REVIEW ARTICLE

Prevalence, Risk Factors and Measures of Frailty in Malaysia: A Scoping Review

Julaida Embong[1,2], Khirudin Amir[2], Adha Nawawi[2], Rizah Mazzuin Razali[3], Maria Justine[1]

[1] Center for Physiotherapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA Selangor, Puncak Alam Campus, 42300 Puncak Alam Selangor Malaysia
[2] Physiotherapy Department, Kuala Lumpur Hospital, 50586 Kuala Lumpur
[3] Geriatric Unit, Kuala Lumpur Hospital, 50586 Kuala Lumpur

ABSTRACT

This scoping review aimed to map out the empirical evidence on the prevalence, associated risk factors, and measures of frailty among older people in Malaysia. This scoping review is guided by the methodological framework suggested by Arksey and O'Malley. Literature searches were conducted on academic journals published from 2010 to 2020 (Malaysian studies only). Ten studies were included in this review from 1778 papers screened from the electronic databases. Frailty prevalence was found in the range of 5.7% to 56.5%, whereas pre-frailty was 57.9% to 72.8%. Associated risk factors of frailty can be categorized into body impairments, activity limitations, and personal factors. The most commonly used measure is based on Fried's Phenotype Model, however, the procedure for each criterion varied. The findings of the scoping review highlighted the gaps regarding the risk factors and inconsistencies in the measure of frailty.

Keywords: : Fatigue, Frailty, Malaysia, Older people, Weight loss.

Corresponding Author:
Maria Justine, PhD
Email: maria205@uitm.edu.my
Tel: : +603 3258 4365

INTRODUCTION

Malaysia is currently facing the prospect of an aging population as in 2020 about 10% of its population are 60 years old and above (1). It is estimated that by 2030 the elderly population will grow to about 15% that qualifies Malaysia as an aging population (2). Aging brings about many consequences with frailty has been identified as one of the most common ones (3), which has been regarded as a new geriatric syndrome (4) that leads to higher risks of adverse health outcomes (5). Frail older people are at greater risk of premature death and multiple health adverse effects, including falls, injuries, disabilities, and dementia, all of which may lead to poor quality of life (QOL) and increased cost and use of health care services, such as visits to the emergency room, hospitalization, and institutionalization (6).

Frailty has been defined in numerous ways. Frailty term originated from the Greek word that means loss of flesh, and later was updated as the loss of muscle mass and function that occurs with aging (7). The loss of muscle mass has been evident as the cause of reductions in the metabolic rate and physical activity leading to depletion in energy production and consumption (8). Others suggested that frailty occurs when there is increased vulnerability to stressors leading to a multi-system impairment (9). The latest update is that frailty is associated with a homeostatic instability due to the disturbance in the interaction between genetic, biological, functional, cognitive, psychological, and socio-economic domains or dimensions (5). The evolution of the definition for frailty indicates that further studies are warranted to enhance its understanding and to determine its risk factors that may depend on how it is measured and which factors can be modified through rehabilitation.

Studies on the prevalence of frailty have been conducted among various countries in Asia such as China, Indonesia, Thailand, and Singapore, and reported the ranges between 5.7% and 62.8% (10,11,12,13). Some of these countries classified frailty status into either frail, pre-frail, or robust. In addition, various screening tools have been used to define frailty status. According to a previous study (14), screening tools may depend on the model characteristics and clinical settings. Thus, previous findings on the prevalence of frailty in Asia may not represent Malaysia due to differences in the

sociodemographic factors.

Since Malaysia is moving very fast to become an aging population, thus, it is important to examine the prevalence and risk factors of frailty specific to the Malaysian setting. This identification may provide evidence and guide the planning of health care provision and rehabilitation strategies for older people aiming to optimize their functions. No doubt a few studies have been conducted in Malaysia, however, there is little effort to conduct a review of both frailty and the risk factors among the older persons in Malaysia. Hence, there is a need to map the findings of the current evidence in Malaysia regarding frailty. Therefore, the objective of this scoping review is to map the existing literature related to frailty in older persons, specifically in Malaysia. Besides, it is also the aim of this scoping to review the common screening tools used among studies conducted in Malaysia. It is anticipated that the results of this study will provide the baseline information on the prevalence of frailty, the associated risk factors of frailty, and the screening tool or measure for frailty.

MATERIALS AND METHODS

This scoping review was undertaken to summarize the prevalence, risk factors, and measurement tools of frailty in Malaysia. This scoping review is guided by the methodological framework suggested by Arksey and O'Malley (15). The review was divided into five stages, that include:
1) Identification of research questions,
2) Identification of relevant studies,
3) Study selection,
4) Charting the data, and
5) Collating, summarizing and reporting the results.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2009) was used to depict the flow of articles from the initial search until the final selection (Fig 1) (16).

Identification of research questions

Based on the purpose of this study, the following are the questions that were attempted to be answered in this review:
1) What is the prevalence of frailty in Malaysia?
2) What are the risk factors associated with frailty? and
3) What is the measure or screening tool used to define frailty status?

Identification of relevant studies

The journals related to this topic were searched comprehensively from January 2010 to November 2020. The electronic databases (e.g., PubMed, CINAHL, Scopus, PROQUEST, Google Scholar, and Cochrane Library) were searched to identify all types of study, except systematic reviews or review papers that can be included in the review. The inclusion criteria were

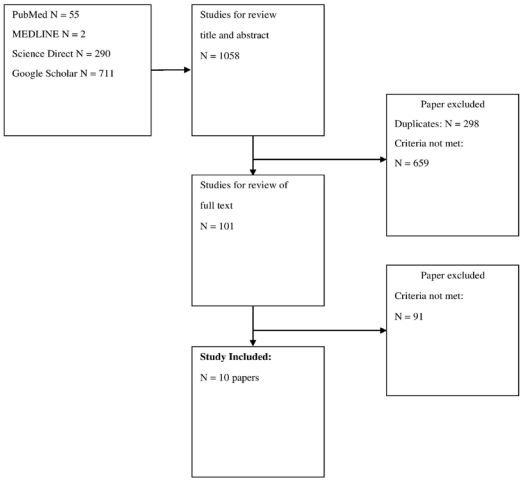

Fig 1. Flowchart of the selection process

applied to studies conducted only in the Malaysian setting. Frailty, prevalence, incidence, risk factors, risk factor, measurement, measurements, diagnosis, and Malaysia were the key terms suggested for the search of relevant papers. The Boolean terms "AND"; "OR"; NOT were used to separate the keywords. The researchers independently examined the titles, abstracts, and keywords for eligibility to be included in the review.

