FACTORS CORRELATED WITH HEALTH-RELATED QUALITY OF LIFE AMONG ELDERLY OUTPATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE FROM SELECTED HOSPITALS IN MALAYSIA

NOR FARAHAIN YAHYA

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By

NOR FARAHAIN YAHYA

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

June 2019
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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

FACTORS CORRELATED WITH HEALTH-RELATED QUALITY OF LIFE AMONG ELDERLY OUTPATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE FROM SELECTED HOSPITALS IN MALAYSIA

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June 2019

Chair : Noraida Omar, PhD
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The prevalence and mortality rate of Chronic Obstructive Pulmonary Disease (COPD) is in the increasing trend, especially among elderly people. As COPD is an incurable disease, improving patient's Health-related Quality of Life (HRQOL) need to be the main focus area in management. However, most of the study on HRQOL was conducted among younger adult people. Thus, limited information on elderly people especially in Malaysia. Therefore, to fill the gaps, this study was conducted to determine factors correlated with HRQOL in elderly outpatients with COPD from selected hospital in Malaysia. The factors examined in this study were socio-demographic, health status, nutrition status, functional status and sleep quality.

A cross-sectional study involved 140 elderly patients diagnosed with COPD was conducted at Respiratory Clinic of Institut Perubatan Respiratori and Hospital Serdang. Data on socio-demographic and health status were collected by interviewing patients and reviewing their medical records. Nutritional status involved Body Mass Index (BMI), Fat-Free Mass Index (FFMI), body fat, weight loss, dietary intake and risk of malnutrition. Other information collected included a functional status and sleep quality. HRQOL in this study was determined by COPD Assessment Test.

The mean age of patients in this study was 70 ± 7 years. Majority of the patients in this study were male (97%) Malay (59%) patients who married (75%), ex-smoker (72%) and attained primary education (48%). Majority of them had a moderate stage of airflow limitation (53%) and did not visit the emergency department or experience any episode of exacerbation that required hospitalization for the past one year (57%).
Most of the patients in this study had a normal BMI (53%), FFMI (78%) and body fat (45%), but they were also presented with weight loss (52%). Majority of them did not consume an oral nutrition supplement (99%). For dietary intake, patients did not have adequate energy, protein, carbohydrate, fat, vitamin A, C, D and E intake as measured by individual requirements. Over half of the patients in this study were classified as at risk of malnutrition (50%) and had poor sleep quality (65%). Apart from that, most of them had normal handgrip strength (56%) and only had difficulty to breathe when hurrying on the level or walking up a slight (43%). The mean score of HRQOL in this study was $21 \pm 6.85$ and domain of functional status scored the highest.

Factors such as BMI ($r=-0.228, p=0.018$), body fat ($r=-0.191, p=0.048$), risk of malnutrition ($r=-0.266, p=0.005$) and sleep quality ($r=0.496, p=0.001$) were found to be correlated with HRQOL. For breathlessness during daily activities, grade of Modified Medical Research Council showed a significant difference for HRQOL ($F=15.75, p=0.001$). Both, smoking history ($F=2.244, p=0.022$) and history of hospitalisation or visit to the emergency department due to COPD ($F=0.045, p=0.030$) had a mean difference in HRQOL. For multiple linear regression, four factors were found to be significantly contributed towards HRQOL, which were smoking (Beta=0.178, $t=2.571, p=0.012$), body fat (Beta=-0.148, $t=-2.153, p=0.034$), breathlessness on daily activities (Beta=0.488, $t=6.793, p=0.000$) and sleep quality (Beta=0.323, $t=4.462, p=0.000$). These four factors can explain 51.7% (R Square) of the variation of HRQOL.

In conclusion, limitations of daily activities due to breathlessness, poor sleep quality, smoking and lower body fat were significantly contributed towards poor HRQOL among elderly outpatients with COPD from Institut Perubatan Respiratori and Hospital Serdang.
FAKTOR YANG BERKAITAN DENGAN KUALITI KESIHATAN HIDUP DI KALANGAN PESAKIT LUAR WARGA TUA YANG MENGHIDAP PENYAKIT PULMONORI OBSTRUKTIF KRONIK DARIPADA HOSPITAL TERPILIH DI MALAYSIA

