

Association of Socio-Demographic, Psychosocial and Functional Factors with Frailty Syndrome among Community-Dwelling Elderly in Kuala Nerus, Terengganu

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ABSTRACT

Background: Frailty syndrome among the elderly is associated with an increased risk of disability, morbidity, and mortality as they aged. There were limited studies on frailty syndrome among the Malaysian elderly, which were not widely discussed in various settings and factors. Therefore, the association of the factors with the frailty syndrome was still limited and not clearly revealed. This article reports the prevalence of frailty syndrome and its associations with the socio-demographic characteristics, psychosocial and functional status among the community-dwelling elderly in Kuala Nerus, Terengganu.

Materials and Methods: Out of the 279 (90% response-rate) elderly respondents, 118 male and 161 female were randomly selected and interviewed. Using the validated Fried's phenotype, respondents were categorized as frail (≥ 3 criteria) or non-frail (≤ 2 criteria).

Result: The mean age of the respondents was 73.3 ± 6.1 years old. The prevalence of frailty syndrome was 18.3%. From the binary logistic regression, lower participation of the respondents in leisure activities [OR: 2.63; 95% CI: 1.015 – 6.804] and attending feast [OR: 3.99; 95% CI: 1.015 – 6.804]; have depressive symptoms [OR: 4.17; 95% CI: 1.367 – 12.740] and dependent to mobile [OR: 3.42; CI: 1.310 – 8.925] were significantly associated with frailty syndrome.

Conclusion: The understanding of the interactions between frailty syndrome and contributing factors might be significant in identifying the modifiable risk factors and gave an overview that can be used as the baseline data on frailty syndrome for the intervention program.

Keywords: Frailty syndrome, community-dwelling, socio-demographic, psychosocial, functional.

1.0 Introduction

Globally, people aged 65 and older in 2015 were estimated to be 8.5 percent of the total population and is projected to increase to 12.0 percent by 2030 and to 16.7 percent of the total world population by 2050 (He, Gookind & Kowal, 2016). The similar increasing trend of population aging was also observed in Malaysia, where senior citizens aged 60 years and above were projected to increase from 9 percent to 15 percent of the total population (Department of Statistics Malaysia, 2010). Frailty syndrome is expected to become a common problem among the older population. Frailty is considered as a geriatric biological syndrome, characterized by the decreased physiological reserves, which is associated with increased risk of disability and high vulnerability to poor health outcomes, such as falls, hospitalization, institutionalization, and death (Klein et al., 2015). The definition of frailty was proposed by Fried et al. (2001) and has been validated in the Cardiovascular Health Study (CHS). It proposed a physical phenotype, which defines frailty syndrome as a combination of weakness, exhaustion, lack of activity, weight loss/underweight and slow walking speed. All these five components are related to each other in the cycle of frailty (Fried et al., 2001). Individual with three or more components were classified as frail while the presence of none to two components was defined as non-frail. Frailty prevalence in older adults has been reported largely across the world and the number varies due to the different instruments used to define and operationalize frailty, different geographical, study design, the range of age, gender, characteristic of respondents and the heterogeneity of Fried's frailty phenotype implementation (Syddall et al., 2006).

Frailty is related to multidimensional factors which includes low-socio-demographic status (Curcio et al., 2014; Alvarado et al., 2008), low contact with people (Mhaolainet al., 2012; Woo et al., 2005), absence of social support (Woo et al., 2005), no participation in religious activities (Reid-Arndt et al., 2011), having depressive symptoms (Kang et al., 2016), having cognitive impairment (Robertson et al., 2014; Ávila-Funes et al., 2011), having difficulties in daily activities (Curcio, Henao & Gomez, 2014; Guilleyet al., 2008), and low muscle strength (Lang et al., 2009). Low socioeconomic position not only make people vulnerable to acquire some physical limitations but also can accumulate to the point where they are likely to be inhibiting (Gjonca, Tabassum & Breeze, 2009). From the psychosocial aspects, social isolation and feelings of loneliness are associated with a high risk of frailty and might cause social disability (Markle-Reid & Browne, 2003). Meanwhile, religious participation is believed to reduce psychological distress and improve spiritual coping, social support, or a more generalized and positive belief system (Maselko & Kubzansky, 2006). Elderlies who have difficulties to perform activities might restrict their social involvement, thus, might influence their quality of life (Woo et al., 2005). On the other hand, elderlies who are likely to isolate and not participate in communities or religious activities would decrease their self-esteem, which can result in depression. Elderlies with depressive symptoms would restrict their activities and eventually, may lead to frailty (Mhaolainet al., 2012). The physical and cognitive function declines as people aged and were found to be associated with frailty syndrome (Robertson et al., 2014). Cardiovascular Health Study (CHS) (Fried et al., 2001) found that frail participants have limitations in their mobility, have difficulties in performing activities of daily living (ADL) and associated with disability (Savela et al., 2013). The limitations in social contact, such as fewer interactions with family and friends outside the home and the limitations in social activities are linked with lower functional factors (Yeh & Liu, 2003). Decreasing cognitive function may lead to a functional loss, consequently to physical dependency (Lang, Michel & Zekry, 2009). Functional disability is considered to be

the precursor to frailty syndrome since the physical phenotype of frailty includes slow walk, weakness, and physical inactivity.

