MALNUTRITION RISK AND EFFECT OF NUTRITION INTERVENTION AMONG ELDERLY IN COMMUNITY

BY

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A thesis submitted in fulfilment of the requirement for the degree of Master of Health Sciences (Nutrition Sciences)

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MARCH 2021

ABSTRACT

Malnutrition is a concern around the globe including in Malaysia due to its negative effects to the health of elderly. Nutrition screening can help to identify malnutrition and subsequent interventions can be provided to overcome health deterioration related to malnutrition. This study aimed to identify the prevalence of malnutrition and associated factors, dietary intake and effectiveness of nutrition intervention among elderly living in the community. In Phase I of the study, a total of 413 participants aged 60 years and above in several agricultural settlements around Kuantan, Pahang was recruited (n= 134 men, n= 279 women). Malnutrition risk was evaluated using the Mini Nutritional Assessment Short Form (MNA-SF), whilst functional status was determined using Instrumental Activities of Daily Living (IADL). Mini Mental State Examination (MMSE) and Geriatric Depression Scale (GDS) were used to identify cognitive impairment and depressive symptom of participants respectively. Dietary intake data were collected with the use of diet history method and analyses were performed using Nutritionist Pro Software. Adequacy of participants' dietary intake was assessed against Recommended Nutrient Intakes for Malaysia (RNI) 2017. Phase II of the study evaluated the effectiveness of nutrition intervention on nutritional status and dietary intake of the elderly after three months. The elderly who were at malnutrition risk were grouped into intervention (n=30) and control groups (n=30). The intervention group received intensive nutrition intervention while the control group received individual dietary consultation only. Statistically significant value was set at $p<0.05$. This study revealed that 5.1% of elderly participants were malnourished, whilst 20.6% of them were at risk of malnutrition. Age, smoking status, income level, living status and depression were significantly associated with malnutrition risk. This study found that mean energy, protein and fiber intake were significantly lower than recommendation in both genders except for fat and carbohydrate. Micronutrients intake including calcium, vitamin A, vitamin C, vitamin D, riboflavin, thiamine, iron and folate did not meet the requirement outlined in RNI with statistically significant differences. In addition, energy, carbohydrate, protein, fat, folate and iron intake were significantly higher in male than female participants. Meanwhile, calcium and vitamin A intake were significantly higher in female than male participants. Phase II of the study demonstrated that nutrition intervention could help to improve nutritional status of the elderly living in the community. Mean MNA-SF score, body weight, energy, carbohydrate and fiber intake of intervention and control groups improved significantly after three-month follow-up. Mean MNA-SF score of intervention group was identified in well-nourished category after three months which indicated greater impact of intensive nutrition intervention. In conclusion, this study showed malnutrition was prevalent among elderly living in the community while inadequate dietary intake was also an issue in this population. The findings contribute to the body of evidence that nutrition screening is an important initial step to identify malnutrition risk among community living elderly and appropriate intervention is vital to improve their nutritional status. Multidisciplinary healthcare professional collaboration is warranted in future research to identify malnutrition problems and provide effective measures for nutritional care of the elderly.

