THE ASSOCIATION BETWEEN COGNITIVE FUNCTION, SLEEP QUALITY AND PSYCHOSOCIAL STATUS AMONG OLDER ADULTS WITH SARCOPENIA AND POSSIBLE SARCOPENIA IN KELANTAN

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by

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Dissertation submitted in partial fulfilment of the requirements for the degree of Bachelor of Health Science (Honours) (Dietetics)

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CERTIFICATE

This is to certify that the dissertation entitled “The Association Between Cognitive Function, Sleep Quality and Psychosocial Status among Older Adults with Sarcopenia and Possible Sarcopenia in Kelantan” is the bona fide record of research work done by Ms Loo Jia Yee during the period from October 2023 to July 2024 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the degree of Bachelor of Health Science (Honours) (Dietetics).

DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

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PERKAITAN ANTARA FUNGSI KOGNITIF, KUALITI TIDUR DAN STATUS PSIKOSOSIAL DALAM KALANGAN ORANG TUA YANG SARKOPENIA DAN BERKEMUNGKINAN SARKOPENIA DI KELANTAN

ABSTRAK

Sarcopenia boleh mempengaruhi keupayaan kognitif orang tua, kualiti tidur dan keadaan psikososial akibat penuaan. Matlamat kajian ini adalah untuk mengenal pasti perkaitan antara fungsi kognitif, kualiti tidur dan status psikososial dalam kalangan orang tua dengan kemungkinan sarkopenia dan sarkopenia. Satu kajian keratan rentas telah dijalankan dalam kalangan 92 orang warga tua dengan sarkopenia dan kemungkinan sarkopenia menggunakan teknik persampelan mudah di Kelantan berumur 60 tahun dan ke atas. Indeks Jisim Otot Rangka (SMI), kekuatan cengkaman tangan (HGS) dan *Short Physical Performance Battery* (SPPB) digunakan untuk menentukan status sarkopenia. *Montreal Cognitive Assessment* (MOCA) telah digunakan untuk menilai kemerosotan kognitif melalui proses pemeriksaan kognitif yang cepat. *Pittsburgh Sleep Quality Index* (PSQI) ialah ukuran dalaman yang konsisten dan sah bagi kualiti tidur yang dilaporkan sendiri yang terdiri daripada skor global PSQI 21 item. *Flourishing Scale* (FS) dicipta untuk menilai kesejahteraan dalam bidang keyakinan, perhubungan, harga diri dan tujuan hidup. Latar belakang sosiodemografik, sejarah perubatan, ukuran antropometrik dan komposisi badan turut disertakan semasa sesi temu duga. Min dan sisihan piawai umur ialah 69.05 ± 6.35. 51 subjek (55.4%) adalah lelaki dan 41 subjek (44.6%) adalah perempuan. Terdapat perkaitan yang signifikan secara statistik antara fungsi kognitif dan jantina. Walau bagaimanapun, didapati tiada perkaitan yang signifikan secara statistik antara kualiti tidur dan jantina serta tiada perbezaan yang signifikan skor median status psikososial antara lelaki dan wanita. Daripada 92 subjek, didapati 80 subjek (87%)

mempunyai fungsi kognitif yang lemah dan 18 subjek (19.6%) mempunyai kualiti tidur yang lemah. Seterusnya, didapati tiada perkaitan yang signifikan secara statistik antara kualiti tidur dan fungsi kognitif, manakala terdapat perbezaan yang signifikan skor skala berkembang antara fungsi kognitif normal dan gangguan kognitif ringan serta antara fungsi kognitif normal dan demensia. Walau bagaimanapun, kajian lanjut perlu dijalankan untuk memberikan pemahaman yang jelas tentang mekanisme fungsi kognitif, kualiti tidur dan status psikososial dalam sarcopenia untuk mencegah atau melambatkan kejadian keadaan ini.

