
**UNIVERSITI PUTRA MALAYSIA**

# *PREVALENCE OF FRAILTY SYNDROME AND ITS ASSOCIATED FACTORS AMONG COMMUNITY-DWELLING OLDER ADULTS IN KUALA NERUS, TERENGGANU, MALAYSIA*

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**By**

**FAIRUS ASMA BT MOHD HAMIDIN**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science**

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**January 2017**

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Frailty syndrome is a clinical syndrome that decreases resistance to stressors, resulting from cumulative declines across multiple physiological systems. It is closely related to ageing which increases the risk of falls, hospitalisation, disability and death. In Malaysia, the data on frailty syndrome are still limited and less studied. A cross-sectional study on 279 community-dwelling older adults (118 male and 161 female) aged 60 years and above was conducted in four sub-districts (Seberang Takir, Tepoh, Wakaf Tembusu, and Bukit Tunggal) in Kuala Nerus to determine the prevalence of frailty syndrome and its associated factors. This study assessed the frailty syndrome through quantitative measurement based on the "phenotype of frailty" defined by Fried et al., (2001) that has been validated in the Cardiovascular Health Study. Respondents were classified as non-frail (score: 0-2) or frail (score $\geq$ 3). The characteristics of the respondents were assessed through the structured questionnaire which consisted of sociodemographic and socioeconomic characteristics, health-related status, dietary intake, and anthropometric measurements including body mass index, body circumference and body composition. The prevalence of frailty syndrome among the respondents was 18.3%. The mean age of respondents was 73.32 (*S.D* = 6.10) years with 60.2% in age 60-74 years. Majority of the respondents were living with others (82.4%), unemployed (83.5%) and depended on others for monetary support (78.5%). About 13.3% of the respondents were obese and 9.3% were underweight. The average daily energy intake for male and female were 1163 $\pm$ 294 kcal and 966 $\pm$ 291 kcal, respectively, which are both below the Recommended Nutrient Intake (RNI).

In the bivariate analysis, the factors associated with frailty syndrome included: advanced age, unmarried, no formal education, unemployed, poor hearing, appetite loss, hospitalisation in the previous year, poor self-rated health, lower body mass index, lower waist circumference, lower mid-upper arm circumference, lower calf

circumference, lower percentage of total body fat and lower lean body mass. After a multivariate analysis through binary logistic regression, advanced age [odds ratio (OR): 3.29; 95% confidence interval (CI): 1.41 – 7.69], unmarried [OR: 4.25; 95% CI: 1.68 – 10.75], hospitalisation in the previous year [OR: 4.38; 95% CI: 1.50 – 12.79], poor self-rated health [OR: 4.73; 95% CI: 2.04 – 10.99], and lower body mass index [OR: 0.88; 95% CI: 0.80 – 0.98] were significantly associated with frailty syndrome. The characteristics of frail older adults and the factors associated provide an overview on underlying effects and guiding actions for prevention programs functioning to reverse and minimize the adverse effects of frailty syndrome.

Abstrak tesis yang dikemukakan kepada senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**PREVALENS SINDROM KELEMAHAN DAN FAKTOR PENENTU YANG BERKAITAN DALAM KALANGAN KOMUNITI WARGA TUA DI KUALA NERUS, TERENGGANU, MALAYSIA**

Oleh:

**FAIRUS ASMA BT MOHD HAMIDIN**

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Sindrom kelemahan adalah sindrom klinikal yang mengurangkan rintangan ke atas pemunca tekanan akibat dari kemerosotan pelbagai sistem fisiologi. Sindrom ini berkait rapat dengan penuaan dan meningkatkan risiko jatuh, kemasukan ke hospital, ketidakupayaan dan kematian. Di Malaysia, data mengenai sindrom kelemahan ini masih terhad dan kurang dikaji. Kajian keratan rentas ke atas 279 komuniti warga tua (118 lelaki dan 161 wanita) berumur 60 tahun dan keatas dijalankan bagi menentukan prevalens dan faktor penentu kepada sindrom kelemahan di empat sub-mukim (Seberang Takir, Tepoh, Wakaf Tembusu, dan Bukit Tunggal) di Kuala Nerus. Kajian ini mengenalpasti sindrom kelemahan melalui pengukuran kuantitatif berdasarkan *"phenotype of frailty"* yang ditakrifkan oleh Fried et al. (2001) melalui *"Cardiovascular Health Study"*. Responden diklasifikasikan sebagai tiada kelemahan (skor: 0-2) atau mempunyai kelemahan (skor: $\geq$ 3). Ciri-ciri responden dinilai melalui soal-selidik berstruktur yang mengandungi ciri sosiodemografi dan sosioekonomi, status kesihatan, pengambilan makanan, pengukuran antropometri termasuklah indeks jisim tubuh, ukuran lilitan badan dan komposisi badan. Prevalens sindrom kelemahan dalam kalangan responden adalah 18.3%. Purata umur responden adalah 73.3 (*S.D* = 6.10) tahun dan 60.2% dalam lingkungan umur (60–74 tahun). Majoriti responden tinggal bersama orang lain (82.4%), tidak bekerja (83.5%) dan bergantung kepada orang lain untuk sumber pendapatan (78.5%). Kira-kira 13.3% daripada responden adalah obes dan 9.3% pula kurang berat badan. Purata pengambilan makanan harian bagi lelaki dan wanita adalah 1163 $\pm$ 294 kcal dan 966 $\pm$ 291 kcal dan masing-masing adalah rendah berbanding Saranan Pengambilan Makanan (RNI).

