



FACTORS INFLUENCING SELF-MANAGEMENT BEHAVIORS AMONG
ADULTS WITH MILD TO MODERATE CHRONIC OBSTRUCTIVE
PULMONARY DISEASE IN COLOMBO, SRI LANKA

KANCHANA MADUMALI WARNAKULA ROYAL WEERASOORIYA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR MASTER DEGREE OF NURSING SCIENCE
(INTERNATIONAL PROGRAM)
IN ADULT NURSING PATHWAY
FACULTY OF NURSING
BURAPHA UNIVERSITY

2024

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The Thesis of Kanchana Madumali Warnakula Royal Weerasooriya has been approved by the examining committee to be partial fulfillment of the requirements for the Master Degree of Nursing Science (International Program) in Adult Nursing Pathway of Burapha University

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65910018: MAJOR: ADULT NURSING PATHWAY; M.N.S. (ADULT NURSING PATHWAY)
KEYWORDS: MILD TO MODERATE COPD/ SELF-MANAGEMENT BEHAVIORS/
DYSPNEA/ PERCEIVED STRESS/ COPD KNOWLEDGE/
PERCEIVED SOCIAL SUPPORT

KANCHANA MADUMALI WARNAKULA ROYAL WEERASOORIYA :
FACTORS INFLUENCING SELF-MANAGEMENT BEHAVIORS AMONG ADULTS
WITH MILD TO MODERATE CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN
COLOMBO, SRI LANKA. ADVISORY COMMITTEE: NIPHAWAN SAMARTKIT, Ph.D.
KHEMARADEE MASINGBOON, DSN 2024.

Self-management behaviors were important for chronic obstructive pulmonary disease (COPD). However, information about COPD self-management among this group of people is limited in Sri Lanka. This research aimed to describe the level of self-management behaviors and determine whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka. A simple random sampling technique was used to recruit 108 adults with mild to moderate COPD who visited the central chest clinic in Colombo, Sri Lanka. Five self-administered questionnaires were used including demographic data, the COPD Self-Management Scale, the Perceived Stress Scale, the COPD Knowledge Questionnaire, and the Perceived Social Support Scale. Descriptive statistics and standard multiple linear regression were used to analyze data.

The results of this study showed that the mean score of the self-management scale was 3.04 (SD = 0.35) out of 5, indicating a moderate level. The regression analysis revealed that COPD self-management behaviors were significantly predicted by dyspnea ($\beta = .212, p = .006$), perceived stress ($\beta = -.195, p = .018$), COPD knowledge ($\beta = .263, p = .001$), and perceived social support ($\beta = .366, p = .000$). It can explain 41.7% of the variance in self-management among adults with mild to moderate COPD in Colombo, Sri Lanka.

The study findings provide evidence for healthcare providers to develop the interventional program aimed to reduce dyspnea and perceived stress and improve the level of disease knowledge and social support to promote good self-management behaviors among adults with mild to moderate COPD.

ACKNOWLEDGEMENTS

I would like to offer my heartfelt thanks to my major advisor Associate Professor Dr. Niphawan Samartkit and co-advisor Assistant Professor Dr. Khemaradee Masingboon. My study would not have been successful without their precious advice and guidance. Further, I am indebted to them for investing their time and energy in me with this study and supporting me to complete this thesis. I am deeply thankful to Associate Professor Dr. Wanpen Pinyopasakul for her input in this study.

I am most obliged to the Thailand International Development Cooperation Agency (TICA) and all academic staff of the Master of Nursing Sciences (International) Program, Faculty of Nursing, Burapha University for their constant encouragement and timely administrative support. I would like to thank Asst. Prof. Capt. Dr. Pachanok Witheethamasak for her support for this study. Further, I appreciate the valuable support extended by Ms. Rungnapa Yodchot (International Affairs staff), who is very responsible and effective in communication, which has provided great convenience for my study and scientific research.

In addition to that I would like to express my infinite gratitude to Professor Thamara Amarasekara, for her selfless help, who directed me to this program and guided me to complete it successfully. Furthermore, I am grateful to all the original authors of study instruments in this study including the “Music Therapy Research Group Sri Lanka” and the people who were involved in the back translation procedure for spending their valuable time on this work.

I will be forever grateful for the great assistance received from all the staff at Central Chest Clinic in Colombo, Sri Lanka to collect data smoothly.

My warm and heartfelt thanks go to my family and friends for their continued support throughout this study.

Last but not least, all the participants of this study have my wholehearted gratitude for giving me their time and cooperating with me in completing this study.

Kanchana madumali Warnakula royal weerasooriya

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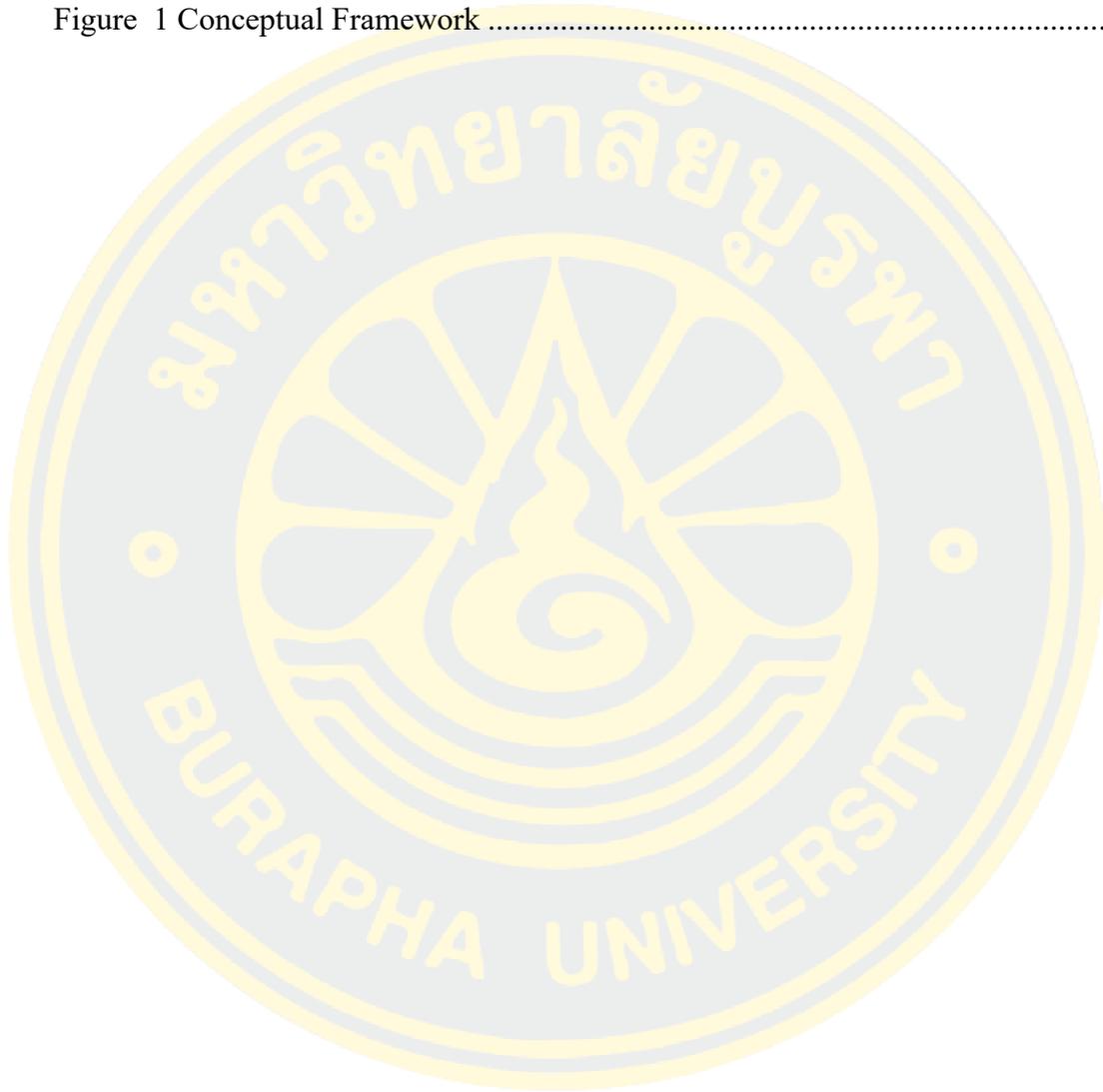
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CHAPTER 1

INTRODUCTION

Background and Significance of the Problem

Chronic Obstructive Pulmonary Disease (COPD) is a progressive disease that requires lifelong management and it is a global health problem because it causes high prevalence and mortality (The Global Initiative for Chronic Obstructive Lung Disease [GOLD], 2022). The global prevalence is 11.7% (World Health Organization, 2021) and 212.3 million people are suffering from COPD throughout the world (Safiri et al., 2022). In addition to that it is now one of the top three causes of death worldwide (GOLD, 2022), and COPD accounts for 3.3 million deaths per year (Safiri et al., 2022). Furthermore, COPD's disability-adjusted life years (DALYs) were 74.4 million in 2019 (Safiri et al., 2022). The prevalence of COPD in Sri Lanka is 10.5% which is similar to the global and nearly 1.8 million people suffer from COPD (Amarasiri et al., 2017; Department of Census & Statistics, 2019).

COPD is considered a completely irreversible chronic disease that is characterized by chronic airflow limitation due to small airway disease and parenchymal destruction (emphysema), usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development (GOLD, 2022). According to the degree of airflow limitation (forced expiratory volume in 1 second, FEV_1), COPD is divided into mild ($FEV_1 \geq 80\%$ predicted), moderate ($FEV_1 \geq 50\%$ and $< 80\%$ predicted), severe ($FEV_1 \geq 30\%$ and $< 50\%$ predicted), and very severe ($FEV_1 < 30\%$ predicted) (GOLD, 2022). A systematic review done by Varmaghani et al. (2019) revealed that the most common stages of COPD in the world were mild and moderate and among the COPD population, 44.16% had mild and 44.22% had moderate COPD (Varmaghani et al., 2019).

In Sri Lanka, the adult population (aged 18-64 years) was 12.7 million in 2018 (Department of Census & Statistics, 2019) and nearly 1.3 million adults are suffering from COPD (AHB, 2020). Furthermore, 90% of COPD patients belong to the mild and moderate levels according to the GOLD classification (Amarasiri et al., 2017; Gunasekera et al., 2019). Globally, exacerbation is the most common problem

with COPD and between 30% to 50% of people suffer from exacerbations (Viniol & Vogelmeier, 2018). During exacerbations there is increased hyperinflation and gas trapping, with reduced expiratory flow, thus accounting for increased dyspnea (GOLD, 2022). In the UK 10·9% of mild COPD patients had at least one severe exacerbation per year (Han et al., 2017), and 22% of moderate COPD patients had frequent exacerbations per year (Hurst et al., 2010). However, at the population level, approximately 20% of moderate COPD patients may experience frequent exacerbations (GOLD, 2022).

Frequent exacerbation is defined as two or more exacerbations per year (GOLD, 2022), and frequent exacerbations are associated with a decline in lung function, increased mortality, and disease progression (Korpershoek et al., 2017; GOLD, 2022). The self-management is one of the most important in preventing exacerbations (Boyer, 2023; Viniol & Vogelmeier, 2018; GOLD, 2022). According to the Annual Health Bulletin in Sri Lanka, there is a rising trend of admissions due to exacerbation of COPD, and nearly 20,000 people are admitted with frequent exacerbation per year (AHB, 2020), which reflects poor self-management of the disease condition.

The GOLD guideline recommends pharmacological treatments and non-pharmacological treatments for COPD to prevent frequent exacerbations. In Sri Lanka, physicians mostly follow the GOLD recommendations for managing COPD (Chokhani et al., 2021). The physicians use the spirometric results and their clinical expertise in diagnosing their patients according to the GOLD guideline. They prescribe oral medications and inhalers for routine follow-up patients as pharmacological treatments. Self-management interventions applied at an early stage may reduce risk in more severe stages of disease (Jolly et al., 2018). So that, 94% of physicians routinely advise COPD patients regarding smoking cessation, breathing exercises, influenza or pneumococcal vaccinations, dietary management, and teaching them about effective inhaler use techniques (Chokhani et al., 2021)

Self-management generally refers to the “individual’s ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition” in conjunction with family, community, and healthcare professionals (Ogunbayo et al., 2017; Ryan & Sawin, 2009). COPD

self-management behaviors refer to an individual's behavior in conjunction with family, in daily life to relieve and control symptoms, reduce and prevent deterioration, slow disease progression, and improve quality of life (Yadav et al., 2020b). The self-management behaviors have positive effects on exacerbation recovery time, and reduce hospital admissions (Allegrante et al., 2019; Barrecheuren & Bourbeau, 2018; Korpershoek et al., 2017; O'Connor et al., 2019), reduction of COPD exacerbation duration (Schrijver et al., 2021), and prevent disease progression (Jolly et al., 2018). Moreover, work productivity can improve among adults with COPD through self-management behaviors (Lee et al., 2020).

Adults are physically active and mostly they have a working lifestyle. Therefore, adults usually expose to environmental factors, occupational triggers and long-term exposure to traffic air pollutants may have contributed to the increase in COPD (Varmaghani et al., 2019). However, adults have better lung function and immune system function than those in older age groups (Priyankara et al., 2021). When considering self-management behaviors, adults can be actively involved in managing their disease condition by taking responsibility and making decisions to manage their condition rather than elders (Bringsvor et al., 2018). COPD in young people may have a substantial impact on health. There may be significant structural and functional lung abnormalities among young adults due to smoking, exposed occupational triggers, and environmental factors (GOLD, 2022). Therefore, focusing on self-management behaviors among adults and the early stage of the disease (mild to moderate) is essential to delaying the disease progression.

Self-management behaviors of COPD mainly include symptoms, daily life, emotions, and information management (Barrecheuren et al., 2018; Yang et al., 2019). Symptom management refers to the COPD patient seeking medication and another method to deal with COPD symptoms such as dyspnea, cough, and sputum (Zhang et al., 2013). In Sri Lanka, 89% of patients with COPD have breathing problems (Perera et al., 2022), cough and wheezing are the most common symptoms of COPD (Madegedera et al., 2022). However, only 11% were using oral and inhaler medication for symptom control when they had exacerbation (Yasaratne & Dharmage, 2020). In addition to that, 64% of patients do not practice correct inhaler techniques (Chokhani et al., 2021). Also, a study done in Colombo, revealed that 34.2% of

participants were non-adherence to recommended all medications (Dassanayaka et al., 2019).