THE ASSOCIATION BETWEEN COGNITIVE FUNCTION, SLEEP QUALITY AND PSYCHOSOCIAL STATUS AMONG OLDER ADULTS WITH SARCOPENIA AND POSSIBLE SARCOPENIA IN KELANTAN

ABSTRACT

Sarcopenia may influence an elderly's cognitive ability, quality of sleep and psychosocial condition due to aging. The aim of this study was to explore the association between cognitive function, sleep quality and psychosocial status among older adults with sarcopenia and possible sarcopenia. A cross-sectional study was conducted among 92 older adults with possible sarcopenia and sarcopenia using convenience sampling technique in Kelantan aged 60 years old and above. Skeletal Muscle Mass Index (SMI), hand grip strength (HGS) and Short Physical Performance Battery (SPPB) was used to determine sarcopenia status. Montreal Cognitive Assessment (MOCA) was used to assess cognitive impairment through a quick cognitive screening process. Pittsburgh Sleep Quality Index (PSQI) was an internally consistent and valid measure of self-reported sleep quality that made up of the global score of the 21-item PSQI. Flourishing Scale (FS) was created to assess wellness in the areas of optimism, relationships, self-esteem, and life purpose. Sociodemographic data, medical history, anthropometric measurement and body composition were also included during interview. The mean and standard deviation of age was 69.05 ± 6.35. 51 subjects (55.4%) were male and 41 subjects (44.6%) were female. There is statistically significant association between cognitive function and gender. However, it was found that there is no statistically significant association between sleep quality and gender as well as there is no significant difference of the median psychosocial status score between men and women. Out of 92 subjects, it was discovered that 80 subjects (87%) have poor cognitive function and 18 subjects (19.6%) have poor

sleep quality. Next, it was found that there is no statistically significant association between sleep quality and cognitive function, whereas there are significant different of flourishing scale score between normal cognitive function and mild cognitive impairment as well as between normal cognitive function and dementia. Nonetheless, further studies should be carried out to provide clear understanding on mechanism of cognitive function, sleep quality and psychosocial status in sarcopenia to prevent or delayed the incidence of this condition.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Sarcopenia is a widespread skeletal muscle condition that causes rapid depletion of muscle mass as well as function and is linked to more negative effects, such as higher risk of falling, decline in functionality, frailty, and death (Cruz-Jentoft et al., 2019). It is classified into two types: possible sarcopenia and proven sarcopenia. Low muscular strength or poor physical performance were considered indicators of possible sarcopenia, whereas low muscle mass combined either low muscle strength or poor physical performance indicated confirmed sarcopenia. Severe sarcopenia is the additional term for reduced muscular mass, poor strength of muscles, and low physical performance that occur at the same time (Chang et al., 2021). Older people frequently suffer from sarcopenia (Cruz-Jentoft et al., 2019). Even though the wide variations in diagnostic classifications, assessment techniques, and cut-off points that cause reported prevalence of sarcopenia differ from each other, a recent systematic review of published research conducted globally estimated that the overall prevalence of the condition ranges from 0.2% to 86.5% (Petermann-Rocha et al., 2021).

The operational description and clinical criteria of sarcopenia were modified in 2018 by the European Working Group on Sarcopenia in Older People (EWGSOP2), suggested utilising reduced muscle mass and poor muscular strength as indicators for the diagnosis (Cruz-Jentoft et al., 2019). However, the most recent 2019 consensus of the Asian Working Group for Sarcopenia (AWGS) also argued that sarcopenia diagnosis depends on the evaluation of mass of muscles, strength of muscles, and gait speed (GS) (Chen et al., 2020). Thus, by including the idea of "probable sarcopenia" in the EWGSOP2 definition, muscular strength is highlighted as an indicator for additional

evaluation and therapies (Sobestiansky et al., 2019). The AWGS has developed a diagnostic algorithm based on the research that is currently available in Asian countries such as China, Hong Kong, Japan, Korea, Malaysia, Taiwan, and Thailand with an emphasis on the epidemiology of sarcopenia (Arai et al., 2014). Even though sarcopenia risk typically rises with age (Petermann-Rocha et al., 2021), sarcopenia's pathophysiology is still not fully understood as it includes a complex interaction between sedentary behaviour, ageing, being obese, inflammation and oxidative stress which have an impact on mass of muscles and function (Molino et al., 2015).