Study selection

In the first selection stage, all the titles and abstracts were checked by two independent reviewers to remove irrelevant articles. The reviewed studies were selected if information about 1) Malaysia; 2) profile of participants; 3) prevalence of physical frailty; 4) risk factors of frailty, and 5) measure, assessment, or screening tools of frailty were provided. All studies included were written in English. The full texts of the papers found or included from step1 were retrieved (second stage) by the same independent reviewers. The reference lists of these articles were checked for any papers that were missing during the first phase of the search process. The selected papers were reviewed and discussed by the two reviewers for agreement to be in the review. The final decision by a third independent reviewer was required if there were no consensus made by the two reviewers. All factors that could be described as being connected to physical frailty were extracted from the papers by the two reviewers.

Charting the data

The papers that were selected were summarised in Table I to present the authors, publication years, study type(s) and purpose(s), study setting, sample data, and findings on the prevalence and risk factors of frailty. The information regarding the screening tools used was were summarised based on the screening tools used and their criteria, and in addition to that, the information regarding other outcome measures used was included in Table

Table I. Prevalence and risk factors of frailty

Authors	Study design	Objectives	Study setting	Participants characteristics	Prevalence	Associated Risk factors based on the ICF model
Teoh et al. (18)	Cross-sectional study	To investigate the relationship between metabolic syndrome with falls, and the role of frailty markers in this potential relationship, among community-dwelling older adults	Data from the first wave Malaysian Elders Longitudinal Research (MELoR): Hospital-based health check / urban dwellers	N=1415 Age=55 and above Mean age=68.56 ± 7.26 years 57.2% women	Not reported (NR)	BI: NF AL: higher risk of falls PR: NF PF: NF EF: NF
Norazman et al. (19)	Cross sectional study	To determine the prevalence and risk factors of the frailty syndrome	10 PPR flats in Kuala Lumpur: Elderly who were residing in the People Housing Project (Projek Perumahan Rakyat (PPR) at Kuala Lumpur	N= 301 multi ethnic residents Age=60 years and above Able to ambulate Age range=60-84 years Mean age= 67.08 (5.5) years Male=30%, Female=70% Chinese=37(12.3%), Indian=45(5%), Malay=213(70.8%)	Frailty: 15.9% Pre-frail: 72.8%	BI: low skeletal muscle mass, high serum C-reactive protein (CRP) level AL: NF PR: NF PF: increased in age, lower household income, being at risk of malnutrition EF: NF
Norazman et al. (20)	Cross sectional study	To explore the prevalence of malnutrition risk and frailty as well as the overlapping constructs	Community dwelling living: Resident PPR (okt 2018-jan 2019)	N= 301 multi ethnic residents Age=60 years and above Able to ambulate Age range=60-84 years Mean age= 67.08 (5.5) years Male=30%, Female=70% Chinese=37(12.3%), Indian=45(5%), Malay=213(70.8%)	Frail: 14.6% Pre-frail: 59.7%	BI: Body fat, lower skeletal muscle mass, malnutrition AL: NF PR: NF PF: Increasing age EF: NF
Murukesu et al. (21)	Cross sectional study	To determine the prevalence of frailty in Rumah Seri Kenangan (RSK). To determine the association with cognitive status and functional fitness among frail, and pre-frail in RSK	Institutional residents	N = 302 Age= 60 years and above Age range=60-90 years Mean age=68.90 (7.24) years Malay (55.6%); Chinese (26.5%); Indian (17.9%) Mean stay at RSK=4.09-3.85 years	Frail: 56.5% Pre-frail: 40.7% Robust: 2.9%	BI: NF AL: lower cognitive status, lower dynamic balance and mobility (TUG) PR: NF PF: Hypertension EF: NF
Mohd Hamidin et al. (22)	Cross sectional study	To determine the prevalence of frailty association with sociodemographic and socioeconomic characteristics, health-related status, and anthropometric measurements	Community dwelling living: Terengganu (60 villages)	N=279 Age= 60 years and above Able to ambulate Age range=63-99 years Mean age=73.32 (6.05) years Male= 18 (42.3%) Female=61 (57.7%)	Frail: 18.3 %	BI: lower BMI AL: NF PR: NF PF: advanced age, being unmarried, hospitalisation in the previous year, poor self-rated health EF: NF
Ahmad et al. (23)	Cross-sectional study	To describe the prevalence and transitions of frailty among rural-community dwelling To analyse factors associated with different states of frailty transition.	Rural community-dwellers: Kuala Pilah Negeri Sembilan	N=1885 Age=60 years and above Able to ambulate Age range=NR Mean age=NR Male, n=887 (37.9%), Female, n=1437 (62.1%) Chinese=40(1.8%), Indian=43(2%), Malay=2231 (95.6%), Others=10 (0.6%)	Frail; 9.4% Pre-frail: 57.9% Robust: 32.7%	BI: NF AL: poor cognitive function, low physical activity PR: NF PF: older age, women, Ethnicity, low socioeconomic status, higher number of chronic diseases. EF: NF

CONTINUED

Table I. Prevalence and risk factors of frailty (CONT.)

Authors	Study design	Objectives	Study setting	Participants characteristics	Prevalence	Associated Risk factors based on the ICF model
Nur Hafizah et al. (24)	Cross sectional study	To determine the prevalence of frailty syndrome and its associations with the socio-demographic characteristics, psychosocial and functional status	Community-dwelling elderly in Kuala Nerus, Terengganu	N=279 Age=60 years and above Age range= 60–99 years old Mean age=73.32 (6.05) years	Frail: 18.3%	BI: NF AL: lower participation in leisure activities, attending feast, depressive symptoms PR: NF PF: depending to mobiles EF: NF
Badrasawi et al. (25)	Cross-sectional study	To determine the prevalence and the risk factors of frailty among multi-ethnic community-dwelling elderly	Community dwelling elderly from 10 urban and rural districts in the Klang Valley	N=473 Age= 60 years and above Age range=60-90 years Mean age=68 (5.9) years Men=210 (44.4%) Women= 263 (55.6%) Chinese 52%	Frailty: 8.9% Pre-frail: 61.7%	BI: abdominal obesity, low peak expiratory flow rate AL: slower rapid pace gait speed PR: NF PF: female EF: NF
Badrasawi et al. (26)	Cross-sectional study	To examine the differences in nutritional, physical and cognitive function among frail, pre-frail and robust Malaysian elderly	Community dwelling living	N=650, multi ethnic from rural and urban area Age range =60 years old and above Mean age=Women: 68.9 (5.9) years; Men:67.3 (5.7) years Male=210, Female=263	Frailty: 8.9% Pre-frail: 61.7%	BI: higher BMI and WC, lower CC, FFM, and BMR AL: low physical performance, low cognitive function PR: NF PF: higher overnight fasting, Higher energy intake EF: NF
Sathasivam et al. (27)	Cross-sectional study	To explore the prevalence of frailty factors associated with evolution of Malaysian elderly population	Community-dwelling elderly: urban area	N= 789 Age=60 years and above Age range=60-99 years Mean age=69.6 (7.2) years Male= 320, Female=469	Frail: 5.7% Pre-frail: 67.7%	BI: lower body weakness AL: Cognitive status, history of falls PR: NF PF: Poor perception of health status, EF: NF

