle mass, physical performance, number of medications, and alcohol consumption could be used as a predictive indicators of muscle strength. Future research is required to focus on more vulnerable populations for the assessment of SARC-Calf and to include larger samples of older populations to determine significant relationships between sarcopenia and factors in daily life. Moreover, it is important for the future research to focus on the consensus regarding the definition and the diagnostic criteria for sarcopenia.

Keywords: sarcopenia, older adults, nurses, SARC-F, daily life

ΕΘΝΙΚΟΝ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ

ΤΜΗΜΑ ΝΟΣΗΛΕΥΤΙΚΗΣ

ΔΙΕΡΕΥΝΗΣΗ ΤΗΣ ΚΑΘΗΜΕΡΙΝΟΤΗΤΑΣ ΣΕ ΗΛΙΚΙΩΜΕΝΟΥΣ ΜΕ ΣΑΡΚΟΠΕΝΙΑ

ΠΑΝΑ ΑΝΑΣΤΑΣΙΑ
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Περίληψη

Εισαγωγή: Η σαρκοπενία είναι μια μυϊκή νόσος, ιδιαίτερα συχνή στους ηλικιωμένους. Η σαρκοπενία οδηγεί σε δυσμενείς εκβάσεις για την υγεία, όπως πτώσεις, κατάγματα, μειωμένη λειτουργικότητα και φτωχή ποιότητα ζωής. Οι επαγγελματίες υγείας μπορούν να προλάβουν, να καθυστερήσουν, να θεραπεύσουν και μερικές φορές ακόμη και να αναστρέψουν τη σαρκοπενία μέσω έγκαιρης ανίχνευσης και τεκμηριωμένων παρεμβάσεων. Οι νοσηλευτές περνούν πολύ χρόνο

δουλεύοντας δίπλα σε ηλικιωμένους. Ως εκ τούτου, ο ρόλος τους στη διαχείριση της σαρκοπενίας και στον προσυμπτωματικό έλεγχό της είναι πολύ σημαντικός.

Σκοπός: Η διερεύνηση της σχέσης της σαρκοπενίας με δείκτες υγείας και παράγοντες της καθημερινής ζωής σε δείγμα ηλικιωμένων του ελληνικού πληθυσμού. Πιο συγκεκριμένα, αυτή η μελέτη στοχεύει να μεταφράσει και να σταθμίσει το εργαλείο προσυμπτωματικού ελέγχου SARC-F στα ελληνικά και να διερευνήσει τη σχέση διάφορων εννοιών της σαρκοπενίας με τη λειτουργικότητα, την κόπωση και τον ύπνο.

Μεθοδολογία: Για τη μετάφραση και τη στάθμιση του SARC-F ακολουθήθηκαν τα προτιμώμενα βήματα της Ομάδας Ειδικού Ενδιαφέροντος για τη Σαρκοπενία της European Union Geriatric Medicine Society (EUGMS). Το εργαλείο SARC-Calf δημιουργήθηκε από το συνδυασμό του SARC-F με την περιφέρεια της κνήμης. Διεξήχθη συγχρονική μελέτη σε ηλικιωμένους που κατοικούν στην κοινότητα, χρησιμοποιώντας δειγματοληψία ευκολίας. Οι συμμετέχοντες συγκεντρώθηκαν από τον Ιούλιο του 2020 έως τον Οκτώβριο του 2022, είτε ως εξωτερικοί ασθενείς είτε ως οι συνοδοί τους σε ελληνικό δημόσιο νοσοκομείο ή στην κοινότητα και σε οργανώσεις. Συμπεριλήφθηκαν στη μελέτη εάν ήταν ≥ 65 ετών, ικανοί να περπατούν με ή χωρίς τη χρήση βοηθήματος, ικανοί να επικοινωνούν στην ελληνική γλώσσα, πρόθυμοι να ανταποκριθούν στην έρευνα και αν παρείχαν γραπτή συγκατάθεση για συμμετοχή. Αποκλείστηκαν όσοι πληρούσαν τα ακόλουθα κριτήρια: σοβαρές γνωστικές διαταραχές, καθιστώντας αναξιόπιστη την επικοινωνία και την ανάκτηση πληροφοριών, όσοι είχαν βηματοδότη ή εμφυτευμένο απινιδωτή λόγω της χρήσης συσκευής Βιοηλεκτρικής Εμπέδησης (BIA), όσοι έπασχαν από οξύ ή χρόνιο πρόβλημα υγείας που δεν τους επέτρεπε να απαντήσουν στα ερωτηματολόγια και να πραγματοποιήσουν τις απαιτούμενες μετρήσεις και όσοι δεν παρείχαν γραπτή συγκατάθεση. Οι πληροφορίες των συμμετεχόντων συλλέχθηκαν μέσω συνεντεύξεων πρόσωπο με πρόσωπο. Για τη διάγνωση της σαρκοπενίας η μυϊκή δύναμη αξιολογήθηκε με ψηφιακό δυναμόμετρο χειρολαβής, η μυϊκή μάζα με συσκευή BIA και η σωματική απόδοση με το τεστ βάδισης 4 μέτρων. Συλλέχθηκαν δεδομένα σχετικά με τα δημογραφικά χαρακτηριστικά, το ιατρικό ιστορικό, τη χρήση φαρμάκων και τον τρόπο ζωής. Ο δείκτης Barthel Index (BI) χρησιμοποιήθηκε για την αξιολόγηση της λειτουργικότητας των συμμετεχόντων. Η αυτοαναφερόμενη κόπωση αξιολογήθηκε χρησιμοποιώντας την Fatigue Severity Scale (FSS) και την Visual Analogue Scale (VAS). Οι δυσκολίες στον ύπνο εκτιμήθηκαν με την Athens

Insomnia Scale (AIS) και οι ίδιοι οι συμμετέχοντες προσδιόρισαν τη διάρκεια του ύπνου τους.

Αποτελέσματα: Το SARC-F μεταφράστηκε και προσαρμόστηκε στα ελληνικά. Στο pre-test πήραν μέρος 10 άτομα ηλικίας ≥ 65 ετών, 5 άνδρες και 5 γυναίκες. Κατόπιν, συμμετείχε μία δεύτερη ομάδα που αποτελούνταν από 22 άτομα ηλικίας ≥ 65 ετών, με διάμεση ηλικία τα 71 έτη, εύρος 65-97, 11 άνδρες, 11 γυναίκες. Η αξιοπιστία μεταξύ των βαθμολογητών και μεταξύ των διαδοχικών δοκιμών προσδιορίστηκε από τον δείκτη Kappa, και στις δύο περιπτώσεις ο συνολικός δείκτης Kappa ήταν k = 1. p < 0,001 (τέλεια συμφωνία). Η εσωτερική συνοχή αξιολογούμενη με τον συντελεστή Cronbach's alpha ήταν 0,657 που υποδηλώνει ένα αποδεκτό επίπεδο συνοχής. Για την κλινική στάθμιση του SARC-F και τη διερεύνηση πιθανών σχέσεων μεταξύ σαρκοπενίας και παραγόντων στην καθημερινή ζωή, πήραν μέρος 100 ηλικιωμένοι στην κοινότητα (διάμεση ηλικία 72,50 ± 9 έτη, 59% γυναίκες). Με βάση τον νεότερο ορισμό της European Working Group on Sarcopenia in Older People (EWGSOP2), ο επιπολασμός της σαρκοπενίας ήταν 10% σε ολόκληρο τον πληθυσμό της μελέτης, 7% στους άνδρες και 3% στις γυναίκες. Η ελληνική εκδοχή του SARC-F αξιολογήθηκε έναντι τεσσάρων λειτουργικών ορισμών της σαρκοπενίας και της πιθανής σαρκοπενίας. Με βάση τον εκάστοτε ορισμό που χρησιμοποιήθηκε για τη σαρκοπενία, η ευαισθησία του SARC-F κυμαινόταν από 27 έως 50%, η ειδικότητα από 82,2 έως 85,7%, η αρνητική προγνωστικές τιμή (NPV) μεταξύ 66,7 και 93,8% και η θετική προγνωστική τιμή (PPV) ήταν πάντα κάτω από 60%. Το SARC-Calf επέδειξε βελτιωμένη ειδικότητα (95,6 έως 98,4%) αλλά χαμηλότερη ευαισθησία (10 έως 20%) από το SARC-F. Η NPV ήταν παρόμοια με αυτή του SARC-F, αλλά η PPV ήταν πολύ υψηλότερη εκτός από την περίπτωση που χρησιμοποιήθηκε ο ορισμός του Foundation of the National Institutes of Health (FNIH με 3 κριτήρια). Το SARC-F, έναντι της πιθανής σαρκοπενίας, επέδειξε 42,1% ευαισθησία, 86,4% ειδικότητα, 42,1% PPV και 86,4% NPV. Το SARC-Calf, έναντι της πιθανής σαρκοπενίας, έδειξε σε σύγκριση με το SARC-F χαμηλότερη ευαισθησία (10,5%), βελτιωμένη ειδικότητα (96,3%), παρόμοια NPV (82,1%) και PPV (40%). Μετά την πολυμεταβλητή λογιστική παλινδρόμηση, ο BI (OR 0.725; 95% CI 0.595 – 0.884, p = 0.001), η κόπωση αξιολογούμενη με την VAS (OR 1.435; 95% CI 1.064 – 1.936, p = 0.018), και η AIS (OR 1.306; 95% CI 1.053 – 1.620, p = 0.015) φαίνεται να προβλέπουν τη βαθμολογία στο SARC-F. Θετική συσχέτιση βρέθηκε ανάμεσα στην ηλικία και την

πιθανή σαρκοπενία (OR 1.205; 95% 1.090 – 1.333, p < 0.001) και την επιβεβαιωμένη σαρκοπενία (OR 1.192; 95% CI 1.078 – 1.317, p < 0.001). Η συχνότητα βάδισης βρέθηκε να σχετίζεται με την πιθανή σαρκοπενία (OR 0,231; 95% CI 0,057 – 0,943, p = 0,041). Μετά από πολλαπλή γραμμική παλινδρόμηση, παρατηρήθηκε συσχέτιση ανάμεσα στη μυϊκή δύναμη, το βασικό χαρακτηριστικό της σαρκοπενίας, και την ηλικία (συντελεστής b -0,356, 95% CI -0,523 – -0,190, p < 0,001), το φύλο (συντελεστής b -11,107, 95% CI -13,738 – -8,475, p < 0,001), τη μυϊκή μάζα (συντελεστής b 1,200, 95% CI 0,051 – 2,349, p = 0,041), τη σωματική απόδοση (συντελεστής b 6,969, 95% CI 3,357 – 10,581, p < 0.001) τον αριθμό των λαμβανόμενων φαρμάκων (συντελεστής b -0,560, 95% CI -0,990 – -0,130, p = 0,011), και την κατανάλωση αλκοόλ (συντελεστής b -3,633, 95% CI -6,467 – -0,798, p = 0,013).