خلاصة البحث

سوء التغذية مصدر قلق في جميع أنحاء العالم بما في ذلك في ماليزيا بسبب آثاره السلبية على صحة كبار السن. يمكن أن يساعد فحص التغذية في تحديد سوء التغذية و يمكن تقديم التدخلات اللاحقة للتغلب على التدهور الصحي المرتبط بسوء التغذية. هدفت هذه الدراسة إلى التعرف على مدى انتشار سوء التغذية وما يرتبط بها من عوامل ، المدخول الغذائي وفعالية التدخل التغذوي بين كبار السن الذين يعيشون في المجتمع. . في المرحلة الأولى من الدراسة ، بلغ إجمالي المشاركين 413 مشترك من الفئة العمرية 60 عامًا وأعلاه في العديد من المستوطنات الزراعية حول كوانتان، باهانج تم جمع (ن = 134 رجال ، ن = 279 امرأة). تم تقييم مخاطر سوء التغذية باستخدام الحد الغذائي الادنى Mini Nutritional Assessment (MNA-SF) و اختصاره فحص .(IADL) ، بينما تم تحديد الحالة الوظيفية باستخدام الأنشطة الآلية للحياة اليومية لتحديد تلف الإدراك وأعراض (GDS) ومقياس الاكتئاب عند الشيخوخة (MMSE) الحالة العقلية المصغر تم استخدام الاكتئاب لدى المشتركين على التوالي. بيانات المدخول الغذائي تم جمعها باستخدام طريقة السجل السابق للنظام الغذائي وتم تقييم كفاية المدخول الغذائي .Nutritionist Pro Software إجراء التحليلات باستخدام برنامج التغذية برو المرحلة الثانية من الدراسة قيمت فعالية التدخل .2017 (RNI) للمشاركين بالمقارنة مع مآخذ المغذيات الموصى بها لماليزيا التغذوي على الحالة التغذوية والمدخول الغذائي لكبار السن بعد ثلاثة أشهر. تم تجميع كبار السن الذين كانوا معرضين لخطر سوء التغذية (ن = 30) ومجموعات المراقبة (ن = 30). تلقت مجموعة التدخل الغذائي تدخل غذائي مكثف بينما تلقت كشفت .p=0.05 المجموعة الضابطة نظام غذائي فردي قائم على الاستشارة فقط. تم تعيين قيمة ذات دلالة إحصائية عند هذه الدراسة أن 5.1٪ من كبار السن كانوا يعانون من سوء التغذية ، بينما 20.6٪ منهم معرضون للخطر من سوء التغذية. كان العمر وحالة التدخين ومستوى الدخل والحالة المعيشية والاكتئاب يرتبط بشكل كبير بمخاطر سوء التغذية. وجدت هذه الدراسة أن متوسط الطاقة,البروتين والألياف أقل بكثير من التوصية في كلا الجنسين باستثناء الدهون والكربوهيدرات. تناول المغذيات الدقيقة بما في ذلك الكالسيوم وفيتامين أ, فيتامين ج وفيتامين د والريبوفلافين والثيامين والحديد وحمض الفوليك لا مع وجود فروق ذات دلالة إحصائية. بالإضافة إلى ذلك ، الطاقة ،و تناول الكربوهيدرات RNI يفي بالمتطلبات المبينة في والبروتين والدهون وحمض الفوليك والحديد أعلى بكثير في الذكور من الإناث. وفي الوقت نفسه ، كان تناول الكالسيوم وفيتامين أ أعلى بشكل ملحوظ في الإناث من المشاركين الذكور. . أظهرت المرحلة الثانية من الدراسة أنه يمكن أن يساعد ووزن MNA-SF التدخل الغذائي على تحسين الحالة التغذوية لكبار السن الذين يعيشون في المجتمع. متوسط درجة الجسم والطاقة والكربوهيدرات والألياف المتناولة في مجموعات التدخل والمراقبة تحسنت بشكل ملحوظ بعد ثلاثة أشهر من لمجموعة التدخل في فئة التغذية الجيدة بعد ثلاثة أشهر مما يشير إلى تأثير MNA-SF المتابعة. تم تحديد متوسط درجة أكبر للتدخل الغذائي المكثف. الخلاصة ، أظهرت هذه الدراسة أن سوء التغذية كان منتشرًا بين كبار السن الذين يعيشون في المجتمع في حين أن المدخول الغذائي غير الكافي كان أيضًا مشكلة لدى هؤلاء السكان. النتائج تساهم في مجمع الأدلة على أن فحص التغذية هو أولية مهمة وخطوة لتحديد مخاطر سوء التغذية بين المسنين في المجتمع و التدخل المناسب أمر حيوي لتحسين حالتهم التغذوية. الرعاية الصحية متعددة التخصصات مطلوبة في الأبحاث المستقبلية لتحديد مشاكل سوء التغذية .وتوفير تدابير فعالة للرعاية التغذوية للمسنين

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Health Sciences (Nutrition Sciences).