Dalam analisis "bivariate", faktor-faktor yang berkaitan dengan sindrom kelemahan termasuklah: usia lanjut, tidak berkahwin, tiada pendidikan formal, tidak bekerja, masalah pendengaran, tiada selera makan, sejarah kemasukan ke hospital dalam

tempoh setahun yang lepas, persepsi kesihatan diri yang tidak memuaskan, rendah indeks jisim tubuh, rendah ukuran lilitan pinggang, rendah lilitan otot lengan tengah, rendah lilitan betis, rendah peratusan lemak badan dan rendah jisim otot. Selepas analisis "multivariate" melalui "binary logistic regression", usia lanjut [odds ratio (OR): 3.29; 95% confidence interval (CI): 1.41 – 7.69], tidak berkahwin [OR: 4.25; 95% CI: 1.68 – 10.75], sejarah kemasukan ke hospital dalam tempoh setahun yang lepas [OR: 4.38; 95% CI: 1.50 – 12.79], persepsi kesihatan diri yang tidak memuaskan [OR: 4.73; 95% CI: 2.04 – 10.99] dan indek jisim tubuh yang rendah [OR: 0.88, CI: 0.80 – 0.98] adalah faktor yang signifikan bagi dikaitkan dengan sindrom kelemahan. Ciri-ciri sindrom kelemahan dalam kalangan warga tua dan faktor yang berkaitan memberi gambaran keseluruhan mengenai punca kepada penyebab serta dijadikan panduan untuk merangka program pencegahan bagi mengubah dan mengurangkan kesan buruk sindrom kelemahan ini.

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I certify that a Thesis Examination Committee has met on 11 January 2017 to conduct the final examination of Fairus Asma Mohd Hamidin on her Master thesis entitled "Prevalence of Frailty Syndrome and its Associated Factors among Community-Dwelling Older Adults in Kuala Nerus, Terengganu, Malaysia" in accordance with the universUniversiti Putra Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The committee recommends that the candidate can be awarded a relevant degree.

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of study

Frailty syndrome is a clinical syndrome commonly affecting older adults. Frailty is a condition of decreased reserve and resistance to stressors, resulting from cumulative declines across multiple physiological systems, and causing vulnerability to adverse outcomes, including mortality, disability, institutionalisation and falls (Fried et al., 2001). It is not a new syndrome but in several decades has become a topic of increasing interest in health care. Fried et al. (2001) revealed that frailty is not comorbidity or a disability. However, comorbidity could be an etiologic risk factor and disability is an outcome of frailty. To date, there are a lot of definitions to frailty and there are different diagnostic criterias for frailty. The instrument proposed by Fried et al. (2001) in Cardiovascular Health Study (CHS) known as Fried frailty phenotype or Fried criteria is a concurrent validated tool that is widely used and well accepted criterion by researchers to determine frailty among community-dwelling older adults, using five measurable components: 1) unintentional weight loss; 2) weakness; 3) slowness, 4) exhaustion; and 5) low physical activity. The presence of three or more components defines a frail older adult and the presence of none to two components defines a non-frail older adult.