Notes; BI=body impartment, AL=activity limitation, PR=participation restriction, PF=personal factors, EF=environmental factors, NF=no findings

II. The International Classification of Functioning and Disability (ICF) model was used to guide the mapping of the domains related to the risk factors of frailty (17) based on the following classification: 1) Body function and structures(impairment) (BI): 2) Activity (limitation) (AL): 3) Participation (Restriction) (PR): 4) Personal Factors (PF) and 5) Environmental factors (EF). The purpose of the mapping was to incorporate all variables that were determined to be physical frailty-related.

Collating, summarizing, and reporting the results

Table I illustrates the evaluations of all selected papers guided by the review questions. The information about the measure or screening tools and information on additional measures was also included in Table II.

RESULTS

In the first phase of the search, 1058 titles were found, most of which were found in Google Scholar. There were 101 papers retrieved for review in the full text after a compilation based on titles, abstracts, and the exclusion of duplicates. A total of 10 papers was included in the second phase as shown in Fig 1. Further evaluation of studies included in the selected articles was conducted, however, no additional related studies were discovered. Among the studies included in the final review, three studies were conducted in 2020 (18-20), one study conducted in 2019 (21), three studies in 2018 (22-24), one study in 2017 (25), one study in 2016 (26), one study in 2015 (27). All studies included in the review conducted a cross-sectional study. The sample size of the studies included in this review ranged from 279 to 1885 participants, aged 55 to 99 years old. The majority of the studies have included three major ethnicities in Malaysia, namely, Malays, Chinese, and Indians. This article summarizes the findings of the review according to the research questions, namely, the prevalence, risk factors, and measure of frailty as outlined in Tables I and II.

Prevalence of frailty

The prevalence of frailty was found in nine studies except for one study (18) that did not report the prevalence of frailty status. The frailty status was categorized into pre-frail, frail, and robust. The prevalence of pre-frailty is in the range of 57.9% to 72.8%. The prevalence of frailty

is in the range of 5.7% to 56.5%. While two studies (21, 23) also included the robust category of frailty that ranged from 2.9% to 32.9.

Risk factors of frailty

The risk factors of frailty were tabulated to match the domains described in the ICF model, namely, impairments on body functions and structures (BI), activities limitation (AL), participation restrictions (PR), and two contextual factors, i.e. personal factors (PF) and environmental factors (EF) (Table I).

Impairment of body structure and functions

A total of six studies have reported that impairment of body structure and functions are associated with frailty. These factors include reduced muscle mass, body fat, hypertension, increased body mass index (BMI), increased waist circumference or abdominal obesity, reduced calf circumference (CC), reduced fat-free mass (FFM), reduced basal metabolic rate (BMR), reduced peak expiratory flow rate (PEFR) and lower body weakness.

Activity limitations and participation restriction

A total of six studies have reported that activity limitations are associated with frailty. Some of the factors associated with activity limitations include a higher risk of falls, poor cognitive status, reduced dynamic balance and mobility, reduced physical activity, reduced leisure activities, depressive symptoms, reduced physical

Table II. Measures of frailty

Authors (Years)	Frailty Diagnositic Criteria	Frailty criteria				
		Shrinking	Exhaustion	Weakness	Slowness	Physical Activity
Teoh et al. (18)	Modified Fried's Phenotype: based on four criteria	'In the past year have you lost 10 pounds (4.5 kg) or more in weight when you weren't trying to, for example, because of illness?', with answer categories: 1 'No' and 2 'Yes' [2]	I feel full of energy these days, with answer categories: 1 'Often,' 2 'Sometimes,' 3 'Not often,' 4 'Never.	Weakness (reduced grip strength) was defined as using 25th centile cut-offs of less than 15 kg in women and less than 20 kg in men.	Walking speed (Time for 15 feet) ; if more than 75th percentile of walking speed (7 seconds)=slow walking speed.	None
Norazman,et al. (19)	Fried's Phenotype	Unintentional weight loss: > 5kg for the past 6-12 months	Two question from self-reporting on fatigue: CES-D scale of depression that was proposed in the original method	Handgrip strength (Jamar Hydraulic): Sitting position, compress max strength for 3 attempts. Cut-off point AWGS	Gait speed 4 meter; Cut-off point 0.8m/s	Physical activity scale for elderly (PASE)
Norazman,et al. (20)	Fried's Phenotype	Frailty Assessment Components: Standardized Protocol. Modification were made for the cut-off points and the assessment of physical activity				PASE
Murukesu et al. (21)	Fried's Phenotype	Unintentional weight loss equal or greater 4.5kg in the past 12 month	Self-reported 2 question from CES-D: I felt that everything I did was an effort; I could not get going	Grip Strength using JAMAR (Plus+,Patterson Medical)	Gait speed (5-meter)	PASE
Mohd Hamidin et al. (22)	Fried's Phenotype	Unintentional weight loss equal or greater 4.5kg or 5% previous year. OR Self-report clothes become too big	Two question from self-reporting on fatigue: CES-D scale of depression that was proposed in the original method - 'I felt that everything I did was an effort; "I could not get going"	Grip strength of the dominant hand (3x): Using digital hand grip (Chander, Model MG4800); 18.0kg (Male) %≤25; 12.5(Female)	Gait speed (4. 6 meters): Cut-off point, Male > 7 sec (height >173cm); Female > 6 sec (height > 159cm)	Rapid Assessment of Physical Activity (RAPA)

CONTINUED

Table II. Measures of frailty(CONT.)