Συμπεράσματα: Η ελληνική εκδοχή του SARC-F επέδειξε τέλεια αξιοπιστία μεταξύ των αξιολογητών και μεταξύ των επαναληπτικών δοκιμών και αποδεκτό επίπεδο εσωτερικής συνοχής. Το SARC-F φαίνεται να είναι ένα χρήσιμο εργαλείο προσυμπτωματικού ελέγχου για νοσηλευτές, για να μπορούν με ακρίβεια να εντοπίζουν στην κοινότητα ηλικιωμένους χωρίς σαρκοπενία. Παράγοντες στην καθημερινή ζωή, όπως το επίπεδο λειτουργικότητας, η αυτοαναφερόμενη κόπωση και οι δυσκολίες στον ύπνο συσχετίστηκαν με τον κίνδυνο για σαρκοπενία, με βάση το ερωτηματολόγιο SARC-F. Η ηλικία ήταν ένας παράγοντας κινδύνου για χαμηλότερη μυϊκή δύναμη, πιθανή και επιβεβαιωμένη σαρκοπενία. Η συχνότητα βάδισης έδειξε αρνητική συσχέτιση με την πιθανή σαρκοπενία. Το φύλο, η μυϊκή μάζα, η σωματική απόδοση, ο αριθμός των ληφθέντων φαρμάκων και η κατανάλωση αλκοόλ θα μπορούσαν να χρησιμοποιηθούν ως προγνωστικοί δείκτες της μυϊκής δύναμης. Απαιτείται η μελλοντική έρευνα να επικεντρωθεί σε πιο ευάλωτους πληθυσμούς για την αξιολόγηση του SARC-Calf και να συμπεριλάβει μεγαλύτερο αριθμό ηλικιωμένων για να προσδιοριστούν σημαντικές σχέσεις μεταξύ της σαρκοπενίας και παραγόντων στην καθημερινή ζωή. Επίσης, είναι σημαντικό οι επόμενες έρευνες να εστιάσουν στην επίτευξη συμφωνίας ως προς τον ορισμό και τα διαγνωστικά κριτήρια της σαρκοπενίας.

Λέξεις – κλειδιά: σαρκοπενία, ηλικιωμένοι, νοσηλευτές, SARC-F, καθημερινότητα

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APPENDIX

Approval of the research protocol

ΕΘΝΙΚΟΝ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ
ΤΜΗΜΑ ΝΟΣΗΛΕΥΤΙΚΗΣ
ΕΠΙΤΡΟΠΗ ΗΘΙΚΗΣ ΚΑΙ ΔΕΟΝΤΟΛΟΓΙΑΣ

//

Αθήνα 28/1/2020
Αρ. Πρωτ.: 316

Προς: κ. Αναστασία Πανά

Καθηγήτρια Χρ. Λεμονίδου

Καθηγητής Ι. Μαντάς

Καθηγήτρια Δ. Παπαδάτου

Αναπλ. Καθηγητής Α. Σταματάκης

Επίκ. Καθηγήτρια Βενετία-Σοφία Βελονάκη

Θέμα: Έγκριση πραγματοποίησης ερευνητικής μελέτης με θέμα «**Διερεύνηση της καθημερινότητας και της χρήσης των υπηρεσιών υγείας σε ηλικιωμένους με σαρκοπενία**».

Η Επιτροπή Ηθικής και Δεοντολογίας του Τμήματος Νοσηλευτικής του Πανεπιστημίου Αθηνών, εγκρίνει το συνημμένο ερευνητικό πρωτόκολλο για την πραγματοποίηση επιστημονικής έρευνας με θέμα «**Διερεύνηση της καθημερινότητας και της χρήσης των υπηρεσιών υγείας σε ηλικιωμένους με σαρκοπενία**» καθόσον η έρευνα δεν προσκρούει σε θέματα ηθικής και δεοντολογίας.

Η ως άνω αναφερόμενη μελέτη θα πραγματοποιηθεί στο πλαίσιο διδακτορικής διατριβής της **ΥΔ κ. Αναστασίας Πανά,** με Επιβλέπουσα την Επίκ. Καθηγήτρια κ. Βενετία-Σοφία Βελονάκη.

ΓΙΑ ΤΗΝ ΕΠΙΤΡΟΠΗ

Καθηγήτρια Χρ. Λεμονίδου

ΕΘΝΙΚΟΝ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ
ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ
ΣΧΟΛΗ ΕΠΙΣΤΗΜΩΝ ΥΓΕΙΑΣ
ΤΜΗΜΑ ΝΟΣΗΛΕΥΤΙΚΗΣ

Ελληνική Γεροντολογική και Γηριατρική Εταιρεία

ΕΝΤΥΠΟ ΣΥΓΚΑΤΑΘΕΣΗΣ ΣΕ ΕΡΕΥΝΑ

Καλείστε να πάρετε μέρος σε έρευνα που διεξάγεται από το Εθνικό και Καποδιστηριακό Πανεπιστήμιο Αθηνών – Τμήμα Νοσηλευτικής και την Ελληνική Γεροντολογική και Γηριατρική Εταιρεία.

Σκοπός της έρευνας

Με τον όρο σαρκοπενία νοείται η απώλεια μυϊκής μάζας ή/και μυϊκής λειτουργίας. Βασικός σκοπός της έρευνας είναι η διερεύνηση της σχέσης της σαρκοπενίας με δημογραφικά στοιχεία και χαρακτηριστικά της καθημερινότητας σε δείγμα ατόμων της Τρίτης Ηλικίας του ελληνικού πληθυσμού. Επιπλέον σκοπός είναι η μετάφραση και η στάθμιση του ερωτηματολογίου SARC-F στα ελληνικά, το οποίο χρησιμοποιείται στη διεθνή βιβλιογραφία ως εργαλείο διαλογής (εντοπισμού) των σαρκοπενικών ατόμων Τρίτης Ηλικίας.

Διαδικασία

Εφόσον δεχτείτε να συμμετέχετε στην έρευνα, θα κληθείτε να απαντήσετε σε ερωτηματολόγιο που θα συλλέγει πληροφορίες για τα δημογραφικά σας χαρακτηριστικά, την κατάσταση της υγείας σας, τη λήψη φαρμάκων και τους παράγοντες που επηρεάζουν την υγεία, όπως διατροφικές, καπνιστικές συνήθειες και σωματική άσκηση. Θα γίνει καταγραφή παραμέτρων όπως είναι το βάρος, το ύψος, η περιφέρεια της μέσης, του ισχίου και η περίμετρος της κνήμης. Ο υπολογισμός της

μυϊκής μάζας θα γίνει με τη χρήση βιοηλεκτρικής εμπέδησης (BIA). Η αξιολόγηση της μυϊκής δύναμης θα βασίζεται στη δύναμη λαβής των χεριών με τη χρήση χειροδυναμόμετρου, ενώ η εκτίμηση της φυσικής δραστηριότητας θα περιλαμβάνει την ταχύτητα βάδισης τεσσάρων μέτρων. Θα ληφθεί επίσης δείγμα αίματος, στο οποίο θα εξεταστούν συγκεκριμένοι παράμετροι (25-υδροξυ βιταμίνη D, παραθορμόνη, ασβέστιο, φώσφορος, λόγος αιμοπεταλίων προς λεμφοκύτταρα (PLR), λόγος ουδετερόφιλων προς λεμφοκύταρρα (NLR), C-αντιδρώσα πρωτεΐνη (CRP) και αλβουμίνη. Επίσης, θα σας γίνουν ερωτήσεις που θα αφορούν στην ικανότητά σας να εκτελείτε τις καθημερινές σας δραστηριότητες, στην ποιότητα του ύπνου σας και σε τυχόν αίσθημα κόπωσης.

Ενδεχόμενοι κίνδυνοι

Η συμμετοχή στη μελέτη δεν ενέχει κινδύνους. Η αιμοληψία μπορεί να προκαλέσει σπάνια ελαφρύ πόνο, μικρή αιμορραγία, μώλωπες, ελαφρό αίσθημα ζάλης, και μόλυνση στο σημείο όπου μπαίνει η βελόνα στο σώμα. Οι μετρήσεις των αναφερόμενων παραμέτρων θα πραγματοποιηθούν από ειδικά εκπαιδευμένους επαγγελματίες υγείας.