Identification of factors associated with frailty syndrome would benefit health practitioners, educators, and policy makers in developing future plans, intervention and treatment to the targeted groups. The prevention of frailty thus required that highlight on the modifiable environment risk factors before it may reach the more serious stage that would affect the movement. There were very little studies on frailty syndrome among Malaysian senior citizens, which were not widely discussed in various settings and factors. Thus, the association of the factors was still limited and not clearly revealed. This study intended to be the initial work on frailty syndrome and its association with the socio-demographic characteristics, psychosocial and functional status among the elders in community-dwelling in Kuala Nerus, Terengganu.

2.0 Materials and Methods

2.1 Study design and recruitment

This was a cross-sectional study conducted in Terengganu which is located in Peninsular Malaysia. Seven districts in Terengganu included Besut, Dungun, Hulu Terengganu, Kemaman, Marang, Setiu and Kuala Terengganu. Regarding the Basic Data of Terengganu State 2011, Kuala Terengganu has the highest proportion of older adults. Kuala Nerus district has been selected due to the highest proportion of older people than the other districts in Terengganu (Department of Statistics Malaysia, 2010). Kuala Nerus district consisted of four sub-districts (Tepoh, SeberangTakir, Bukit Tunggal, and Wakaf Tembesu). All 60 villages under these four sub-districts were listed. To avoid any bias and to make the total number of respondents represent each village fairly, the number of respondents were recruited based on the proportion of elderly population in each village. The total of 308 respondents were randomly selected using the 'Research Randomizer' application (Urbaniak & Plous, 1999), where the name list was retrieved from the District Office of Kuala Terengganu based on the latest data of the Census Malaysia 2010. Based on Aday and Cornelius (Aday & Cornelius, 2006), the sample size was calculated based on two proportions formula with the medium design effect of this study was 1.5. The medium design effect was estimated because the respondents within the cluster are more homogenous based on the marital status of previous study with the expected response rate of this study was 0.8. Thus, a total of 308 respondents who have been residing in Kuala Nerus for more than 12 months and are able to communicate effectively were included in this study. The response rate for the study was 90%. Respondents with mental illness (dementia or Alzheimer), terminally ill (end stage cancer or in rehabilitation), bedridden, and having hearing difficulties or deaf were excluded. A few structured questions were used to ascertain the presence of mental illness, for instance, by asking the respondents whom they lived with. The respondents who could not be reached out for the next visits or refused to participate were considered to be drop out (drop-out rate was 10%). Data was collected through house-to-house visits. Some incentive was given to each respondent at the end of the face-to-face interview and the anthropometric assessment session, which took about 30 to 45 minutes per respondent. This study was conducted from June 2013 until October 2013. This study was approved by the University Research Ethics Committee of

Universiti Putra Malaysia (JKEUPM) (Reference number: UPM/TNCPI/RMC/1.4.18 JKEUPM).

2.2 Instruments

The data collection was done by distributing the structured questionnaire and assessing the frailty status. Prior to the distribution of the questionnaire, a pilot study was conducted among 10 free-living elderly for the questionnaire's feasibility and validity. The free-living elderly who have the similar characteristics with the targeted group were chosen. They were interviewed to check their understanding on Rapid Assessment of Physical Activity (RAPA) questionnaire, to assess the length of time to complete the interview session and assessment of frailty status using Fried Phenotype which was translated into Malay version, using forward-backward translation by expert panel that have clinical skills and required knowledge for this study. The structured questionnaire was divided into three sections; socio-demographic and socioeconomic characteristics; psychosocial status; and functional status. The assessment of frailty syndrome was used to determine frailty status.

2.2.1 Structured questionnaires

Three (3) parts of independent variables included were socio-demographic and socioeconomic characteristics, psychosocial status and functional status. The first part was Part A: Socio-demographic characteristics which included gender, age, marital status, employment status, household monthly income, household size, and educational level. The second part was the Part B: Psychosocial status which were assessed by social relationship and social participation; and depressive status which was assessed by Malay version Geriatric Depression Scale (M-GDS-14). The last part was Part C: Functional status assessed by Activity of Daily Living (ADL) using Barthel's Index; Instrumental Activity of Daily Living (IADL) using Katz Index; cognitive function using Elderly Cognitive Assessment Questionnaire (ECAQ); and mobility function using Elderly Mobility Status (EMS).

2.2.2 Assessment of frailty syndrome by Fried Phenotype

Fried Phenotype was used to assess the frailty syndrome status. A well-established, standardized frailty phenotype, which was validated in the Cardiovascular Health Study (CHS) has been proposed (Fried et al., 2001). The five criteria of frailty phenotype were; unintentional weight loss, weakness, exhaustion, slowness, and low level of physical activity. A person is classified as frail when present with three or more of the criteria. In the current study, frailty syndrome was assessed by slightly modified version of the Fried frailty phenotype by substituting the tools to measure physical activity level and strength to fit with this population sample and culture.

2.2.2.1 Unintentional weight loss

Weight loss is defined as the unintentional weight loss of 10 lbs (4.5 kg) or > 5% of body weight of the prior years since 60 years old. It also was defined indirectly from self-report weight loss (e.g: the clothes became too loose). Respondents were classified as frail if weight loss is presents (Fried et al., 2001).

2.2.2.2 Weakness

Weakness was assessed by assessing the grip strength using a digital handgrip (Charder; Model MG4800), which was measured based on the CHS protocol using the highest value of three readings of a dominant hand. Charder digital handgrip is a mechanical handgrip that measures the grip strength based on the amount of tension produced in a spring. This present study indicates the weakness according to the value of grip strength is at a percentile of $\leq 25^{\text{th}}$ by gender (18.0 kg for male and 12.5 kg for female). Handgrip strength is a validated tool and a feasible method to measure the muscle strength and muscle function. It was suitable for the upper muscle function measurement to reflect the maximum strength derived from the extrinsic and intrinsic hand muscle contraction (Mitsionis et al., 2009). The classification of weakness was determined if the grip strength (the maximum value of three attempts dominant hand) falls at the lowest quartile, which is below 25% of the quartile stratified for gender.