Authors (Years)	Frailty Diagnositic Criteria	Frailty criteria				
		Shrinking	Exhaustion	Weakness	Slowness	Physical Activity
Ahmad et al. (23)	Fried's Phenotype	Weight loss 15% less than lifetime maximum weight (not based on whether the weight loss was intentional or unintentional)	Self-reported from GDS (Do you feel full of energy?. No criteria on exhaustion	JAMAR dynamometer 2 trial for each side. Stratified by gender and body mass index	Gait speed (4-meter), With or without aid, gender and body the value mass index	PASE
Nur Hafizah et al. (24)	Fried's Phenotype	Unintentional weight loss of 10 Ibs (4.5kg) or > 5% body weight, prior years since 60 years old	Using two question from CES-D scale: I felt that everything I did was an effort. I could not get going. (Score divide to 0-3, 0=rarely, 1=some of the time, 2=mod. amount of the time, 3=most of the time)	Digital handgrip (Charder:Model MG4800): 18.0 kg for male, 12.5 kg for female. Below 25% of the quartile stratified for gender	Gait speed (15 feet) 4.75 meter: ≥7 sec (male height <173cm and female <159 cm; ≤6 sec (male >173 cm and female >159cm)	RAPA
Badrasawi et al. (25)	Fried's Phenotype	Unintentional weight loss: > 5kg for the past 6-12 months	Two question from self-reporting on fatigue: CES-D scale of depression that was proposed in the original method	Hand grip less than the cut-off point	Gait speed	PASE
Badrasawi et al. (26)	Fried's Phenotype	Unintentional weight loss: > 5kg for the past 6-12 months	Self-reported two question from CES-D: I felt that everything I did was an effort; I could not get going	Grip strength	5-meter walking test using gait speed. Cut off changes according to height and gender	PASE
Sathasivam et al. (27)	Frailty Index	Questionnaire involve 40-item physical domain - 5 items, comorbidities - 16 items, hearing domain - 1 item, visual domain - 3 items, signs and symptoms - 6 items, psychological symptoms - 4 items, physiological parameters – 5 items. All outcomes were dichotomous (yes/no) or trichotomized (0, no; 0.5, may be; 1, yes)				

performance, slower gait, and history of falls. None of the studies included in this review has reported any measures or findings on participation restriction.

Personal and environmental factors

The nine studies included in this review reported that frailty is associated with personal factors as shown in Table I. Most of these studies showed frailty is associated with age, gender (female), lower household income or socioeconomic, at risk of malnutrition, single, hospitalization in the previous year, poor self-rated or perception of health, ethnicity, hypertension, increased number of chronic diseases, higher overnight fasting, higher energy intake, and depending on mobiles. None of the studies have reported any environmental factors that may be associated with frailty.

Measures of frailty

In terms of measures to determine the physical frailty status, nine studies used the criteria by the Fried's Phenotype Model (18-26) and one study (27) used the Frailty Index. Among the studies that have used the Fried's Phenotype model, one study (18) used the modified Fried criteria that refer to four criteria without reporting the level of physical activity (PA).

DISCUSSION

Prevalence of frailty

The prevalence of frailty in Malaysia is expected to increase due to the aging of the population and an increase in life expectancy from year to year. In this review, the majority of the studies to determine the prevalence of frailty were conducted in the community and showed a range of 57.9% to 72.8% for pre-frail and 5.7% to 18.3% for frail. Those living in the institution showed a higher prevalence of frailty and pre-frailty that is 56.5% and 40.7%, respectively. The wide range of the prevalence could be influence by the different samples of the population, sociodemographic factors, economic status, and environment (10). Using different screening tools may produce a different rate of frailty prevalence (28-30). Although, in this review, the majority of the studies included have used Fried's phenotype model, however, inconsistency existed in the cut-off values, procedures, and outcome measure for each criterion.

Malaysia seems to have the highest prevalence of frailty when compared to other Asian countries. For instance, Singapore has reported the prevalence of physical frailty that is about 5.7% (12) which seems to be the lowest when compared to other countries such as Indonesia

(8.1%) (10), Thailand (13.9%) (11), and China (7.0%) (13). The differences in the prevalence could be due to differences in the sociodemographic factors, the anthropometric parameters, and the screening tools used to define frailty. Singapore may have the lowest prevalence as it has one of the best healthcare services and elderly care policies compared to other countries (31). Singapore also has a higher life expectancy compared to Malaysia, China, Indonesia, and Thailand (32). Further studies are warranted to unravel the possible contributing factors to the high prevalence of frailty, considering Malaysia has a smaller number of older people compared to the other Asian countries.

Risk factors of frailty

Multiple risk factors can contribute to frailty syndrome. It is important to note whether the factors can represent the ICF model as it provides a common conceptual framework for the understanding, exploration, and assessment of human functioning in the sense of disability and explains various factors related to the participation restriction among frail elderly (33). Besides, identifying the ability of the factors whether it can be modified is important as this can be the focus of intervention or rehabilitation for prevention or delaying the consequences of frailty syndrome among older people, while non-modifiable factors can have implications on policy-making.

Body function and structure (impairment)

In the ICF model, the impairment domain refers to a substantial loss of body functions and structure (33). In this scoping review, we found impairment factors such as anthropometric and body compositions, lower body weakness, and reduced peak expiratory flow rate (PEFR) were associated with frailty. Findings on anthropometric and body compositions are consistent with other previous studies (11, 34). A study conducted in the Northern part of Thailand has found smaller mid-arm circumference as a risk factor for frailty syndrome (11). Besides, frailty status is associated with a higher BMI and waist circumference (34), lower muscle strength, and poorer physical functions (35). With regards to the weakness of the lower body, it could be also related to the reduction of muscle mass, physical inactivity, and thus reduced muscle strength. This will further cause increased frailty as lower body weakness will limit mobility and participation in physical activity. Reduced peak expiratory flow rate (PEFR) as a factor in contributing to frailty could be due to poor exercise tolerance that leads to immobility among older persons. PEFR is associated with pulmonary symptoms and other indices of chronic diseases (36).

We believe that assessing the physical performances or physical functions has an implication on rehabilitation strategies as most physical performances are modifiable. On the other hand, we found limited studies that have focused on measuring physical performances or physical functions. This could be because some of the outcome measures for body functions may overlap with measures for the activity limitations. For instance, a study in Korea revealed that frailty was associated with physical performance factors (exercise capacity measured by the 6-min walk test, upper limb function measured by the 30-sec arm curl test, lower limb strength function measured by the 30-sec chair stand test, upper limb strength measured by the grip-strength, upper limb flexibility measured by the Back scratch), indicating the importance of improving physical functions in the prevention of frailty syndromes (37).

Activity limitation and participation

The difficulties faced by individuals in carrying out daily activities at a personal level are described as activity limitation (33). Impairment to the body structures and functions is associated with frailty that may progress to an advanced stage when the physical performance of an older person deteriorates and will give a high impact on the mobility of daily activities (38).