Older adults are the most vulnerable group facing this syndrome. Its consistency increases with increasing age. The estimation of older adults population aged 65 years and above in European countries is projected to rise from 18% to 28% of the population in 2060 (European Union, 2014). The sharp rise of ageing population occurs simultaneously around the world. Similar global trending was seen in Malaysia where the population of older adults was continuously increased. The article from "The Establishment Post" in August 2015 showed (as cited in Malaysian Department of Statistic) the proportion of older adults aged 60 years and above is 9.1% and further rising to 15% by the year 2035 is projected, in which it will reach the aged nation (as cited in National Population and Family Development Board). In Malaysia, those with chronologically 60 years old and above are categorised as older adults (Department of Social Welfare Malaysia, 2013). With increasing age, a lot of problems may seem to rise among them in terms of deterioration of health and physical performances. The fast growing older adults population needs to be a concern in terms of prevention and intervention programmes provided through health care systems to overcome this problem.

The progression of clinical frailty in the older adults is complex. It is not caused by a single factor but commonly affected by numerous factors and can be interrelated or independent of each other. According to literatures, several factors that contribute to development of frailty include decline in lean body mass, malnutrition, social factors, deterioration in physiological processes, presence of pathological conditions, no

practice of a healthy lifestyle and might also be related to genetics and underlying factors that are still unknown. Identification of factors contributing to frailty syndrome is very important to design programmes and in developing future interventions. Prevention at an early stage should be the first line of defense before it may reach the serious stage and become a disability.

## 1.2 Problem statements

Frailty syndrome has become increasingly recognised as a major concern for older adults. The review on prevalence of frailty in the community from 21 cohort studies ranging from 4.0% to 59.1% with an overall weighted prevalence of 9.9% (Collard et al., 2012). Frailty usually results from a combination of problems and is eventually expressed as an overall functional decline (Bales and Ritchie, 2002). It puts them at an increased risk of adverse outcomes to the onset of disability, morbidity, institutionalisation and mortality. It is a continuous process and many factors can trigger the growing of its process. The underlying factors of frailty syndrome among older adults are multiple and are variable between individuals and populations. Researchers have determined several possible risk factors for frailty such as physiologic, comorbidity, disability, social status, sociodemographic and psychological factors.

Frailty syndrome gives negative prognostic factor for functionality and survival. The impact of this issue may affect the quality of life of the older adults in later life and burden care givers as well. For instance, social ties of older adults with their families and communities will be restricted due to physical and health barrier. There is also an issue in terms of social abuse from care givers; direct or indirect neglect when they are sick and in poor condition. The maintenance of physical, psychological and social functions is of particular concern to the older adults in giving them a good quality of life and also reducing the risk of adverse outcomes.

The older adults tend to be frail and significantly associated with various adverse outcomes. Frailty is a global issue and is expected to become a common problem among senior citizens in Malaysian. To date, the local studies on frailty syndrome among older adults are still limited, even in nearby countries. Besides, by looking at multidimensional factors contributed to frailty syndrome such as sociodemographic and socioeconomic characteristics; health-related status; anthropometric characteristics; and dietary intake could identify predictors and the modifiable risk factors of frailty syndrome.

The proportion aged 60 or older is rising quickly, leading to an increasing number of chronic noncommunicable diseases, age-related diseases, rising health cost and giving an unsustainable pressure on public spending. The study on several modifiable risk factors related to frailty may give positive impact on reversing it adverse outcomes. The assessment of modifiable risk factors may be useful as part of the screening, diagnosis and intervention. Intervention at primary stage in

community to prevent older adults from entering the frail stage and implementation of secondary intervention could leave the frailty syndrome at its initial stages reversible and prevent functional decline (Abellan van Kan et al., 2008). Thus, it is important to come out with the baseline data of frailty syndrome and its predictors need to be determined for the proper intervention planning to the target group.

## 1.3 Research questions

Given the limited data on prevalence of frailty syndrome and its associated factors thus triggering this study to determine the answers to the following research questions:

a) What is the prevalence of frailty syndrome among community-dwelling older adults in Kuala Nerus, Terengganu by using the Fried criteria?
b) What are the relationships between sociodemographic and socioeconomic characteristics, health-related status, anthropometric characteristics, and dietary intake with frailty syndrome?
c) What are the predictors that determine frailty syndrome among community-dwelling older adults in Kuala Nerus, Terengganu?

## 1.4 Objectives of study

General:

To determine the prevalence of frailty syndrome and its associated factors among community-dwelling older adults in Kuala Nerus, Terengganu.

Specific:

a) To determine the sociodemographic and socioeconomic characteristics, health-related status, anthropometric characteristics and dietary intake among the respondents.
b) To determine the prevalence of frailty syndrome among the respondents.
c) To determine the differences in sociodemographic and socioeconomic characteristics, health-related status, anthropometric characteristics and dietary intake between genders, age groups and frailty status.
d) To determine the association between sociodemographic and socioeconomic characteristics, health-related status, anthropometric characteristics and dietary intake with frailty syndrome.
e) To determine factors those predict frailty status among the respondents.