Ενδεχόμενα οφέλη για της συμμετέχοντες και την κοινωνία

Θα έχετε την ευκαιρία να μάθετε πληροφορίες που αφορούν την υγεία της και να κάνετε δωρεάν συγκεκριμένες εξετάσεις. Η συμμετοχή της θα δώσει τη δυνατότητα στην ερευνητική ομάδα, να μελετήσει τα χαρακτηριστικά των ατόμων της Τρίτης Ηλικίας, αναφορικά με τη σαρκοπενία και να σχεδιάσει στοχευμένα προγράμματα προαγωγής της υγείας.

Εμπιστευτικότητα

Οι πληροφορίες που θα συγκεντρωθούν, θα είναι αυστηρά εμπιστευτικές και θα προστατεύονται από τους κανόνες του ιατρικού απορρήτου καθώς και από την νομοθεσία για την προστασία των προσωπικών δεδομένων. Σε δημοσιεύσεις ή

παρουσιάσεις, που θα αφορούν στη συγκεκριμένη μελέτη, δεν θα αποκαλυφθούν προσωπικά δεδομένα των συμμετεχόντων.

Ελευθερία συναίνεσης

Η συμμετοχή σας στην έρευνα είναι εθελοντική. Μπορείτε να αρνηθείτε να συμμετάσχετε ή να διακόψετε οποιαδήποτε στιγμή. Η συμμετοχή σας ή μη στη μελέτη δεν θα επηρεάσει τη φροντίδα υγείας που λαμβάνετε ή που θα λάβετε στο μέλλον.

Πληροφορίες

Αν έχετε οποιαδήποτε απορία ή ερώτηση είμαστε στη διάθεσή σας. Αν θέλετε επιπλέον διευκρινήσεις επικοινωνείστε με την επιστημονικά υπεύθυνη.

Στοιχεία επιστημονικά υπεύθυνου ερευνητή

Αναστασία Πανά
Email: natasa_pana@yahoo.com

Ημερομηνία …./…../….
Ονοματεπώνυμο συμμετέχοντος

Υπογραφή

Ονοματεπώνυμο ερευνητή/τριας

Υπογραφή

ΕΘΝΙΚΟΝ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ
ΤΜΗΜΑ ΝΟΣΗΛΕΥΤΙΚΗΣ

Ελληνική Γεροντολογική και Γηριατρική Εταιρεία

Επιδημιολογική Μελέτη

Επιπολασμός Σαρκοπενίας στην Τρίτη Ηλικία

Ημερομηνία:	……...
Δημογραφικά Στοιχεία	
Κωδικός συμμετέχοντα:	……
Φύλο:	□ Άνδρας □Γυναίκα
Ηλικία:	…….
Μορφωτικό επίπεδο:	□ Δημοτικό □ Γυμνάσιο □ Λύκειο □ ΙΕΚ – Ανώτερη Σχολή □ ΤΕΙ-Πανεπιστήμιο □ Μεταπτυχιακό □ Διδακτορικό
Ετήσιο εισόδημα:	□ <8.000€ □ 8.000-15.000€ □ >15.000€
Ιατρικό ιστορικό	
	□ Καρδιαγγειακές Παθήσεις (Αγγειακά Εγκεφαλικά Νοσήματα, Καρδιακές Ανεπάρκειες, Ισχαιμικές Καρδιοπάθειες). Παρακαλώ προσδιορίστε…… □ Καρκίνος. Παρακαλώ προσδιορίστε……
Χρόνιο νόσημα	□ Χρόνιες Πνευμονοπάθειες (Βρογχικό Άσθμα, Χρόνια Αποφρακτική Πνευμονοπάθεια). Παρακαλώ προσδιορίστε…… □ Σακχαρώδης Διαβήτης □ Αρτηριακή Υπέρταση □ Αρθρίτιδες – Οστεοαρθρίτιδες □ Αυτοάνοσα Νοσήματα

Φαρμακευτική αγωγή:	□ Λίθος ουροποιητικού □ Άλλο. Παρακαλώ προσδιορίστε…… …… …… ……
Ανθρωπομετρικά στοιχεία	
Βάρος:	……..kg
Ύψος:	……..m
Κατάσταση Βάρους το τελευταίο 6μηνο	□ % απώλεια βάρους [(Αρχικό Βάρος-Τρέχον Βάρος)/Αρχικό Βάρος] *100= ……. Ακούσια Εκούσια □ Σταθερό βάρος □ Πρόσληψη βάρους
Περιφέρεια μέσης	…….cm
Περιφέρεια λεκάνης	…….cm
Περιφέρεια κνήμης	……cm
Περιφέρεια μεσότητας βραχίονα	*.....cm*

Εργαστηριακές εξετάσεις	
25 (OH) D3	……. ng/ml
PLR (#Αιμοπετάλια/#Λεμφοκύτταρα)	…….
NLR (#Ουδετερόφιλα/#Λεμφοκύτταρα)	…….
CRP (C-αντιδρώσα πρωτεΐνη)	…….mg/L
Αλβουμίνη	…….g/dL
Ασβέστιο	…….mg/L
Φωσφόρος	…….mg/L
Παραθορμόνη (PTH)	…….pg/ml (ng/lt)

Υπολογισμός Σαρκοπενίας	Βιοηλεκτρική εμπέδηση (BIA)	Χειροδυναμόμετρο	Ταχύτητα βάδισης 4m/ Timed Up and Go test
Μυϊκή Μάζα			
Μυϊκή Δύναμη		……..kg	
Σωματική Απόδοση			……..m/s

Βοήθεια στο περπάτημα NAI / OXI

ΕΡΩΤΗΣΕΙΣ ΟΣΤΕΟΠΟΡΩΣΗΣ

1. ΚΑΤΑΓΜΑΤΑ; ΝΑΙ.... ΟΧΙ.....ΣΗΜΕΙΟ ΚΑΤΑΓΜΑΤΟΣ.....

2. ΑΠΟ ΠΤΩΣΗ; ΝΑΙ.... ΟΧΙ.....

3. ΠΟΣΕΣ ΦΟΡΕΣ ΠΕΣΑΤΕ ΤΟ ΤΕΛΕΥΤΑΙΟ ΕΤΟΣ;.....ΜΕ ΚΑΤΑΓΜΑ.....ΧΩΡΙΣ ΚΑΤΑΓΜΑ...

4. ΑΙΣΘΑΝΕΣΘΕ ΑΣΤΑΘΕΙΑ ΚΑΤΑ ΤΗ ΒΑΔΙΣΗ; ΝΑΙ..... ΟΧΙ.....

5. ΚΑΠΝΙΖΕΤΕ/ΚΑΠΝΙΖΑΤΕ; ΝΑΙ ..... ΟΧΙ .....

6. ΠΟΣΑ ΤΣΙΓΑΡΑ ΚΑΠΝΙΖΕΤΕ ΚΑΘΗΜΕΡΙΝΑ; .....

7. ΚΑΤΑΝΑΛΩΣΗ ΑΛΚΟΟΛ ΑΝΑ ΕΒΔΟΜΑΔΑ (ml/ημέρα, 100ml=1ποτήρι 12%)

0	< 300	300	400	500	600

8 ΑΣΚΗΣΗ

ΠΟΤΕ ΣΠΑΝΙΑ	1-2 ώρες/εβδομάδα	2+ ώρες/εβδομάδα

9 ΒΑΔΙΣΗ

Πάνω από 3 φορές/εβδομάδα για 15΄	Λιγότερο από 3 φορές/εβδομάδα	Καθόλου

10. ΈΧΕΤΕ ΚΑΝΕΙ ΜΕΤΡΗΣΗ ΟΣΤΙΚΗΣ ΠΥΚΝΟΤΗΤΑΣ; ΝΑΙ ..... ΟΧΙ .....

11. ΈΧΕΤΕ ΟΣΤΕΟΠΟΡΩΣΗ; ΝΑΙ ..... ΟΧΙ ..... ΔΕΝ ΓΝΩΡΙΖΩ…….

THE SARC-F QUESTIONNAIRE

SARC-F Screen for Sarcopenia

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0 Some = 1 A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2
Falls	How many times have you fallen in the past year?	None = 0 1–3 falls = 1 4 or more falls = 2

SARC-F ερωτηματολόγιο σαρκοπενίας

Ονοματεπώνυμο: Ηλικία:

Συνιστώσα	Ερώτηση	Βαθμολογία
Μυϊκή δύναμη	Πόσο δυσκολεύεστε να σηκώσετε και να μεταφέρετε 5 κιλά;	Καθόλου = 0 Λίγο = 1 Πολύ μεγάλη δυσκολία ή πλήρης ανικανότητα = 2
Βοήθεια στο περπάτημα	Πόσο δυσκολεύεστε να περπατήσετε μέσα σ' ένα δωμάτιο;	Καθόλου = 0 Λίγο = 1 Πολύ μεγάλη δυσκολία, με χρήση βοηθημάτων ή πλήρης ανικανότητα = 2
Έγερση από καθιστή θέση	Πόσο δυσκολεύεστε να σηκωθείτε από την καρέκλα ή το κρεβάτι;	Καθόλου = 0 Λίγο = 1 Πολύ μεγάλη δυσκολία, ή μόνο με βοήθεια = 2
Ανέβασμα σκάλας	Πόσο δυσκολεύεστε να ανεβείτε 10 σκαλοπάτια;	Καθόλου = 0 Λίγο = 1 Πολύ μεγάλη δυσκολία ή πλήρης ανικανότητα = 2
Πτώσεις	Πόσες φορές έχετε πέσει τους τελευταίους 12 μήνες;	Καμία = 0 1-3 πτώσεις = 1 4 ή περισσότερες πτώσεις = 2

Υποσημείωση: Ως παράδειγμα των 5 κιλών αναφέρεται η δυσκολία να σηκώσει κάποιος και να μεταφέρει 2,5 κιλά ντομάτες και 2,5 κιλά πατάτες με τα δύο χέρια