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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ACKNOWLEDGEMENTS

First and foremost, praise be to Allah the Almighty for His Blessing and Grace; for giving me the inspiration and strength throughout the completion of this thesis.

My utmost gratitude to my supervisor, Assistant Professor Dr. Aliza Haslinda Hamirudin and co-supervisor; Assistant Professor Dr.Suriati Sidek and Assistant Professor Dr. Nor Azlina A. Rahman for their continuous guidance, advice, effort and invertible suggestion throughout my study. I also forward my special thanks to all staff of Kulliyyah of Allied Health Sciences for their help whether directly and indirectly along the way of this research.

Lastly my gratitude goes to my father, Zainudin bin Mohamad, my mother, Azizah binti Abdul Rahman, family members, and all my friends for their advice and motivation. Without their endless support and encouragement, this thesis would not have been same as presented here.

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LIST OF ABBREVIATIONS

AI	Adequate Intakes
A.S.P.E.N	American Society for Parenteral and Enteral Nutrition
BMI	Body Mass Index
EAR	Estimated Average Requirements
GDS	Geriatric Depression Scale
IADL	Instrumental Activities of Daily Living
IBM SPSS	Statistical Package for Social Sciences
MMSE	Mini-Mental State Examination
MNA	Mini Nutritional Assessment
MNA-SF	Mini Nutritional Assessment –Short Form
(NSI-13).	Nutrition Screening Initiative Checklist
ONS	Oral Nutrition Supplementation
PG-SGA	PG-SGA Score Patient-Generated Subjective Global Assessment
RDA	Recommended Dietary Allowance
RNI	Recommended Nutrient Intakes
SGA	Subjective Global Assessment
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Population is ageing globally at an upward trend (United Nation, 2015). Ageing is previously more prevalent in the developed countries; however, it is also a phenomenon in developing countries in recent years (Tobi, Fathi & Amaratunga, 2017). Declining in fertility and mortality have been identified as two key drivers of these demographic changes (Turner, 2009; Christensen, Doblhammer, Rau, & Vaupel, 2009; Ward, Parikh, & Workman, 2011). The number of elderly people around the globe is expected to become more than double by 2050 and beyond triple by 2100, rising from 962 million in 2017 to 2.1 billion in 2050 and 3.1 billion in 2100 (United Nation, 2017).

The age group to define the elderly in Malaysia is similar to the cut-off age adopted by the United Nations which is 60 years and older (Mohammad & Abbas, 2012; Mohamad Yunus Abd Manaf, Omar, Omar & Salleh, 2017). Referring to Malaysia context based on projections made by Department of Statistic, Malaysia is expected to reach ageing population status by the year 2035, at which point 15% of the total population will be 60 years old and above. According to United Nation (2017), the elderly population in Malaysia continued to rise to 9.7% in 2017 and it is projected to increase to 23.1% in 2050.The Department of Statistics Malaysia (DOSM) (2018) reported that the percentage of Malaysian elderly population aged 65 years old increases from 6.2% in 2017 to 6.5% in 2018. The number of elderly is 2.10 million from total of 32.4 million Malaysian population. By 2040, the number is expected to become triple from 2.10 million to more than 6.0 million.

While the proportion of the elderly in Malaysia continues to grow, the changes will definitely pose several challenges in various aspects that have the potential to place significant burdens on healthcare and other support services (Forsyth & Chia, 2009; Wiener & Tilly, 2002; Prince at al., 2015; Tey et al., 2015). Various health and nutritional problems are expected to increase as the elderly are susceptible to health deterioration (De Groot & van Staveren, 2010; Culo, 2011; Thakur, Banerjee & Nikumb, 2013). Among elderly people's health issues such as chronic non-communicable diseases, mental health, disability, ocular morbidity; malnutrition is also prevalent and it usually coexists with other morbidities (Wells & Dumbrell, 2006; Jaul & Barron,2017). In this thesis, the focus of malnutrition term is on undernutrition and inadequacy of nutrients intake.