Oleh

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Bilangan dan kadar kematian penyakit pulmonori obstruktif kronik semakin meningkat terutama dalam kalangan warga tua. Oleh kerana penyakit ini adalah penyakit yang tidak dapat diobati, kualiti kesihatan hidup pesakit perlu ditingkatkan dan menjadi fokus utama dalam pengurusan penyakit. Walaubagaimanapun, kebanyakkan kajian telah dijalankan dalam kalangan dewasa muda. Oleh itu, maklumat berkaitan kualiti kesihatan hidup dalam kalangan warga tua adalah terhad terutamanya di Malaysia. Untuk mengisi jurang yang ada, kajian ini dijalankan bertujuan untuk mengenalpasti faktor-faktor yang berkait dengan kualiti kesihatan hidup dalam kalangan pesakit luar warga tua yang menghidap penyakit pulmonori obstruktif kronik dari hospital terpilih di Malaysia. Faktor-faktor yang dikaji dalam kajian ini adalah sosio-demografi, status kesihatan, status pemakanan, status keupayaan dan kualiti tidur.


Purata umur bagi pesakit dalam kajian ini adalah 70 ± 7 tahun. Kebanyakkan pesakit adalah lelaki (59%) berbangsa Melayu (97%), berkahwin (75%), bekas perokok (72%) dan memperoleh pendidikan rendah (48%). Kebanyakkan pesakit mempunyai penyakit kronik lain (53%) dan darah tinggi merupakan penyakit yang
sering dihadapi oleh pesakit. Kebanyakan pesakit mempunyai sekatan aliran udara pada tahap sederhana (53%) dan mereka juga tidak melakukan lawatan ke jabatan kecemasan ataupun mempunyai sejarah kemasukan ke hospital disebabkan oleh penyakit pulmonori obstruktif kronik sepanjang tahun lalu (57%).

Kebanyakan pesakit dalam kajian ini mempunyai indeks jisim badan (53%), indeks jisim lemak (78%) dan lemak badan (45%) yang normal, tetapi mereka juga mengalami penurunan berat badan (52%). Kebanyakkan daripada mereka tidak mengambil makanan tambahan nutrisi (99%). Untuk pengambilan makanan, pesakit tidak mempunyai pengambilan tenaga, protein, karbohidrat, lemak, vitamin A, C, D dan E yang mencukupi mengikut keperluan individu. Lebih separuh daripada pesakit dalam kajian ini dikenalpasti berisiko menghidap penyakit kekurangan zat makanan (50%) dan mempunyai kualiti tidur yang kurang (65%). Selain itu, kebanyakkan daripada mereka mempunyai kekuatan genggaman tangan yang normal (65%) dan hanya mengalami kesukaran untuk bermasfat ketika bergegas atau berjalan sedikit (43%). Purata bagi kualiti kesihatan hidup bagi kajian ini adalah 21 ± 6.85 dan domin bagi keupayaan berfungsi memperolehi purata tertinggi.

Faktor-faktor seperti indeks jisim badan (r=-0.228, p=0.018), lemak badan (r=-0.191, p=0.048), risiko kekurangan zat makanan (r=-0.266, p=0.005), p=0.001) didapati berkait dengan kualiti kesihatan hidup. Untuk kesukaran pernafasan semasa menjalankan aktiviti harian, gred untuk Modified Medical Research Council menunjukkan perbezaan yang ketara untuk kualiti kesihatan hidup (F=15.75, p=0.001). Bagi sejarah merokok (F=2.244, p=0.022) dan kemasukan ke hospital atau lawatan ke jabatan kecemasan disebabkan penyakit pulmonori obstruktif kronik (F=0.045, p=0.030), kedua-duanya mempunyai perbezaan purata pada kualiti kesihatan hidup. Bagi regresi linear berganda, empat faktor telah dikenalpasti sebagai penyumbang utama kepada kualiti kesihatan hidup. Antaranya ialah merokok (Beta=0.178, t=2.571, p=0.012), lemak badan (Beta=-0.148, t=-2.153, p=0.034), kesukaran permfasan semasa menjalankan aktiviti harian (Beta=0.488, t=6.793, p=0.000) dan kualiti tidur (Beta=0.323, t=4.462, p=0.000). Keempat-empat faktor ini dapat menerangkan 51.7% (R Square) variasi kualiti hidup berkaitan dengan kesihatan.