The research has extensively demonstrated that the risk of cognitive deterioration is elevated in sarcopenia (Cipolli et al., 2019). Specifically, a cross-sectional study involving 3025 women aged 75 years old and above showed a correlation between cognitive ability and muscular strength—a key feature of sarcopenia. It is not well understood which cognitive areas are impacted by muscular strength. Although it is thought that muscle mass is a predictor of cognitive decline, there is inconsistent evidence linking muscle mass to cognitive impairment (Sui et al., 2020). Even though the precise processes underlying this relationship are currently unknown, risk factors may contribute to the explanation of the correlation between sarcopenia and cognitive decline. It has been shown that there is direct communication between the brain and muscles through the release of myokines brought on by exercise (Chen et al., 2020; Severinsen & Pedersen, 2020). Exercise preserved and improved metabolism and cognitive abilities (Cotman et al., 2007, Mattson, 2012) as well as slow down the progression of neurological disorders (Agudelo et al., 2014). It also causes muscle cells, which are metabolically active, to create and release myokines. It was suggested that the name "exerkines" be used to refer to all components released during exercise (Perdersen, 2019).

Sleep is a routine daily living practise. People who sleep longer or shorter periods of time are more prone to develop sarcopenia, which raises the possibility of injuries and fatalities (Harknett et al., 2020; Ida et al., 2019; Lucassen et al., 2017). Lack of sleep may be a factor in sarcopenia, muscular degeneration, deteriorating muscle strength, and slow walking (Fu et al., 2017; Hu et al., 2017; Pana et al., 2021). Sleep is linked to a process of both mental and physiological recovery (Buchmann et al., 2016). Furthermore, the maintenance of circadian rhythms can be affected by ageing and the occurrence of several chronic illnesses, such as sarcopenia (Vitale et al., 2019). Maintaining circadian rhythm is crucial for maintaining skeletal muscle performance, metabolism, and cellular physiology. As a result, individual who did not get the required amount of sleep each day may be at higher risk of dying earlier in life (Hirshkowitz et al., 2015). Additionally, insufficient sleep may impair cognitive function and increase the risk of falling and death in the elderly (Ancoli-Israel & Cooke, 2005). On the other hand, prolonged periods of sleep were linked to a slower pace of walking and reduced grip strength, but not to a decrease in muscle mass. In earlier work, they looked at the cross-sectional relationship between physical frailty and sleep length. It was found that longer sleep duration was linked to greater rates of weakness and slowness (Nakakubo et al., 2018). Further research also revealed that longer sleep duration was linked to decreased muscular strength in older persons (Chen et al., 2017; Auyeung et al., 2015).

Additionally, psychosocial status is also crucial. According to a recent review research (Tieland et al., 2018), self-efficacy, social isolation, social capital, fear of falling, resilience, depression, and social networks were all known to have a direct impact on sarcopenia, as well as influence them indirectly through lifestyle choices. Research has shown that those who dine alone (Tani et al., 2015) or have small social networks (Boulos et al., 2016) were more likely to have psychological problems that contribute to nutritional

deficiencies. There were 31 residents of residential care apartment complexes (RCACs) who participated in a research that assessed the relationship between muscle mass, strength, and function relation to depressive symptoms, social support, and exercise self-efficacy. It was demonstrated that those with strong social support networks, no signs of depression, and a high degree of self-efficacy had statistically higher levels of muscle mass, strength, and function (Taani et al., 2018).

1.2 Problem Statement

Globally, the number of persons over 65 has been rising in recent years, making the prevention of age-related illnesses such as sarcopenia a major social concern (Dennison et al., 2017). Because of the potential for significant cost increases resulting from increased hospitalisation frequency and length as well as an increase in falls due to weakness in the muscles (Antunes et al., 2016; Beaudart et al., 2017), this condition has emerged as a major worldwide public health concern (Shafiee et al., 2017). Furthermore, a large loss of muscle mass increases the risk of osteoporosis (Cruz-Jentoft et al., 2019) and bone fractures, making sarcopenia a serious health issue that has to be addressed in order to identify potential risk factors. The current lack of agreement on cut-off points complicates the diagnosis of sarcopenia (Scisciola et al., 2021).