2.2.2.3 Exhaustion

Exhaustion was assessed by using two questions from the Center for Epidemiologic Studies Depression (CES-D) scale. The respondents were asked to rate how often in the last week did they felt like following the two statements; "I felt that everything I did was an effort" and "I could not get going". The score is divided from 0 to 3, where 0 = rarely, 1 = some of the time, 2 = moderate amount of the time, and 3 = most of the time. Respondent with a score of 2 or 3 on either statement was defined as exhausted.

2.2.2.4 Slowness

Slowness was defined as a value in the lowest quintile of the study population (adjusted for gender and standing height) to complete 15 feet (4.75 meter). Walking speed was measured as the time needed to walk at a distance of 4.75 meter. Accordingly, the respondents were categorized as having slow walking speed when the time to walk 15 feet is ≥ 7 seconds (for male with height < 173 cm or female with height < 159) or ≥ 6 seconds (for male with height > 173 cm or female with height > 159 cm).

2.2.2.5 Low physical activity

In the present study, the Rapid Assessment Physical Activity (RAPA) questionnaire was used to assess the physical activity level of the respondents. Originally, Minnesota leisure time physical activity was used to assess the physical activity (Fried et al., 2001). RAPA is a valid tool for older adults and more general, simple, and suitable for the assessment of physical activity among the older adults in Malaysia. It can capture their level of physical activity by asking their daily routine and leisure time activities. Physical activity was estimated using the self-report of frequency, duration, and intensity of usual activities. It contains two parts, namely Part A: aerobic activities; and Part B: strength and flexibility. In the present study, only aerobic activities was used for the assessment of physical activity level. The categorization was divided into five levels of physical activity: (i) sedentary, (ii) underactive, (iii) light activities, (iv) regular underactive, and (v) regular active. The scoring of 1 and 2 were classified as having a low physical activity, while scoring of 3 to 5 were classified as active. Sedentary and underactive respondents with a score of 1 and 2, respectively, were considered as frail. The instructions for completing the questionnaire provided a brief

description of the three levels of physical activity (light, moderate, and vigorous) with graphic and text depictions of the types of activities that fall into each category.

2.3 Data analysis

The Statistical Package for the Social Sciences (SPSS-20) software was applied in analyzing the data of this study which involved three (3) levels: univariate, bivariate and multivariate. In univariate analyses, categorical variables was analyzed by cross-tabulation of percentages (%) and frequencies (n). It described the characteristics of the socio-demographic and socioeconomic, psychosocial status, and functional factors among the respondents according to gender. The main purpose of the bivariate analyses were to explore the relationship and compare the groups. The association or proportion of the differences between the categorical variables was tested by using the Pearson chi-square test. In the multivariate analysis, the Binary Logistic Regression was used to predict the categorical outcomes. The results were presented as odds ratio (OR) and 95% confidence interval (CI) were calculated. There were two groups of dependent variable, which frailty status was divided into frail (exhibit at least three criteria of frailty phenotype) and non-frail (exhibit two or less criteria of frailty phenotype).

3.0 Result

3.1 Respondents' Background

The community-dwelling elderly aged 60 years old and above were recruited from four Sub-districts in Kuala Nerus District. The response rate for this study was 90%, which 279 of 308 eligible respondents agreed to participate in this study (42.3% males and 57.7% females). The age mean of the respondents was 73.32 ± 6.05 years old, ranging from 63 to 99 years old. From Table 1, only 17.6% of the respondents lived alone, about 66.3% lived with at least four household members, including themselves. The majority of the respondents were unmarried females (51.3%); had a formal education with at least primary education (58.8%); and unemployed (83.5%). Male had a significantly higher percentage of being married and having formal education as compared to female ($p < 0.001$). Female had a significantly higher percentage of living alone, unemployed, and depending on others for income sources as compared to male ($p < 0.01$). Nearly half (43.7%) of the respondents have a low-income level ($< RM500$). The income sources were derived from social welfare and children, whilst for those who did not depend on others, usually used their savings and pension or their spouse's pension, and/or having their own salary.

Table 1: Respondents' background according to gender [n (%)]

Characteristics	n (%)		
	Male (n = 118)	Female (n = 161)	All (n = 279)
SOCIO-ECONOMIC & SOCIODEMOGRAHIC FACTORS			
Living arrangement			
Stay alone	11 (9.3)	38 (23.6)	49 (17.6)**
Accompanied	107 (90.7)	123(76.4)	230 (82.4)
Marital status			
Married	87 (73.7)	49 (30.4)	136 (48.7)*
No spouse	31 (26.3)	112(69.6)	143 (51.3)
Education level			
Illiteracy	33 (28.0)	82 (50.9)	115 (41.2)*
Formal	85 (72.0)	79 (49.1)	164 (58.8)