In this current scoping review, findings on depression symptoms and cognitive disability as the risk factors for frailty are consistent with a few previous studies (38, 39). A previous study has shown that cognitive frailty is also associated with impairment in the gait speed, Timed Up and Go, and short physical performance battery (PC/PCC, basal ganglia) suggesting that the accumulation of amyloid-β in the brain as a brain imaging biomarker and phenotypes of physical frailty (weight loss, weakness, exhaustion, slowness, low physical activity) contribute to the cognitive frailty (40). Another study that has assessed the association of frailty with neuropsychological domains (based on three factors), namely, (i) speeded executive and fluency, (ii) episodic memory, and (iii) working memory revealed that individuals who were depressed and frail had worse performance than non-frail depressed across all three factors (41). On the other hand, frail persons were almost 8 times more likely to have a cognitive impairment, 8 times more likely to have some kind of dementia, almost 6 times more likely to have vascular dementia (OR 5.6, 95% CI 1.2-25.8) and over 4 times more likely to have Alzheimer's disease compared to healthy ones as reported in the Cardiovascular Health Study (42). Thus, we believe that cognitive decline has a significant impact on physical frailty, thus the measure for cognitive decline should be one of the criteria in the physical frailty screening. This is supported by one study that found that the rates of change in frailty and cognition are strongly correlated and this may be due in part because they share a common pathologic basis (43).

We found one study that has used the TUG as a measure for walking speed or mobility (21). In frailty assessment, it involves the component that can relate to activity limitation such as slowness in gait, reduced grip strength, and reduced effort tolerance. Slower gait speed

or reduce dynamic balance lead to immobility and thus may increase the risk of frailty that can be further associated with physical inactivity. Another known risk factor for frailty is physical inactivity or reduce the level of physical activity consistent with previous studies (28, 44). There is a high prevalence among older adults with inadequate physical activity levels in combination with a significant amount of time spent on sedentary behavior (45). Physical activity or regular participation has been shown to consistently promote healthy aging as it helps to maintain neuromuscular functions and promote psychological wellbeing (39). Those participating in physical activity may be able to reverse some effects of chronic disease by regularly completing activities ranging from low intensity walking through to more vigorous sports and resistance exercises (46). A study in Kuala Nerus, Malaysia (24) shows that low physical activity can relate to a higher prevalence of frailty among the elderly in Malaysia. While, there is a lack of study that reported the role of physical activity among older people in Malaysia, this warrant further study to look into this aspect, however, a suggestion from previous studies is to encourage to increase physical activities and increase self-efficacy that can be guided by experts in geriatric rehabilitation.

With regards to the participation domains in the ICF model, we did not find any of the reviewed studies that have measured variables that can indicate this domain. Participation is defined in the ICF model as the 'involvement in a life situation', while participation restrictions refer to 'problems an individual may experience in the involvement in life situations' (47). Participation is cited as central to a person's quality of life and well-being (48). The concept of participation is recognized as an important rehabilitation outcome (49), and thus, we believe that it should be measured as the outcome of frailty.

Personal factors

Personal factors are another important domain in the ICF model that covers the basic background of the life and health status of the person (33). In this scoping review, personal factors associated with frailty include age, gender (female), low income, at risk of malnutrition, unmarried, hospitalization in the previous years, poor self-rated health, co-morbidities, higher overnight fasting, higher energy intake, and depending on mobiles. A study conducted among hospitalized patients in China found old age, low educational level, more than 5 comorbidities, and polypharmacy were associated with frailty (30). These findings were also supported by a recent systematic review and meta-analysis (50), which concluded that increasing age, being female, and having more than three diseases were associated with frailty. Frailty is also associated with lower education, having no spouse, poorer health perception, and an increasing number of comorbidities (11).

Increasing age as a risk factor for frailty has been reported in many studies (11, 28, 29, 30, 39, 50). The process of aging accompanied by physiological decline increases the vulnerability of becoming fragile, thus, frailty syndrome is expected with advancing age. Women seem to be at risk of frailty more than men that could be due to their longer life expectancy as the majority of the countries in Asia showed women have a longer life expectancy (32). In 2019, life expectancy in Malaysia was 73.4 years old for men and 78.2 years old for women compared to other Asian countries Malaysia is the second-lowest. The lowest life expectancy was in Indonesia (70.1 years for males, 74.6 years for females. Other countries have a higher life expectancy, such as Thailand (81.3 years for females, 74.2 years for males), Hong Kong (82.34 years for males, 88.13 years for females), Singapore (81.4 years for males, 85.7 years for females), and Japan (82.34 for males, 88.13 years for females). It has been found that the 10-year survival rate is associated with the female gender than with the male gender in older adults, from that the prevalence of frailty increased with age in both men and women, but was higher in women than in males (51).

The lower-income level as a risk factor of frailty was consistent with a finding among community-dwelling older people in the rural South Indian population (28). To explain this, older people with low income or having no financial support may have limited access to health care resources as well as poor nutrition as they may not be able to buy food that is suitable for older people. In terms of finding that malnutrition is a risk of frailty, similar to two others (52, 53). A study conducted in Lebanon found that older people with both malnutrition and risk of malnutrition were related to a significantly increased risk of frailty (52). Improper food intake, for instance, the lack of protein intake may promote the development of sarcopenia leading to generalized muscle weakness which is related to becoming frail. This is evidence from a study conducted in Taiwan that found that those who were at increased risk for malnutrition demonstrated a skeletal muscle index of about 9.93 and a body fat mass of <12.25 kg (53).

Hospitalization in the previous year was found to be associated with frailty. In older people, hospitalization may mark the early deterioration of health and thus progresses to becoming frail. Hospitalization can have some hazards which mainly affect the functional capacity of older people functional decline that is temporally associated with hospitalization may be caused by both the illness itself, as well as by the "hazards of hospitalization (54). Also, it was suggested that recovery from pre-frail and frail states is substantially diminished by intervening hospitalization (55). Finding on self-rated health (SRH) status or poor health perception is consistent with another study (11). According to a study conducted in Colombia, frailty arises as a key factor affecting SRH in older adults (56).

The finding from this review that being unmarried is associated with frailty is supported by a previous study that suggested lack of social support may be consistent with a previous study that reported older people who have no spouse are at a higher risk of frailty (11). In contrast, a study has found among urban living elderly in Brazil, the absence of a partner is associated with pre-frailty (57), while those married or being a housewife found to be associated with frailty in a study among the Turkish population (58). Being unmarried may lack social support and thus putting them at an increased risk of social frailty (59).