While sarcopenia risk regularly rises with age (Petermann-Rocha et al., 2021), the pathogenesis is still unclear and most likely complicated. According to recent research, sarcopenia may be linked to worse cognitive function, nonetheless this link has not been conclusively shown in the literature. Even though a systematic study has been conducted on the relationship between sarcopenia and cognitive decline (Chang et al., 2016), the relationship between both was unclear in relation to various definitions of the sarcopenia. Furthermore, certain important variables like the research population and geographic region haven't been covered before (Peng et al., 2020).

The influence of sleep quality such as hours of sleep on muscle mass has been studied through correlational research, and the results indicate that a decrease in sleep duration or quality results in a loss of muscle mass (Chen et al., 2017). Nonetheless, disparities exist in the findings of several contemporary investigations concerning sarcopenia and sleep. At the same time, Pourmotabbed et al., (2019) did not conduct subgroup analyses due to a limited number of included studies and lack of information on the prevalence of sarcopenia among elderly who slept for extended periods of time or short periods of time. There were no meta-analyses available that discuss the period of time or what quality of people sleep affects the risk of sarcopenia (Li et al., 2023).

It is well known that psychosocial status contribute to nutritional deficiencies in elderly since research indicated that individuals who eat by themselves (Tani et al., 2015) or have small social networks (Boulos et al., 2016) were more prone to experience depression and malnutrition. This may increase the risk of sarcopenia. Studies on the psychological risk factors of cognitive impairment were few, despite earlier research on the risk factors for cognitive impairment (Brommelhoff et al., 2009; da Silva et al., 2013; Gao et al., 2012; Li, 2011; Schweitzer et al., 2002). The possibility that depression might cause cognitive impairment is unknown (Schweitzer et al., 2002). Therefore, we would like to investigate the prevalence of possible sarcopenia and sarcopenia among older adults to find out the development of sarcopenia is associated with cognitive function, sleep quality and psychosocial status so that we can have more understanding on the relationship between each other and be prepared for prevention and intervention in the future. Understanding the connection between sarcopenia and cognitive function may help with dementia prevention and treatment planning that is more suitable (Peng et al., 2020). Next, the findings from this study can aid in the discussion of the need for therapies to enhance sleep quality and lessen the bad influences of age-associated sarcopenia, as

well as the necessity of considering sleep quality and as risk factor (Rubio-Arias et al., 2019). In addition, understand the relationship between psychosocial status such as family support, social support and depression and sarcopenia may also help to point up actions that need to be implemented for developing a healthy psychosocial status for population of community-dwelling older adults in Kelantan.

1.3 Research Questions

The following questions are sought to be answered at the end of the study:-

i. What is the cognitive function status among older adults with sarcopenia and possible sarcopenia in Kelantan?
ii. How is the sleep quality status among older adults with sarcopenia and possible sarcopenia in Kelantan?
iii. What is the psychological status among older adults with sarcopenia and possible sarcopenia in Kelantan?
iv. Is there any significant association between sleep quality and cognitive function among older adults with sarcopenia and possible sarcopenia?
v. Is there any significant association between psychosocial status and cognitive function among older adults with sarcopenia and possible sarcopenia?

1.4 Research Objectives

1.4.1 General Objective

To determine the association between cognitive function, sleep quality and psychosocial status among older adults with sarcopenia and possible sarcopenia.

1.4.2 Specific Objectives

i. To determine the cognitive function status of older adults with sarcopenia and possible sarcopenia in Kelantan.

ii. To determine the sleep quality status of older adults with sarcopenia and possible sarcopenia in Kelantan.
iii. To determine the psychosocial status of older adults with sarcopenia and possible sarcopenia in Kelantan.
iv. To determine the association between sleep quality and cognitive function among older adults with sarcopenia and possible sarcopenia.
v. To determine the association between psychosocial status and cognitive function among older adults with sarcopenia and possible sarcopenia.