Employment status			
Employed	29 (24.6)	17 (10.6)	46 (16.5)**
Unemployed/Retired	89 (75.4)	144 (89.4)	233 (83.5)
Income level			
< RM 500	43 (36.4)	79 (49.1)	122 (43.7)***
RM 500 – RM1499	48 (40.7)	61 (37.9)	109 (39.1)
≥RM1500	27 (22.9)	21 (13.0)	48 (17.2)
Household size			
≤ 4	74 (62.7)	111 (68.9)	185 (66.3)
>4	44 (37.3)	50 (31.1)	94 (33.7)
Financial dependency			
Independent	36 (30.5)	24 (14.9)	60 (21.5)**
Depend on others	82 (69.5)	137 (85.1)	219 (78.5)
PSYCHOSOCIAL FACTORS			
Social relationship			
<u>Siblings</u>			
Frequently (Once per week/ Once per month)	44 (37.3)	73 (45.3)	117(41.9)
Seldomly (At least once in 3 months/Very rare/Never)	74 (62.7)	88 (54.7)	162 (58.1)
<u>Children</u>			
Frequently (Once per week/ Once per month)	104 (88.1)	134 (83.2)	238 (85.3)
Seldomly (At least once in 3 months)/Very rare/Never)	14 (11.9)	27 (16.8)	41 (14.7)
<u>Grandchildren</u>			
Frequently (Once per week/ Once per month)	97 (82.2)	138 (85.7)	235 (84.2)
Seldomly (At least once in 3 months/Very rare/ Never)	21 (17.8)	23 (14.3)	44 (15.8)
<u>Relatives</u>			
Frequently (Once per week/ Once per month)	72 (61.0)	97 (60.2)	169 (60.6)
Seldomly (At least once in 3months/ Very rare/ Never)	46 (39.0)	64 (39.8)	110 (39.4)
<u>Neighbours</u>			
Frequently (Once per week/ Once per month)	114 (96.6)	150 (93.2)	264 (94.6)
Seldomly (At least once in 3 months)/Very rare/ Never)	4 (3.4)	11 (6.8)	15 (5.4)
Social participation			
<u>Participation in regular activities</u>			
<u>Leisure walk/ activities</u>			
Frequently (almost everyday/ 3-4 days per week)	105 (89.0)	117 (72.7)	222 (79.6)*
Seldomly (1-2 days per week)/ rare/ Never)	13 (11.0)	44 (27.3)	57 (20.4)
<u>Feast</u>			
Frequently (at least once a month/ at least once in 3 months)	83 (70.3)	102 (63.4)	185 (66.3)
Seldom (at least once in a year)/ Never)	35 (29.7)	59 (36.6)	94 (33.7)
<u>'Gotong-royong'</u>			
Frequently (at least once a month/ at least once in 3 months)	39 (33.1)	51 (31.7)	90 (32.3)
Seldom (at least once in a year)/ Never)	79 (66.9)	110 (68.3)	189 (67.7)
<u>Participation in religious activities</u>			
<u>Pray together in mosque</u>			
Frequently (almost everyday/ at least once a week)	97 (82.2)	64 (39.8)	161 (57.7)*
Seldomly (at least once a month)/ Never)	21 (17.8)	97 (60.2)	118 (42.3)
<u>Tahlil recitation</u>			
Frequently (almost everyday/ at least once a week)	75 (63.6)	80 (49.7)	155 (55.6)***
Seldomly (at least once a month)/ Never)	43 (36.4)	81 (50.3)	124 (44.4)
<u>Religious talk</u>			
Frequently (almost everyday/ at least once a week)	74 (62.7)	88 (54.7)	162 (58.1)
Seldomly (at least once a month)/ Never)	44 (37.3)	73 (45.3)	117 (41.9)
<u>Depressive level</u>			
Depression	19 (16.1)	14 (8.7)	33 (11.8)
Normal	99 (83.9)	147 (91.3)	246 (88.2)
FUNCTIONAL FACTORS			
Cognitive function			
Normal	102 (86.4)	125 (77.6)	227 (81.4)
Impaired	16 (13.6)	36 (22.4)	52 (18.6)
Mobility function			
Dependent	4 (3.4)	10 (6.2)	14 (5.0)
Independent	114 (96.6)	151 (93.8)	265 (95.0)
Activities of Daily Living (ADL)			
No difficulties	9 (7.6)	26 (16.1)	35 (12.5)***
Difficulties to perform ADL	109 (92.4)	135 (83.9)	244 (87.5)
Instrumental Activity of Daily Living (IADL)			
Difficulties to perform IADL	88 (74.6)	109 (67.7)	197 (70.6)
No difficulties	30 (25.4)	52 (32.3)	82 (29.4)

Chi-Square Test:

* p<0.001, ** p<0.01, *** p<0.05, significant difference between gender

In terms of social relationship, it was reported that majority of the respondents frequently met their neighbours (90.4%), followed by children (85.3%), grandchildren (84.2%), relatives (60.6%), and siblings (41.9%). Majority respondents went out for leisure activities (79.6%) and attended feast (66.3%) frequently. Regarding religious activities, it seems that more than half of the respondents pray together (*Jemaah*) in the mosque (57.7%), participate in *tahlil* recitation (55.6%) and religious talk frequently (58.1%). There was a high prevalence of the respondents with an absence of depression (88.2%). There was a high proportion of the respondents (81.4%) with normal cognitive function, 95.0% could mobile safely and independently, 87.5% have difficulties to perform the ADL, and 70.6% have difficulties in performing the IADL tasks.