Sebagai kesimpulan, batasan aktiviti harian akibat kesukaran permfasan, kualiti tidur yang kurang, merokok dan lemak badan yang rendah adalah penyumbang utama kepada kualiti kesihatan hidup yang kurang memuaskan di kalangan pesakit luar warga tua yang menghidap penyakit pulmonori obstruktif kronik dari Institut Perubatan Respiratori dan Hospital Serdang.
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I certify that a Thesis Examination Committee has met on 25 June 2019 to conduct the final examination of Nor Farahain binti Yahya on her thesis entitled "Factors Correlated with Health-Related Quality of Life Among Elderly Outpatients with Chronic Obstructive Pulmonary Disease from Selected Hospitals in Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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CHAPTER 1

INTRODUCTION

1.1 Background

The United Nations use the chronological age of 60 years old and above as the definition of elderly people (World Health Organization, 2018). Globally, there are about 962 million people aged 60 years or above in 2017, and this represents about 13% of the global population (United Nations, 2017b). In 2017, Malaysia has 3074 thousand elderly people, comprising 10% from the total population and this number is projected to be 9647 thousand in 2050, which is tripled from the current number (United Nations, 2017a).

Ageing is a progressive degeneration of the tissues that alter body composition and organ functions (Saka, Kaya, Ozturk, Erten, & Karan, 2010). This process increases the risk of diseases and death (Barzilai, Huffman, Muzumdar, & Bartke, 2012). Various diseases commonly present in elderly people and one of them is Chronic Obstructive Pulmonary Disease (COPD) (Marengoni, Rizzato, Wang, Winblad, & Fratiglioni, 2009; Taskin, Biswas, Siddiquee, Islam, & Alam, 2014).

Epidemiology and Impact of COPD Asia survey reported that the prevalence of COPD in Asia was 6.2% and Vietnam had the highest prevalence (9.4%), followed by Singapore (5.9%), Thailand (5.3%), Malaysia (5.1%), Indonesia (4.5%) and lastly Philippines (4.2%) (Lim et al., 2015). This survey also found that the prevalence was highest among people aged 40-44 years (26%), followed by elderly aged 65 years and above (20%). However, in Malaysia, the prevalence of COPD was higher among elderly people (26%) (Lim et al., 2015; Loh et al., 2016b).

Lung function starts to decline as people grow older (MacNee, 2016). In normal ageing of the lung, changes such as decline in lung function, increased gas trapping, lose of lung elastic recoil and enlargement of the distal air spaces will occur and these similar changes also happen in the lung of COPD patients (MacNee, 2016; Mercado, Ito, & Barnes, 2015). The correlation between ageing and COPD process results in an acceleration of lung aging and leads to death (Antonelli-Incalzi et al., 2009; Galizia et al., 2011; MacNee, 2016).

A previous study showed that elderly with COPD are usually presented with poorer lung function compared to healthy elderly, as proved by spirometry test, and it is closely related with poorer Health-Related Quality of Life (HRQOL) (Franssen et al., 2018). Another study also showed that elderly with COPD had
worse quality of life than younger age group of COPD patients (Corlateanu, Botnaru, Covantev, Dumitru, & Siafakas, 2016). Besides that, a lot of studies have found that HRQOL of COPD patients worsening as age increased (Ahmed, Neyaz, & Aslami, 2016; Horita et al., 2014). All the findings above do show that COPD impact the elderly people more than others.

It has been well established that factors like socio-demographic (age, sex, education level, marital status and smoking status), disease duration, number of medication and health status (co-morbidities, exacerbation and severity of airflow obstruction) are closely related with poor HRQOL (Ahmed et al., 2016; Ayora, Macia-soler, Orts-Cortes, Hernandez, & Seijas-Babot, 2018; Balcells et al., 2010; Brandl et al., 2018; Jones et al., 2011; Scharf et al., 2011; Sundh et al., 2015). Other factors such as dyspnea, physical activity and sleep quality have also been found to be correlated with HRQOL of COPD patients (Agrawal, Joshi, & Jain, 2015; Balcells et al., 2010; Scharf et al., 2011). A part from that, nutrition-related factors were also correlated with HRQOL, however, the data on this factors are limited (Burgel et al., 2013; Mostert, Goris, Weling-Scheepers, Wouters, & Schols, 2000; Obaseki, Erhabor, Awopeju, Obaseki, & Adewole, 2013). Besides that, most studies were only conducted among the adult population and data related to elderly people are scarce.

1.2 Problem Statement

The Global Burden of Disease study mentioned that the prevalence of COPD in this world had increased up to 44.2% from 1990 to 2015 (Soriano et al., 2017). In Asia, the increment of the prevalence of COPD also happened, which increased up to 44.2% from 1990 to 2010 (Chan et al., 2017). This finding found that the increment was significant in the elderly people (Chan et al., 2017). The increment of prevalence of COPD in elderly people might be resulted from the increment of the elderly people in global population (Denton & Spencer, 2010).