Daily life management refers to the COPD patient taking an appropriate amount of exercise and avoiding activities that exacerbate COPD (Zhang et al., 2013). Sri Lankan adults with COPD spend their days sedentary without exercise (Jayamaha et al., 2022). Even though most physicians advise smoking cessation, 70% of patients with COPD are smokers (Chokhani et al., 2021). Women are heavily affected by exposure to biomass fuel smoke as evidenced by 64.1% of Sri Lankan females using biomass fuel for cooking (Jayaweera et al., 2020). Influenza and pneumococcal vaccination can reduce exacerbations and death in COPD patients (GOLD, 2022). However, a study revealed that only 27% of participants received the pneumococcal vaccine which is freely provided by the government (Madegedera et al., 2022).

Emotional management refers to the COPD patient managing emotional changes such as anxiety and depression associated with COPD (Zhang et al., 2013). A study done in Colombo Sri Lanka, revealed that nearly one-fifth of patients attending the respiratory outpatient clinic screened positive for either anxiety or depressive disorder even though the majority live with their families (Galhenage et al., 2018). Therefore, healthcare providers need to inquire about depression and/or anxiety symptoms and advise the patients to cope with emotions correctly (GOLD, 2022).

Information management refers to the COPD patient communicating with clinicians or accessing media to gain information about COPD (Zhang et al., 2013). Regular communication with doctors and nurses can reduce exacerbation by 45%-60% (Park et al., 2020). In Sri Lanka, the diagnosed mild to moderate patients with COPD are usually asked to do a follow-up visit every month or two months according to their condition (Chokhani et al., 2021) and they will receive information regarding their condition, appropriate behaviors, and improving inhaler skills. However, among Sri Lankan adults there is low usage of technology for searching disease conditions including the Internet (Perera et al., 2022).

Effective chronic disease management requires the involvement of the family because it is the closest unit in contact with patients. Family care and support are linked to better patient self-management and health outcomes (Ryan & Sawin, 2009). In Sri Lankan culture, there are nuclear families and extended families,

moreover, family members play a major role in taking good care of patients including providing information about the disease, taking care of their nutrition, medication management (i.e. correctly using inhalers), arranging clinic visits, and supporting change in their health behavior (i.e. quit smoking, practice breathing exercises, environment arrangement for reduced risk of exacerbation). Even though adults can manage their disease condition, they need family support for symptom management, and emotion management with their active working life.

Self-management of patients with COPD may vary since there are many factors related to self-management behaviors including, age, gender, disease severity, dyspnea, perceived stress, co-morbidities, monthly income, education level, COPD knowledge, and social support (Aredano et al., 2020; Bringsvor et al., 2018; Cherian et al., 2021; Lan et al., 2022; Yadav et al., 2020a; Yang et al., 2019). However, based on Individual and Family Self-Management Theory (IFSMT) (Ryan & Sawin, 2009), disease conditions may affect self-management. Dyspnea is the main symptom of patients with COPD and literature shows that it can influence self-management behaviors. Moreover, adults have a working lifestyle and mostly, they take responsibility for taking care of their family. Therefore, they may face more stress with the disease condition. IFSMT and literature stated that perceived stress can influence self-management behaviors. Disease knowledge is very important to manage their condition based on IFSMT. Reviewed literature also showed that disease knowledge can influence self-management. In addition to that social support is a key factor for self-management according to IFSMT and literature. Therefore, guided by the IFSMT and literature, in this study, dyspnea, perceived stress, COPD knowledge, and perceived social support were selected to determine whether these factors can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Dyspnea is defined as “a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity” (Hanania & O'Donnell, 2019). The severity of the condition/ disease trajectory is associated with the self-management process and it affects the individual or family self-management behaviors (Ryan & Sawin, 2009). Dyspnea belongs to condition-specific factors in IFSMT and the level of dyspnea may affect COPD self-management behaviors. A

study revealed that 82% of patients with COPD had dyspnea of any grade, and 46% had moderate-to-severe dyspnea ($MRC \geq 3$). Moderate-to-severe dyspnea was also observed in 32% of patients with mild COPD (Hanania & O'Donnell, 2019). A study done in Norway stated that higher dyspnea level was associated with emotional distress ($p=.004$, $\beta=.15$, 95% CI 0.05- 0.26) (Bringsvor et al., 2018). In Turkey, a study revealed that there was a statistically significant between dyspnea and self-management behavior ($p < .05$) (Kilic et al., 2021). Furthermore, A study done in Iran stated that self-management intervention could reduce the dyspnea of patients with COPD ($p < .05$) (Dehkordi et al., 2022).

Perceived stress refers to the “degree to which events in a person’s life are assessed as stressful, unpredictable, and uncontrollable” (Mendis et al., 2023). Individual cognitive status, perspectives, and information processing can enhance or diminish self-management behaviors (Ryan & Sawin, 2009). Perceived stress belongs to individual and family factors in IFSMT. Most studies stated that COPD is found to be more common in men than women (Chokhani et al., 2021; GOLD, 2022; Priyankara et al., 2021), and men are working outside of their homes and they take responsibility for their families. Further, more adults with perceived stress are also related to professional activity ($r = .32$, $p < .05$) (Wrzeciono et al., 2021). A study done in Spain revealed that there was a significant relationship between perceived stress and quitting smoking in adults ($\beta = -.0164$, $p < .01$) (Barroso-Hurtado et al., 2023). However, in patients with COPD, perceived stress can also affect the treatment, compliance, and outcome as evidenced by perceived stress reducing the level of function in everyday life and can lead to poor self-management (Hansen et al., 2023). A study done in Denmark revealed that perceived stress was a statistically significant predictor for disease management ($R^2 = .256$, $p < .05$) (Hansen et al., 2023).

The persons will be more likely to engage in the recommended health behaviors if they have adequate knowledge about their condition (Ryan & Sawin, 2009). COPD knowledge refers to the person’s understanding of the symptoms, medication, and risk factors (Maples et al., 2010). Studies done in Sri Lanka revealed that the awareness of pulmonary rehabilitation, indoor air quality, COPD risk factors, and safety actions for risk factors remains poor (Kumari et al., 2019; Madushani et al., 2020; Sooriyakanthan et al., 2022; Yasaratne & Dharmage, 2020). A study done in

Nepal stated that poor disease knowledge was associated with activation in disease management (OR = 1.01, 95% CI: 1.00–1.11, $p < .05$) (Yadav et al., 2020a). Another study done in China revealed that COPD knowledge was positively correlated to self-management behavior ($r = .369$, $p < .01$) (Yang et al., 2019). Also, a study done in Korea revealed that COPD knowledge was positively correlated to self-management behavior ($r = .295$, $p < .001$) (Lim et al., 2022).

Social support refers to individuals getting instrumental, emotional, and informative help to promote health from family, friends, and others (Zimet et al., 1990). Ryan & Sawin (2009) believed that patients who experience positive influence and support in daily life are more likely to engage in recommended health behaviors (Ryan & Sawin, 2009). Studies done in China revealed that the availability of support was positively correlated with self-management behaviors ($\beta = .236$, $p = .02$) (Lan et al., 2022), there was a positive correlation between social support and self-management behaviors ($r = .451$, $p < .01$) (Zhao et al., 2023). Another study done in Korea also revealed that social support was positively correlated with self-management behaviors ($r = .347$, $p = .001$) (Lim et al., 2022).

Besides of above factors, environmental conditions, sociocultural norms, and demographic and clinical characteristics may affect COPD self-management. In Sri Lanka, there are increasing cases of respiratory disease due to air pollution in urban areas. Colombo reportedly has high levels of ambient air pollution due to heavy motor vehicle traffic and factories located in the city (Ileperuma, 2020). Moreover, indoor air pollution is a major health hazard about 78% of households use firewood for cooking often in congested poorly ventilated kitchens (Ileperuma, 2020). Furthermore, there is limited data available regarding self-management behaviors among adults with mild to moderate COPD and limited studies have addressed factors influencing COPD self-management in the Sri Lankan context. To bridge these gaps of knowledge, this study focused on describing the level of self-management behaviors and determining whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka. The findings of this study provide information for nursing professionals, to design effective self-management programs for adults with mild to moderate COPD which help and guide them to manage their

disease effectively, improve their health outcomes and quality of life, and reduce the healthcare cost in Sri Lanka.

Objectives of the research

1. To describe the self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.
2. To determine whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Research Hypothesis

Dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Scope of Study

The purposes of this study were to describe the level of self-management behaviors and to determine whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka. The data was collected in the central chest clinic in Colombo, Sri Lanka from March 2024 to April 2024.

Research Framework

This study was based on the literature and Individual and Family Self-Management Theory (IFSMT) developed by Ryan and Sawin (2009). This theory includes three dimensions such as context, process, and outcome. Context includes condition-specific (i.e., dyspnea), physical and social environment, and individual and family perception (i.e., perceived stress) which directly affect process and outcome dimensions. The process dimension refers to the self-management process of the patient and it includes knowledge and belief (i.e., COPD knowledge), self-regulation skills and ability, and social facilitation (i.e., perceived social support) which help to

encourage the patient's participation in self-management behaviors. The third dimension of this theory is outcome. The outcome dimension is divided into two categories proximal and distal outcome. The patient's participation in self-management behaviors is the proximal outcome while maintaining good health, higher quality of life, and reduced healthcare costs are the distal outcome.

Dyspnea and perceived stress are in the context dimension that can directly affect an individual's and family's ability to engage in the process dimension and outcome dimension (Ryan & Sawin, 2009). Previous research revealed that dyspnea can affect to self-management process and self-management behaviors of adults with COPD (Bringsvor et al., 2018; Hanania & O'Donnell, 2019; Kilic et al., 2021), which is the same as perceived stress (Barroso-Hurtado et al., 2023; Hansen et al., 2023). Constructs in the process dimension directly affect the outcome dimensions (Ryan & Sawin, 2009). COPD knowledge (Lim et al., 2022; Yadav et al., 2020a; Yang et al., 2019) and perceived social support (Lan et al., 2022; Lim et al., 2022; Zhao et al., 2023) which belong to the process dimension may affect COPD self-management behaviors. Moreover, Ryan and Sawin (2009) explain that the interventions aimed at the context dimension can reduce risk or foster conditions that support self-management. The interventions aimed at the self-management process can enhance knowledge and beliefs, increase an individual's use of self-regulation behaviors, and encourage social facilitation.

Therefore, guided by the IFSMT and literature review, this study focused on exploring the influence of dyspnea, perceived stress, COPD knowledge, and perceived social support on self-management behaviors among adults with mild to moderate COPD. The conceptual framework is shown in Figure 1.

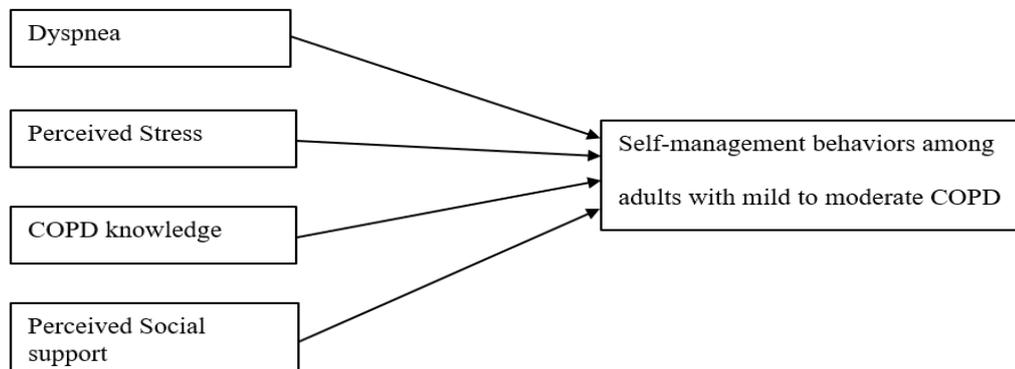


Figure 1 Conceptual Framework

Definition of terms

Adults with mild to moderate COPD refers to persons aged belongs to 18-64 years, who have been diagnosed with mild to moderate COPD for at least 6 months by a physician, according to the criteria of spirometry ($FEV_1/FVC < 0.70$ and $FEV_1 \geq 50\%$) (GOLD, 2022) and come to the respiratory clinic at the central chest clinic in Colombo, Sri Lanka for regular follow up to evaluate their health status.

Self-management behaviors refer to the ability of COPD patients in conjunction with family, community, and healthcare professionals to reduce symptoms and prevent exacerbation including symptom management, daily life management, emotion management, and information management. The COPD self-management scale (CSMS) was used to measure COPD self-management behaviors, which was designed by Zhang et al. (2013) and modified by Yang et al. (2019).

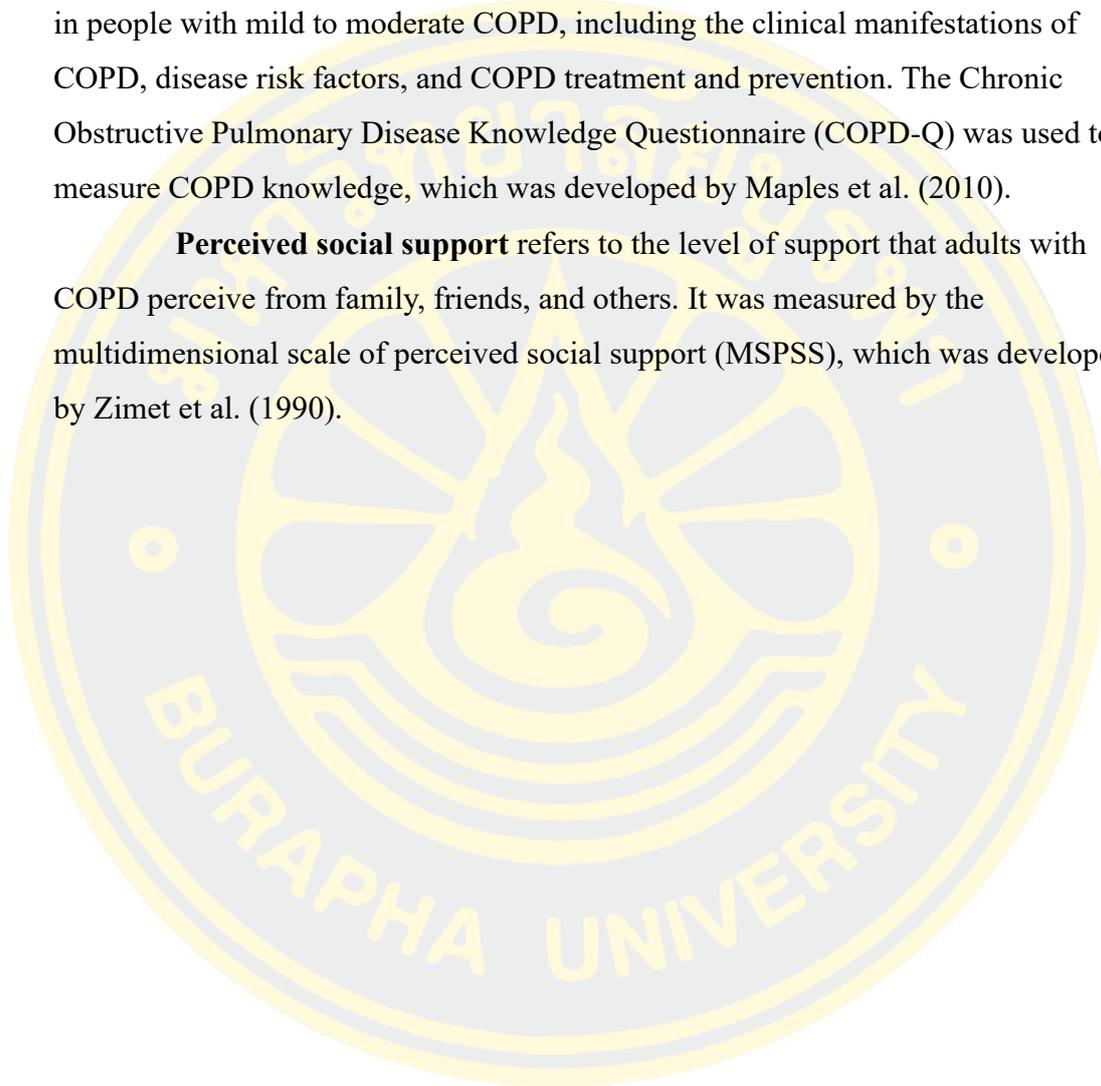
Dyspnea is the feeling that COPD patients cannot get enough air into the lungs and a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity. It feels like a sense of increased effort to breathe, chest heaviness, air hunger, or gasping. Dyspnea level was measured by the Medical Research Council Dyspnea scale (Fletcher et al., 1960).