BARTHEL INDEX

THE BARTHEL INDEX

Patient Name: _____
Rater Name: _____
Date: _____

Activity	Score
FEEDING 0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent	_____
BATHING 0 = dependent 5 = independent (or in shower)	_____
GROOMING 0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)	_____
DRESSING 0 = dependent 5 = needs help but can do about half unaided 10 = independent (including buttons, zips, laces, etc.)	_____
BOWELS 0 = incontinent (or needs to be given enemas) 5 = occasional accident 10 = continent	_____
BLADDER 0 = incontinent, or catheterized and unable to manage alone 5 = occasional accident 10 = continent	_____
TOILET USE 0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	_____
TRANSFERS (BED TO CHAIR AND BACK) 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent	_____
MOBILITY (ON LEVEL SURFACES) 0 = immobile or < 50 yards 5 = wheelchair independent, including corners, > 50 yards 10 = walks with help of one person (verbal or physical) > 50 yards 15 = independent (but may use any aid; for example, stick) > 50 yards	_____
STAIRS 0 = unable 5 = needs help (verbal, physical, carrying aid) 10 = independent	_____
TOTAL (0–100):	_____

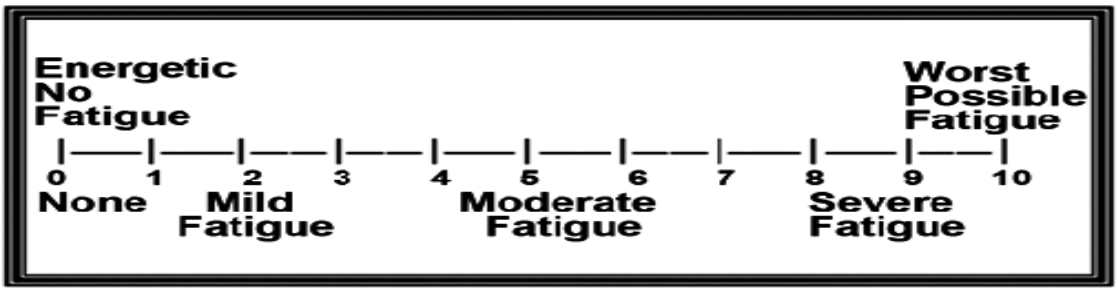
Κλίμακα Barthel

Σίτιση
0= ανίκανος
5= χρειάζεται βοήθεια για τον τεμαχισμό, την επάλειψη
του βουτύρου κ.λπ. ή απαιτεί τροποποίηση διατροφής
10= ανεξάρτητος
Μπάνιο
0= εξαρτώμενος
5= ανεξάρτητος (ή ντους)
Περιποίηση
0= χρήζει βοηθείας για την προσωπική φροντίδα
5= ανεξάρτητος: πρόσωπο/ μαλλιά/ δόντια/ ξύρισμα (τα υλικά του παρέχονται)
Ντύσιμο
0= εξαρτώμενος
5= χρειάζεται βοήθεια, αλλά μπορεί να κάνει περίπου το μισά μόνος του
10= ανεξάρτητος (για κουμπιά, φερμουάρ, κορδόνια κ.λπ.)
Ακράτεια κοπράνων
0= ακράτεια (ή θα πρέπει να δοθεί κλύσμα)
5= περιστασιακό ατύχημα
10= δεν πάσχει από ακράτεια κοπράνων
Ουροδόχος κύστη
0= ακράτεια ούρων, ή καθετήρας και ανίκανος να διαχειριστεί μόνος του
5= περιστασιακό ατύχημα
10= δεν πάσχει από ακράτεια ούρων
Χρήση τουαλέτας
0= εξαρτώμενος
5= χρειάζεται κάποια βοήθεια, αλλά μπορεί να κάνει κάτι μόνος
10= ανεξάρτητος (να καθίσει / να σηκωθεί, ντύσιμο, σκούπισμα)
Μεταφορά (από το κρεβάτι και πίσω)
0= αδυναμία, δεν δύναται να καθίσει
5= χρήζει μείζονα βοήθεια (ένα ή δύο άτομα), μπορεί να καθίσει
10= χρήζει λίγη βοηθείας (λεκτική ή σωματική)
15= ανεξάρτητος
Κινητικότητα
0= μη ικανός να περπατήσει ή <45 μέτρα
5= αναπηρική καρέκλα ανεξάρτητος, συμπεριλαμβανομένων των γωνιών, >45 μέτρα
10= περπατά με τη βοήθεια ενός ατόμου (λεκτικής ή σωματικής) >45 μέτρα
15= ανεξάρτητος
Σκάλες
0= ανίκανος
5= χρειάζεται βοήθεια (λεκτική, σωματική, χρήση υποβοηθήματος)
10= ανεξάρτητος

FATIGUE SEVERITY SCALE

	Scores 1 = Strongly Disagree; 7 = Strongly Agree						
1. My motivation is lower when I am fatigued.	1	2	3	4	5	6	7
2. Exercise brings on my fatigue.	1	2	3	4	5	6	7
3. I am easily fatigued.	1	2	3	4	5	6	7
4. Fatigue interferes with my physical functioning.	1	2	3	4	5	6	7
5. Fatigue causes frequent problems for me.	1	2	3	4	5	6	7
6. My fatigue prevents sustained physical functioning.	1	2	3	4	5	6	7
7. Fatigue interferes with carrying out certain duties and responsibilities.	1	2	3	4	5	6	7
8. Fatigue is among my three most disabling symptoms.	1	2	3	4	5	6	7
9. Fatigue interferes with my work, family, or social life.	1	2	3	4	5	6	7

VISUAL ANALOGUE SCALE



ΚΛΙΜΑΚΑ ΣΟΒΑΡΟΤΗΤΑΣ ΚΟΠΩΣΗΣ

Οδηγίες: Κατωτέρω υπάρχει μια σειρά από δηλώσεις σχετικές με την κόπωση σας.

Με τον όρο κόπωση εννοούμε μια αίσθηση κούρασης, έλλειψη ενεργητικότητας ή γενικής εξάντλησης.

Παρακαλούμε διαβάστε κάθε δήλωση και επιλέξτε έναν αριθμό από το 1 έως το 7, όπου ο αριθμός 1 δηλώνει ότι διαφωνείτε απόλυτα με τη δήλωση και ο αριθμός 7 ότι συμφωνείτε απόλυτα.

Παρακαλούμε απαντήστε σε αυτές τις ερωτήσεις λαμβάνοντας υπόψη το πώς αισθανόσασταν τις τελευταίες ΔΥΟ ΕΒΔΟΜΑΔΕΣ.

Κυκλώστε τον αριθμό που αντιπροσωπεύει την απάντηση σας, σε κάθε ερώτηση ξεχωριστά.

	Διαφωνώ Απόλυτα						Συμφωνώ Απόλυτα
1. Η διάθεση μου μειώνονται όταν κουράζομαι	1	2	3	4	5	6	7
2. Η σωματική άσκηση μου αυξάνει την κούραση	1	2	3	4	5	6	7
3. Κουράζομαι εύκολα	1	2	3	4	5	6	7
4. Η κούραση με επηρεάζει αρνητικά στις σωματικές μου δραστηριότητες (πχ. δουλειές στο σπίτι)	1	2	3	4	5	6	7
5. Η κούραση συχνά μου προκαλεί προβλήματα	1	2	3	4	5	6	7
6. Η κούραση με εμποδίζει να καταπιάνομαι για ώρα με σωματική δραστηριότητα (πχ. ψώνια, δουλειές στο σπίτι)	1	2	3	4	5	6	7
7. Η κούραση με επηρεάζει αρνητικά να ανταπεξέλθω στα καθήκοντα και υποχρεώσεις μου (πχ. εργασία)	1	2	3	4	5	6	7
8. Η κούραση είναι ένα από τα τρία βασικά συμπτώματα που με δυσκολεύουν σοβαρά στην καθημερινή μου ζωή	1	2	3	4	5	6	7
9. Η κούραση με επηρεάζει αρνητικά στη δουλειά, στην οικογένεια και στο κοινωνικό μου περιβάλλον	1	2	3	4	5	6	7

ATHENS INSOMNIA SCALE

Athens Insomnia Scale

ID:_____ Age:_____ Sex:_____ Date:_____

Instructions: This scale is intended to record your own assessment of any sleep difficulty you might have experienced. Please, check (by circling the appropriate number) the items below to indicate your estimate of any difficulty, provided that it occurred at least three times per week during the last month[a]

Sleep induction (time it takes you to fall asleep after turning-off the lights)
0: No problem 1: Slightly delayed 2: Markedly delayed 3: Very delayed or did not sleep at all

Awakenings during the night
0: No problem 1: Minor problem 2: Considerable problem 3: Serious problem or did not sleep at all

Final awakening earlier than desired
0: Not earlier 1: A little earlier 2: Markedly earlier 3: Much earlier or did not sleep at all

Total sleep duration
0: Sufficient 1: Slightly insufficient 2: Markedly insufficient 3: Very insufficient or did not sleep at all

Overall quality of sleep (no matter how long you slept)
0: Satisfactory 1: Slightly unsatisfactory 2: Markedly unsatisfactory 3: Very unsatisfactory or did not sleep at all

Sense of well-being during the day
0: Normal 1: Slightly decreased 2: Markedly decreased 3: Very decreased

Functioning (physical and mental) during the day
0: Normal 1: Slightly decreased 2: Markedly decreased 3: Very decreased

Sleepiness during the day
0: None 1: Mild 2: Considerable 3: Intense

ATHENS INSOMNIA SCALE

Αυτή η κλίμακα έχει σκοπό να καταγράψει την δική σας εκτίμηση σχετικά με τις δυσκολίες που μπορεί να αντιμετωπίσατε στον ύπνο. Παρακαλώ, επιλέξτε (κυκλώνοντας τον κατάλληλο αριθμό) τα ερωτήματα που δηλώνουν σύμφωνα με την εκτίμηση σας τον βαθμό δυσκολίας, με την προϋπόθεση ότι συνέβησαν τουλάχιστον τρεις φορές την εβδομάδα κατά τη διάρκεια του περασμένου μήνα.