Previous studies had reported that the prevalence of COPD in Malaysia was highest in elderly people (Lim et al., 2015; Loh et al., 2016b). There is insufficient statistics of COPD for Malaysia, thus the trend of the prevalence of COPD over time cannot be defined. But, the prevalence of COPD in elderly is probably increasing, as the number of elderly people in Malaysia is also in the rising trend (United Nations, 2017a). Therefore, research on elderly with COPD in Malaysia needs to explore more about the disease.

As prevalence of COPD increased, the total death from COPD also increased by 11.6% from 1990 to 2015 which result in 3.2 million death (Soriano et al., 2017). Most of the COPD deaths occur in area of East Asia, South Asia, Southeast Asia and Central Africa with higher amount among elderly group (Burney, Patel, Newson, Minelli, & Naghavi, 2015). According to World Health Organisation, mortality from COPD is expected to increase by more than 30% in next decade, which causes COPD to become the third leading cause of death worldwide by 2030 (World Health Oragnization, 2019). The increment of
mortality rate is expected to be more dramatic in Southeast Asia as prevalence of smoking in this area are higher compare to global average in 2015 (Reitsma et al., 2017).

According to Malaysian Burden of Disease and Injury Study, COPD ranked fifth place for the leading cause of death in 2014 (Institute for Public Health, 2017). Even when classified by age group, COPD still in the top five diseases for the leading cause of death in elderly people in 2014 (Institute for Public Health, 2017). This statistic indicated a need for urgent action to reduce the mortality rate in COPD patients, especially in elderly people.

In 2015, COPD ranked eighth for the leading cause of global burden of disease and expected to move up to fifth place in 2030 (Soriano et al., 2017; World Health Organization, 2008). While in Malaysia, COPD placed at sixth for leading cause of total burden in 2014 (Institute for Public Health, 2017). After adjusted by age group, it became top five diseases for the leading cause of total burden in elderly people (Institute for Public Health, 2017). Burden of the disease can be determined by many indicators and assessing patient’s HRQOL is one of them (Tsiliigianni, Kocks, Tzanakis, Siafakas, & van der Molen, 2011). Previous study had shown that COPD patients had the lowest HRQOL which indicate the greatest burden of disease when compared to other diseases such as rheumatoid arthritis, diabetes, asthma and epilepsy (Arne et al., 2009; Inotai, Ágh, & Mészáros, 2012). Other studies also mentioned that COPD patients usually presented with poor HRQOL (Ahmed et al., 2016; Dodd et al., 2012; Kelly et al., 2012; Sarkar et al., 2015). Comparison of HRQOL among COPD patients had shown that elderly people had scored the worst HRQOL than younger people (Corlateanu et al., 2016). Other than that, previous study found that poor HRQOL in elderly patients were closely related to mortality (Antonelli-Incalzi et al., 2009; Gudmundsson et al., 2006). Thus, we need to investigate more about HRQOL in elderly with COPD as an effort to decrease the burden of disease and mortality rate.

A lot of factors were found to be correlated with HRQOL such as age, sex, education level, marital status, smoking status, disease duration, number of medication (Ahmed et al., 2016; Brandl et al., 2018; Henoch, Strang, Lofdahl, & Ekberg-jansson, 2016; Scharf et al., 2011). In addition, HRQOL has been shown to be influenced by co-morbidities, exacerbation, and severity of airflow obstruction (Agrawal et al., 2015; Ahmed et al., 2016; Ayora et al., 2018; Balcells et al., 2010; Jones et al., 2011; Scharf et al., 2011; Sundh et al., 2015). Apart from that dyspnea, lower functional status and sleep quality have been linked to poor HRQOL (Agrawal et al., 2015; Balcells et al., 2010; Scharf et al., 2011).

Poor HRQOL also correlated with BMI, FFMI and weight loss (Burgel et al., 2013; Mostert et al., 2000; Obaseki et al., 2013). However, the data on nutrition-related factors are scarce even though poor nutritional status was commonly presented among COPD patients (King, Cordova, & Scharf, 2008; Odencrants, Ehnfors, & Ehrenberg, 2009). It needs to investigate more on nutrition-related factors in
COPD patients as malnutrition was found to correlate with deterioration of respiratory muscle, severity of disease and physical ability (Collins, Elia, & Stratton, 2013; Mete, Pehlivan, Gülbaş, & Günen, 2018). Other than that, malnutrition in COPD patients was commonly found in elderly group (Battaglia et al., 2011). In a normal aging process, elderly people will also experience a reduction of food intake, together with the alteration of body composition which leads to poor nutritional status (Saka et al., 2010). Thus, malnutrition issue in elderly with COPD was expected to be more critical compared to other age groups as a result of overlaps between COPD and aging process (Odencrants, Ehnfors, & Grobe, 2005; Sergi et al., 2006). Apart from that, malnutrition in elderly with COPD was found to correlate with mortality (Ranieri et al., 2008). Therefore, more attention is need for nutrition-related factors, especially in elderly group.