Perceived Stress refers to the degree to which events in an adult's life with COPD are assessed as stressful, unpredictable, and uncontrollable including awareness, coping, and the ability to how often COPD patients experienced a

particular emotion or thought over the past 4 weeks. The perceived stress level was measured by the Perceived Stress Scale (PSS-10) which was developed by Cohen et al. (1983).

COPD knowledge refers to the understanding of COPD and its management in people with mild to moderate COPD, including the clinical manifestations of COPD, disease risk factors, and COPD treatment and prevention. The Chronic Obstructive Pulmonary Disease Knowledge Questionnaire (COPD-Q) was used to measure COPD knowledge, which was developed by Maples et al. (2010).

Perceived social support refers to the level of support that adults with COPD perceive from family, friends, and others. It was measured by the multidimensional scale of perceived social support (MSPSS), which was developed by Zimet et al. (1990).



CHAPTER 2

LITERATURE REVIEWS

This chapter describes chronic obstructive pulmonary disease (COPD), and self-management behaviors among adults with mild to moderate COPD as follows.

1. Overview of Chronic Obstructive Pulmonary Disease
 - 1.1. Definition of COPD
 - 1.2. Pathophysiology and Signs and symptom
 - 1.3. Diagnosis and assessment of COPD
 - 1.4. Treatment of COPD
 - 1.5. Guideline for care and prevention of complication
2. Self-management behaviors of patients with COPD
 - 2.1. Definition of self-management behaviors
 - 2.2. Family involvement in self-management behaviors
 - 2.3. Self-management behaviors among COPD persons
 - 2.4. Self-management behaviors among adults with mild to moderate COPD
 - 2.5. Self-management behaviors among adults with COPD in Sri Lanka
3. Individual and Family Self-Management Theory
4. Factors influencing self-management behaviors among adults with mild to moderate COPD
 - 4.1 Dyspnea
 - 4.2 Perceived stress
 - 4.3 COPD knowledge
 - 4.4 Perceived social support
5. Summary of the literature review

Overview of Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease (COPD)

COPD is a common chronic respiratory condition resulting in gradual deterioration and worsening of symptoms. Nearly 212.3 million people are suffering from COPD throughout the world (Safiri et al., 2022) and the global prevalence is 11.7% (WHO, 2021). In addition to that, it is now one of the top three causes of death worldwide (GOLD, 2022), and it accounts for 3.3 million deaths per year (Safiri et al., 2022). 90% of these deaths occur in low and middle-income countries (Verma et al., 2021). According to the Global Burden of Disease (GBD) Study in 2019, COPD was ranked as the fourth leading cause of global disability-adjusted life years (DALYs) in individuals (Islam et al., 2021) and COPD accounting for 74.4 million DALYs in 2019 (Safiri et al., 2022). Previous systematic reviews on the epidemiology of COPD have reported a global prevalence ranging from 7.6% in 2004 to 11.4% in 2014 (Safiri et al., 2022). However, the prevalence and severity of COPD vary by geographical region (Varmaghani et al., 2019). In the USA, 6.4% (an estimated 15.7 million adults) have been diagnosed with COPD (Wheaton et al., 2015). Further, the most recent estimate of COPD prevalence in South Asia is 6.7% (Jarhyan et al., 2022). When considering South Asian countries, the prevalence of COPD was highest in north India (19.4%), followed by Bangladesh (13.5%), and Nepal (8.5%) (Jarhyan et al., 2022). The COPD prevalence in Sri Lanka is 10.5%, similar to the global (Amarasiri et al., 2017).

Also, COPD imposes a substantial economic burden, The USA accounts for \$32 billion in annual medical costs for COPD (Bauer & Schiffman, 2019) and it is the second most common cause of emergency admissions (Feetham & van Dorn, 2017). Furthermore, many people suffer from this disease for years and die prematurely from it or its complications globally (GOLD, 2022). Therefore, COPD has become a severe health problem in the world.

Definition of COPD

According to the GOLD, COPD is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant

exposure to noxious particles or gases and influenced by host factors including abnormal lung development (GOLD, 2022).

Pathophysiology, Signs, and symptom

The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airway disease and parenchymal destruction (emphysema). Chronic inflammation causes structural changes, narrowing of the small airways, and destruction of the lung parenchyma that leads to the loss of alveolar attachments to the small airways and decreases lung elastic recoil. In turn, these changes diminish the ability of the airways to remain open during expiration. A loss of small airways may also contribute to airflow limitation and mucociliary dysfunction. Mucus hypersecretion is due to an increased number of goblet cells and enlarged submucosal glands, both because of chronic airway irritation by cigarette smoke and other noxious agents (GOLD, 2022). This peripheral airway limitation progressively traps gas during expiration, resulting in hyperinflation. Static hyperinflation reduces inspiratory capacity and is commonly associated with dynamic hyperinflation during exercise leading to increased dyspnea. The airflow limitation and gas trapping the extent of inflammation, fibrosis, and luminal exudates in the small airways correlates with the reduction in forced expiratory volume in one second (FEV₁) and FEV₁/FVC (forced vital capacity) ratio (GOLD, 2022). Dyspnea, chronic cough or chronic sputum production, wheezing, chest tightness, fatigue, and additional features in severe disease including weight loss, muscle loss, and anorexia are the clinical symptoms of COPD (GOLD, 2022; Woldeamanuel et al., 2019).

Diagnosis and assessment of COPD

1. Diagnosis

Based on the GOLD criteria, a diagnosis of COPD is suspected if the patient presents with clinical manifestations, a history of exposure to risk factors, and a family history of COPD and/or childhood factors but is confirmed by the presence of a post-bronchodilator forced expiratory volume in one second/forced vital capacity value of <0.7 . The spirometry is the most reproducible and objective measurement of airflow limitation and it should measure the volume of air forcibly exhaled from the point of maximal inspiration and the volume of air exhaled during the first second of this maneuver, and the ratio of these two measurements (FEV₁/FVC) should be

calculated. The spirometry measurements are evaluated by comparison with reference values based on age, height, sex, and race. The Spirometric criterion for airflow limitation is a post-bronchodilator fixed ratio of $FEV_1/FVC < 0.70$, excluding other diseases (GOLD, 2022; Woldeamanuel et al., 2019).

2. Assessment

A detailed medical history must be considered regarding the following aspects for COPD assessment. The patient's exposure to risk factors, past medical history (asthma, allergy, sinusitis, respiratory infections in childhood, other chronic infections TB/HIV), family history, the severity of the spirometric abnormality, symptoms of the patient, history of exacerbation frequency, and presence of comorbidities (GOLD, 2022).

2.1 Classification

Spirometry measurement is the key factor for detecting airway limitations. It should be performed after the administration of an adequate dose of at least one short-acting inhaled bronchodilator to minimize variability (GOLD, 2022). The expiratory volume in the first second after maximal inspiration to the total lung capacity (TLC), both as a volume measurement and as a measure of mean flow rate in one second is the primary indicator of impaired lung function (GOLD, 2022). The normal airflow range is (3.18 ± 0.12) L for men and (2.31 ± 0.05) L for women. $FEV_1 = FVC$ in normal individuals, $FEV_1 < FVC$ in the presence of airway obstruction, decreased FEV_1 , and prolonged expiratory time in obstructive ventilation disorders (GOLD, 2022). Breathing problems are a key symptom of COPD. It causes airway limitation which causes breathing difficulties (GOLD, 2022)

The GOLD divides COPD into four levels according to the degree of airflow limitation based on post-bronchodilator forced expiratory volume in one second (FEV_1): GOLD 1 or mild, $FEV_1 \geq 80\%$ predicted; GOLD 2 or moderate, $FEV_1 \geq 50\%$ and $< 80\%$ predicted; GOLD 3 or severe, $FEV_1 \geq 30\%$ and $< 50\%$ predicted; GOLD 4 or very severe, $FEV_1 < 30\%$ predicted (GOLD,2022). In Sri Lanka, the severity in stage 1 was 85.0%, stage 2 was 12%, stage 3 was 1.5% and stage 4 was 1.4% in 2017 (Amarasiri et al., 2017).

2.2 Assessment of symptoms

Dyspnea is a major cause of the disability and anxiety that is associated with the disease. Chronic cough is often the first symptom of COPD. The cough may be intermittent but subsequently may be present every day, often throughout the day (GOLD, 2022). The Modified British Medical Research Council (mMRC) questionnaire, the COPD assessment test (CATTM), and the COPD control questionnaire (CCQ) are suitable for a comprehensive assessment of symptoms since these are not complex to use in routine practice (GOLD, 2022). More than 50% of adults have at least one respiratory symptom (Ruan et al., 2023).

2.3 Assessment of exacerbation risk

Exacerbation is the most common problem with COPD and between 30% to 50% of people with COPD suffer from exacerbations globally (Viniol & Vogelmeier, 2018). Exacerbation is characterized by a sustained worsening of patients' respiratory symptoms, which are beyond normal day-to-day variability, acute in onset, and necessitate a change in regular medication (GOLD, 2022). Exacerbations of respiratory symptoms triggered by respiratory infections with bacteria or viruses, environmental pollutants, or unknown factors often occur in patients with COPD (GOLD, 2022). However, at the population level, approximately 20% of GOLD 2 (moderate airflow limitation) patients may experience frequent exacerbations requiring treatment with antibiotics and/or systemic corticosteroids (GOLD, 2022). Frequent exacerbation is defined as two or more exacerbations per year (GOLD, 2022), and frequent exacerbations are associated with a decline in lung function, increased mortality, increased healthcare utilization increased rate of hospitalization and readmission, and disease progression (Korpershoek et al., 2017; GOLD, 2022). During exacerbations there is increased hyperinflation and gas trapping, with the reduced expiratory flow, thus accounting for increased dyspnea (GOLD, 2022). Exacerbations are an important medical and healthcare problem since it is evident that severe exacerbations of COPD are related to a significantly worse survival outcome (Viniol & Vogelmeier, 2018).

2.4 Assessment of risk factors

Long-term cumulative exposure to noxious gases and particles such as tobacco smoking, and outdoor/occupational, and indoor air pollution are major risk

factors for COPD (GOLD, 2022). Also, smoking, indoor air pollution, and ambient air pollution are the main risk factors for COPD in South Asia (Jarhyan et al., 2022). In addition to that, genetic factors (hereditary deficiency of alpha-1-antitrypsin), age, sex (men>women), socioeconomic status (poverty, crowding, poor nutrition, infections), chronic diseases (asthma, chronic bronchitis, infections) are also risk factors for COPD (GOLD, 2022; Yadav et al., 2020a).

2.5 Assessment of comorbidities

Most of the patients have concomitant chronic illnesses at the time of diagnosis of COPD because the elders are particularly vulnerable to multimorbidity as a result of response to common risk factors such as aging, smoking, alcohol, diet, and inactivity (GOLD, 2022). The common comorbidities include cardiovascular disease, hypertension, diabetes mellitus, skeletal muscle dysfunction, osteoporosis, depression, anxiety, and lung cancer (GOLD, 2022; Yadav et al., 2020a). These comorbidities may occur in patients with mild, moderate, or severe airflow limitation, influence mortality, and hospitalizations independently, and deserve specific treatment. Hence, comorbidities should be looked for routinely and treated appropriately in any patient with COPD (GOLD, 2022).

Treatment of COPD

COPD is considered to be a completely irreversible disease. Hence, the goal of treatment is not to cure the disease but to change health behavior and equip persons with the skills to actively participate in disease management to prevent and alleviate symptoms, improve exercise endurance and health status, prevent exacerbations, and slow down the disease process (GOLD, 2022). Management strategies for COPD include pharmacological and non-pharmacological interventions.

Pharmacological treatments are used to manage acute symptoms and prevent the risk of exacerbation. These pharmacological therapies help to reduce COPD symptoms, reduce the frequency, severity, and risk of exacerbation, and improve health status and exercise tolerance (GOLD, 2022). Bronchodilators (beta2-agonist, methylxanthines, and antimuscarinic drugs), anti-inflammatory agents (inhaled corticosteroids (ICS), and other medications (oral glucocorticoids, phosphodiesterase-4 (PDE4) inhibitors, antibiotics, mucolytic and antioxidant agents) are

pharmacological therapy of COPD with the potential to reduce exacerbations (GOLD, 2022).

Acute symptom management

Bronchodilator medications in COPD are most often given regularly to prevent or reduce symptoms. These medications can increase FEV₁ and/or change other spirometric variables. They act by altering airway smooth muscle tone and the improvements in expiratory flow reflect the widening of the airways rather than changes in lung elastic recoil to reduce gas trapping, thereby reducing lung volumes and improving symptoms and exercise capacity (GOLD, 2022). Bronchodilators include beta₂-agonists, methylxanthines, and antimuscarinic drugs.

Beta₂-agonists act to relax airway smooth muscle by stimulating beta₂-adrenergic receptors which improve FEV₁ and symptoms. There are short-acting beta₂-agonists (SABA) and long-acting beta₂-agonists (LABA). As an adverse effect of beta₂-agonists has the potential to precipitate cardiac rhythm disturbances in susceptible patients. Antimuscarinic drugs block the bronchoconstrictor effects. short-acting muscarinic antagonists (SAMAs) and long-acting muscarinic antagonists (LAMAs) improve symptoms and health status. The main adverse effect of antimuscarinic drugs is dryness of the mouth (GOLD, 2022).