1. ΕΝΑΡΞΗ ΥΠΝΟΥ *(χρόνος που χρειάζεστε για να αποκοιμηθείτε μετά από το σβήσιμο των φώτων)*

0 Κανένα πρόβλημα	**1** Μικρή καθυστέρηση	**2** Σημαντική καθυστέρηση d	**3** Μεγάλη καθυστέρηση η δεν κοιμηθήκατε καθόλου

2. ΞΥΠΝΗΜΑΤΑ ΜΕΣΑ ΣΤΗ ΝΥΧΤΑ

0 Κανένα πρόβλημα	**1** Μικρό πρόβλημα	**2** Σημαντικό πρόβλημα	**3** Σοβαρό πρόβλημα η δεν κοιμηθήκατε καθόλου

3. ΤΕΛΙΚΗ ΑΦΥΠΝΙΣΗ ΝΩΡΙΤΕΡΑ ΑΠΟ ΤΗΝ ΕΠΙΘΥΜΗΤΗ

0 Όχι νωρίτερα	**1** Λίγο νωρίτερα	**2** Σημαντικά νωρίτερα	**3** Πολύ νωρίτερα η δεν κοιμηθήκατε καθόλου

4. ΣΥΝΟΛΙΚΗ ΔΙΑΡΚΕΙΑ ΥΠΝΟΥ

0 Επαρκής	**1** Ελαφρά ανεπαρκής	**2** Σημαντικά ανεπαρκής	**3** Πολύ ανεπαρκής η δεν κοιμηθήκατε καθόλου

5. ΣΥΝΟΛΙΚΗ ΠΟΙΟΤΗΤΑ ΥΠΝΟΥ *(ανεξάρτητα από τη διάρκεια του ύπνου)*

0 Ικανοποιητική	1 Ελαφρά Μη ικανοποιητική	**2** Σημαντικά Μη ικανοποιητική	**3** Πολύ μη ικανοποιητική η δεν κοιμηθήκατε καθόλου

6. ΑΙΣΘΗΣΗ ΕΥΕΞΙΑΣ ΚΑΤΑ ΤΗ ΔΙΑΡΚΕΙΑ ΤΗΣ ΗΜΕΡΑΣ

0 Φυσιολογική	**1** Ελαφρά μειωμένη	**2** Σημαντικά μειωμένη	**3** Πολύ μειωμένη

7. ΛΕΙΤΟΥΡΓΙΚΟΤΗΤΑ(ΣΩΜΑΤΙΚΗ ΚΑΙ ΝΟΗΤΙΚΗ)ΣΤΗ ΔΙΑΡΚΕΙΑ ΤΗΣ ΜΕΡΑΣ

0 Φυσιολογική	**1** Ελαφρά μειωμένη	**2** Σημαντικά μειωμένη	**3** Πολύ μειωμένη

8. ΥΠΝΗΛΙΑ ΣΤΗ ΔΙΑΡΚΕΙΑ ΤΗΣ ΗΜΕΡΑΣ

0 Καθόλου	**1** Ήπια	**2** Αρκετή	**3** Έντονη

ΧΡΗΣΙΜΟΠΟΙΕΙΤΕ ΦΑΡΜΑΚΑ ΓΙΑ ΝΑ ΚΟΙΜΗΘΕΙΤΕ;

ΝΑΙ	ΌΧΙ	ΠΕΡΙΣΤΑΣΙΑΚΑ

ΑΝ ΧΡΗΣΙΜΟΠΟΙΕΙΤΕ ΦΑΡΜΑΚΑ ΓΙΑ ΝΑ ΚΟΙΜΗΘΕΙΤΕ. ΑΥΤΑ ΕΙΝΑΙ:

ΦΥΤΙΚΑ	ΦΑΡΜΑΚΕΥΤΙΚΑ

ΠΟΣΕΣ ΩΡΕΣ ΚΟΙΜΑΣΤΕ ΤΟ ΒΡΑΔΥ (ΑΠΟ ΤΗΝ ΩΡΑ ΠΟΥ ΘΑ ΣΑΣ ΠΑΡΕΙ Ο ΎΠΝΟΣ ΜΕΧΡΙ ΝΑ ΑΝΟΙΞΕΤΕ ΤΑ ΜΑΤΙΑ ΣΑΣ ΚΑΙ ΝΑ ΜΗΝ ΞΑΝΑΚΟΙΜΗΘΕΙΤΕ); ……

Related Publications

European Geriatric Medicine
https://doi.org/10.1007/s41999-020-00399-8

REVIEW

Association between muscle strength and sleep quality and duration among middle-aged and older adults: a systematic review

Anastasia Pana[1,2,3] · Panayota Sourtzi[1,2] · Athina Kalokairinou[1,2] · Alexandros Pastroudis[2,3] · Stamatios-Theodoros Chatzopoulos[3] · Venetia Sofia Velonaki[1,2]

Received: 2 July 2020 / Accepted: 11 September 2020

Key summary points

Aim To investigate the association between sleep quality and duration and muscle strength among community-dwelling middle-aged and older adults.

Findings According to the present review, it seems that there is an association between sleep quality and duration with handgrip strength among middle-aged and older adults. The results for the gender-specific impact and the different sleep duration (short or long or both) are inconsistent.

Message Health professionals should conduct geriatric assessment and consider the possible coexistence of impaired sleep with weak muscle strength, especially in older adults who are at high risk of sarcopenia, frailty or functional limitations.

Abstract

Purpose To examine the relationship between sleep quality and duration and muscle strength among community-dwelling middle-aged and older adults.

Methods A systematic review was conducted from March 2020 until May 2020. Searches were done for peer-reviewed and English-written articles reporting results of studies in PubMed, Embase, Scopus, Cochrane Library, and in article references lists. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses was used as well as the Newcastle–Ottawa Scale (NOS) to appraise the methodological quality.

Results Twenty-one cross-sectional, three prospective studies and a total of 92,363 subjects were included. The majority of the included studies are classified as "high quality". Handgrip strength is the main method of muscle strength assessment. Sleep assessment is usually conducted using subjective measures, such as validated sleep scales or self-reported questionnaires. Actigraphy, as an objective measure, is used less often. Most studies support strong evidence on the association between weak muscle strength and poor sleep quality and duration among middle-aged and older adults; whereas the results for the gender-specific association and the impact of short or long sleep duration were inconclusive.

Conclusion This review has identified strong evidence on the relationship between sleep quality and duration and muscle strength among middle-aged and older adults. Health professionals should consider this relationship as a component of geriatric assessment in community practice and geriatric settings. Future rigorous research with a combination of subjective and objective measurements is needed to explore whether gender and specific sleep duration are related to muscle strength.

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s41999-020-00399-8) contains supplementary material, which is available to authorized users.

✉ Anastasia Pana

Journal Pre-proof

Association between self-reported or perceived fatigue and falls among older people: a systematic review

Anastasia Pana, RN, PhDc, RN, Panayota Sourtzi, PhD, RN, Athina Kalokairinou, PhD, RN, Alexandros Pastroudis, MD, Stamatios-Theodoros Chatzopoulos, MD, Venetia Sofia Velonaki, PhD, RN

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Sarcopenia and polypharmacy among older adults: A scoping review of the literature

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ARTICLE INFO

Keywords:
Polypharmacy
Sarcopenia
Number of medications
Multiple medication

ABSTRACT

Background: Sarcopenia and polypharmacy are both prevalent conditions in the geriatric population, leading to poor quality of life and adverse outcomes.
Objective: To explore the evidence on the relationship between sarcopenia and polypharmacy and to summarize the findings and the gaps from the existing literature.
Method: A systematic scoping review was conducted between March and May 2021, with no restriction on publication date, using the Arksey and O'Malley framework and reported according to PRISMA-ScR. Four bibliographic databases, PubMed, Web of Science, Scopus, Proquest One Academic, and four sources of gray literature were searched for studies written in English or Greek. Data were extracted quantitatively and using thematic analysis.
Results: Of the 397 initially retrieved records, 22 studies were finally included in this review, 20 published articles and 2 posters-presentations. Most of the studies used cross-sectional data. The relationship between sarcopenia and polypharmacy should be interpreted on the basis of the definition of polypharmacy, the diagnostic criteria of sarcopenia used, and the population setting. Sarcopenia or risk for sarcopenia are associated with polypharmacy or the number of medications in community-dwelling older adults, regardless of diagnostic criteria used for sarcopenia.
Conclusion: There is an association between sarcopenia or risk for sarcopenia and polypharmacy or the number of medications in community-dwelling older adults but not among residents of nursing homes or inpatients. Specific widely accepted definitions of polypharmacy and sarcopenia, a consensus on the method of sarcopenia assessment, and prospective studies are needed to identify polypharmacy as a potential risk factor for sarcopenia.