Besides that, study on COPD in Malaysia is still scarce. To the best of my knowledge, studies which have been conducted in Malaysia only focused on the prevalence, exacerbation, nutritional status and dietary intake of COPD patients (Al Aqqad et al., 2016; Dzakwan & Hariadha, 2017; Loh & Ong, 2016a; Loh et al., 2016b; Pirabbasi, Najafiyan, Cheraghi, Shahar, Abdul Manaf, et al., 2012b; Pirabbasi, Najafiyan, Cheraghi, Shahar, Manaf, et al., 2012a). There are a few studies that have examined HRQOL of COPD patients, with only four study focused on factors related to HRQOL (Draman, Hasnan, Mohamed, & Jaeb, 2013; Hazlinda, Noorizan, Yahaya, & Fahmi, 2014; Justine, Tahirah, & Mohan, 2013; Maria, Aslinda, Nurul Ain, & Fatim, 2010; Ramli, Ying, Mohd Ali, & Abdul Manap, 2014; Suzana, Hanis, Tang, Ayiesah, & Roslina, 2008). However, these studies only examined a few factors which are sociodemographic, smoking status, lung function, severity of disease, exacerbation and co-morbidities. Other than that, most of the study assessed HRQOL using generic questionnaire and not the standard questionnaire as recommended by Global Initiative for Chronic Obstructive Lung Disease (GOLD) (2018). Moreover, most of them were conducted in different age groups. Thus, more studies should be carried out to determine other factors that related to HRQOL in the specific age group (≥ 60 years old), in the local context.

1.3 Research Questions

This study attempted to answer the following research questions:

i. What are the socio-demographic, health status, nutritional status, meal-related situation, functional status, sleep quality and HRQOL of elderly outpatients with COPD from selected hospitals in Malaysia?

ii. Are there any correlations between the following factors and HRQOL among elderly outpatients with COPD from selected hospitals in Malaysia?
   a) Socio-demographic
   b) Health status
   c) Nutritional status
   d) Functional status
1.4 Objectives

1.4.1 General Objective

To determine factors correlated with HRQOL among elderly outpatients with COPD from selected hospitals in Malaysia.

1.4.2 Specific Objective

There are three specific objectives for this study which are:

i. To determine the socio-demographic, health status, nutritional status, meal-related situation, functional status, sleep quality and HRQOL of elderly outpatients with COPD from selected hospitals in Malaysia.

ii. To determine the correlations between the following factors and HRQOL among elderly outpatients with COPD from selected hospitals in Malaysia:
   a) Socio-demographic
   b) Health status
   c) Nutritional status
   d) Functional status
   e) Sleep quality

iii. To determine the contribution of the following factors towards HRQOL among elderly outpatients with COPD from selected hospitals in Malaysia:
   a) Socio-demographic
   b) Health status
   c) Nutritional status
   d) Functional status
   e) Sleep quality
1.5 Hypotheses

There are two hypotheses for this study which are:

i. There are significant correlations between the following factors and HRQOL among elderly outpatients with COPD from selected hospitals in Malaysia:
   a) Socio-demographic
   b) Health status
   c) Nutritional status
   d) Functional status
   e) Sleep quality

ii. There are significant contributions of the following factors towards HRQOL among elderly outpatients with COPD from selected hospitals in Malaysia:
   a) Socio-demographic
   b) Health status
   c) Nutritional status
   d) Functional status
   e) Sleep quality

1.6 Significance of Study

The impact of COPD on HRQOL has been well established in many countries. In Malaysia, there are few studies that determined HRQOL in COPD patients (Draman et al., 2013; Hazlinda et al., 2014; Justine et al., 2013; Maria et al., 2010; Ramli et al., 2014; Suzana et al., 2008). However, all of them were conducted among different age group and none of them focusing specifically on elderly people. Thus, the result on HRQOL in this study could be baseline data that specific toward elderly group in the local context.