Inhaled corticosteroids (ICS) are the commonly used anti-inflammatory agent in clinical practice. However, ICS is not recommended to be used alone in regular treatment because ICS neither modifies the long-term decline of FEV₁ nor mortality in patients with COPD. Oral candidiasis, hoarse voice, skin bruising, and pneumonia are adverse effects of ICS. Combining bronchodilators with different mechanisms can increase bronchodilatation and reduce the risk of side effects. ICS combined with LABAs is more effective than either component alone in improving lung functions, and health status, and reducing exacerbations in patients with COPD. Furthermore, triple therapy (LABA+LAMA+ICS) can improve lung functions (Smalley et al., 2021; GOLD, 2022). In addition to that systemic glucocorticoids use to manage acute exacerbations in hospitalized patients and during emergency department visits (GOLD, 2022).

Inhaler therapy

Most of these medications are inhaled, hence inhaler technique needs to be assessed regularly. Inhalation devices include nebulizers, metered-dose inhalers (MDIs) used with or without spacers, soft-mist inhalers, and breath-actuated devices i.e., breath-actuated MDIs and single-dose and multi-dose dry powder inhalers (DPIs) (GOLD, 2022). All classes of inhaled drugs are not available in all types of devices. Therefore, sometimes one patient has to use several inhalers with several devices. Healthcare providers must educate the patient and family members about the correct techniques, doses, and devices for inhalation therapy. The family members can help to patient to practice inhalation therapy in the correct way to prevent exacerbations.

Oxygen therapy and ventilatory support

Long-term oxygen therapy is used in severe and very severe COPD to prevent severe resting hypoxemia. Home oxygen therapy is recommended for severe hypoxemia (GOLD, 2022). Healthcare workers should educate patients and family members about how to use oxygen therapy and ideally maintain the level of oxygen. Family members can help the patient by arranging a home environment for oxygen therapy and help to apply the correct amount as the patient needs.

Noninvasive ventilation (NIV) in the form of noninvasive positive pressure ventilation (NPPV) is the standard of care for decreasing morbidity and mortality in patients hospitalized with an exacerbation of COPD. Furthermore, there are clear benefits associated with the use of continuous positive airway pressure (CPAP) to improve both survival and the risk of hospital admissions (GOLD, 2022). However, home oxygen therapy or ventilatory support is used with the severity of the disease. Sever or very severe COPD patients need oxygen or ventilatory support than mild and moderate levels (GOLD, 2022).

Prevent the risk of exacerbation and complication

LAMA treatments improve the effectiveness of pulmonary rehabilitation and reduce exacerbations and related hospitalizations. triple therapy is also used to prevent exacerbations (GOLD, 2022). Respiratory infections are one of the triggers for exacerbation. Therefore, annual vaccination can help to prevent respiratory infections.

Vaccination

Influenza vaccination can diminish lower respiratory tract infections which require hospitalization, exacerbations, and death in COPD patients. Moreover, pneumococcal vaccinations, the 13-valent conjugated pneumococcal vaccine (PCV13) and the 23-valent pneumococcal polysaccharide vaccine (PPSV23) are recommended for all patients above 65 years and PPSV23 is also recommended for younger COPD patients with significant comorbid conditions since these vaccines can reduce lower respiratory tract infections, reduce the incidence of community-acquired pneumonia in COPD patients less than 65 years, with an FEV1 < 40% predicted, or comorbidities (GOLD, 2022).

Other medication

Patients and families should be informed to observe symptoms including dyspnea, wheezing, color of sputum, cough, or fever. If any worsening of symptoms they should go to the hospital. Antibiotics also can be used to manage COPD according to the GOLD guideline. Azithromycin (250mg/day or 500mg three days per week) or Erythromycin (250mg two times per day) for one year in patients prone to reduced exacerbations compared to usual care (GOLD, 2022). In addition to that regular treatment with mucolytics such as Carbocysteine and N-acetylcysteine (NAC) may reduce exacerbations and improve health status (GOLD, 2022).

These pharmacological therapies should be individualized and guided by the severity of symptoms, risk of exacerbations, comorbidities, side effects, patient response, drug availability, and cost (GOLD, 2022).

Guideline for care and prevention of complications

The GOLD program was established in 1998 and provides regular updates and evidence-based recommendations for the management of COPD. Smoking cessation, vaccinations (Influenza vaccine, pneumococcal vaccine), pulmonary rehabilitation (PR), education (self-management, and integrative care), symptom control and palliative care, and other treatments (oxygen therapy and ventilatory support) are non-pharmacological interventions for the management of COPD (GOLD, 2022).

1. Identify and reduce exposure to risk factors

Smoking harms the prognosis and progression of the disease among patients with COPD. Hence, healthcare workers must consider delivering smoking cessation messages and interventions to patients and should encourage patients to quit smoking at every available opportunity. Further, COPD patients should avoid indoor and outdoor air pollution including smoke from biomass fuel, by recommending efficient ventilation, and non-polluting cooking stoves (Holtjer et al., 2023; GOLD, 2022).

2. Pulmonary rehabilitation

Pulmonary rehabilitation is defined as “a comprehensive intervention based on thorough patient assessment followed by patient-tailored therapies that include but are not limited to, exercise training, education, self-management intervention aiming at behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors” (GOLD, 2022). Pulmonary rehabilitation is appropriate for most patients with COPD and it improves dyspnea, health status, and exercise tolerance, and reduces recurrent hospitalization due to exacerbations (GOLD, 2022). Furthermore, pulmonary rehabilitation programs in subjects with COPD, significant and clinically relevant improvement of emotional function, sense of control over the condition, and exercise capacity (Janssen et al., 2021).

3. Education and Self-management

Although medical treatments can slow progression and mitigate the impact of many chronic conditions, the management of chronic conditions through the patient’s involvement in undertaking long-term adherence to a preventive or therapeutic regimen can improve functional status and health outcomes (Allegrante et al., 2019). Patient education often plays an essential part since patient knowledge is an important thing for behavior change for promoting self-management skills. Even though COPD is preventable, once established it cannot be cured, but effective self-management strategies can lessen the burden of disease and improve quality of life (Safiri et al., 2022).

4. Nursing care for patients with COPD and their families.

As nurses and healthcare professionals, our expectations for individuals and families to assume responsibility for managing their healthcare have outpaced our

understanding of how to assist them in acquiring the knowledge, skills, and social facilitation for health management (Ryan & Sawin, 2009). Insufficient support from health professionals can lead to patients with COPD and families experiencing a burden (Sigurgeirsdottir et al., 2020). Therefore, involvement by nurses may reduce the burden and distress of the patient and family, and enhance their chance of developing practical skills (inhaler techniques), strategies for managing adverse events (exacerbations), and anticipation of future events (Sigurgeirsdottir et al., 2020).

Education and self-management are important are very important because COPD cannot be cured. Therefore, the nurses must provide them with health education including, smoking cessation, guidance on proper lip breathing, diaphragmatic breathing, maintaining good ventilation, risk factors for exacerbations, compliance with medication, and the importance of taking vaccines annually to prevent exacerbations. In addition to that, the nurses should evaluate whether the patient can use inhalers correctly. They should instruct first-time inhaler patients and families on using the inhalers correctly and sometimes one patient has to use several inhalers with several devices. Therefore, nurses must educate the patient and family members about the correct techniques, doses, and devices for inhalation therapy. Furthermore, the nurses can give answers to any questions patients, and their families have about disease conditions and treatment plans and educate patients and family members to manage acute conditions and cope with emotions.

Self-management interventions aim to motivate, engage and coach patients to positively adapt their health behaviors and develop skills to manage their disease condition on a day-to-day basis better (GOLD, 2022). Self-management behavior refers to individuals' active management of a chronic illness in collaboration with their family members, and clinicians, and self-management behavior is used to manage chronic diseases and cooperate with other behavior to promote health (Ryan & Sawin, 2009). Patient education on self-management provides disease management knowledge and skills that help patients with COPD, to learn how their lungs work and why they experience breathlessness, use new airway clearance skills to manage their symptoms daily, and in turn have less frequent exacerbations because of their proactive management, leading to a higher quality of life, better health status, and

fewer visits with healthcare professionals (Camus-Garcia et al., 2021; Sigurgeirsdottir et al., 2019; Smalley et al., 2021).

In recent years, considerable research has shown that self-management interventions have positive effects on exacerbation recovery time, reduce hospital admissions, and are associated with increased quality of life (Korpershoek et al., 2017) and reduction of COPD exacerbation duration (Schrijver et al., 2021). A Cochrane review on self-management interventions for patients with COPD showed significant advantages in terms of respiratory-related hospital admissions and dyspnoea (Viniol & Vogelmeier, 2018). Therefore, self-management is one of the most important in preventing exacerbations in COPD patients (Boyer, 2023; Viniol & Vogelmeier, 2018; GOLD, 2022).

Self-management behaviors of patients with COPD

Definition of self-management behaviors

Chronic diseases require patients to engage in self-management to successfully monitor and mitigate their symptoms and to interact effectively with healthcare providers. Self-management generally refers to the “individual’s ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition” (Ogunbayo et al., 2017). Ryan and Sawin (2009) believe that family involvement is a key element in the self-management process. Involvement of the families, in the management of chronic health conditions leads to the improvement of their health outcomes, increased quality of life, and realignment of healthcare expenditures including a decreasing demand for health services and self-management also contributes to the overall health of society (Ryan & Sawin, 2009).

According to the Cochrane Database of Systematic Review, chronic condition self-management programs (CDSMP) improve exercise capacity, cognitive symptom management, and communication with physicians, as well as lower health distress and improve disease-specific self-efficacy. Furthermore, the CDSMP has been shown to reduce healthcare expenditures, fewer emergency room visits in one year, lower inpatient and outpatient visits, fewer hospitalizations, and lower healthcare costs (Allegrante et al., 2019). However, it takes some time to adapt to the

disease condition and lifestyle changes for newly diagnosed COPD patients proper social support can mitigate the burden of the disease (Ryan & Sawin, 2009; GOLD, 2022).

Family involvement in self-management behaviors

Effective chronic disease management requires the involvement of the family because it is the closest unit in contact with patients. Family members are people who have been providing care for each other for a long time. Family care and support are linked to better patient self-management and health outcomes (Ryan & Sawin, 2009). When a person develops COPD, family members (spouses/ children, relatives) assume the role of informal caregivers, providing practical help, psychological support, and help with healthcare utilization. Family caregiving is important in COPD care and patients' self-management support (Sigurgeirsdottir et al., 2020).

The family caregivers' role in motivating COPD patients towards self-management where the goal to optimize patients' health, reduce symptoms, and increase function, involves the establishment of alliances with healthcare providers (Sigurgeirsdottir et al., 2020). Family involvement is essential for understanding and managing the symptoms, keeping active, preserving the quality of life, knowing what to expect, how to facilitate the patient's resources on the illness journey, and environmental control to prevent exacerbation. Even though adults can actively engage in self-management, high levels of stress, and depression are experienced by COPD patients due to their working lifestyles and responsibilities for providing for the family. In addition to that, families' responsibilities increase in parallel with patients' disease trajectory (Sigurgeirsdottir et al., 2020). Therefore, family involvement in managing symptoms (i.e. medication adherence, the use of proper inhaler techniques, the practice of breathing exercises), regular clinic visits, support for emotion management (i.e. help to reduce working stress), environmental arrangements to prevent exacerbation (i.e. if use biomass fuel for cooking, arrange the adequate ventilation in the kitchens and always encourage to wear a face mask when exposing to occupational triggers, dust or polluted air), to help quit smoking are essential.

Self-management behaviors among COPD persons

COPD self-management behaviors refer to an individual's behavior in daily life to relieve and control symptoms, reduce and prevent deterioration, slow disease progression, and improve quality of life (Yadav et al., 2020b). Self-management behaviors are one of the key mechanisms for reducing COPD exacerbations and subsequent hospitalizations, reducing dyspnea, and improving health-related quality of life among adults with COPD (Barrecheuren & Bourbeau, 2018; O'Connor et al., 2019). Physical inactivity in COPD is a fundamental cause of dyspnea, hospitalization, and mortality (Korpershoek et al., 2016). COPD self-management behaviors include quitting smoking, appropriate use of daily medications, receipt of influenza and pneumococcal vaccination, routine appointments with healthcare providers (Barrecheuren & Bourbeau, 2018; Jolly et al., 2018; O'Connor et al., 2019), and physical activity/exercise, avoiding stimuli, early detection of symptom deterioration, medical treatment of exacerbations, managing stress and anxiety, and awareness for recurrent exacerbations (Korpershoek et al., 2017).

Being diagnosed with COPD is a major life transition, followed by a period of psychological crisis with worry, fear, and anxiety. Most of the patients with COPD report high levels of anxiety and depression symptoms, including fear, worry, being afraid, panic attacks because the experience of a severe exacerbation induced panic and constant fear and worry of rehospitalization. When experiencing progression, patients expressed fear of dying – not of being dead but of the dying process involving suffocation (Christiansen et al., 2023). Moreover, symptoms of anxiety and depression are persistent over a longer period and can be associated with maladaptive behaviors, such as avoidance of activities that are expected to trigger dyspnea. Also, this can lead to isolation, deconditioning, symptom progression, and reduced quality of life and eventually result in the development of an anxiety disorder (Christiansen et al., 2023).

A study done in Canada revealed adults with COPD reported poor coordination with medical services (OR = .63, CI = 0.56-0.71, $p < .05$) (Cloutier et al., 2023). However, the literature shows that there is poor self-management among patients with COPD. The studies done in China revealed that the level of self-management behaviors of COPD patients was suboptimal (Lan et al., 2022; Yang et

al., 2019). In the Netherlands, only a minority of COPD patients are activated for self-management (Korpershoek et al., 2016), females had higher self-management behaviors than men (Scheffer et al., 2021). A study done in the USA stated that there was poor patient activation for COPD disease management (Mullerova et al., 2016).

Self-management behaviors among adults with mild to moderate COPD

Adults (aged 18-64 years) (WHO, 2019) are physically active and mostly they have a working lifestyle. Therefore, adults are more exposed to environmental factors, occupational triggers and long-term exposure to traffic air pollutants may have contributed to the increase in COPD (Varmaghani et al., 2019). Moreover, when considering self-management behaviors, adults can be actively involved in managing their disease condition by taking responsibility and making decisions to manage their condition rather than elders (Bringsvor et al., 2018). Also, adults have better lung function and immune system function than in older age groups (Priyankara et al., 2021). In addition to that work productivity can improve among adults with COPD through self-management behaviors (Lee et al., 2020). Therefore, focusing on self-management behaviors among adults is essential to delaying the disease progression.