In this scoping review, the presence of a health condition or co-morbidities were found to be associated with frailty syndrome. These are supported with previous studies that reported having more than 5 comorbidities (30) or having more than three diseases (50) or an increasing number of comorbidities (11), while one study found that older people with diabetes increased the risk of frailty (39). Previous studies have shown that older people with comorbidities who are taking more than five drugs are at risk of frailty (11, 30, 50).

This scoping review also found that those who practice overnight fasting and higher energy intake are at risk of frailty. We could not find any previous studies that have similar findings, however, we believe that the practice of fasting especially at night may hamper the recovery process of any illness suffered by the elderly. Fasting may also limit nutritional food intake such as protein into the body that may, in turn, lead to loss of body weight and loss of lean body mass (sarcopenia) contributing to functional impairment (60). One study found that energy intake is associated with less frailty (61).

We found one study in this review that reported older people who are dependent on mobiles are at increased risk of frailty (24). A study conducted in Singapore found that poor social network is a risk factor for frailty (12). The elderly who depends on the mobile or social network may rely on these facilities for health services or to call for medical services or to call their carer in case they fell ill.

Environmental factors

The ICF model defines environmental factors as the physical social and attitudinal environment in which individuals live and how they conduct their lives (33). Other study has identified connections between living alone and various negative health effects, such as social isolation, functional disability, and mortality (34). In this scoping review, we did not find any environmental factors that are associated with frailty. However, we noted that the elderly residing in the institution which is known as the Rumah Seri Kenangan, funded by the government has the highest percentage of frailty which was 56.5%. On the other hand, frailty is also highly prevalent among home care elderly clients due to malnutrition and a lower level of education (62). The lowest prevalence of frailty was among older people residing in the urban district (5.7%). When comparing among community-dwellers from a different setting, those living in the rural or villages had the highest prevalence of frailty (18.3%) and those living in the urban district were the lowest (5.7%). These findings are inconsistent with a finding from a systematic review and meta-analyses among community-dwelling in China in which they found those living in the urban (10%) had a higher prevalence of frailty compared to those living in the rural (7%) (50). In Malaysia, those living in the rural setting may have lower education, lower-income, and limited access to healthcare resources which might have contributed to the higher prevalence of frailty. Another study explained that the development of frailty is correlated with environmental factors, such as self-perceived socioeconomic status, living alone, or with family and social networks (33).

Measure of frailty

The Fried's Phenotype Model seems to be the most commonly chosen assessment for frailty status, while only one study has used the Frailty Index (27). Previous research (The HELIAD Study) on the prevalence of frailty using five different instruments (Fried definition, FRAIL Scale, FI, TFI, and CGI) in a cohort of older adults and explore the association between frailty and various risk factors (29). This study highlighted that the prevalence of frailty varied depending on the definition used, in which they showed that by using the GFI they found 30.2% of the sample being studied were frail, while the FRAIL Scale showed only about 1.5%, Fried's phenotype was 4.1%, FI was 19.7%, TFI was 24.5% of the sample population were frail. Similarly, another study conducted in South India among older people living in the rural village, comparing the Fried's phenotype, FI and TFI reported varied prevalence of frailty with the TFI (63%) showed the highest percentage of frailty and the lowest is the Fried's phenotype (28%), while using the FI was 59% (28). Another study among hospitalized elderly also showed varied prevalence using the tools; Fried (32.3%), 36.2% (CFS), 19.25 (FRAIL), 25.2% (Edmonton), 35.1% (FI) (30). We conclude that the sensitivity of these various instruments may be influenced by the different settings of older people. In this review, we did not find any study that has compared the use of different tools to define frailty status. Since studies that were included in this review were from various sociodemographic backgrounds the use of Fried's Phenotype to define frailty status may underestimate or overestimate the frailty status of the participants. Therefore, more future studies are warranted to compare the sensitivity of different tools for different settings where the elderly reside.

This scoping review has some limitations as there

were scarce studies conducted in Malaysia on the prevalence rate, risk factors, and measures for frailty status. The findings of this review are inconclusive as Malaysia is unique in terms of its sociodemographic factors, such as ethnicities, living environments, settings (elderly institutions, urban, suburban, rural, and FELDA settlements, etc). Therefore, future studies must give more attention to the overall prevalence rates, especially those who seek medical care in the hospital or primary care clinics so that focus can be given to the needy. Besides, we suggest that more studies are needed in Malaysia to determine whether the concept of body structures and functions that include physical performances, functional performances, physical functions, and functional capacity influences frailty syndromes among Malaysian older people.

CONCLUSION

In conclusion, the finding of this study highlighted that frailty and pre-frailty were highly prevalent among the Malaysian older people compared to other Asian countries. The majority of the findings on the risk factors can be categorized into body impairments, activity limitations, and personal factors. More study is indicated to determine factors that are modifiable such as physical functions, functional status, and quality of life so that early intervention to prevent frailty can be designed based on measurable assessments. Furthermore, the findings presented in this paper may provide knowledge and early recognition for the risk factor related to the ICF model that is specific for the Malaysian older people that may be used to guide further research as well as the plan of intervention.