## 1.5 Significance of study

This study attempts to determine the prevalence and to identify factors associated with frailty syndrome among community-dwelling older adults in Kuala Nerus. Frailty syndrome is a global and health care issue since it leads to adverse outcomes such as falls, hospitalisation, disability, morbidity and mortality, which in turn contributes to the decrease in quality of life. This study provides an understanding of

frailty syndrome by identifying its predictors and those who may be at risk to be frail.

The multidimensional factors including sociodemographic and socioeconomic characteristics, health-related status, anthropometric characteristics and dietary intake were covered in this study in determining their relation with frailty syndrome. Although, the nature of this study could not identify a causal relation between predictors and frailty syndrome but at least it would be beneficial to other researchers in the same field.

To the future researchers, this study can provide baseline information on the recent status of frailty among community-dwelling older adults; enhances the knowledge and understanding on this health issue. Such data are obviously very important to be a guide to public health policy in creating preventive goals. Additionally, the study findings will be added to the body of knowledge on frailty syndrome for future researchers that would like to extend this area to the cohort study or to other population groups or to a larger population sample size.

As the older adults population size in Malaysia is growing with greater longevity, the impact of frailty syndrome could not be ignored and neglected. Determining the predictors of frailty syndrome is important in identifying the modifiable risk factors. Study findings could have implications on educationers, health practitioners and policy makers as a guide in terms of assessments, exploring etiologies and predicting factors for developing future planning, intervention and treatment to the targeted groups.

## 1.6 Null hypotheses

a) There is no significant association between sociodemographic and socioeconomic characteristics, health-related status, anthropometric characteristics and dietary intake with frailty syndrome among the respondents.
b) There are no factors that can significantly predict the frailty syndrome among the respondents.

## 1.7 Research framework

The research framework (Figure 1.1) shows the relationship between independent variables and dependent variables. This study was guided by a framework that links four components of independent variables that could influence the risk of being frail covered by: 1) sociodemographic and socioeconomic characteristics; 2) health-related status; 3) anthropometric characteristics; and 4) dietary intake. In this study, we investigated 25 known and putative associated factors according to previous

literatures that identify several predictors of frailty syndrome since it is a multifactorial and multidimensional syndrome, but did not investigate the association with functional, cognitive and clinical aspects.

For sociodemographic and socioeconomic characteristics, in general, advanced age and female gender showed a positive association with frailty that were commonly reported in previous studies (Woods et al., 2005; Michelon et al., 2006; Avila-Funes et al., 2008; Masel et al., 2009; Chen et al., 2010; Jurschik et al., 2012), while educational level and income level showed an inverse association with frailty. Low socioeconomic characteristics potentially increased the risk of frailty (Szanton et al., 2010; Woo et al., 2010).

The present study highlights several self-reported medical conditions and diseases that may be related with frailty syndrome including diabetes mellitus, heart diseases, hypertension, respiratory problems, gastro-intestinal problems, renal diseases, and arthritis. One review study has revealed no disease showed an inverse association with frailty (Mello et al., 2014). Anyway, diabetes, hypertension, heart diseases and rheumatoid arthritis patients have high probability of getting frailty (Klein et al., 2005; Newman et al., 2001). Geriatric syndromes and falls appeared to be an important contributor as both of them are linked to disability (Rosso et al., 2013; Rubenstein, 2006), while hospitalised older adults commonly demonstrated poor grip strength and unintentional weight loss (Hunt et al., 2013) that stand as criterias of frailty. Those with poor self-rating on their health showed a high potential of becoming frail in later life. Poor self-rated health is consistently found as being a predictor to frailty syndrome (Fried et al., 2001; Walston et al., 2002; Fried et al., 2004; Bergman et al., 2007; Ensrud et al., 2009; Avilla-Funes et al., 2009). Smoking status has a positive association with sarcopenia (Lee et al., 2007) where the sarcopenia acknowledged is a key feature of frailty syndrome.

Most studies found a positive association between frailty and body mass index (BMI) (Mello et al., 2014). Previous literatures have shown that obesity is a significant risk factor of frailty syndrome (Stenholm et al., 2014; Chang et al., 2010; Blaum et al., 2005; Villareal et al., 2004; Walston et al., 2002). Findings in the study by Hubbard et al. (2010) reported a U-shaped relationship between BMI and frailty suggesting that those who are underweight (BMI $< 18.5$ kg.m$^2$) and obese (BMI $\geq 30$ kg.m$^2$) are more likely to present as frail.