Disease severity is vital in COPD self-management because the self-management interventions applied at an early stage may reduce risk in more severe stages of the disease (Jolly et al., 2018). A systematic review done by Varmaghani et al. (2019) revealed that the most common stages of COPD were mild and moderate while 44.16% had mild COPD, and 44.22% had moderate COPD among the COPD population (Varmaghani et al., 2019). However, patients with mild COPD with fewer symptoms were at higher risk of poor adherence than patients with moderate COPD because lack of clinical symptoms may induce some patients to take therapy episodically, rather than daily (Aredano et al., 2020). The longitudinal studies done in the UK revealed that 10.9% of mild COPD patients (n=1105) had at least one severe exacerbation per year (Han et al., 2017) and 22% of moderate COPD patients (n=2138) had frequent exacerbations per year (Hurst et al., 2010). Another study done in Korea revealed that the disease stage was negatively associated with COPD self-efficacy ($r = -.121, p = .002$), which is an influence on self-management (Lim et al., 2022). Therefore, the adoption of healthy behaviors in mild to moderate stages is of decisive significance in slowing the disease's progression to severe stages (Jolly et al.,

2018; Liu et al., 2020b). COPD self-management behaviors include symptom management, daily life management, emotion management, and information management (Zhang et al., 2013).

1. Symptom management

Symptom management plays a prominent part in self-management behaviors in day to day life of patients with COPD (GOLD, 2022). Symptom management refers to the COPD patient seeking medication and another method to deal with COPD symptoms such as dyspnea, cough, and sputum (Zhang et al., 2013). A Canadian study done with mild to moderate COPD [mild COPD (n=397); moderate COPD (n=262)] revealed that 32% of people with mild-moderate airflow limitation experiencing moderate-to-severe dyspnoea (Medical Research Council (MRC) Scale ≥ 3). Moreover, 4% of mild and 8% of moderate participants had more than two episodes of exacerbation within 12 months (Cherian et al., 2021). Frequent exacerbations in mild to moderate stages can increase the trajectory of the disease.

Although the long-term decline of pulmonary function in patients with COPD could not be reversed by the medication treatments, adherence to medication treatment can prevent and control symptoms, reduce the incidence of COPD exacerbation, improve health status, and exercise endurance in patients with COPD (GOLD, 2022). Therefore, adhering to medication and inspiratory muscle training is also very important for patients with mild to moderate COPD. Nevertheless, a study done in Italy (n=136) revealed that 46.3% of participants with mild to moderate COPD did not adhere to the medications (Aredano et al., 2020). The family members can help patients with COPD to comply with medication and help to practice the correct inhaler techniques at the correct time because some patients use several different types of inhalers. Although adults can do this by themselves family members can remind them on time because adults can forget due to their busy working lifestyle.

2. Daily life management

Daily life management refers to the COPD patient taking an appropriate amount of exercise and avoiding activities that exacerbate COPD (Zhang et al., 2013). Patients with COPD identify risks and avoid risk factors (tobacco smoke, indoor and outdoor air pollution, occupational exposure) exposure in the early stage of the disease, delaying the disease progression (GOLD, 2022). A Canadian study done with

mild to moderate COPD [mild COPD (n=397); moderate COPD (n=262)] revealed that decline in FEV1 more frequently in people with moderate COPD, and current smokers than particularly versus never-smokers (OR 1.64, 95% CI 1.07–2.52) (Cherian et al., 2021). Another study done in China revealed that more severe airflow limitation in current smokers (mean FEV1% predicted of 47.5%, $p < .01$) (Liu et al., 2020a) indicating that smoking has a greater effect on lung function decline in COPD.

Smoking cessation is a key element in increasing lung function. A study done in California with 3,926 smokers with mild-to-moderate COPD revealed that participants who stopped smoking experienced an improvement in FEV1 in the year after quitting. Moreover, researchers revealed that those who stopped smoking had a rate of decline in FEV1 of 31 ± 48 ml/y, and continuing smokers showed a more rapid rate of decline in FEV1 by 62 ± 55 ml/y, which is twice the rate observed in those who stopped smoking (Scanlon et al., 2020). Although quitting smoking has a positive significance in slowing down COPD from mild to severe, a study revealed that the likelihood of smoking cessation was higher among patients with severe and very severe COPD (OR 1.235, 95% CI=1.050–1.452) compared to mild and moderate COPD.

Patient activation led to improvements in health outcomes in several chronic conditions (Yadav et al., 2020a). Physical exercise including breathing exercises reduce, dyspnea, frequent exacerbations, and hospital readmissions (Korpershoek et al., 2017). A study done in Turkey with COPD revealed that anxiety and depression scores decreased, improving dyspnea, and exercise capacity in mild to moderate patients through regular exercises ($p < .05$). In the early stage of COPD, dyspnea or wheezing usually occurs with physical activity and exercise. Physical exercise training can improve the fitness of patients with mild or moderate COPD (Chavannes et al., 2022). According to this evidence, daily life management is an essential part of COPD disease management and family members also have a responsibility to help the patient manage his/her daily life effectively. Family members can help them practice effective breathing exercises, avoid risk factors such as maintaining good ventilation at home, encourage the patient to get vaccine annually, help to quit smoking and avoid smoking by family members near the patient.

3. Emotional management

Emotional management refers to the COPD patient managing emotional changes such as anxiety and depression associated with COPD (Zhang et al., 2013). According to the GOLD guideline, healthcare providers need to inquire about depression and/or anxiety symptoms and advise the patients to cope with emotions correctly when taking medical history (GOLD, 2022).

COPD-related anxiety has a debilitating effect on daily life and leads to feelings of worry and grief due to lost abilities. Furthermore, in some patients, anxiety also resulted in profuse sweating and incontinence, which made them embarrassed and subsequently avoid social situations (Christiansen et al., 2023). A study done with mild COPD in China (n= 275) revealed that 8.1% of participants had anxiety and 13.4% of participants had depression (Xiao et al., 2018). The prevalence of depression among COPD patients was 86% in India (Agarwal et al., 2018). Another study done in Turkey revealed that Anxiety and depression scores decreased after pulmonary rehabilitation in the mild to moderate group ($p<.05$) (Korkmaz Ekren et al., 2018). Therefore, emotion management is vital in self-management in COPD and family involvement is a key element for this because the patient can share his/her emotions with them. Working-age adults face many stressors in the working environment and they have a responsibility to take care of their families. So, family members can talk with the patient and share their ideas for effective emotion management. Family members should understand them because anxiety and stress can increase dyspnea. Therefore, family can help make patients more confident to control symptoms.

4. Information management

Information management refers to the COPD patient communicating with clinicians or accessing media to gain information about COPD (Zhang et al., 2013). COPD is a chronic disease that patients need to cooperate with healthcare providers and work together to manage the disease. Healthcare providers provide counseling, improve inhaler skills, and adjust treatment to prevent deterioration. Regular communication with doctors and nurses can reduce exacerbation by 45%-60% (Park et al., 2020). However, people with mild to moderate COPD tend not to go to the hospital unless they have symptoms or exacerbations (Barrecheuren & Bourbeau, 2018). A cross-sectional study done in Ethiopia (n=734) revealed that nearly 88% of

participants were in the mild to moderate stage, only 2.5% follow-up clinic regularly, and 9.8% had no clinic visits at all (Woldeamanuel et al., 2019). This causes to lack of communication with healthcare providers, which results in inappropriate health behaviors. The family members should be involved in taking the patient for clinic follow-up regularly and they also can communicate with healthcare providers regarding disease conditions and treatments. Therefore, family members can support understanding more and can share information at home. Furthermore, they can help patients gather information about the disease condition by using new technology. However, according to literature self-management behaviors among adults with mild to moderate COPD remain a problem (Barrecheguren et al., 2018). Therefore, it is essential to focus on self-management behaviors among adults with mild to moderate COPD.

Self-management behaviors among adults with COPD in Sri Lanka

1. The situation of COPD in Sri Lanka

Sri Lanka is a tropical island lying off the South Asian region. It has a land area of 65,610 square kilometers and a population of around 22 million (AHB, 2020). It is a low-middle-income country and the average monthly household income was 76,414 LKR (238 USD) in 2019 (Department of Census & Statistics, 2019). It is divided into 9 provinces and 25 districts. The highest population density is seen in the western province and Colombo is the capital of Sri Lanka which is located in the western province. COPD prevalence in Sri Lanka is 10.5% and urban and rural prevalence is 6.4% and 4.1% respectively.

The adult population (age 18-64 years) was 12.7 million in 2018 (Department of Census & Statistics, 2019) and nearly 1.3 million adults are suffering from COPD (AHB, 2020). Moreover, among the COPD population, 90% of patients belong to the mild and moderate levels according to the GOLD classification and the highest number of patients belongs to more than 40 years (Amarasiri et al., 2017; Chokhani et al., 2021; Gunasekera et al., 2019). The COPD prevalence in adult males was 16.4% (the adult male population is 6.7 million) and the prevalence of COPD among females is 6% (adult female population-7.5 million) (Amarasiri et al., 2017). Further, 62% of patients with COPD had at least one of the comorbidities including hypertension, diabetes, and ischemic heart disease (Madegedera et al., 2022), 89% of

patients with COPD have breathing problems (Perera et al., 2022), and coughing and wheezing are the most common symptoms of COPD (Madegedera et al., 2022). Moreover, a descriptive cross-sectional study done in Colombo revealed that nearly one-fifth of patients attending the respiratory outpatient clinic screened positive for either an anxiety or depressive disorder (Galhenage et al., 2018).

The physicians in Sri Lanka, are mostly following the GOLD strategy recommendations for the pharmacological and non-pharmacological management of COPD (Chokhani et al., 2021). Most of the physicians (65.89%) use spirometric/ peak flow meter results and their clinical expertise in diagnosing their patients according to the GOLD guidelines. Further, they often prioritized the disease symptoms and exacerbation history of patients for treatment selection. For mild COPD patients, most physicians prescribe a short-acting b₂-agonist (SABA) followed by a combination of a SABA and a short-acting muscarinic receptor antagonist (SAMA). Further, physicians prescribe for moderate COPD patients, a long-acting b₂-agonist (LABA) and long-acting muscarinic receptor antagonist (LAMA) combination followed by a combination of LABA and inhaled corticosteroids (ICS). Also, 88% of physicians prescribe a pressurized metered dose inhaler (pMDI) with or without a spacer (Chokhani et al., 2021). As non-pharmacological treatments, 94% of physicians routinely advise COPD patients regarding smoking cessation, breathing exercises, influenza or pneumococcal vaccinations, dietary management, and teaching them about effective inhaler use techniques (Chokhani et al., 2021).

The diseases of the respiratory system are the fourth leading cause of death and there is a rising trend of admissions and deaths due to COPD including the Colombo district (AHB, 2020). The total admissions due to exacerbation of COPD from 2016 to 2019, have been rising from 37402 to 47024 respectively and nearly 20000 patients admitted due to frequent exacerbation per year (AHB, 2020). Self-management is one of the most important strategies for a reduction in exacerbations in COPD patients (Viniol & Vogelmeier, 2018; GOLD, 2022). However, according to the respiratory clinic data in Colombo, 40% of patients with COPD were admitted due to frequent exacerbations per year, which reflects poor self-management of their disease condition.

2. Self-management behaviors among patients with COPD

There is limited data available on overall self-management behaviors among adults with COPD in Sri Lanka. However, Tobacco smoking remains a challenge among males (Yasaratne & Dharmage, 2020). Most physicians advise smoking cessation, but 70% of patients with COPD are smokers (Chokhani et al., 2021) and a descriptive study done among patients with COPD (n=184) in the Colombo district revealed that 13.6% of participants were current smokers (Dassanayaka et al., 2019). When compared with the global prevalence of smoking among females (19.5%) (Chokhani et al., 2021), there is less prevalence (2.6%) of smoking among Sri Lankan females (Sooriyanathan et al., 2022). Although females are fewer smokers, a descriptive study done with never-smoke females (n=600) revealed that women are heavily affected by exposure to biomass fuel smoke as evidenced by 64.1% of participants using biomass fuel (wood, charcoal, crop residues, and animal dung) for cooking (Jayaweera et al., 2020).

Even though patients were taught about inhaler use in their routine clinics, 54% of COPD patients practice the inhalation technique poorly (Chokhani et al., 2021). Furthermore, 24% of patients with COPD suffered from wheezing, but only 11% were using oral and inhaler medication for symptom control when they had exacerbation (Yasaratne & Dharmage, 2020). Not only inhalers, a descriptive cross-sectional study (n=184) done on patients with COPD in Colombo revealed that 34.2% of participants were non-adherence to recommended all medications (Dassanayaka et al., 2019) which caused frequent exacerbations. Another study revealed that only 27% of COPD patients received pneumococcal vaccine which is freely provided by the government (Madegedera et al., 2022).

The diagnosed mild to moderate patients with COPD were usually asked to do a follow-up visit every month or two months according to their condition (Chokhani et al., 2021) and they will receive information regarding their condition, appropriate behaviors such as smoking cessation, vaccination, risk factors for exacerbation, nutrition, and improving inhaler skills. However, among Sri Lankan adults there is low usage of technology for searching disease conditions including the Internet (Perera et al., 2022). Further studies revealed that the awareness of pulmonary rehabilitation is limited (Sooriyanathan et al., 2022), and the awareness

of indoor air quality remains poor (Yasaratne & Dharmage, 2020). Moreover, some environmental factors also affect the exacerbation of COPD in Colombo such as high population density and density of vehicles, narrow roads and frequent traffic congestion, and overcrowding of factories which result in high concentrations of ambient particulate matter exceeding WHO air quality guidelines (The daily average PM_{2.5} levels of the WHO guideline = 25 $\mu\text{g}/\text{m}^3$ and in Sri Lanka, the daily average concentrations for PM_{2.5} = 34.48 $\mu\text{g}/\text{m}^3$) (Priyankara et al., 2021). However, 36.8% of COPD patients were not aware of COPD risk factors and 52.9% of COPD patients had poor knowledge of safety actions for risk factors (Kumari et al., 2019; Madushani et al., 2020). This information also reflects insufficient disease management among patients with COPD because patients who have adequate knowledge base around their disease can promptly respond to manage their disease condition (Boyer, 2023).

In addition to that, many adults with COPD are spending their days sedentary without exercise (Jayamaha et al., 2022). Adult men are responsible for earning money in Sri Lankan culture; therefore, a physically inactive life with COPD will affect their monthly income. Furthermore, out-of-pocket expenses on medicines and other pharmaceutical products are particularly higher for households with chronic non-communicable diseases including COPD patients (Pallegedara, 2018). Proper adherence to the appropriate self-management behaviors could also reduce the economic burden on individuals, families, and society (Lee et al., 2020). Therefore, COPD disease management is needed to reduce this physical, social, and economic burden in Sri Lanka.

Extended family structure in most Asian countries, provides the scope for family caregivers to share the caring responsibilities (Isac et al., 2021). In Sri Lankan culture, there are nuclear families and extended families and most people live with their family. The family may include the patient's spouse, children, parents, and any other relatives and the family is very important to individuals in the Sri Lankan context including Colombo, because family members will take responsibility for taking care of patients and provide support to patients in any stage of disease. The family members play a major role in managing patients with COPD including taking them to routine clinic visits, taking care of their nutrition and medications, providing

information about the disease, and supporting change to their behaviors in a healthy way.