Other than that, this study could also contribute towards the sparse literature on nutritional status, dietary intake and functional status among elderly with COPD in local context. Besides that, there was a few studies in local that examined sleep quality in elderly people, however, none of them involved elderly with COPD (Azri, Dahlan, Masuri, & Isa, 2016; Rashid, Ong, & Wong, 2012). Thus, the finding of the study could be novel information on sleep quality among elderly with COPD.

Apart from that, there are studies in Malaysia that examined the correlation of factors with HRQOL among COPD patients (Draman et al., 2013; Hazlinda et al., 2014; Justine et al., 2013; Maria et al., 2010). However, none of them included a nutritional status, functional status and sleep quality as a factor in their studies. Therefore, the results of study could add on a new information on factors correlated with HRQOL among elderly with COPD in local context. Besides that, the study could also provide new finding on factors that predict HRQOL in elderly with COPD.
The findings of the study could also provide a suitable suggestion and inspiration for future research to study more on the factors related to HRQOL among elderly population. Besides that, this study could be used as reference that will provide an overview of elderly with COPD for the researcher to conduct a bigger study like intervention.

There were two studies in Malaysia that determined the nutritional status and intake of elderly with COPD (Pirabbasi et al., 2012a; Pirabbasi et al., 2012b). However, the study was conducted in 2012. Thus, the finding could provide the latest information which could be useful for dietitian to plan a nutrition strategy for COPD patients especially elderly people. Other than that, the data of the study could also facilitate other healthcare to formulate efficient strategies and worthwhile approaches to make the treatment and management more effective.

The finding of the study could be used to trigger policymaker to increase tobacco tax as an alternative to reduce the prevalence of smoking in Malaysia. Besides that, the study also demonstrated how COPD impacts patient’s life, which showed the need for future research in this field.

1.7 Conceptual Framework

Previous studies included these factors which were socio-demographic, health status, nutritional status, functional status and sleep quality as factors to be studied. The literature showed the relation between these factors with HRQOL, however, they have not been specifically studied on the elderly people in the Malaysian context.

This study was conducted among elderly outpatients with COPD and aimed to determine the factors of socio-demographic, health status, nutritional status, functional status and sleep quality with HRQOL. The details are shown in Figure 1.1. Socio-demographic included age, sex, race, educational level, marital status and lifetime tobacco smoking history. Health status involved co-morbidities, history of hospitalisation or visit to the emergency department due to COPD and severity of airflow limitation.

Nutritional status was divided into three parts, which included anthropometric measurement, dietary intake and risk of malnutrition. COPD patients are usually presented with poor nutritional status and dietary intake (Montes de Oca et al., 2008; Sergi et al., 2006; Yazdanpanah, Shidfar, Moosavi, Heidarnazhad, & Haghani, 2010; Zhong et al., 2007). Poor nutritional status will impair functional status and result in poor quality of life (Budweiser et al., 2008; Horita et al., 2014).

Functional status involved breathlessness on daily activities and handgrip strength. COPD patients are usually classified as physically inactive and it is closely related with disability and risk of death (Katz et al., 2011). For sleep
quality factors, the obstruction of airflow due to COPD, contributes to poor sleep
quality and impaired HRQOL (Nunes et al., 2009; Scharf et al., 2011).

The dependent variable for the study was HRQOL which defined as an aspect
of quality of life which are affected by health (Centers for Disease Control and
Prevention, 2017). HRQOL in this study was assessed using COPD Assessment
Test (CAT). Poor HRQOL in elderly with COPD usually correlated with mortality
(Antonelli-Incalzi et al., 2009; Gudmundsson et al., 2006). However, the
condition might also be influenced by occupational status, environmental
exposure and hereditary (Celli & Macnee, 2004; GOLD, 2018; Paulin et al.,
2015). Other factors such as disease duration, number of medication,
depression and anxiety were not included in this study as they were not related
to nutrition.
Socio-demography
-Age, sex, race, education level, marital status and lifetime tobacco smoking history

Health status
-Comorbidities, history of hospitalisation or visit to the emergency department due to exacerbation and severity of airflow limitation

Nutritional status

Anthropometric measurements
-Body Mass Index
-Body composition
-Weight loss

Dietary intake
-3 days diet recall
- Supplement intake

Risk of malnutrition
-Malnutrition

Functional status
-Breathlessness on daily activities
-Handgrip strength

Sleep quality

Cofounding factors
-Occupational status
-Environmental exposure
-Hereditary

Health-related quality of life

Other factors
-Disease duration
-Number of medication
-Depression and anxiety

Mortality

Figure 1.1. Conceptual Framework
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