Vol. 2022

Nurses' Key Role in the Early Detection of Sarcopenia among Older People

REVIEWS

Published 2022-09-21

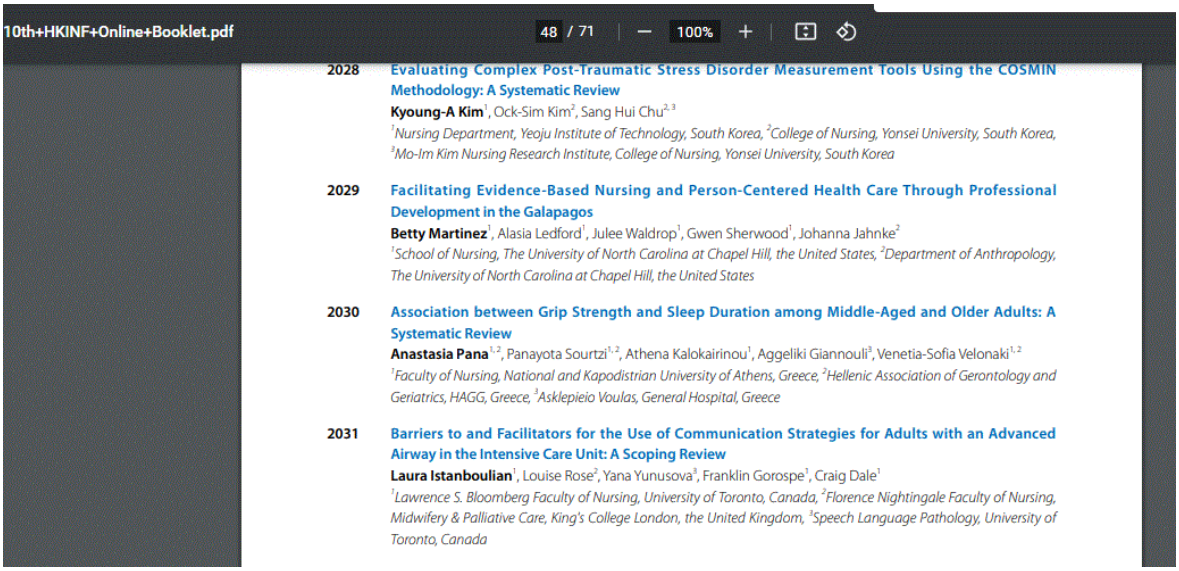
Anastasias Pana [+], Panayota Sourtzi [+], Athina Kalokairinou [+], Venetia Sofia Velonaki [+]

Abstract

Sarcopenia, the loss of muscle strength and mass with age, is becoming more frequent among older people and is recognized as a risk factor for falls, disability, and mortality. Sarcopenia can be prevented, delayed, treated, and sometimes even reversed using effective interventions such as early detection. Available screening tools implemented by health professionals can contribute to the early recognition of people at risk for sarcopenia. In this review, we discuss the vital role of nurses, as gatekeepers to care, in the screening process of sarcopenia and the concept of screening as being a part of the professional nursing autonomous roles by presenting the existing evidence regarding the contribution of nurses in the screening interventions for sarcopenia.

Related Posters

1. *10th Hong Kong International Nursing Forum cum, 3rd Sigma Asia Region Conference (7-8 December 2020)*



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Kyoung-A Kim[1], Ock-Sim Kim[2], Sang Hui Chu[2,3]
[1]Nursing Department, Yeoju Institute of Technology, South Korea, [2]College of Nursing, Yonsei University, South Korea, [3]Mo-Im Kim Nursing Research Institute, College of Nursing, Yonsei University, South Korea

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[1]School of Nursing, The University of North Carolina at Chapel Hill, the United States, [2]Department of Anthropology, The University of North Carolina at Chapel Hill, the United States

2030 **Association between Grip Strength and Sleep Duration among Middle-Aged and Older Adults: A Systematic Review**
Anastasia Pana[1,2], Panayota Sourtzi[1,2], Athena Kalokairinou[1], Aggeliki Giannouli[3], Venetia-Sofia Velonaki[1,2]
[1]Faculty of Nursing, National and Kapodistrian University of Athens, Greece, [2]Hellenic Association of Gerontology and Geriatrics, HAGG, Greece, [3]Asklepieio Voulas, General Hospital, Greece

2031 **Barriers to and Facilitators for the Use of Communication Strategies for Adults with an Advanced Airway in the Intensive Care Unit: A Scoping Review**
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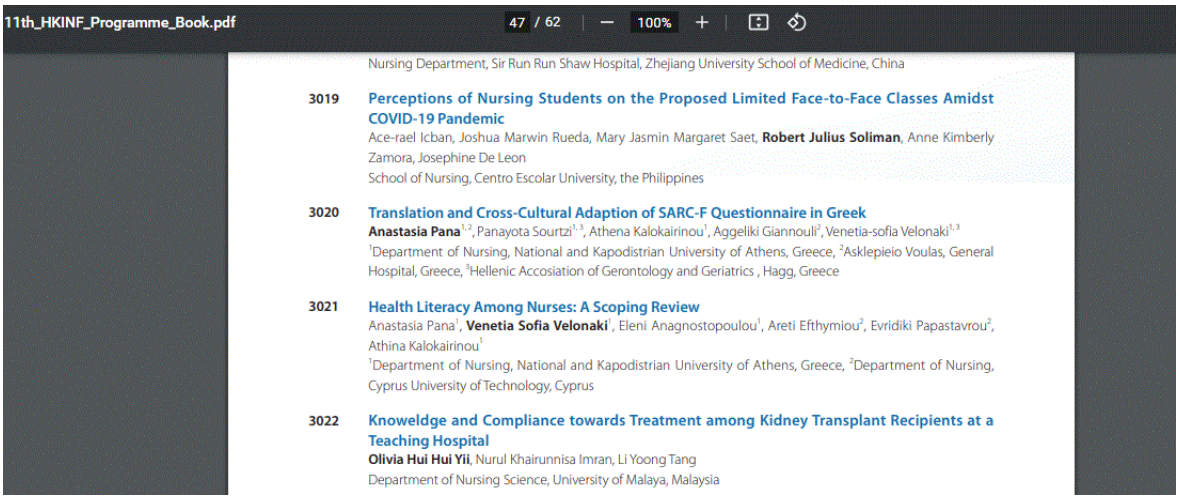
[1]Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Canada, [2]Florence Nightingale Faculty of Nursing, Midwifery & Palliative Care, King's College London, the United Kingdom, [3]Speech Language Pathology, University of Toronto, Canada

2. *11th Hong Kong International Nursing Forum (8-9 December 2021)*



Nursing Department, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, China

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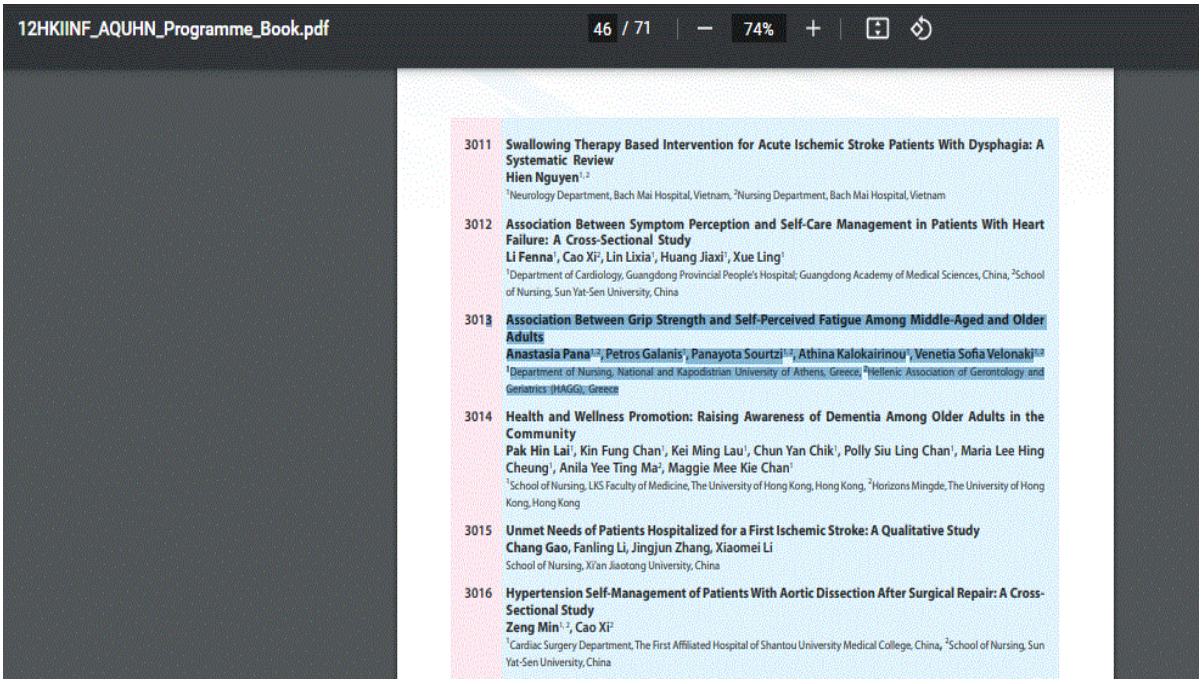
Anastasia Pana[1,2], Panayota Sourtzi[1,3], Athena Kalokairinou[1], Aggeliki Giannouli[2], Venetia-sofia Velonaki[1,3]
[1]Department of Nursing, National and Kapodistrian University of Athens, Greece, [2]Asklepieio Voulas, General Hospital, Greece, [3]Hellenic Accosiation of Gerontology and Geriatrics , Hagg, Greece

3021 **Health Literacy Among Nurses: A Scoping Review**
Anastasia Pana[1], **Venetia Sofia Velonaki**[1], Eleni Anagnostopoulou[1], Areti Efthymiou[2], Evridiki Papastavrou[2], Athina Kalokairinou[1]
[1]Department of Nursing, National and Kapodistrian University of Athens, Greece, [2]Department of Nursing, Cyprus University of Technology, Cyprus