3.2 Prevalence of frailty syndrome

Table 2: Prevalence of frailty syndrome according to gender and age group [n (%)]

Characteristics	Gender [n (%)]		Age group [n (%)]		Total (n = 279)
	Male (n = 118)	Female (n = 161)	60-74 years old (n = 168)	≥ 75 years old (n = 111)	
Frailty syndrome status					
Non-frail (0 criteria)	43 (36.4)	69 (42.9)	90 (53.6)	22 (19.8)	112 (40.1)
Pre-frail (1-2 criteria)	54 (45.8)	62 (38.5)	65 (38.7)	51 (45.9)	116 (41.6)
Frail (≥ 3 criteria)	21 (17.8)	30 (18.6)	13 (7.7)	38 (34.2) ^b	51 (18.3)
Fried phenotype					
Unintentional weight loss ^d	20 (50.0)	20 (50.0)	18 (45.0)	22 (55.0)	40 (14.3)
Exhaustion ^e	23 (46.9)	26 (53.1)	15 (30.6)	34 (69.4) ^b	49 (17.6)
Weakness ^f	29 (40.3)	43 (59.7)	27 (37.5)	45 (62.5) ^b	72 (25.8)
Slowness ^g	14 (24.1)	44 (75.9) ^a	24 (41.4)	34 (58.6) ^c	58 (20.8)
Low physical activity ^h	56 (45.9)	66 (54.1)	54 (44.3)	68 (55.7) ^b	122 (43.7)

Chi-square test

^ap < 0.01, significant differences between gender

^bp < 0.001, ^cp < 0.01, significant differences between age group

^d unintentional weight loss (≥ 4.5 kg) or body mass index (BMI) < 18 kg/m²

^e respondents felt that everything they did was an effort most of the time in the past week (based on 2 questions from CES-D Depression Scale)

^f handgrip strength below than 25th percentile for men (18.0 kg) and women (12.5 kg)

^g Walking time of 4.6 meters stratified by gender and height

^h Score 1 and 2 classified as sedentary based on Rapid Assessment Physical Activity (RAPA) questionnaire

As shown in Table 2, the prevalence of frailty among the respondents was 18.3%, with a significantly higher prevalence among the older age group (34.2%) as compared to those from the younger age group (7.7%). According to Fried Phenotype, the phenotype that most frequently observed were low physical activity level (43.7%) and weakness (25.8%), followed by lowered walking speed (20.8%), exhaustion (17.6%) and have unintentional weight loss (14.3%). There was only the slowness criterion that shows a significant difference between male and female. It was noted that about three-quarters of those who had slowness were among females as compared to only one-quarter who were among males (p < 0.01). Within the age group, older elderlies have a significantly higher prevalence of exhaustion, weakness, slowness, and low physical activity as compared to younger elderlies, except for unintentional weight loss. Exhaustion was the highest criterion reported among the older elderlies and it was noted that the prevalence was almost three-quarter (69.4%) as compared to only 30.6% in the younger elderlies.

3.3 Associated factors of frailty syndrome

From Table 3, older age, unmarried (single/widowed/divorced), no formal education, and unemployment demonstrated their association with frailty syndrome. An older elderly is more

likely to be frail as compared to a younger elderly ($p<0.001$). Two-thirds of the older elderly had frailty, whereas only 7.7% of the younger elderly had frailty. In terms of marital status, those who were unmarried have more than the three-fold higher prevalence of frailty as compared to those who were currently married (27.3% and 8.8%, respectively) ($p<0.001$). With regards to the educational status, the frail respondents were more likely to be among those who had no formal education (30.4%) ($p<0.001$). Employed respondents were presented with no frailty, whereas almost one-quarter of unemployed respondents were frail. A high prevalence of frailty was seen among those living alone (26.5%) as compared to those who lived with others (16.5%), but there was no significant association. The other variables, including household size, household income, and income sources did not show any statistical association with frailty syndrome.

Table 3: Distribution of respondents according to frail groups [n (%)]

Characteristics	n (%)		p-value
	Non-frail (n = 228)	Frail (n = 51)	
SOCIO-ECONOMIC & SOCIODEMOGRAPHIC FACTORS			
Gender			0.983
Male	97 (42.5)	21 (41.2)	
Female	131 (57.5)	30 (58.8)	
Living arrangement			0.149
Stay alone	36 (15.8)	13 (25.5)	
Accompanied	192 (84.2)	38 (74.5)	
Marital status			< 0.001
Married	124 (54.4)	12 (23.5)	
No spouse (single/widowed/ divorced)	104 (45.6)	39 (76.5)	
Educational level			0.001
Illiteracy	80 (35.1)	35 (68.6)	
Formal	148 (64.9)	16 (31.4)	
Employment status			0.001
Employed	46 (20.2)	0 (0.0)	
Unemployed/Retired	182 (79.8)	51 (100.0)	
Income level			0.285
< RM 500	95 (41.7)	27 (52.9)	
RM 500 – RM1499	91 (39.9)	18 (35.3)	
≥RM1500	42 (18.4)	6 (11.9)	
Household size			0.581
≤ 4	149 (65.4)	36 (70.6)	
>4	79 (34.6)	15 (29.4)	
Financial dependency			0.352
Independent	52 (22.8)	8 (15.7)	
Depend on others	176 (77.2)	43 (84.3)	
PSYCHOSOCIAL FACTORS			
Social relationship			
<u>Siblings</u>			0.031
Frequently (Once per week/ Once per month)	104 (45.2)	13 (27.5)	
Seldomly (At least once in 3 months/Very rare/Never)	124 (54.8)	38 (72.5)	
<u>Children</u>			1.000
Frequently (Once per week/ Once per month)	194 (85.1)	44 (86.3)	
Seldomly (At least once in 3 months)/Very rare/Never)	34 (14.9)	7 (13.7)	
<u>Grandchildren</u>			0.536
Frequently (Once per week/ Once per month)	194 (85.1)	41 (80.4)	
Seldomly (At least once in 3 months/Very rare/ Never)	34 (14.9)	10 (19.6)	
<u>Relatives</u>			0.043
Frequently (Once per week/ Once per month)	194 (85.1)	41 (80.4)	
Seldomly (At least once in 3months/ Very rare/ Never)	34 (14.9)	10 (19.6)	
<u>Neighbours</u>			0.742
Frequently (Once per week/ Once per month)	216 (94.7)	48 (94.1)	
Seldomly (At least once in 3 months)/Very rare/ Never)	12 (5.3)	3 (5.9)	
Social participation			
<u>Participation in regular activities</u>			< 0.001
<u>Leisure walk/ activities</u>			