The risk of developing malnutrition increases with advancing age as it presents a number of challenge for the maintenance of good nutritional health in elderly (Ahmed & Haboubi, 2010; Amarya, Singh & Sabharwal, 2015). The elderly who suffer from malnutrition have longer recovery periods and hospital stay, high incidence of complications during hospitalization, delayed wound healing, poorer quality of life and high rates of morbidity and mortality (Amarantos, Martinez & Dwyer, 2001; Correia & Waitzberg, 2003; Raynaud-Simon, 2009). Therefore, nutritional issues pertaining to elderly are becoming increasingly important to be discussed which requires extensive and up-to-date information to plan for effective healthcare strategies to ensure healthy aging takes place (Tappenden et al., 2013; Robinson, 2018).

1.2 STATEMENT OF RESEARCH PROBLEM

Malnutrition is a frequent unnoticed issue among elderly in the community (Elia, Zellipour & Stratton, 2005; Morley, 2012). More worrying, malnourished elderly is more often than their well-nourished counterparts to require additional clinic visits or to be admitted to the hospital (Visvanathan et al., 2003; Rist, Miles & Karimi, 2012). Furthermore, a multitude of studies have shown that once admitted to the hospital, the malnourished elderly is at increased risk of experiencing various complications like delayed wound healing, pressure ulcers, infections, increase readmission rates and prolonged hospitalization (Davidson & Getz, 2004; Harris & Haboubi, 2005). They are also at a greater risk of morbidity and mortality (Norman, Pichard, Lochs & Pirlich, 2008; Charlton et al., 2012), reduce quality of life (Neumann, Miller, Daniels & Crotty, 2005) and increased financial burden on their family and health sector (Weekes et al., 2009).

Malnutrition already exists among elderly living at home and it is well-documented among Malaysian elderly (Sherina et al., 2004; Shahar et al., 2007; Suzana et al., 2013). However, the early signs are not easily detected due to lack of regular screening system coupled with irregular encounter with health care professionals (Evans, 2005; Elia & Russell, 2009; Craven, Pelly, Isenring & Lovell, 2017). Therefore, implementing nutrition screening is essential for initial step in identifying malnutrition risk among elderly, thus intervention could be taken place to prevent further health complications in this population (Field & Hand, 2015; Robinson, 2018).

1.3 SIGNIFICANCE OF THE STUDY

Several studies which have been done in Malaysia highlighted the prevalence of malnutrition among elderly living in community (Sherina et al., 2004; Shahar et al., 2007; Suzana et al., 2013). This is a cause of concern considering malnutrition can have deleterious effects on health outcomes of elderly which is associated with an increased risk of morbidity and mortality (Schueren et al., 2014; Kruizenga et al., 2016; Naseer, Forssell & Fagerström, 2016). Nutrition screening can help to identify malnutrition and subsequent appropriate interventions can lead to improvement in quality of life (Hamirudin et al., 2016; Bravo et al., 2018). However, none of the nutrition screening studies among community living elderly in Malaysia were accompanied by nutrition intervention. Furthermore, no study in Malaysia has evaluated effectiveness of intensive individual nutrition intervention exclusively among elderly in the community setting. Therefore, this research has a potential to prevent further health complications associated with malnutrition through nutrition intervention and subsequently reducing healthcare costs to treat the health and medical conditions, which is in line with 10th Malaysia Health Plan towards cost effective healthcare services. In addition, most studies on dietary intake of community living elderly were conducted more than a decade ago, which indicated a need for recent data on dietary intake of this population.

1.4 RESEARCH OBJECTIVES

1.4.1 General Objective

To identify the prevalence of malnutrition and associated factors, dietary intake and effectiveness of nutrition intervention among elderly in the community.

1.4.2 Specific Objective

PHASE I

1. To determine the prevalence of malnutrition among elderly in the community using the Mini Nutritional Assessment- Short Form (MNA-SF).
2. To identify factors associated with malnutrition among elderly living in community.
3. To assess dietary intake of elderly in community in comparison to Recommended Nutrients Intake (RNI) for Malaysia 2017.