REFERENCES

1. Dosm.gov.my. 2020. Department of Statistics Malaysia Official Portal. [online] Available at: <https://www.dosm.gov.my/v1/> [Accessed 29 December 2020].
2. Un.org. 2020. [online] Available at: <https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf> [Accessed 29 December 2020].
3. Who.int. 2020. Ageing and Health. [online] Available at: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health> [Accessed 29 December 2020].
4. Morley JE. Frailty and sarcopenia: the new geriatric giants. Revista de investigacion clinica. 2016 Jun 15;68(2):59-67.
5. Pilotto A, Custodero C, Maggi S, Polidori MC, Veronese N, Ferrucci L. A multidimensional approach to frailty in older people. Ageing Research Reviews. 2020 Jul 1;60:101047.
6. Kojima G. Increased healthcare costs associated with frailty among community-dwelling older people: A systematic review and meta-analysis. Archives of gerontology and geriatrics. 2019 Sep 1;84:103898.
7. Fulop T, Larbi A, Witkowski JM, McElhaney J, Loeb M, Mitnitski A, Pawelec G. Aging, frailty and age-related diseases. Biogerontology. 2010 Oct 1;11(5):547-63.
8. Ringer T, Hazzan AA, Agarwal A, Mutsaers A, Papaioannou A. Relationship between family caregiver burden and physical frailty in older adults without dementia: A systematic review. Syst Rev. 2017;6(1).
9. Rodrнguez-Macas L, Fйart C, Mann G, Vica J, Chatterji S, Chodzko-Zajko W, et al. Searching for an operational definition of frailty: A delphi method based consensus statement. the frailty operative definition-consensus conference project. Journals Gerontol - Ser A Biol Sci Med Sci. 2013;68(1):62–7.
10. Pengpid S, Peltzer K. Prevalence and associated factors of frailty in community-dwelling older adults in Indonesia, 2014–2015. Int J Environ Res Public Health. 2020;17(1).
11. Thinuan P, Siviroj P, Lerttrakarnnon P, Lorga T. Prevalence and potential predictors of frailty among community-dwelling older persons in Northern Thailand: A cross-sectional study. Int J Environ Res Public Health. 2020;17(11):1–13.
12. Vaingankar JA, Chong SA, Abdin E, Picco L, Chua BY, Shafie S, et al. Prevalence of frailty and its association with sociodemographic and clinical characteristics, and resource utilization in a population of Singaporean older adults. Geriatr Gerontol Int. 2017;17(10):1444–54.
13. Wu C, Smit E, Xue Q, Odden MC. Prevalence and Correlates of Frailty Among Community- Dwelling Chinese Older Adults : The China Health and Retirement Longitudinal Study. 2018;73(1):102–8.
14. Satake S, Arai H. Implications of frailty screening in clinical practice. Current Opinion in Clinical Nutrition & Metabolic Care. 2017 Jan 1;20(1):4-10.
15. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. International journal of social research methodology. 2005 Feb 1;8(1):19-32.
16. Moher D, Liberati A, Tetzlaff J, Altman DG, Prisma Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS med. 2009 Jul 21;6(7):e1000097.
17. Cieza A, Brockow T, Ewert T, Amman E, Kollerits B, Chatterji S, Ustun TB, Stucki G. Linking health-status measurements to the international classification of functioning, disability and health. Journal of Rehabilitation Medicine. 2002 Sep 1;34(5):205-10.
18. Teoh RJ, Mat S, Khor HM, Kamaruzzaman SB, Tan MP. Falls, frailty, and metabolic syndrome in urban

dwellers aged 55 years and over in the Malaysian elders longitudinal research (MELoR) study-a cross-sectional Study. Postgraduate medicine. 2020 Nov 5:1-6.
19. Norazman CW, Adznam SN, Jamaluddin R. Physical frailty among urban-living community-dwelling older adults in Malaysia. International journal of environmental research and public health. 2020 Jan;17(18):6549.
20. Norazman CW, Adznam SN, Jamaluddin R. Malnutrition as Key Predictor of Physical Frailty among Malaysian Older Adults. Nutrients. 2020 Jun;12(6):1713.
21. Murukesu RR, Singh DK, Subramaniam P, Tan XV, Mohamd Izhar IA, Ponvel P, Mohd Rasdi HF. Prevalence of frailty and its association with cognitive status and functional fitness among ambulating older adults residing in institutions within West Coast of Peninsular Malaysia. International journal of environmental research and public health. 2019 Jan;16(23):4716.
22. Mohd Hamidin FA, Adznam SN, Ibrahim Z, Chan YM, Abdul Aziz NH. Prevalence of frailty syndrome and its associated factors among community-dwelling elderly in East Coast of Peninsular Malaysia. SAGE open medicine. 2018 May 28;6:2050312118775581.
23. Ahmad NS, Hairi NN, Said MA, Kamaruzzaman SB, Choo WY, Hairi F, Othman S, Ismail N, Peramalah D, Kandiben S, Mohd Ali Z. Prevalence, transitions and factors predicting transition between frailty states among rural community-dwelling older adults in Malaysia. PLoS One. 2018 Nov 5;13(11):e0206445.
24. Nur Hafizah AA, Zuriati I, MH FA. Association of Socio-Demographic, Psychosocial and Functional Factors with Frailty Syndrome among Community-Dwelling Elderly in Kuala Nerus, Terengganu. International Journal of Public Health and Clinical Sciences. 2018 Sep 20;5(5):176-93.
25. Badrasawi M, Shahar S, Singh DK. Risk factors of frailty among multi-ethnic Malaysian older adults. International Journal of Gerontology. 2017 Sep 1;11(3):154-60.
26. Badrasawi M, Shahar S, Singh DK. Nutritional, physical and cognitive status among pre-frail and frail Malaysian older adults. Malaysian Journal of Nutrition. 2016 22(3):1-11.
27. Sathasivam J, Kamaruzzaman SB, Hairi F, Ng CW, Chinna K. Frail elders in an urban district setting in Malaysia: multidimensional frailty and its correlates. Asia Pacific Journal of Public Health. 2015 Nov;27(8_suppl):52S-61S.
28. Kendhapedi KK, Devasenapathy N. Prevalence and factors associated with frailty among community-dwelling older people in rural Thanjavur district of South India: a cross-sectional study. BMJ open. 2019 Oct 1;9(10):e032904.
29. Ntanasi E, Yannakoulia M, Mourtzi N, Vlachos GS, Kosmidis MH, Anastasiou CA, Dardiotis E, Hadjigeorgiou G, Megalou M, Sakka P, Scarmeas N. Prevalence and risk factors of frailty in a community-dwelling population: the HELIAD study. Journal of aging and health. 2020 Jan;32(1):14-24.
30. Liang YD, Zhang YN, Li YM, Chen YH, Xu JY, Liu M, Li J, Ma Z, Qiao LL, Wang Z, Yang JF. Identification of Frailty and Its Risk Factors in Elderly Hospitalized Patients from Different Wards: A Cross-Sectional Study in China. Clinical Interventions in Aging. 2019;14:2249.
31. Rogerson A, Stacey S. Successful ageing in Singapore. Geriatrics. 2018 Dec;3(4):81.
32. Facts, W., Asia, L., Continents, A., America, N., America, C., America, S., East, M., Countries, A., Maps, U., Maps, C., Maps, R., Maps, P., Maps, E., Facts, W., Know?, D., Facts, Q., Us, A. and Us, C., 2020. Life Expectancy In Asia. [online] WorldAtlas. Available at: <https://www.worldatlas.com/articles/asian-countries-where-people-live-the-longest.html> [Accessed 29 December 2020].
33. Liu JY. The severity and associated factors of participation restriction among community-dwelling frail older people: an application of the International Classification of Functioning, Disability and Health (WHO-ICF). BMC geriatrics. 2017 Dec 1;17(1):43.
34. Hubbard RE, Lang IA, Llewellyn DJ, Rockwood K. Frailty, body mass index, and abdominal obesity in older people. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences. 2010 Apr 1;65(4):377-81.
35. Yoon DH, Hwang SS, Lee DW, Lee CG, Song W. Physical frailty and cognitive functioning in Korea rural community-dwelling older adults. Journal of clinical medicine. 2018 Nov;7(11):405.
36. Cook NR, Evans DA, Scherr PA, Speizer FE, Vedal S, Branch LG, Huntley JC, Hennekens CH, Taylor JO. Peak expiratory flow rate in an elderly population. American Journal of Epidemiology. 1989 Jul 1;130(1):66-78.
37. Jeoung BJ, Lee YC. A Study of relationship between frailty and physical performance in elderly women. Journal of exercise rehabilitation. 2015 Aug;11(4):215.
38. Davis DHJ, Rockwood MRH, Mitnitski AB, Rockwood K. Impairments in mobility and balance in relation to frailty. Arch Gerontol Geriatr. 2011;53(1):79–83.
39. Chen LJ, Chen CY, Lue BH, Tseng MY, Wu SC. Prevalence and associated factors of frailty among elderly people in Taiwan. International Journal of Gerontology. 2014 Sep 1;8(3):114-9.
40. Yoon DH, Lee JY, Shin SA, Kim YK, Song W. Physical frailty and amyloid-deposits in the brains of older adults with cognitive frailty. Journal of clinical medicine. 2018 Jul;7(7):169.
41. Potter GG, McQuoid DR, Whitson HE, Steffens