Frequently (almost everyday/ 3-4 days per week)	198 (86.8)	24 (47.1)	
Seldomly (1-2 days per week)/ rare/ Never	30 (13.2)	27(52.9)	
Feast			< 0.001
Frequently (at least once a month/ at least once in 3 months)	175 (76.8)	10 (19.6)	
Seldom (at least once in a year)/ Never	53 (23.2)	41 (80.4)	
'Gotong-royong'			< 0.001
Frequently (at least once a month/ at least once in 3 months)	87 (38.2)	3 (5.9)	
Seldom (at least once in a year)/ Never	141 (61.8)	48 (94.1)	
Participation in religious activities			
Pray together in mosque			
Frequently (almost everyday/ at least once a week)	147 (64.5)	14 (27.5)	< 0.001
Seldomly (at least once a month)/ Never	81 (35.5)	37 (72.5)	
Tahlil recitation			
Frequently (almost everyday/ at least once a week)	146 (64.0)	9 (17.6)	< 0.001
Seldomly (at least once a month)/ Never	82 (36.0)	42 (82.4)	
Religious talk			
Frequently (almost everyday/ at least once a week)	151 (66.2)	11 (21.6)	< 0.001
Seldomly (at least once a month)/ Never	77 (33.8)	40 (78.4)	
Depressive level			
Depression	16 (7.0)	17 (33.3)	< 0.001
Normal	212 (93.0)	34 (66.7)	
FUNCTIONAL FACTORS			
Cognitive function			
Normal	200 (87.7)	27 (52.9)	< 0.001
Impaired	28 (12.3)	24 (47.1)	
Mobility function			
Dependent	174 (76.3)	12 (23.5)	< 0.001
Independent	54 (23.7)	39 (76.5)	
Activities of Daily Living (ADL)			
No difficulties	21 (9.2)	14 (27.5)	0.001
Difficulties to perform ADL	207 (90.8)	37 (72.5)	
Instrumental Activity of Daily Living (IADL)			
Difficulties to perform IADL	148 (64.9)	49 (96.1)	< 0.001
No difficulties	80 (35.1)	2 (3.9)	

Pearson Chi-square test statistic and Fisher's Exact test *p* value reported for all variables. Statistical significant, * $p < 0.001$, ** $p < 0.01$, *** $p < 0.05$ (2-tailed)

It was reported (Table 3) that the respondents who were less frequent to meet their siblings and relatives were more likely to be frail ($p < 0.05$). The prevalence of frailty was higher among those who seldom participate in leisure activities, *gotong-royong*, and attending feast ($p < 0.001$). Regarding religious activities, respondents who seldom pray together in the mosque (72.5%), participate in *tahlil* recitation (82.4%), and religious talk (78.4%) were more likely to be frail ($p < 0.001$). There was a greater proportion (47.1%) of impaired cognitive function among frail respondents ($p < 0.001$) (Table 3). Respondents who mobile dependently ($p < 0.001$) were higher among frail elderly (76.5%). The respondents who have difficulties in performing ADL tasks were prevalent among frail respondents (27.5%) as compared to non-frail respondents (9.2%). In terms of the IADL, the respondents who have difficulties in performing IADL tasks were higher among frail elderly (96.1%).

3.4 Predictors of frailty syndrome

Table 4: Binary logistic regression for frailty syndrome and significant variables using ENTER Method