3022 **Knoweldge and Compliance towards Treatment among Kidney Transplant Recipients at a Teaching Hospital**
Olivia Hui Hui Yii, Nurul Khairunnisa Imran, Li Yoong Tang
Department of Nursing Science, University of Malaya, Malaysia

3. *12th Hong Kong International Nursing Forum cum 1st Asia-Pacific Qualitative Health Research Network (AQUHN) Conference (30 November – 2 December 2022)*


12HKIINF_AQUHN_Programme_Book.pdf 46 / 71 74%

3011 **Swallowing Therapy Based Intervention for Acute Ischemic Stroke Patients With Dysphagia: A Systematic Review**
Hien Nguyen[1,2]
[1]Neurology Department, Bach Mai Hospital, Vietnam, [2]Nursing Department, Bach Mai Hospital, Vietnam

3012 **Association Between Symptom Perception and Self-Care Management in Patients With Heart Failure: A Cross-Sectional Study**
Li Fenna[1], Cao Xi[2], Lin Lixia[1], Huang Jiaxi[1], Xue Ling[1]
[1]Department of Cardiology, Guangdong Provincial People's Hospital; Guangdong Academy of Medical Sciences, China, [2]School of Nursing, Sun Yat-Sen University, China

3013 **Association Between Grip Strength and Self-Perceived Fatigue Among Middle-Aged and Older Adults**
Anastasia Pana[1,2], Petros Galanis[3], Panayota Sourtzi[1,2], Athina Kalokairinou[1], Venetia Sofia Velonaki[1,2]
[1]Department of Nursing, National and Kapodistrian University of Athens, Greece; [2]Hellenic Association of Gerontology and Geriatrics (HAGG), Greece

3014 **Health and Wellness Promotion: Raising Awareness of Dementia Among Older Adults in the Community**
Pak Hin Lai[1], Kin Fung Chan[1], Kei Ming Lau[1], Chun Yan Chik[1], Polly Siu Ling Chan[1], Maria Lee Hing Cheung[1], Anila Yee Ting Ma[2], Maggie Mee Kie Chan[1]
[1]School of Nursing, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong, [2]Horizons Mingde, The University of Hong Kong, Hong Kong

3015 **Unmet Needs of Patients Hospitalized for a First Ischemic Stroke: A Qualitative Study**
Chang Gao, Fanling Li, Jingjun Zhang, Xiaomei Li
School of Nursing, Xi'an Jiaotong University, China

3016 **Hypertension Self-Management of Patients With Aortic Dissection After Surgical Repair: A Cross-Sectional Study**
Zeng Min[1,2], Cao Xi[2]
[1]Cardiac Surgery Department, The First Affiliated Hospital of Shantou University Medical College, China, [2]School of Nursing, Sun Yat-Sen University, China

4. *Panhellenic Conference of ESNE (3-6 May 2023)*


50ο ΣΥΡΟΣ ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΕΘΝΙΚΟΥ ΣΥΝΔΕΣΜΟΥ ΝΟΣΗΛΕΥΤΩΝ ΕΛΛΑΔΟΣ
3 – 6 ΜΑΙΟΥ 2023

2η Ημέρα • Πέμπτη 4 Μαΐου 2023

ΟΥΣΑ Ε POSTERS

3

ΚΗ ΥΓΕΙΑ ΚΑΙ ΝΟΣΗΛΕΥΤΙΚΟ ΕΠΑΓΓΕΛΜΑ
σίρα Στεργιανή
Αξιωματικών Νοσηλευτικής, Βύρωνας, Αττική

4

ΤΗΤΑ ΖΩΗΣ ΑΣΘΕΝΩΝ ΜΕ ΚΟΛΟΣΤΟΜΙΑ
Ιωάννα
τρια , Τμήμα Νοσηλευτικής, ΔΙΠΑΕ, Αλεξάνδρεια Παν/πολη

5

ΡΟΦΟΡΗΣΗ ΝΟΣΗΛΕΥΟΜΕΝΩΝ ΑΣΘΕΝΩΝ
μιχάλης Παπαμιχαήλ Μιχαήλ[1], Ιωαννίδης Ιορδάνης[1], Πολυκανδριώτη Μαρία[2]
τής Νοσηλευτικής Πανεπιστημίου Δυτικής Αττικής
γήτρια Νοσηλευτικής Πανεπιστημίου Δυτικής Αττικής

6

ΡΕΤΟΓΟΝΟΙ ΠΑΡΑΓΟΝΤΕΣ ΣΤΑ ΤΡΑΠΕΖΙΚΑ ΚΑΤΑΣΤΗΜΑΤΑ ΚΑΙ Η ΕΠΙΔΡΑΣΗ ΤΟΥΣ

2η Ημέρα • Πέμπτη 4 Μαΐου 2023

ΑΙΘΟΥΣΑ Ε POSTERS

ΑΑ038

ΣΤΑΘΜΙΣΗ ΣΤΗΝ ΕΛΛΗΝΙΚΗ ΓΛΩΣΣΑ ΤΟΥ ΕΡΩΤΗΜΑΤΟΛΟΓΙΟΥ ΔΙΑΛΟΓΗΣ ΤΗΣ ΠΙΘΑΝΗΣ ΣΑΡΚΟΠΕΝΙΑΣ "SARC-F" ΣΕ ΗΛΙΚΙΩΜΕΝΟΥΣ ΣΤΗΝ ΚΟΙΝΟΤΗΤΑ
Πανά Αναστασία[1], Σουρτζή Παναγιώτα[2], Καλοκαιρινού Αθηνά[3], Βελονάκη Βενετία Σοφία[4]
[1] ΠΕ Νοσηλεύτρια, MSc, Υποψήφια Διδάκτορας του Τμήματος Νοσηλευτικής ΕΚΠΑ
[2] Καθηγήτρια Νοσηλευτικής της Υγιεινής της Εργασίας, Τμήμα Νοσηλευτικής ΕΚΠΑ
[3] Καθηγήτρια Κοινοτικής Νοσηλευτικής, Τμήμα Νοσηλευτικής ΕΚΠΑ
[4] Επίκουρη Καθηγήτρια Νοσηλευτικής Ηθικής και Νομικής Ευθύνης, Τμήμα Νοσηλευτικής ΕΚΠΑ

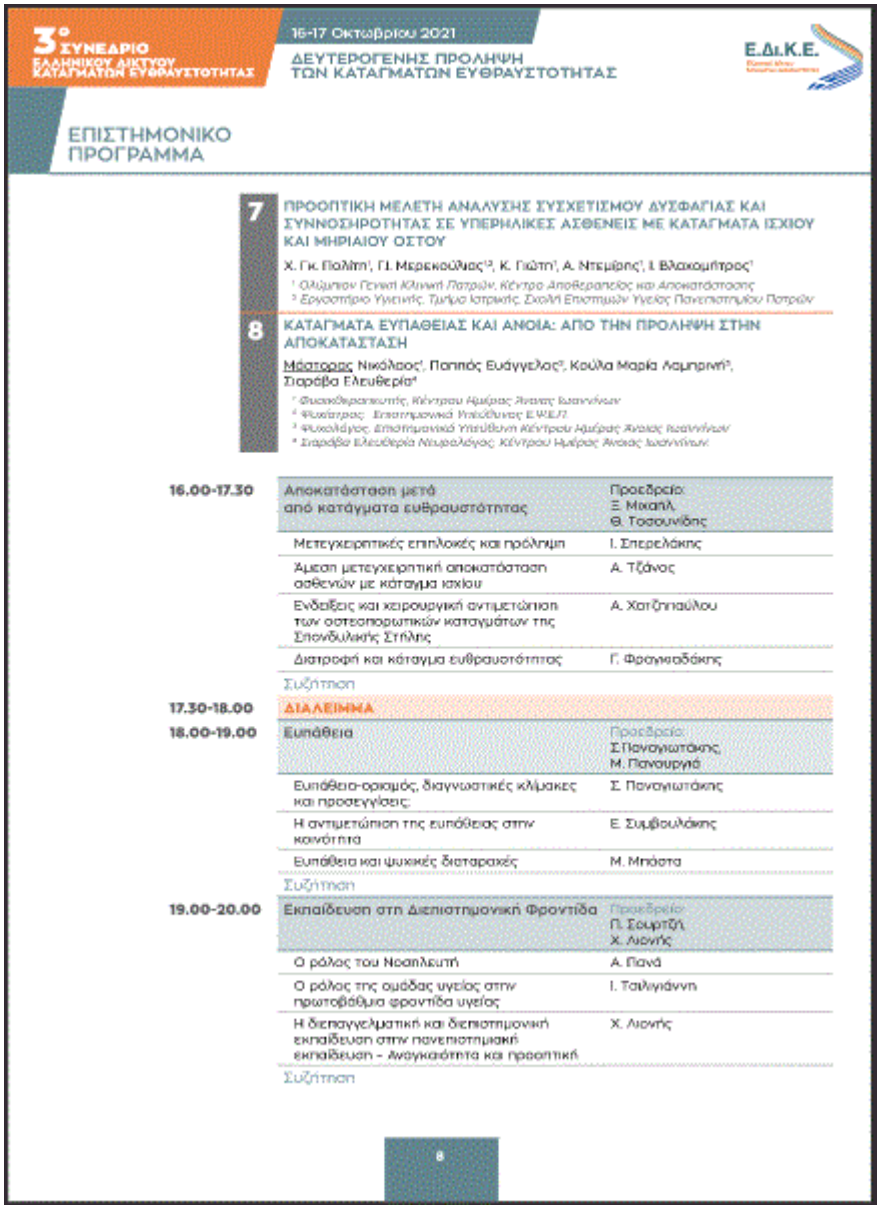
ΑΑ039

ΑΝΑΓΚΕΣ ΕΚΠΑΙΔΕΥΣΗΣ ΤΩΝ ΑΤΥΠΩΝ ΦΡΟΝΤΙΣΤΩΝ ΑΣΘΕΝΩΝ ΜΕ ΑΝΟΙΑ ΚΑΙ ΥΠΟΣΤΗΡΙΞΗ ΤΟΥΣ ΑΠΟ ΤΟΥΣ ΝΟΣΗΛΕΥΤΕΣ
Μπουζούκα Ευανθία, Παπουτσή Λαμπρινή, Φούτρου Αννίτα
Προπτυχιακές Φοιτήτριες Τμήματος Νοσηλευτικής του Πανεπιστημίου Δυτικής Αττικής