DC. Physical frailty in late life depression is associated with deficits in speed dependent executive functions. International journal of geriatric psychiatry. 2016 May;31(5):466-74.
42. Kulmala J, Nykɑnen I, Mɑnty M, Hartikainen S. Association between frailty and dementia: a population-based study. Gerontology. 2014;60(1):16-21.
43. Buchman AS, Yu L, Wilson RS, Boyle PA, Schneider JA, Bennett DA, Kritchevsky S. Brain pathology contributes to simultaneous change in physical frailty and cognition in old age. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences. 2014 Dec 1;69(12):1536-44.
44. Setiati S, Laksmi PW, Aryana IGPS, Sunarti S, Widajanti N, Dwipa L, et al. Frailty state among Indonesian elderly: Prevalence, associated factors, and frailty state transition. BMC Geriatr. 2019;19(1):1–10.
45. Da Silva VD, Tribess S, Meneguci J, Sasaki JE, Garcia-Meneguci CA, Carneiro JAO, et al. Association between frailty and the combination of physical activity level and sedentary behavior in older adults. BMC Public Health. 2019;19(1):1–6.
46. McPhee JS, French DP, Jackson D, Nazroo J, Pendleton N, Degens H. Physical activity in older age: perspectives for healthy ageing and frailty. Biogerontology. 2016 Jun 1;17(3):567-80.Jeoung BJ, Lee YC. A Study of relationship between frailty and physical performance in elderly women. Journal of exercise rehabilitation. 2015 Aug;11(4):215.
47. WHO. World Health Organization, Geneva. World Rep Child Inj Prev [Internet]. 2001; Available from: https://apps.who.int/iris/bitstream/handle/10665/42407/9241545429.pdf
48. Reinhardt JD, Stucki G. Rheumatoid arthritis and participation--the social animal revisited. The Journal of rheumatology. 2007 Jun 1;34(6):1214-6.
49. Noonan VK, Kopec JA, Noreau L, Singer J, Chan A, Mɒsse LC, Dvorak MF. Comparing the content of participation instruments using the International Classification of Functioning, Disability and Health. Health and quality of life outcomes. 2009 Dec 1;7(1):93.
50. He B, Ma Y, Wang C, Jiang M, Geng C, Chang X, Ma B, Han L. Prevalence and risk factors for frailty among community-dwelling older people in China: a systematic review and meta-analysis. The journal of nutrition, health & aging. 2019 May 1;23(5):442-50.
51. Corbi G, Cacciatore F, Komici K, Rengo G, Vitale DF, Furgi G, et al. Inter-relationships between Gender, Frailty and 10-Year Survival in Older Italian Adults: an observational longitudinal study. Sci Rep. 2019;9(1):1–7.
52. Boulos C, Salameh P, Barberger-Gateau P. Malnutrition and frailty in community dwelling older adults living in a rural setting. Clinical Nutrition. 2016 Feb 1;35(1):138-43.
53. Chang SF. Frailty is a major related factor for at risk of malnutrition in community dwelling older adults. Journal of Nursing Scholarship. 2017 Jan;49(1):63-72.
54. Schimmel EM. The hazards of hospitalization. BMJ Quality & Safety. 2003 Feb 1;12(1):58-63.
55. Gill TM, Gahbauer EA, Han L, Allore HG. The relationship between intervening hospitalizations and transitions between frailty states. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences. 2011 Nov 1;66(11):1238-43.
56. Ocampo-Chaparro JM, Zapata-Ossa HD, Cubides-Munйvar BM, Curcio CL, Villegas JD, Reyes-Ortiz CA. Prevalence of poor self-rated health and associated risk factors among older adults in Cali, Colombia. Colombia Mйdica. 2013 Oct;44(4):224-31.
57. Pegorari MS, Tavares DM dos S. Factors associated with the frailty syndrome in elderly individuals living in the urban area. Rev Lat Am Enfermagem. 2014;22(5):874–82.
58. Eyigor S, Kutsal YG, Duran E, Huner B, Paker N, Durmus B, et al. Frailty prevalence and related factors in the older adult—FrailTURK Project. Age (Omaha). 2015;37(3):1–13.
59. Makizako H, Shimada H, Tsutsumimoto K, Hotta R, Nakakubo S, Makino K, Lee S. Social frailty leads to the development of physical frailty among physically non-frail adults: A four-year follow-up longitudinal cohort study. International journal of environmental research and public health. 2018 Mar;15(3):490.
60. Bales CW, Ritchie CS. Sarcopenia, weight loss, and nutritional frailty in the elderly. Annual review of nutrition. 2002 Jul;22(1):309-23.
61. Schoufour JD, Franco OH, Kiefte-de Jong JC, Trajanoska K, Stricker B, Brusselle G, Rivadeneira F, Lahousse L, Voortman T. The association between dietary protein intake, energy intake and physical frailty: results from the Rotterdam Study. British Journal of Nutrition. 2019 Feb;121(4):393-401.
62. Miettinen M, Tiihonen M, Hartikainen S, Nykɑnen I. Prevalence and risk factors of frailty among home care clients. BMC geriatrics. 2017 Dec 1;17(1):266.