Characteristics	B	Odds ratio (95% CI)	p-value
SOCIO-ECONOMIC & SOCIODEMOGRAPHIC FACTORS			
Age group			
60-74 years old	0.819	1.00	0.093
≥ 75 years old		2.27 (0.871 – 5.901)	
Marital status			
Married	0.258	1.00	0.594
Single/ widowed/ divorced		1.29 (0.639 – 5.296)	
Educational level			
Formal	0.150	1.00	0.775
Illiteracy		1.16 (0.416 – 3.247)	
PSYCHOSOCIAL FACTORS			
Social relationship			
<i>Siblings</i>			
Frequently (Once per week/ Once per month)	0.009	1.00	0.986
Seldomly (At least once in 3 months/Very rare/Never)		1.01 (0.363 – 2.808)	
<i>Relatives</i>			
Frequently (Once per week/ Once per month)	0.079	1.00	0.870
Seldomly (At least once in 3months/ Very rare/ Never)		1.08 (0.419 – 2.794)	
Social participation			
<u>Participation in regular activities</u>			
<i>Leisure walk/ activities</i>			
Frequently (almost everyday/ 3-4 days per week)	0.966	1.00	0.047
Seldomly (1-2 days per week)/ rare/ Never		2.63 (1.015 – 6.804)	
<i>Feast</i>			
Frequently (at least once a month/ at least once in 3 months)	1.385	1.00	0.011
Seldom (at least once in a year)/ Never		3.99 (1.380 – 11.555)	
<i>'Gotong-royong'</i>			
Frequently (at least once a month/ at least once in 3 months)	-0.017	1.00	0.982
Seldom (at least once in a year)/ Never		0.98 (0.217 – 4.456)	
<u>Participation in religious activities</u>			
<i>Pray together in mosque</i>			
Frequently (almost everyday/ at least once a week)	-0.254	1.00	0.652
Seldomly (at least once a month)/ Never		0.78 (0.257 – 2.342)	
<i>Tahlil recitation</i>			
Frequently (almost everyday/ at least once a week)	0.426	1.00	0.621
Seldomly (at least once a month)/ Never		1.53 (0.283 – 8.276)	
<i>Religious talk</i>			
Frequently (almost everyday/ at least once a week)	0.306	1.00	0.694
Seldomly (at least once a month)/ Never		1.36 (0.296 – 6.227)	
Depressive level			
Depression			
Normal	1.429	1.00	0.012
		4.17 (1.367 - 12.740)	
FUNCTIONAL FACTORS			
Cognitive function			
Normal	0.512	1.00	0.317
Impaired		1.67 (0.612 – 4.554)	
Mobility function			
Dependent	1.229	1.00	0.012
Independent		3.42 (1.310 – 8.925)	
Activities of Daily Living (ADL)			
No difficulties	-0.341	1.00	0.550
Difficulties to perform ADL		0.71 (0.232 – 2.177)	
Instrumental Activity of Daily Living (IADL)			
Difficulties to perform IADL	1.196	1.00	0.147
No difficulties		3.31 (0.657 – 16.632)	

Dependent variable: Frailty status (non-frail and frail)

Statistical significance at the 0.05 level (2-tailed)

The reference category is 1.00

OR, Odds Ratio; CI, Confidence Interval

Cox and Snell $R^2 = 0.333$; Nagelkerke $R^2 = 0.543$

Hosmer–Lemeshow test $df = 8$, $p = 0.588$ (Chi-square: 6.533)

Chi-square (df) = 113.006 (16)

The binary logistic regression was performed using the ENTER method to assess the predictors of frailty syndrome (Table 4). The model contained 16 independent variables (age group, marital status, educational status, social relationship, social participation, depressive level, cognitive function, mobility function, functional ability by the ADL and the IADL). The full model containing all variables was statistically significant, $\chi^2 (16, N = 279) = 113.006$, $p < 0.001$, which indicates that the model was able to distinguish between the frail and the non-frail respondents. The model as a whole was explained between 33.3% (Cox and Snell R square) and 54.3% (Nagelkerke R square) of the variance in the frailty status where they were correctly classified as 88.9% of the cases. The chi-square value for the Hosmer–Lemeshow test is 6.533 with a significance level of 0.588, which supports the model, with 8 degrees of freedom. As reported in Table 4, four independent variables that statistically significant in the models were rarely participating the leisure walk and attended the feast, mobility dependency and having high depressive level. The strongest predictor of frailty syndrome was presence of depression, recording an odds ratio of 4.17 indicating that respondents who have high depressive level were four times more likely to have frailty syndrome than those who have no depression. Respondents who less frequent attended the feast at least once a year 3.99 times more likely to have frailty syndrome. Dependency in mobility displays the odds ratio of 3.42. It indicated that respondents who mobile dependently 3.42 times more likely to be frail. Respondents who participated rarely in leisure walk were 2.63 more likely to have frailty syndrome (Table 4).

4.0 Discussion

In this study, the prevalence of frailty syndrome among the Malay community-dwelling elderly in the area of Kuala Nerus, Terengganu was 18.3%, based on Fried's criteria. This finding was quite higher than the previous local study (Sathasivam et al., 2015) where the prevalence found was 5.7% using the Frailty Index among 789 urban community-dwelling elderlies aged 60 years and above in Malaysia. This range might be due to the difference of frailty definition, measurement instruments, and the criteria used (Sathasivam et al., 2015), which this study used Frailty Phenotype to define frailty syndrome. Meanwhile, it would be consistent with the previous study that found the prevalence of frailty is 15.2% in people of 60 years of age and older in the rural areas in Colombia. The frailty prevalence was ranging from 4.0% to 17.0% in studies that used frailty definition according to the physical phenotype, while in studies that used the broad definitions or measurement instruments, the prevalence varied from 4.2% to 59.1%. The prevalence of frailty syndrome in the current study is lower than those in the SABE (Salud Bienestar y Envejecimiento; Spanish for Health, Well-being and Aging) study (Alvarado et al., 2008) that found a higher frequency of frailty (30% - 47%), which is two or three times than this study. The different settings (urban), which included five large Latin American cities were one of the possible reasons for this discrepancy. Another possible reason for this different value might be due to the local cultural, genetic characteristics (Collard et al., 2012), and physical body size of Malaysian elderlies. Malaysian elderlies regularly have their own cultures such as participating *gotong-royong* and attending religious activities. Meanwhile, physical body size might affect the slowness which is one of the frail criteria of Fried Phenotype.