1.5 Research Hypothesis

1.5.1 Hypothesis

Null Hypothesis (H_0)

1. There is no association between sleep quality and cognitive function among older adults with sarcopenia and possible sarcopenia.
2. There is no association between psychosocial status and cognitive function among older adults with sarcopenia and possible sarcopenia.

Alternative Hypothesis (H_A)

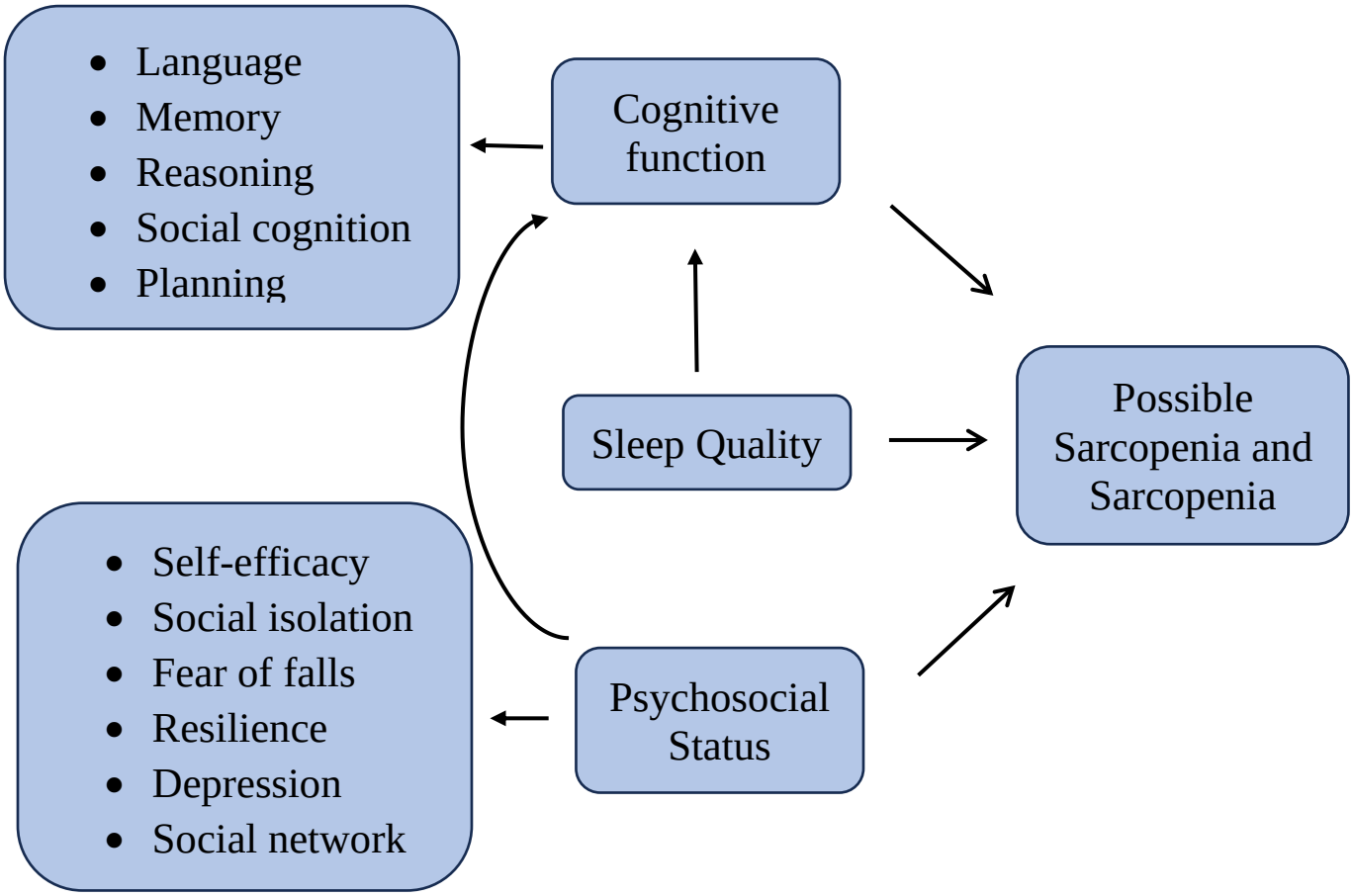
1. There is an association between sleep quality and cognitive function among older adults with sarcopenia and possible sarcopenia.
2. There is an association between psychosocial status and cognitive function among older adults with sarcopenia and possible sarcopenia.