Therefore, this study based on the theoretical model of individual and family self-management (Ryan & Sawin, 2009) to determine the relationship between condition-specific factors (dyspnea), Individual and family factors (perceived stress), knowledge and belief (COPD knowledge), social facilitation (perceived social support), and short-term outcome (COPD self-management behaviors) in adults with mild to moderate COPD.

The Individual and Family Self-Management Theory

Individual and Family Self-Management Theory (IFSMT) is a middle-range theory developed by Ryan and Sawin (2009). The conceptual definition of IFSMT is the purposeful incorporation of health-related behaviors into an individual's or family's daily functioning. The individual or family assumes responsibility for individual and family self-management and it may occur in collaboration with healthcare professionals. Living with chronic disease or engaging in healthy behavior is complex, and it is necessary to integrate self-management behavior into individuals and families (Ryan & Sawin, 2009).

The IFSMT describes that self-management is a dynamic phenomenon and it consists of context, process, and outcome. Factors in the contextual dimension influence individual and family engagement in the process of self-management as well as directly impact outcomes. Strengthening the process of self-management of individuals and families will produce more positive proximal or distal outcomes (Ryan & Sawin, 2009).

Context (Risk and Protective factors)

There are three elements in this context dimension named condition condition-specific, physical and social environment, and individual and family factors. Condition-specific factors refer to a physiological, structural, or functional characteristic of the conditions, its treatment, or prevention of the conditions that impact the amount, type, and critical nature of behaviors needed to manage the condition (i.e., the complexity of the condition or treatment, trajectory, physiological stability, or physiological transitions). In this study, dyspnea and perceived stress

belong to the concept of condition-specific factors and it may affect the individual's and family's engagement in self-management process and COPD self-management behaviors. The physical and social environment refers to physical or environmental factors that enhance or hinder the self-management of individuals and families. It includes factors such as access to health care, transition in health care providers or settings, transportation, neighborhoods, work, school, culture, or social capital. Individual and family factors are those characteristics of the individual and family such as cognitive status, developmental stages, perspectives, information processing, literacy, and capabilities that enhance or diminish self-management.

Process (The self-management process)

The process dimension of IFSMT includes condition-specific knowledge and beliefs, acquisition and use of self-regulation skills and abilities, and social facilitation. Knowledge and beliefs are defined as factual information and perceptions about a health condition or health behavior including self-efficacy, outcome expectancy, and goal congruence. In this study, COPD knowledge belongs to the concept of knowledge and beliefs that may directly affect COPD self-management behaviors.

Self-regulation is the process used to change health behavior and includes skills and activities such as goal-setting, self-monitoring and reflective thinking, decision-making, planning for and engaging in specific behaviors, self-evaluation, and emotional control associated with health behavior change.

Social facilitation occurs within relationships and enhances an individual's capacity to change social influence, social support (emotional, instrumental, or informational), and negotiated collaboration between individuals, families, and healthcare professionals. In this study, perceived social support belongs to the concept of social facilitation which involves COPD self-management.

Proximal and distal outcome

This dimension includes proximal or short-term outcomes that lead to the achievement of distal outcomes successfully. Proximal outcome is actual engagement in self-management behaviors specific to a condition, risk, or transition, in addition to managing symptoms, and pharmacological therapies. The cost associated with

healthcare use is also a proximal outcome. Distal outcomes include health status, quality of life or perceived well-being, and cost of health both direct and indirect.

Ryan and Sawin (2009) explain risk and protective factors in the context dimension affect an individual's and family's ability to engage in the process dimension and directly impact the outcome. Elements in the process dimension are linked and interrelated to the elements in the context dimension and affect the outcome dimension. Constructs of the outcome dimension are affected by both context and process dimensions (Ryan & Sawin, 2009).

Moreover, Ryan and Sawin (2009) believe that individual and family-centered interventions impact self-management by addressing the self-management process dimension. Interventions aimed at the context dimension can reduce risk or foster conditions that support self-management. The interventions aimed at the self-management process can enhance knowledge and beliefs, increase an individual's use of self-regulation behaviors, and encourage social facilitation.

In the IFSMT, many factors are related to self-management behavior and these factors may directly or indirectly relate to self-management behaviors. On this basis, some factors are selected as independent variables. This study focused on whether these factors can influence COPD self-management behavior including dyspnea, perceived stress, COPD knowledge, and social support.

Dyspnea and perceived stress which are included in the context dimension can affect to self-management process and self-management behaviors of adults with COPD. Constructs in the process dimension directly affect the outcome dimensions (Ryan & Sawin, 2009). Ryan and Sawin (2009) propose that the improvement of knowledge may affect to increase of understanding about self-management behaviors. Social support can promote individuals and families to participate in self-management behaviors. The IFSMT shows that the aforementioned factors may have an association with self-management behaviors. The previous studies also have shown a correlation between dyspnea, perceived stress, COPD knowledge, perceived social support, and COPD self-management behavior (Aredano et al., 2020; Barroso-Hurtado et al., 2023; Bringsvor et al., 2018; Cherian et al., 2021; Lan et al., 2022; Lim et al., 2022; Wrzeciono et al., 2021; Yadav et al., 2020a; Yang et al., 2019; Zhao et al., 2023).

Therefore, guided by the IFSMT and literature, this study focused on dyspnea, perceived stress, COPD knowledge, and perceived social support as the independent variables and self-management behaviors among adults with mild to moderate COPD as the dependent variable.

Factors influencing self-management behaviors among adults with mild to moderate COPD

Self-management of patients with COPD may vary since there are many factors influencing self-management behaviors including, age, gender, disease severity, dyspnea, perceived stress, co-morbidities, monthly income, education level, COPD knowledge, and social support (Aredano et al., 2020; Bringsvor et al., 2018; Cherian et al., 2021; Lan et al., 2022; Lenferink et al., 2018; Lim et al., 2022; Yadav et al., 2020a; Yang et al., 2019; Zhao et al., 2023). However, guided by the IFSMT and literature, in this study, dyspnea, perceived stress, COPD knowledge, and perceived social support were selected to determine whether these factors can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Dyspnea

Chronic and progressive dyspnea is a cardinal symptom of COPD. It is a major cause of the disability and anxiety that is associated with the disease. Dyspnea is defined by the American Thoracic Society as “a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity” (Hanania & O'Donnell, 2019). However, based on IFSMT (Ryan & Sawin, 2009), disease conditions may affect self-management. Dyspnea is the main symptom of patients with COPD and literature shows that it can influence self-management behaviors. The GOLD guideline recommended a modified Medical Research Council dyspnea scale to measure dyspnea level (GOLD, 2022) and according to data from the clinical practice research datalink, 82% of patients with COPD had dyspnea of any grade, as assessed by the Medical Research Council (MRC) breathlessness scale, of whom 46% had moderate-to-severe dyspnea ($MRC \geq 3$). Moderate-to-severe dyspnea

was also observed in 32% of patients with mild COPD, indicating that dyspnea is not limited to patients with more severe COPD (Hanania & O'Donnell, 2019).

A Canadian study done with mild to moderate COPD (n=659) revealed 32% of participants with mild to moderate COPD experienced severe dyspnoea and the people with mild COPD were more likely to report more severe dyspnoea than non-COPD (OR 1.64, 95% CI 1.07–2.52, $p < .05$) (Cherian et al., 2021). Moreover, people with mild COPD reported severe dyspnoea in people with recent exacerbations than those without recent exacerbations (OR 3.62, 95% CI 1.02–12.86, $p < .05$) (Cherian et al., 2021). Another study done in Norway stated that higher dyspnea level was associated with emotional distress ($p = .004$, $\beta = .15$, 95% CI 0.05–0.26) (Bringsvor et al., 2018). A study done in Turkey (65% mild to moderate COPD) revealed that there was a statistically significant between dyspnea and self-management behavior ($p < .05$) (Kilic et al., 2021). Furthermore, A study done in Iran stated that self-management intervention could reduce the dyspnea of patients with COPD ($p < .05$) (Dehkordi et al., 2022). However, patients in mild COPD with fewer symptoms were at higher risk of poor adherence than patients in moderate COPD (OR 4.090, 95% CI 1.121–14.927, $p < .05$) because the poor perception of the disease (i.e., lack of clinical symptoms) may induce some patients to take therapy episodically, rather than daily (Aredano et al., 2020). There may be a correlation between dyspnea and self-management behaviors among adults with mild to moderate COPD.

Perceived Stress

Perceived stress refers to the “degree to which events in a person’s life are assessed as stressful, unpredictable, and uncontrollable” (Mendis et al., 2023). The importance of Perceived Stress is that it encompasses multiple dimensions, including awareness, coping, and the ability to self-manage (González-Ramírez et al., 2013). COPD is found to be more common in men than women (Chokhani et al., 2021; GOLD, 2022; Priyankara et al., 2021) because more adults have a working lifestyle and they mostly take responsibility for taking care of their families. Therefore, they may face more stress with the disease condition. IFSMT and literature stated that perceived stress can influence self-management behaviors. Adults with perceived stress are also related to professional activity ($r = .32$, $p < .05$) and the level of physical activity ($r = .32$, $p < .05$). It means that professionally active adults, experience stress

more often (Wrzeciono et al., 2021). A study done in Canada revealed (N = 81924) that 59.8% of persons living with COPD reported perceived life stress and 70.3% reported perceived stress at work (Cloutier et al., 2023).

The data from developed countries has reported that the patterns of tobacco smoking are now almost equal in males and females (GOLD, 2022). Adults living with high stress levels use cigarettes more often (Wrzeciono et al., 2021). A study done in England stated that 67% of participants had higher rates of smoking due to high stress (n=126, $p < .001$) (Parekh et al., 2020). Another study done in the USA revealed that there was a significant association between perceived stress and smoking cessation ($P < .05$), and specifically for young adults, as perceived stress increased, the odds of quitting smoking significantly decreased by 55% (OR = .55, 95% CI = .24–.86, $P < .05$) (Gregor & Borrelli, 2012). Furthermore, a study done in Spain revealed that there was a significant relationship between perceived stress and quitting smoking in adults ($\beta = -.0164$, $p < .01$) (Barroso-Hurtado et al., 2023). On the other hand, continuing to smoke tobacco products leads to the development of the disease (Wrzeciono et al., 2021).

Under states of chronic stress, a prolonged increase in cortisol, the primary neuroendocrine stress hormone, leads to glucocorticoid resistance, increased levels of inflammatory markers, and increased susceptibility to respiratory viruses, all of which may increase the risk of COPD exacerbations (Parekh et al., 2020). A study done in Poland revealed that significantly positive correlations were found between perceived stress and anxiety ($r = .70$, $p < .05$) and the perceived stress significantly affected the results of the spirometry test. The lower result of the FEV₁ is related to the score of perceived general stress ($r = -.38$, $p < .05$). Such correlations mean that the more the patients are prone to perceived stress, the less efficient the respiratory function. (Wrzeciono et al., 2021). Therefore, high stress had increased COPD-related emergency department visits (AOR 2.51, 95% CI 1.06–5.98, $p = .04$) (Parekh et al., 2020).

In patients with COPD, Perceived stress can also affect the treatment, compliance, and outcome as evidenced by perceived stress reducing the level of function in everyday life and can lead to poor adherence (Hansen et al., 2023). A

study done in Denmark revealed that perceived stress was a statistically significant predictor for disease management ($R^2 = .256, p < .05$) (Hansen et al., 2023).

COPD knowledge

COPD knowledge refers to the person's understanding of the symptoms, medication, and risk factors (Maples et al., 2010). Most patients have poor knowledge and understanding of disease effects, progression, and symptom management, and they often do not know what medication they take and why (Baker & Fatoye, 2019). Disease knowledge is very important to manage their condition and based on IFSMT and literature disease knowledge can influence self-management. Studies done in Sri Lanka revealed that the awareness of pulmonary rehabilitation is limited (Sooriyakanthan et al., 2022), the awareness of indoor air quality remains poor (Yasaratne & Dharmage, 2020), 36.8% were not aware of COPD risk factors and 52.9% had poor knowledge of safety actions for risk factors (Kumari et al., 2019; Madushani et al., 2020). Furthermore, a study done in Nepal stated that poor disease knowledge was associated with activation in disease management (OR = 1.01, 95% CI: 1.00–1.11, $p < .05$) (Yadav et al., 2020a). A study done in China with mild to severe COPD revealed that COPD knowledge was positively correlated to self-management behavior ($r = .369, p < .01$) (Yang et al., 2019). Another study done in Korea (89% mild to moderate COPD) also revealed that COPD knowledge was positively correlated to self-management behavior ($r = .295, p < .001$) (Lim et al., 2022). These literature findings reflected that there is a positive correlation between COPD knowledge and self-management behaviors.

Perceived Social Support

Social support refers to individuals getting instrumental, emotional, and informative help to promote health from family, friends, and others (Zimet et al., 1990). Ryan & Sawin (2009) believed that patients who experience positive influence and support in daily life are more likely to engage in recommended health behaviors (Ryan & Sawin, 2009). Social support can both have a positive and negative influence on self-management behavior and some studies indicate that in COPD patients positive social support is associated with reduced hospitalizations, fewer exacerbations, better health status, and improved disease management behaviors (Lenferink et al., 2018).

A systematic review done by Gardener et al. (2018) concluded that COPD patients need support for physical, psychological, and social categories such as understanding COPD, managing symptoms and medication, healthy lifestyle, managing feelings and worries, living positively with COPD, thinking about the future, anxiety and depression, practical support, finance work and housing, families and close relationships, social and recreational life, independence, and navigating service (Gardener et al., 2018).

A study done in the USA showed that COPD patients who rarely/never receive social support were more likely to report depression ($n = 321$, $OR = 2.2$, 95% $CI: 1.56-3.14$, $p < .001$) (Arabyat & Raisch, 2019). A descriptive study done by Lan et al. (2022) revealed that the availability of support was positively correlated with self-management behaviors ($\beta = .236$, $p = .02$) (Lan et al., 2022). Another study done by Zhao et al. (2023) in China showed that there was a positive moderate correlation between social support and Self-management behaviors ($r = .451$, $p < .01$) (Zhao et al., 2023). Another study done in Korea (89% mild to moderate COPD) also revealed that social support was positively correlated with self-management behaviors ($r = .347$, $p = .001$) (Lim et al., 2022).