The current study showed that low physical activity was the most prevalent frailty component, followed by weakness, slowness, exhaustion, and unintentional weight loss. This is parallel

with the findings of National Health & Morbidity Survey 2015 that reported the level of physical activity gradually decreases with increasing age and this was most apparent among older people. Majority of the respondents were unemployed, which they spent most of their time with leisure and domestic daily activities at home. One review study (Sun, Norman & While, 2013) highlighted the fact that the older elderlies were more sedentary than the younger elderlies and the declining pattern of the physical activity with age was extensively reported in the previous studies (Hamdorf, Starr & Williams, 2002; Sims et al., 2007). Physically inactiveness also contributed to the escalating depression and anxiety (De Mello et al., 2013) and lack of social support (Woo et al., 2005). The reason for practicing a sedentary lifestyle might be different between the young and old generation. Poor health status, the existence of chronic illness particularly arthritis, the absence of family or friends to do the activity together, and non-conducive environment have been identified as the major constraints to do physical exercise among the Malaysian older adults (Minhat & Amin, 2012). Thus, the higher prevalence of these frail criteria, including low physical activity, weakness, and slowness will contribute to the high prevalence of frailty syndrome among this population sample.

Regarding the socio-demographic and socio-economic characteristics in the bivariate analysis, the factors that significantly associated with frailty syndrome were older age, unmarried, has no formal education and employment status (unemployed). However, there were no variables found to be associated with frailty in the multivariate analysis. The respondents with no spouse or single, divorced and widowed have been classified as unmarried. Previous studies showed that being married or living with a partner had a negative association with frailty in which it lowers the risk of getting frail (Pegorari & Tavares, 2014; Sánchez-García et al., 2014; Masel et al., 2009). Marital status is considered as a significant feature of the social support network for the older people. The frailty syndrome would be delayed when there is a presence of strong social ties and support, indicating an enhancement in the physiological reserves (Fried et al., 2001, Woo et al., 2005). There was no association observed between gender and frailty syndrome in the present study. This result was consistent with the previous literature (Danon-Hersch et al., 2012). However, many studies revealed that being female was also a contributing factor to frailty syndrome (Alvarado et al., 2008; Ávila-Funes et al., 2011; Collard et al., 2012, Mitsionis et al., 2009, Badrasawi et al., 2016).

In the bivariate analysis, the social relationship with siblings and relatives were associated with frailty syndrome. A higher frequency of contact with relatives and participation in the religious activities were associated with lower incidence of frailty syndrome (Woo et al., 2005). An important aspect of the assessment among the community-dwelling frail elder is the availability of a social support network. The networks often involved family, friends, and neighbours. Frail elderlies were at a high-risk of social isolation due to the sensory and mobility impairments, leading them to be less likely socially active (Lenardt et al., 2015). In the multivariate analysis, social relationship has no association with the frailty syndrome. Some studies reported that there was no association of frailty with social activities, social relationships or enjoyment of home/ neighbourhood (Kawano-Soto, García-Lara & Avila-Funes, 2012). The low participation of the respondents in leisure activities and attending feast were associated with frailty syndrome. This is in line with study by Woo et al. (2005) which reported frailty is more common among who are having low participation in leisure activities, and limited social networks, have little contact with relatives, and are absence in participation of community or religious activities. Depression found to be correlated with frailty syndrome. Depression in the later life leads to cognitive impairment (Andersen et al., 2005), isolation

(Pegorari & Tavares, 2014), and frailty. Mental health can be influenced by the daily spiritual experiences, forgiveness, and religious/spiritual coping, suggesting better mental health experiences among those who regularly participate in the religious activities (Reid-Arndt et al., 2011).

In the bivariate analysis, all the functional variables were associated with frailty syndrome. Mobility dependency remains to be associated with frailty syndrome in the multivariate analyses. The respondents who had one or more difficulties to perform the mobility, the ADL and IADL tasks were considered as being unable or dependent in doing the functional tasks. Consistent with this study (Sourial et al., 2013), a positive correlation was also found between the presence of frailty deficits and the presence of disability. The limitations for social contact, such as fewer interactions with family and friends outside the home and the limitations of social activities are linked with the lower functional factors (Sathasivam et al., 2015). In the present study, the cognitive function was not associated with frailty syndrome. Study (Robertson et al., 2014) on the cognitive domains reported that not all cognitive domains may become impaired simultaneously but may become dependent on the age and if the frailty indicators are present. For instance, a person with slow walking speed may have a poor executive function specifically, but not poor memory (Rosano et al., 2008). Thus, it was possible that the etiology of frailty and cognitive decline may differ depending on which indicators of frailty were present.

One of the limitations of the current study was being a cross-sectional design study, which did not allow the assessment of any cause-effect mechanism. A longitudinal study is needed to clarify the pathway of their associations for a more accurate and reliable understanding of the onset of frailty syndrome and its risk factors. Secondly, the population sample may not represent the entire population in Malaysia due to the study was only conducted in a localized area where the studied population has a particular economic, social characteristic (low socioeconomic status), and mostly with the majority of them being from the Malay community. Thus, the association between ethnicity and frailty could not be determined, since Chinese and Indian are also a majority part of the Malaysian population. A small number of respondents in the risk factors that were tested might limit the statistical power to demonstrate a significant association between the independent variables and frailty syndrome.

5.0 Conclusion and recommendation

The prevalence of frailty syndrome among the Malay community-dwelling elderlies of Kuala Nerus was 18.3%, indicating that frailty syndrome was relatively high among the community-dwelling older adults in Malaysia. The statistically significant variables for frailty syndrome that were identified in the model were rarely participated in the leisure walk and the feast, mobility dependency and having depression. The characteristics of frail among the older adults and the factors associated with frailty give an overview on the underlying effects and will guide the proper actions for the prevention programs in order to reverse and minimize the adverse effects.

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Declaration

Author(s) declare that there was no conflict of interest in this study.

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