1.6 Justification of Study

The findings of the research will provide information about older adults' cognitive function, sleep quality and psychosocial status among older adults with sarcopenia and

possible sarcopenia in Kelantan. Recently, there are limited studies have been carried out to investigate the association between cognitive function and sarcopenia. Even though a systematic study has been conducted on the relationship between sarcopenia and cognitive decline (Chang et al., 2016), but the relationship between both is unclear in relation to various definitions of the sarcopenia. Hence, the outcome of this research may provide insights on cognitive function among older adults with possible sarcopenia and sarcopenia. Furthermore, the sleep quality of the older adults with possible sarcopenia and sarcopenia will also be observed to see the relationship between each other since there are no meta-analyses available that discuss the period of time or what quality of people sleep affects the risk of sarcopenia (Li et al., 2023). Additionally, the study of relationship between psychosocial status and sarcopenia will also be conducted as only a few research of both variables has been undertaken. Thus, the result of the research may be able to fill in the knowledge gap besides enhancing the efficiency of sarcopenia patients' care management specifically related to their cognitive function, sleep quality and psychosocial status.

1.7 Conceptual Framework



Sarcopenia develops and progresses due in large part to the ageing process, which is known to bring about a number of changes in the human body (Chen et al., 2020; Hairi et al., 2012). Sarcopenia is brought on by ageing through a variety of pathways such as impaired neuronal activation and muscle synergy creation, cortical hypoexcitability, loss of anatomical connection integrity, and dysregulation of the basal ganglia, resulting in muscular weakness and slowed gait (Clark & Carson, 2021). Age-related alterations in the brain, including changes in its structure, loss of synapses, and nigrostriatal dopamine depletion, all contribute to a decline in cognitive functioning (Collier et al., 2007; Irwin et al., 1997; Murman, 2015; Ninkina et al., 2020). The main feature of decrease in cognitive function is a reduction in one or more cognitive areas, including memory, language, reasoning, cognition regarding society, and planning (McKhann et al., 2011).

Next, the available scientific data indicates a discrepancy between the possible impact of sleep quality and its consequences on the prevalence of sarcopenia. Anabolic and catabolic hormone regulation (anabolic and catabolic balance) may differ in ineffective sleep due to high levels of cortisol, a catabolic hormone that promotes protein degradation, and low levels of IGF-1, anabolic hormones that promote protein synthesis. This can create a positive balance that favours muscle breakdown and, consequently, the loss of muscle mass (Buchmann et al., 2016; Stitt et al., 2004). On the other hand, research has demonstrated that sleeping too much may disturb the circadian cycle, induce chronic inflammation, which can impair muscle protein synthesis and cause muscular proteolysis (Cesari et al., 2012). Lack of sleep impairs memory formation, decreases response times, and dulls the senses (Crenshaw & Edinger, 1999). On the contrary, extended periods of sleep might indicate low quality or irregular sleep patterns, which could affect cognitive function (Faubel et al., 2009). Moreover, research on the quality of sleep in older persons suggested that a reduction in the regular sleep schedule may have a negative impact on cognitive performance (Nebes et al., 2009). Chronic issues with sleep latency (the amount of time before falling asleep) and maintenance are frequently linked to negative outcomes, such as tiredness and impaired cognitive function (Nebes et al., 2009).

Furthermore, a research found that sarcopenia was directly influenced by self-efficacy, social networks, fear of falling, resilience, and feeling hopeless (Tieland et al., 2018). It has been demonstrated that the development of increased muscular mass, strength, and function is linked to good social support, no depressed symptoms, and a high self-efficacy score. Furthermore, it was discovered that every test used to assess muscle strength and function was valid (Taani, 2017). Next, according to Yuenyongchaiwat et al. (2018), older persons with cognitive impairment showed greater levels of depression and less physical activity than those without the condition. Thus,

depression is linked to impaired cognitive function, which is frequently linked to inadequate exercise or physical activity, both of which may be contributing factors to sarcopenia.