PHASE II

4. To assess the effectiveness of nutrition intervention on nutritional status and dietary intake after 3 months.

1.5 RESEARCH QUESTIONS

PHASE I

1. What is the prevalence of malnutrition among elderly in community?
2. What are the factors associated with malnutrition among elderly in community?
3. What is the dietary intake of elderly in community in comparison to Recommended Nutrients Intake (RNI) for Malaysia 2017?

PHASE II

4. Do the nutritional status and dietary intake among elderly in community improve after 3 months of nutrition intervention?

1.6 RESEARCH HYPOTHESES

PHASE I

1. Prevalence of malnutrition is high among elderly in community.
2. Socio-demographic, psychosocial and functional status are significantly associated with malnutrition among elderly in community.
3. Dietary intake of elderly in community is inadequate in comparison to RNI for all macronutrients and micronutrients.

PHASE II

4. Nutritional status and dietary intake among elderly significantly improve after 3 months of nutrition intervention.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter includes a literature review on nutrition screening, the definition of malnutrition, its prevalence and associated factors, and nutrition assessment among elderly living in community. Next, literature will highlight on the dietary intake of elderly in community. This is followed by a review of literature on the effectiveness of nutrition interventions for malnourished elderly.

2.2 NUTRITION SCREENING

With the well-documented adverse effects of malnutrition on health, there is a need for timely malnutrition identification and management (Elia, Russell & Stratton 2010; Brotherton et al., 2011). Nutrition screening is one of the ways that malnourished individuals can be identified for further appropriate action. It is always better to prevent or detect problems early by screening than discover serious problems in later stage.

Nutrition screening has been defined by the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) as "a process to identify an individual who is malnourished or who is at risk for malnutrition to determine if a detailed nutrition assessment is indicated" (Mualler et al., 2011).

Furthermore, malnutrition is often unrecognized, but with the use of effective screening tool; malnourished elderly or those at nutritional risk will obtain further beneficial outcomes if accompanied by subsequent nutrition intervention. There are various screening tools that incorporate different anthropometric, biochemical and

clinical characteristics. Most importantly, an effective screening tool should be validated, simple and quick to administer, convenient to perform, easily completed by non-healthcare professional staff, patient or family members, no laboratory data needed, inexpensive and non-invasive (Ghimire, Baral & Callahan, 2017; Jones, 2004; Kondrup, Allison, Elia, Vellas & Plauth, 2003).

Green and Watson (2006) described one tool that had been extensively evaluated and validated for the use in elderly living in the community. The tool is the Mini Nutritional Assessment (MNA) and its abbreviated form is the Mini Nutritional Assessment-Short Form (MNA-SF). Additionally, a literature review has been reported the MNA-SF tool was deemed most appropriate for the use in community living elderly (Phillips, Foley, Barnard, Isenring & Miller, 2010).

2.2.1 The Mini-Nutritional Assessment Short-Form (MNA-SF)

MNA was developed in 1994 for determining nutritional status of elderly (Guigoz, Vellas & Garry, 1994). The MNA can provide a rapid and simple evaluation of elderly persons' nutritional status in outpatient clinics, during admission to hospitals and nursing homes for early detection of patients who could benefit from nutrition intervention (Guigoz et al., 1994). It is a validated assessment instrument for the use in elderly populations from the frail to the healthy older persons (Guigoz et al., 1994).

However, a shorter version of the MNA known as MNA-SF was then designed as brief nutrition screening tool is needed (Rubenstein et al., 2001). The MNA-SF showed high diagnostic accuracy in relation to nutritional status and high correlation with the full MNA. The original MNA-SF has a sensitivity of 98%, specificity of 100%, and diagnostic accuracy of 99% for predicting malnutrition (Rubenstein et al., 2001). The sensitivity and specificity of the recently revised MNA-SF is almost identical to the

original MNA-SF, confirming that the revised MNA-SF is valid and compares well against the full MNA (Kaiser et al., 2009). It consists of 6 questions on food intake, weight loss, mobility, psychological stress or acute disease, presence of dementia or depression, and body mass index (BMI). When height and/or weight cannot be assessed, then an alternate scoring for BMI includes the measurement of calf circumference. The MNA-SF categorizes nutritional status into the following categories: well-nourished (12-14), at risk of malnutrition (8-11), or malnourished (≤7).