In term of dietary intake, inadequate food intake and nutritional deficiencies play an important role in the progression to be frail in later life (Fried et al., 2001; Bartali et al., 2006) by exacerbating loss of muscle mass and mucle strength (Kim et al., 2013). Besides, the results from prospective cohort study showed women with lower protein consumption are more likely to become frail than women whose diets are higher in protein (Beasley et al., 2010).

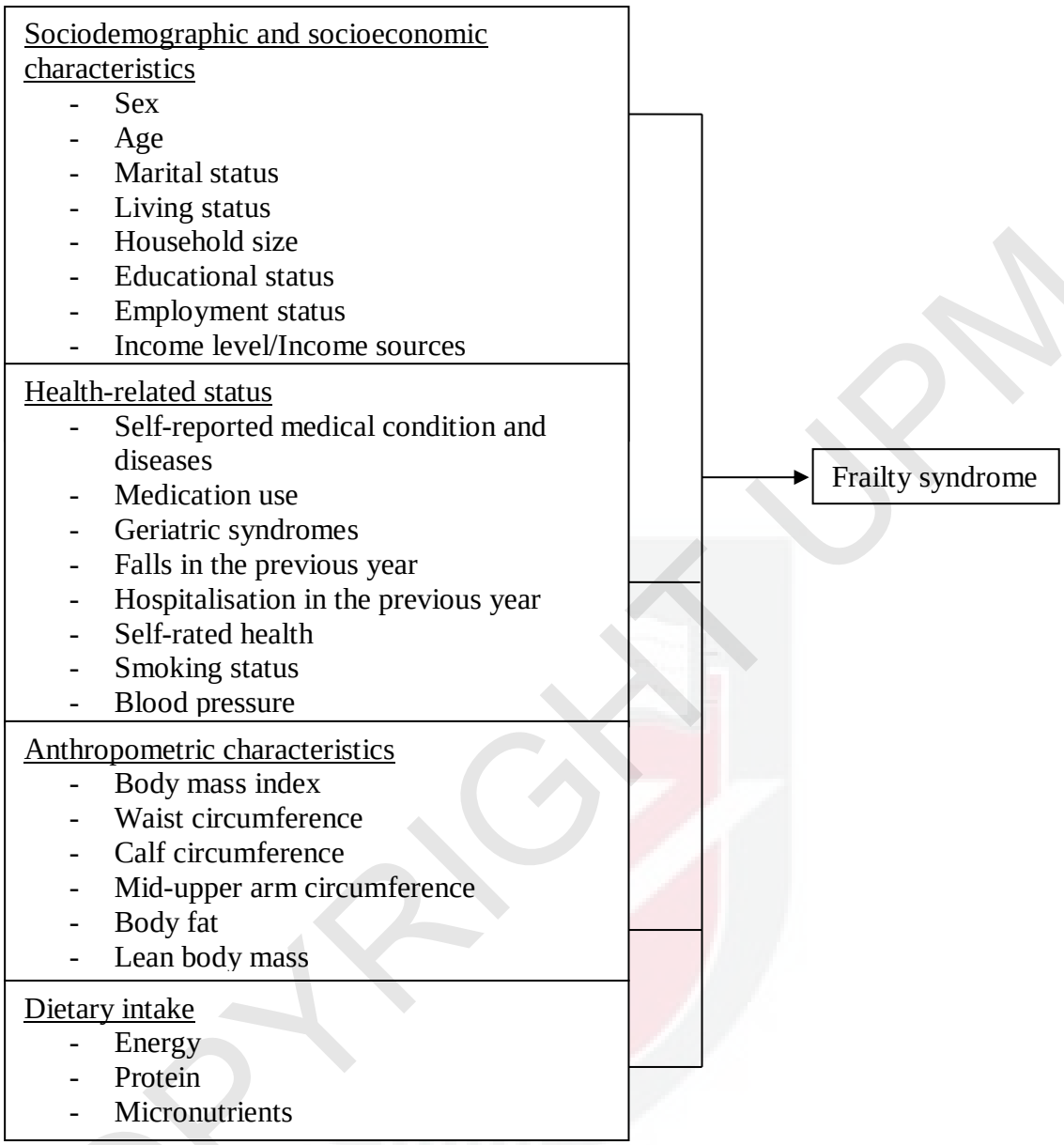


**Figure 1.1: The research framework of the study**

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## APPENDICES