CHAPTER 2

LITERATURE REVIEW

2.1 Prevalence of Possible Sarcopenia and Sarcopenia

According to the definition of the disease adopted by the European Working Group on Sarcopenia in Older People (EWGSOP), European Working Group on Sarcopenia in Older People 2 (EWGSOP2), Asian Working Group for Sarcopenia (AWGS), International Working Group on Sarcopenia (IWGS), and Foundation for the National Institute of Health (FNIH), the prevalence of sarcopenia varies greatly between studies (Carvalho do Nascimento et al., 2021; Petermann-Rocha et al., 2021). According to a systematic study by Nascimento et al. (2021), the prevalence of sarcopenia in older adults varied globally, ranging from 5% for European Working Group on Sarcopenia in Older People 2 (EWGSOP2) to 17% for International Working Group on Sarcopenia (IWGS). Nevertheless, in the research by Petermann-Rocha et al., the highest prevalence of sarcopenia was noted for European Working Group on Sarcopenia in Older People (EWGSOP) (22%), whereas the lowest was noted for Foundation for the National Institute of Health (FNIH) (11%) (Petermann-Rocha et al., 2021). In the studies by Nascimento et al. (2021) and Petermann-Rocha et al. (2021), the pooled prevalence of all criteria was around 10% and 16% respectively.

Despite the fact that two studies used generally healthy populations such as elderly people living in communities, the estimated prevalence of sarcopenia varied, and the reasons for this variability are yet unknown. When comparing various patient groups to the general population, the prevalence of sarcopenia was much greater. According to the analysed studies that reported pooled prevalence, sarcopenia was seen in patients with diabetes (18%) (Feng et al., 2021) and unresectable esophageal cancer (66%) (Jogiat et al., 2022). Patients requiring surgery (Park et al., 2022), suffering from renal and liver

illness (Tantai et al., 2022; Wathanavasin et al., 2022), and having various site-specific malignancies (Findlay et al., 2021; Shachar et al., 2016; ; Su et al., 2019; Surov & Wienke, 2021; Sutton et al., 2022; Yang et al., 2019) also showed a significant prevalence of sarcopenia. According to earlier research, the Asian population's prevalence of sarcopenia, as defined by the Asian Working Group for Sarcopenia (AWGS) 2014, varied from 5.5 to 25.7% (Chen et al., 2020). The pooled prevalence for elderly Chinese community-dwelling individuals was 11–14% (Tian et al., 2017; Xin et al., 2021). The prevalence percentage was 9.7% in China's eastern region (Huang et al., 2021).

On the other hand, there is little epidemiological data about possible sarcopenia. According to the AWGS 2019 consensus, three cross-sectional studies have currently documented the prevalence of possible sarcopenia (Kim & Won, 2020; Wei et al., 2020; Wu et al., 2021). In Singapore, 536 individuals between the ages of 21 and 90 were recruited for one study, resulting in a prevalence rate of 15.3% (Wei et al., 2020). In another study, 2,123 older persons were recruited in Korea; the prevalence was found to be 20.1% for males and 29.2% for women (Kim & Won, 2020), and the third one investigated 6,172 Chinese individuals, finding a 38.5% prevalence (Wu et al., 2021).

In Malaysia, a study of healthy senior citizens from various ethnic groups revealed that almost three out of every five senior citizens 60 years of age and above developed sarcopenia (Norshafarina et al., 2013). Remarkably, among community-dwelling older persons aged 60 years old and older who resided in long-term care facilities in the Malaysian urban region of Klang Valley, a significant prevalence of sarcopenia (47%) was discovered (Yap et al., 2020). Similarly, a different research conducted in the Klang Valley with older persons living in communities found that the prevalence was 33.6% (Ranee et al., 2022). Furthermore, an independent study of senior citizens with type 2 diabetes mellitus who were seen in open primary care clinics found that 28.5% of those