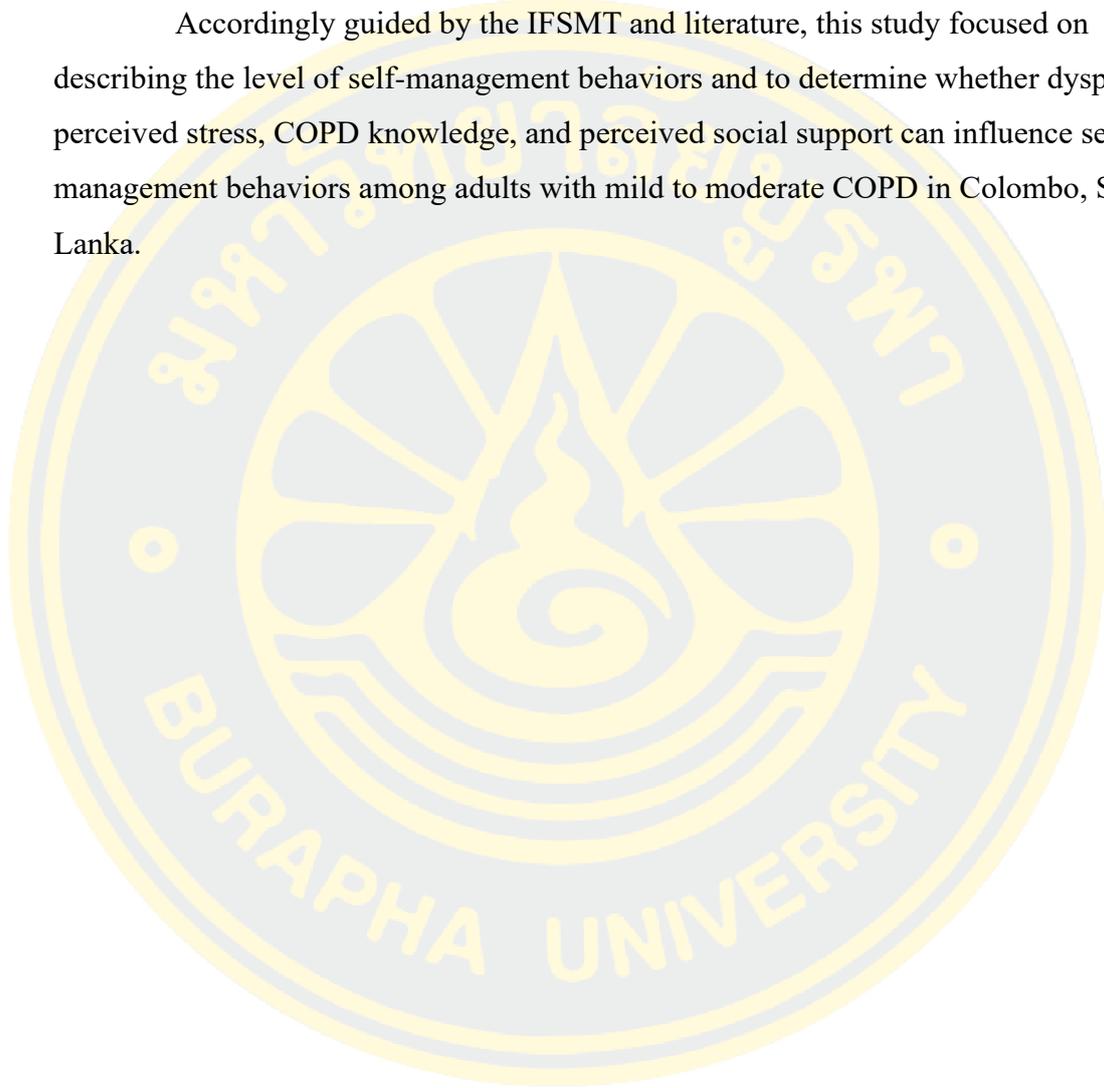
The literature has shown there is a relationship between perceived social support and COPD self-management behaviors. Therefore, perceived social support is a factor that can influence self-management behaviors among adults with mild to moderate COPD.

Summary of the literature review

COPD become a health problem globally, including in Sri Lanka. COPD is considered to be a completely irreversible disease but can prevent and slow down symptoms, prevent deterioration risk, slow down the disease process, and maintain normal life through effective treatment and adequate self-management behaviors. Effective treatment and behavior change are essential in the early stage of the disease. Family involvement is also a key element in the self-management process. However, the situation of self-management behaviors among adults with mild to moderate COPD in Sri Lanka is not a clear idea in general because there is limited data available regarding self-management behaviors among adults with mild to moderate

COPD. Therefore, it is urgent to identify the self-management behaviors among adults with mild to moderate COPD. According to the reviewed literature, self-management behaviors among patients with mild to moderate COPD may vary with the culture, socioeconomic level, education level, and availability of health infrastructure.

Accordingly guided by the IFSMT and literature, this study focused on describing the level of self-management behaviors and to determine whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.



CHAPTER 3

RESEARCH METHODOLOGY

This chapter describes the research methodology including, research design, population, and sample, setting of the study, instruments, translation of instruments, ethical considerations, data collection procedure, and data analysis procedures.

Research design

The predictive correlational research design was used to describe the self-management behaviors among adults with mild to moderate COPD and to determine whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Population and sample

Population

The target population of this study was adults (aged 18-64 years) with mild to moderate COPD ($FEV_1 \geq 50\%$), who were treated in the central chest clinic in Colombo, Sri Lanka. Information collected from this respiratory clinic showed that approximately 1,500 patients with COPD have registered in this clinic and nearly 800-1000 adults with mild to moderate COPD, visit the respiratory clinic every month.

Sample

The sample was adults who were diagnosed with mild to moderate COPD and visited the respiratory clinic to follow up on their health at the Central Chest Clinic in Colombo, Sri Lanka. The sample was recruited from March to April 2024 after completion of the inclusion criteria as follows.

Inclusion criteria

1. Age 18-64 years old.
2. Diagnosed with COPD at least 6 months.

3. The participant is conscious and has a good orientation to place and time.
4. Have no major physical disability such as blindness, hearing disability, or reduced physical mobility requiring assistance.
5. Have no unstable comorbidities such as congestive heart failure, end-stage chronic kidney disease, severe-stage cancer, etc.
6. Have no history of mental illness (From medical record).
7. Have a certain ability to write and speak the Sinhala language.

Sample size

Sample size calculated using the G power 3.1.9.4. For linear multiple regression, Cohen suggested the medium effect size as .15, and it is effective and more suitable for nursing research (Kang, 2021). In this study, the effect size of .15 (Lan et al., 2022), the α of .05, and the power of .90 were applied to compute the sample size. The required sample size was at least 108 participants.

Sampling technique

The sample of 108 adults with mild to moderate COPD, who visited at central chest clinic in Colombo Sri Lanka, were enrolled according to inclusion criteria by using a simple random sampling method until the required sample size was reached. The researcher explained the purpose and process of the study to physicians and nursing staff at the respiratory clinic and obtained their consent. The researcher accompanied the registered nurse in the clinic to select mild to moderate COPD patients who met the inclusion criteria from the appointment of COPD patients. Then the researcher randomly selected 50% of these patients by preparing a piece of paper in the same size and material and wrote down the “odd numbers” and “even numbers”. Then the papers were folded and mixed well in a prepared box. Every morning the researcher selected one paper from the box. As an example, if the researcher picked up “even numbers” on that day, selected adults with mild to moderate COPD by even numbers of appointments. After obtaining the selected patients’ consent, the researcher instructed them to sign the consent form and fill in the questionnaires. Around 10-12 patients were recruited per day, depending upon the number of patients visiting the respiratory clinic. The sample was recruited until the required sample size was reached.

Study setting

This study was conducted at the central chest clinic in Colombo, Sri Lanka. This is the end referral center for respiratory diseases in Sri Lanka and it is governed by the Ministry of Health and indigenous medicine. This clinic was established in collaboration with the National Programme for Tuberculosis Control and Chest Disease (NPTCCD) and over time it has been expanded to cover a wide variety of respiratory diseases including bronchiectasis, COPD, asthma, and interstitial lung disease (ILD), etc. This respiratory clinic opens six days per week (Monday-Friday; from 08:00hr to 16:00hr and Saturday; from 08:00hr to 12:00hr).

This respiratory clinic is managed by 4 consultant respiratory physicians, 25 medical officers, 9 registered nurses, and other healthcare providers (physiotherapists, radiographers, pharmacists, and healthcare assistants). This clinic provides service as outpatients and refers patients from all hospitals in the Colombo district to this clinic. When patients with COPD in the Colombo district are referred to this clinic, they should re-visit according to the medical advice (usually within 1-2 months) according to their condition. Information collected from this respiratory clinic showed that 1525 patients with COPD have registered in this clinic and nearly 565 of mild level and 800 of moderate level patients with COPD visit the clinic. Furthermore, approximately 800-1000 adults (18-64 years) with COPD visit the clinic every month.

The patients usually come to the clinic with their relatives. The doctors are mainly responsible for checking whether the current treatment plan is effective and whether the patient is on the correct medication. The doctors evaluate and assess the condition of the patient by doing a physical examination and adjusting the treatment plan according to the evaluation and assessment results. Usually, the doctors measure the dyspnea level of the patient in each clinic visit by using a modified Medical Research Council dyspnea scale (mMRC) and write it down in the patients' clinic book. Further, the doctors describe the patient's condition to the patient and their relatives, advise them to manage the disease condition, and provide the same consultation to the family members. There is a pulmonary rehabilitation program in this clinic and doctors refer patients to this program.

The registered nurses assist the doctors in completing the patient's physical examination, vaccination, and lung function tests. In addition, the nurses evaluate

whether the patient can use inhalers correctly. They instruct first-time inhaler patients and families on using the inhalers correctly. Moreover, the nurses give answers to any questions patients, and their families have about disease conditions and provide them with health education including, smoking cessation, guidance on proper lip breathing, diaphragmatic breathing, risk factors for exacerbations, and compliance with medication, routine in the morning shift. Finally, the nurse will inform the patient and their family about the next follow-up visit, document the date on the patient's clinic record, and ask them to collect their medication from the counter of the pharmacy at the clinic.

Research Instruments

The five questionnaires were used in the Sinhala version for collecting data; a demographic questionnaire, the COPD self-management scale (CSMS), the perceived stress scale (PSS-10), the chronic obstructive pulmonary disease knowledge questionnaire (COPD-Q), and the multidimensional scale of perceived social support (MSPSS). Dyspnea level was taken from medical records because the doctors check the dyspnea level by using a modified Medical Research Council dyspnea scale (Fletcher et al., 1960) and write it down in each patient's clinic book in every clinic visit.

The demographic Questionnaire

The demographic questionnaire was developed by the researcher specific to the study. It was included in two parts. Part 1 of the demographic questionnaire included information about the characteristics of the patient such as gender, age, marital status, number of family members, and who is the main caregiver (relationship). educational level, monthly income level, occupation, smoking status, availability of O₂ therapy at home, kind of fuel used for cooking and heating, adequate ventilation of the kitchen (open kitchen, windows, chimney), and source of disease education. Part 2 of the demographic questionnaire contained the health information of participants which included weight, height, body mass index (BMI), the degree of airflow limitation/disease severity, dyspnea score, duration of COPD, history of exacerbation, and COPD-related hospitalizations during the previous 12 months, respiratory symptoms, comorbidities, daily COPD treatment. Participants'

self-report was obtained for the information of part 1 and medical records were obtained for the information of part 2 in the demographic questionnaire.

COPD Self-Management Scale

The COPD self-management scale (CSMS) was developed by Zhang et al. (2013). This scale includes 51 items under 5 domains: symptom management, daily life management, emotion management, information management, and self-efficacy (Zhang et al., 2013). Yang et al. (2019) modified the CSMS by omitting the self-efficacy domain and remaining only 4 domains with 40 items. The researcher back-translated this modified version into Sinhala language and used the Sinhalese version in this study to measure the COPD self-management level. This modified version deleted items no; 3 and 4 in the original questionnaire, [Item 3, “I do not take steroids (e.g., prednisone or dexamethasone) when I feel serious shortness of breath” and Item 4, “I do not take anti-inflammatory drugs when I feel serious shortness of breath,” deviates from the actual treatment strategy for COPD patients used in the clinic] because this could potentially negatively affect the reliability of the symptom management part of the questionnaire (Yang et al., 2019). Hence, the modified version of the COPD self-management scale by Yang et al. (2019) was used to describe the level of self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

The scale consists of 40 items under 4 dimensions including; symptom management (items 1,2,3,4,5,6), daily life management (items 12,13,14,16,17,19, 23,26, 27,28,29,30,31,32), emotion management (items 15,18,20,25,33,34,35,36, 37,38,39,40), and information management (items 7,8,9,10,11,21,22,24). These items were scored using the Likert 5-grade scoring method and the answer choices were divided into “never, very few, sometimes, often, and always,” which gives 1 to 5 points respectively (Yang et al., 2019). The final total score of the CSMS is the sum across 40 items, then divided by 40, and the score range is within 1 to 5 points. The score greater than mean+1 SD was classified as having a high level of self-management, the score less than mean-1 SD was classified as having a low level of self-management, and the score greater than or equal to mean-1 SD and less than or equal to mean+1 SD were classified as having a medium level of self-management (Yang et al., 2019).

The Cronbach's alpha coefficient for this modified version of CSMS was 0.91, which reflects the scale is a reliable instrument for evaluating self-management behaviors of patients with COPD (Yang et al., 2019).

The modified Medical Research Council dyspnea scale

The Medical Research Council (MRC) dyspnea scale was developed by Fletcher et al., (1960). Later it is modified and the mMRC breathlessness scale ranges from grade 0 to 4. It is very similar to the original version. The mMRC scale is a tool to measure the degree of disability that breathlessness poses on day-to-day activities on a scale from 0 to 4. 0 = no breathlessness except on strenuous exercise, 1 = shortness of breath when hurrying on the level or walking up a slight hill, 2 = walks slower than people of the same age on the level because of breathlessness or has to stop to catch breath when walking at their own pace on the level, 3 = stops for breath after walking ~100 m or after few minutes on the level, and 4 = too breathless to leave the house, or breathless when dressing or undressing (Fletcher et al., 1960). mMRC scale ≤ 2 is considered as "less breathlessness" and mMRC scale > 2 is considered as "more breathlessness" (GOLD, 2022). The Cronbach's alpha coefficient for this scale is 0.88 which reflects the scale is a reliable instrument for evaluating dyspnea level.

In this study, the mMRC score was taken from medical records because the doctors use the mMRC to assess the dyspnea level and write it down in each patient's clinic book during every clinic visit.

Perceived Stress Scale (PSS-10)

PSS-10 was developed by Cohen et al. (1983). The scale was translated in the Sinhalese version by Mendis et al. (2023) following the back-translation process. In this study, the Sinhalese version of the perceived stress scale (S-PSS-10) was used to measure the level of perceived stress among adults with mild to moderate COPD.