Further, the MNA-SF provides a simple, quick method of identifying elderly who are at risk of malnutrition or malnourished (Skates & Anthony, 2012). Unlike many other nutritional instruments, the MNA-SF was developed to be user-friendly, non-invasive, inexpensive and an advantage of the tool is that no laboratory data is needed (DiMaria-Ghalili & Amella.,2012). Furthermore, it takes about 5 minutes to complete and the questions can easily be incorporated into a complete elderly assessment (Kaberi, 2015). In addition, it is a validated nutrition screening tool for use in community living elderly to identify malnutrition globally and in Malaysia (Shahar & Hussain, 2007).

2.3 DEFINITION OF MALNUTRITION

Based on consensus develop in 2012 by The Academy of Nutrition and Dietetics (Academy) and the American Society for Enteral and Parenteral Nutrition (A.S.P.E.N.) malnutrition can be defined as "a state of either excessive or deficient intakes of macronutrients (energy, protein, carbohydrate and fat) and/or other micronutrients which causes disequilibrium of nutrients in the body" (White et al., 2012). Malnutrition has also been defined as an "any disorder of nutrition status including disorders resulting from a deficiency of nutrient intake, impaired nutrient metabolism, or overnutrition." (Teitelbaum et al., 2005). In fact, due to the lack of agreement on accepted definition

literatures had various description of malnutrition. (Elia, 2017; Laur, McNicholl, Valaitis & Keller, 2017; Soeters et al., 2017; Morley, 2018). Table 1.1 shows definition of malnutrition from. national and international organizations with expert committees and national health services.

Regardless of the definition used, malnutrition is proven to be linked with many adverse outcomes including increased risk of hospital admissions, prolonged hospitalisation, morbidity and mortality than those who are well nourished (Darmon & Drewnowski, 2008; Charlton, 2010; Santos, Amaral & Borges, 2015; Kalaiselvi et al., 2016). More worrying, the existing literature have been showed that prevalence of malnutrition is keep increasing in community settings where majority of elderly reside (Arvanitakis, Vandewoude, Perkisas & Van Gossum, 2013; Gunduz et al., 2015).

Table 2.1 Definition of Malnutrition by International Organizations

World Health Organization (WHO)
"Deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients"
American Society for Parental and Enteral Nutrition (ASPEN)
"An acute, subacute or chronic state of nutrition, in which a combination of varying degrees of overnutrition or undernutrition with or without inflammatory activity have led to a change in body composition and diminished function. (adapted from Soeters PB, Schols AM.)".
European Society for Clinical Nutrition and Metabolism (ESPEN))
"A state resulting from lack of intake or uptake of nutrition that leads to altered body composition (decreased fat free mass (FFM)) and body cell mass (BCM) leading to diminished physical and mental function and impaired clinical outcome from disease"
British Association for Parental and Enteral Nutrition (BAPEN)
"A state of nutrition in which a deficiency or excess (or imbalance) of energy, protein, and other nutrients causes measurable adverse effects on tissue/body form (body shape, size, composition), body function and clinical outcome."
National Health Service (NHS)
"Malnutrition is a serious condition that occurs when a person's diet doesn't the right amounts of nutrients. It means poor nutrition and may refer to undernutrition—not getting enough nutrients and overnutrition—getting more nutrients than you need"

In summary, malnutrition can be defined as undernutrition or overnutrition. Some definitions focus on the imbalance of nutrition, while others also encompass the clinical influence of this imbalance. According to Waterlow (1972), the World Health Organization already emphasized the need for an accepted classification and definition of malnutrition in 1972. Yet, there is no national or international standard generally