ΑΑ040

ΠΑΡΕΜΒΑΣΗ ΣΕ ΟΙΚΟΓΕΝΕΙΕΣ ΜΕ ΠΑΙΔΙ ΣΤΟ ΦΑΣΜΑ ΤΟΥ ΑΥΤΙΣΜΟΥ- Ο ΡΟΛΟΣ ΤΟΥ ΝΟΣΗΛΕΥΤΗ

Related Lectures



3ο ΣΥΝΕΔΡΙΟ ΕΛΛΗΝΙΚΟΥ ΔΙΚΤΥΟΥ ΚΑΤΑΓΜΑΤΩΝ ΕΥΘΡΑΥΣΤΟΤΗΤΑΣ

16-17 Οκτωβρίου 2021

ΔΕΥΤΕΡΟΓΕΝΗΣ ΠΡΟΛΗΨΗ ΤΩΝ ΚΑΤΑΓΜΑΤΩΝ ΕΥΘΡΑΥΣΤΟΤΗΤΑΣ

Ε.Δι.Κ.Ε.

ΕΠΙΣΤΗΜΟΝΙΚΟ ΠΡΟΓΡΑΜΜΑ

7 ΠΡΟΟΠΤΙΚΗ ΜΕΛΕΤΗ ΑΝΑΛΥΣΗΣ ΣΥΣΧΕΤΙΣΜΟΥ ΔΥΣΦΑΓΙΑΣ ΚΑΙ ΣΥΝΝΟΣΗΡΟΤΗΤΑΣ ΣΕ ΥΠΕΡΗΛΙΚΕΣ ΑΣΘΕΝΕΙΣ ΜΕ ΚΑΤΑΓΜΑΤΑ ΙΣΧΙΟΥ ΚΑΙ ΜΗΡΙΑΙΟΥ ΟΣΤΟΥ

Χ. Γκ. Παλίτη[1], Γ. Μερεκούλιας[1,2], Κ. Γιώτη[1], Α. Ντεμίρης[1], Ι. Βλαχομήτρος[1]

[1] Ολύμπιον Γενικό Κλινικό Πατρών, Κέντρο Αποθεραπείας και Αποκατάστασης
[2] Εργαστήριο Υγιεινής, Τμήμα Ιατρικής, Σχολή Επιστημών Υγείας Πανεπιστημίου Πατρών

8 ΚΑΤΑΓΜΑΤΑ ΕΥΠΑΘΕΙΑΣ ΚΑΙ ΑΝΟΙΑ: ΑΠΟ ΤΗΝ ΠΡΟΛΗΨΗ ΣΤΗΝ ΑΠΟΚΑΤΑΣΤΑΣΗ

Μάστορας Νικόλαος[1], Παππάς Ευάγγελος[2], Κούλα Μαρία Λαμπρινή[3], Σιαράβα Ελευθερία[4]

[1] Φυσικοθεραπευτής, Κέντρου Ημέρας Άνοιας Ιωαννίνων
[2] Ψυχίατρος, Επιστημονικά Υπεύθυνος Ε.Ψ.Ε.Π.
[3] Ψυχολόγος, Επιστημονικά Υπεύθυνη Κέντρου Ημέρας Άνοιας Ιωαννίνων
[4] Σιαράβα Ελευθερία Νευρολόγος, Κέντρου Ημέρας Άνοιας Ιωαννίνων

16.00-17.30	**Αποκατάσταση μετά από κατάγματα ευθραυστότητας**	Προεδρείο: Ξ. Μιχαήλ, Θ. Τσουνίδης
	Μετεγχειρητικές επιπλοκές και πρόληψη	Ι. Σπερελάκης
	Άμεση μετεγχειρητική αποκατάσταση ασθενών με κάταγμα ισχίου	Α. Τζάνος
	Ενδείξεις και χειρουργική αντιμετώπιση των οστεοπορωτικών καταγμάτων της Σπονδυλικής Στήλης	Α. Χατζηπαύλου
	Διατροφή και κάταγμα ευθραυστότητας	Γ. Φραγκιαδάκης
	Συζήτηση	
17.30-18.00	**ΔΙΑΛΕΙΜΜΑ**	
18.00-19.00	**Ευπάθεια**	Προεδρείο: Σ.Παναγιωτάκης, Μ. Πανουργιά
	Ευπάθεια-ορισμός, διαγνωστικές κλίμακες και προσεγγίσεις	Σ. Παναγιωτάκης
	Η αντιμετώπιση της ευπάθειας στην κοινότητα	Ε. Συμβουλάκης
	Ευπάθεια και ψυχικές διαταραχές	Μ. Μπάστα
	Συζήτηση	
19.00-20.00	**Εκπαίδευση στη Διεπιστημονική Φροντίδα**	Προεδρείο: Π. Σουρτζή, Χ. Λιονής
	Ο ρόλος του Νοσηλευτή	Α. Πανά
	Ο ρόλος της ομάδας υγείας στην πρωτοβάθμια φροντίδα υγείας	Ι. Ταλιγιάννη
	Η διεπαγγελματική και διεπιστημονική εκπαίδευση στην πανεπιστημιακή εκπαίδευση – Αναγκαιότητα και προοπτική	Χ. Λιονής
	Συζήτηση	

8

1ος Κύκλος Σεμιναρίων Ορθογηριατρικής Νοσηλευτικής Φροντίδας

Επόμενα Σεμινάρια

Παρασκευή 13/1/23 (19.00)

Πτώσεις και Δευτερογενής Πρόληψη Καταγμάτων Ευθραυστότητας.

Εισηγητές: **-Αγγελική Αθανασοπούλου,** *RN, MSc, Προϊσταμένη Παθολογικής Κλινικής ΓΝ Καλαμάτας*

-Αναστασία Πανά, *RN, MSc, PhD(c), ΓΝ Ασκληπιείο Βούλας*

-Ελευθερία Αντωνιάδου, *Φυσίατρος, PhD, Centre Hospitalier du Nord Luxembourg*

Προεδρείο: **-Αμπραχίμ Σάρα Ελένη,** *RN, Msc, PgD (edu), PhD(c), ΓΝ Αττικής "ΚΑΤ"*

-Κοθώνας Κωνσταντίνος, *RN, MSc, 401 ΓΣΝΑ*

Παρασκευή 17/2/23 (19.00)

Delirium

Εισηγητές: **- Παναγιώτα Γαρδέλη,** *MSc, PhD, Καθηγήτρια Νοσηλευτικής ΤΕΕ*

- Άρης Υφαντής, *RMHN, PgDip(ed), MSc, PhDmed, ΓΝ Λαμίας, Vice President 4th Dep.Hellenic Regulatory Body of Nurses Thessalia & Central Greece*

-Θεοφάνης Βορβολάκος, *Επίκουρος Καθηγητής, Δημοκρίτειο Παν. Θράκης*

Προεδρείο: **-Γαμβρούλη Μαρία,** *RN, MSICP, PgDip (ED), MSHCM, PhD (c), ΕΚΠΑ*

-Καζαντζίδου Όλγα, *RN, Ορθοπαιδική κλινική ΓΝΘ «Παπαγεωργίου»*

Τετάρτη 15/3/23 (19.00)

Σχεδιασμός εξόδου και Αποκατάσταση

Εισηγητές: **-Πέτρος Κολοβός,** *Αναπληρωτής Καθηγητής, Πανεπιστήμιο Σπάρτης*

-Αρετή Νικηφόρου, *MSc, Προϊσταμένη Γρ. Εκπαίδευσης, ΚΑΑ Φιλοκτήτης*

-Φωτεινή Αναστασίου, *Γενική Ιατρός, PhD, Διευθύντρια 4ης ΤΟΜΥ Ηρακλείου*

Προεδρείο: **-Παντελάκη Μαρία,** *RN, MSc, Χειρουργείο, ΓΝ Βενιζέλειο*

-Σειραγάκης Επαμεινώνδας, *RN, MSc, Προϊστ. Γρ. Εκπαίδευσης & Ποιότητας Metropolitan Hospital*

Προηγούμενα Σεμινάρια

Τετάρτη 14/11/22 (19.00)

Μεθοδολογία έρευνας

Εισηγητές: **-Πέτρος Γαλάνης,** *Επίκουρος Καθηγητής, Τμήμα Νοσηλευτικής, Πανεπιστήμιο Πελοποννήσου*

-Ολυμπία Κωνσταντακοπούλου, *Οικονομολόγος-Στατιστικός, ΕΚΠΑ*

Προεδρείο: **-Γεωργουσοπούλου Βασιλική,** *RN, PhD, Γρ. Εκπαίδευσης ΓΝ Αλεξανδρούπολης*

-Μωύσογλου Ιωάννης, *RN, PhD , Αν. Προϊστάμενος ΓΝ Λαμίας*

Μπορείτε να παρακολουθήσετε το σεμινάριο ΕΔΩ.

Υπό την αιγίδα

ΕΝΕ ΕΝΩΣΗ ΝΟΣΗΛΕΥΤΩΝ ΕΛΛΑΔΟΣ

ΕΣΝΕ