The 10-item Perceived Stress Scale (PSS) questionnaire encompasses a two-factor structure, assessing both the "negative feelings and the inability to handle stress" as well as "positive emotions and the ability to take action in stressful situations" (Cohen et al., 1983). The scale is structured on a five-point scale (0-never, 1-almost never, 2-sometimes, 3-fairly often, 4-very often) which the participants are required to quantitatively respond to their thoughts and feelings about life events and

situations during the preceding month. The general scoring procedure was adopted for questions 1, 2, 3, 6, 9, and 10 where the rated score from the scale of the respective questions was directly summated. The same reverse scoring procedure was followed for questions 4, 5, 7, and 8. Each 10 items' scores were summated to obtain a final score and were used to calculate the perceived stress levels. The total score ranges from 0 to 40. Perceived stress scores between 0 and 13 were considered 'Low,' 14–26 'Moderate' and 27–40 'High' Perceived Stress Levels (Cohen et al., 1983).

The Cronbach's alpha coefficient for the original English version (PSS-10) was 0.72 (Cohen et al., 1983) and the Sinhalese version of the perceived stress scale (S-PSS-10) Cronbach's alpha coefficient was 0.85 (Mendis et al., 2023) which reflects the scale is a reliable instrument to evaluate perceived stress level.

COPD Knowledge Questionnaire (COPD-Q)

COPD-Q was developed by Maples et al. (2010). The researcher back-translated COPD-Q into Sinhala language and used the Sinhalese version in this study to measure COPD knowledge. The scale consists of 13 items including, prevention, clinical manifestation, treatment, and risk factors of COPD. It includes 8 positive knowledge questions that are true (items 1, 2, 4, 6, 8, 9, 10, 11) and 5 reverse knowledge questions that are false (item 3, 5, 7, 12, 13) (Maples et al., 2010). There are three options for each topic, namely "Yes", "No", and "Not sure". The answer to "yes" to the positive knowledge question scored 1 point, while the answer to "no" or "not sure" scored 0. The reverse knowledge question score was on the contrary (Maples et al., 2010). The total score ranges from 0 to 13, with a higher score indicating a higher level of COPD knowledge.

The Cronbach's alpha coefficient for this English version was 0.72 which reflects the scale is a reliable instrument to evaluate COPD knowledge (Maples et al., 2010).

The Multidimensional Scale of Perceived Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS) was developed by Zimet et al. (1990). The researcher back-translated MSPSS into Sinhala language and used the Sinhalese version in this study to measure the perceived social support. The scale consists of three dimensions and 12 items including family support (items 3,4,8,11), friend's support (items 6,7,9,12), and other's support (items

1,2,5,10). The score for each item ranges from 1 to 7, which ranges from “very strongly disagree” to “very strongly agree” (Zimet et al., 1990).

The final dimension score is obtained by dividing the total scores of each dimension by the number of items. The final total score of the MSPSS was summed across 12 items, then divided by 12, with the score range within 1 to 7 points. In this approach any mean scale score ranging from 1 to 2.9 was considered as low support; a score of 3 to 5 was considered as moderate support; a score from 5.1 to 7 was considered as high support (Zimet et al., 1990).

The Cronbach’s coefficient alpha values ranged from 0.81 to 0.9 for the family subscale, from 0.9 to .94 for the friend’s subscale, from 0.83 to 0.98 for the other subscale, and from 0.84 to 0.92 for the scale as a whole, which shows good reliability (Zimet et al., 1990).

Translation of instruments

In this study, the COPD Self-Management Scale, the COPD Knowledge Questionnaire, and the Multidimensional Scale of Perceived Social Support were translated into the Sinhalese version. The WHO guideline for the translation was used for the back-translation procedure (WHO, 2016). The process involved forward translation, an expert panel, back-translation, and pre-testing (WHO, 2016; Younan et al., 2019). First, permission to use and translate the instruments was obtained from the authors by e-mail correspondence. Second, the questionnaires were translated into Sinhala by two people who are bilingual (Sinhala/English) experienced healthcare professionals, and administrators. Third, a bilingual expert (a person who are member of the faculty of nursing, teaching in the nursing administration and clinical nursing) reviewed and corrected the draft version of the questionnaires. Next, the Sinhalese version of the questionnaires as amended by the expert panel were translated back into English by an independent bilingual healthcare professional who is experienced in translating measurement scales into English but had no prior knowledge of the original questionnaires. Finally, the back-translated English version and original questionnaire were checked by the researcher, the principal advisor, an expert person, and a person whose native language is English.

Reliability of the instruments

The original versions of all the instruments, used for this study, were tested and have been validated by the experts in many previous studies. This meant that all instruments had good validity. The reliability of all the instruments was found to be optimal as shown by Cronbach's alpha in previous studies. The back-translated questionnaires were checked and reviewed whether each item of the instrument was suitable for the subject by an expert panel who is bilingual (Sinhala/English) experienced healthcare professionals, and administrators. For this study, the reliability of the instruments was tested with the questionnaire by using 30 participants with the same characteristics and Cronbach alpha of CSMS was .78, the PSS-10 was .82, the COPD-Q was .70, and the MSPSS was .91. In addition to that for this study with 108 participants, the Cronbach's alpha for CSMS was .86, the PSS-10 was .83, the COPD-Q was .64, and the MSPSS was .94.

Protection of human rights

This study was conducted only after the approval of the research proposal by the Institutional Review Board at Burapha University, Thailand (Protocol code G- HS 122/2566), and further ethical approval was obtained from the University of Sri Jayawardenepura in Sri Lanka (Protocol code ERC 44/23). Furthermore, permission was obtained from the director of the National Programme for Tuberculosis Control and Chest Disease at the central chest clinic in Colombo, Sri Lanka for data collection.

Before the data collection, all participants were informed regarding the purpose of the study and participation procedure. The participants were informed about their right to participate or refuse to participate in the research. The data were collected from individuals who were willing to participate and signed the consent form. The consent form was filled out before data collection. Participants were informed that they have the right not to answer any questions and have the right to change their decision and withdraw from the study at any time if they wish. Patients were informed that their refusal to be a part of this study will not affect the quality of care they receive from the clinic.

All the data were collected anonymously and confidentiality was maintained. Names or other identifiable information were not disclosed in this study and all the data on the paper files were stored in a secure place for research purposes only. Moreover, all electronic data were locked using a password that only the researcher can access and all the data will be destroyed one year after the publication of the research day. In addition, if any individual wants to know the study results, they can contact the researcher.

Data collection

The data collection procedure was conducted by the researcher as follows;

1. The research proposal was approved by IRB at Burapha University, Thailand, and by the ethics review committee at the University of Sri Jayewardenepura, in Sri Lanka.
2. The researcher requested a letter from FON, BUU to address the director of the National Programme for Tuberculosis Control and Chest Disease at the central chest clinic in Colombo, Sri Lanka for asking permission for data collection. The researcher explained the data collection procedures to the respiratory clinic staff.
3. The researcher went to the respiratory clinic every weekday (Monday-Friday) from 8:00 to 16:00hr.
4. The researcher asked for help from the nurse in the clinic to select COPD patients according to inclusion criteria. Then the researcher randomly selected 50% of patients by preparing a chit box (a piece of paper of the same size and material and wrote down the “odd numbers” and “even numbers” then folded and mixed well in a prepared box). Every morning the researcher selected one paper from the box. As an example, if the researcher picked up “even numbers” on that day, selected adults with mild to moderate COPD and even numbers of appointments according to the inclusion criteria.
5. The participants were informed about the objectives, ethical issues, and human protection of the study. Written consent was signed according to the participant’s willingness after understanding.
6. The data were collected using a self-administered questionnaire in a particular place in the clinic.

7. The questionnaire consisted of demographic data, CSMS, S-PSS-10, COPD-Q, and the MSPSS questionnaires. The researcher organized the questionnaire starting with demographic data. Then self-management questionnaire and next perceived stress, COPD knowledge, and perceived social support respectively. The approximate time required was 20-30 minutes for each participant to complete the questionnaire. The researcher considered that participants could see the doctor on time while the questionnaire was completed.

8. This process was repeated until the required sample size was enrolled in the study.

9. The researcher adhered to COVID-19 precautions as mentioned by the Health Ministry of Sri Lanka.

10. There was not any emergency condition happened to the participants during the data collection (i.e., exacerbation symptoms, breathing difficulties)

Data analysis

Data were analyzed using IBM SPSS software (version 26) in this study. The significant level was set at 0.05 and data analysis was included;

1. Descriptive statistics were used to describe frequencies, percentages, means, and standard deviations of the mild to moderate COPD patients' demographic data and variables.

2. Various functions of the statistics were used to test the assumptions of multiple regression (normality of variables, linearity, homoscedasticity, no outlier, no autocorrelation, and no multicollinearity). The results revealed that all assumptions were met.

3. Standard multiple regression was used to identify the factors influencing self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

CHAPTER 4

RESULTS

This chapter presents the results of the data analysis which were described under three sections: demographic characteristics and health information of the participants, description of COPD self-management behaviors, and the factors influencing self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka. The finding of the study is presented as follows:

1. Description of participant characteristics and health information of the participants
3. Description of independent and dependent variables
4. Factors influencing self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Description of participant characteristics

Demographic characteristics

A total number of 108 adults with mild to moderate COPD visited the Central Chest Clinic in Colombo, Sri Lanka participated in this study. The sample comprised 53 males (49.1%) and 55 females (50.9%). The participants ranged from 19 to 64 years old with a mean age of 54.6 years. It was observed most of the participants (66.7%) were older than 55 years old. Most participants (62 %) are married and live with family or relatives (97.2%). Only 6.5% of participants had a vocational diploma or degree. More than half of families (63.9%) earned between 30,000 – 80,000 Sri Lankan rupees (LKR) in a month. It was observed that 45.4% of participants did not have any occupation, but in Sri Lankan culture, most of the females worked as a housewife without a salary. 31.5% of the participants had a history of smoking, while a small percentage of participants were current smokers (5.6%). 51.9% of participants used liquefied petroleum gas (LP gas) and 46.3% used biomass fuel for cooking, while 23.1% had inadequate ventilation levels in the kitchen. Most of the participants (75.9%) had a source of COPD education or health information and the majority (90.7%) had no need for non-invasive therapy at home.

The spouse was the main caregiver of more than half of the participants (55.6%).

Table 1 shows the details of the demographic data of the participants.

Table 1 Demographic characteristics of participants (n = 108)

Characteristics	Number (n)	Percentage (%)
Gender		
Male	53	49.1
Female	55	50.9
Age ($M = 54.62$, $SD = 9.83$, Min =19, max =64)		
18-24 years	2	1.8
25-54 years	34	31.5
55-64 years	72	66.7
Marital status		
Single	7	6.5
Married	67	62.0
Divorced	4	3.7
Widowed	30	27.8
Education		
Not attend school	7	6.5
Primary (Grade 1-5)	22	20.4
Secondary (Grade 6-11)	53	49.1
Post-secondary (Grade 12-13)	19	17.6
Vocational Diploma	2	1.9
Tertiary (Graduate and/or up)	5	4.5
Family income per month (1 USD = 300 LKR)		
Less than 30,000 LKR	20	18.5
30,000 – 80,000 LKR	69	63.9
More than 80,000 LKR	19	17.6

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Occupation		
None	49	45.4
Labor	19	17.6
Farmer	7	6.5
Businessmen	4	3.7
Government servant	12	11.1
Work in a private sector	17	15.7
Smoking status		
Current smoker	6	5.6
Former smoker	34	31.5
Passive smoker (another person smoked around you)	13	12.0
No history	55	50.9
Kind of fuel used for cooking and heating		
Biomass fuel (wood, charcoal)	23	21.3
LP gas	56	51.9
LP gas + biomass fuel	27	25.0
LP gas + Electrical stove	1	0.9
Electrical stove	1	0.9
Ventilation level of the kitchen		
Adequate	83	76.9
Inadequate	25	23.1
Source of COPD education		
No	26	24.1
Yes* (n=160)	82	75.9
Physician	81	50.6
Nurse	78	48.8
Internet	1	0.6

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Need for non-invasive therapy at home		
No	98	90.7
Yes	10	9.3
O ₂ mask	5	4.6
Nebulizer	5	4.6
Main caregiver		
Spouse	60	55.6
Parents	5	4.6
Children	32	29.6
Relatives	8	7.4
None	3	2.8

* Can answer more than 1 item

Health information of the participants

The results showed that 49.1% of the participants had normal body weight (BMI 18.5-24.9 kg/m²) and 30.6% of the participants were overweight. COPD diagnosis duration of the participants ranged from 1 year to 20 years ($M = 5.85$, $SD = 4.59$). The sample consisted of 52 mild COPD (48.1%) and 56 moderate COPD (51.9%) levels of participants. Almost half of the participants (53.7%) had more breathlessness (mMRC value ≥ 2). The majority of the participants (80.6%) had an exacerbation history within the past 12 months, while 59.3% had experienced frequent exacerbations. All participants used bronchodilators (100%) and 99.1% used inhaled corticosteroids as regular medications for COPD and 56.5% did not have any co-morbidities. 98.1% had respiratory symptoms; the most common were dyspnea (85.2%) and cough (50%). 13% of participants had not taken any vaccine, while only 21.3% and 13.9% had taken the Pneumococcal and Influenza vaccines respectively. The majority of participants (67.6%) had no participation in the pulmonary

rehabilitation program. The details of the participants' health information are shown in Table 2.

Table 2 Health information of the participants (n = 108)

Health information	Number (n)	Percentage (%)
BMI (kg/m ²) (M =23.8, SD =4.88, Min =13, Max =49)		
Underweight (<18.5)	15	13.8
Normal weight (18.5 – 24.9)	53	49.1
Overweight (25 – 29.9)	33	30.6
Obese (> 30)	7	6.5
Diagnosis duration (M =5.85, SD =4.59, Min =1, Max =20)		
1-5 years	70	64.8
6-10 years	24	22.2
More than 10 years	14	13.0
COPD severity		
Mild	52	48.1
Moderate	56	51.9
Dyspnea score (mMRC value)		
Less than 2 (less breathlessness)	50	46.3
More than 2 (more breathlessness)	58	53.7
History of exacerbation (past 12 months)		
No	21	19.4
Yes*	87	80.6
Hospital admission	65	59.6
Emergency room visits	44	40.4

Table 2 (Continued)

Health information	Number (n)	Percentage (%)
Exacerbation frequency within the past 12 months		
No	21	19.4
1	23	21.3
2	23	21.3
3	24	22.2
4	12	11.1
5	3	2.8
6	2	1.9
Medications for COPD		
Bronchodilators	108	100.0
Inhaled corticosteroids	107	99.1
Other**	25	23.1
Co-morbidities		
None	61	56.5
Yes* (n=81)	47	43.5
Hypertension	31	38.3
Diabetes	18	22.2
Dyslipidemia	16	19.8
Cardiovascular disease	7	8.6
Arthritis	8	9.9
Osteoporosis	1	1.2

Table 2 (Continued)

Health information	Number (n)	Percentage (%)
Respiratory symptoms		
None	2	1.9
Yes* (n=216)	106	98.1
Dyspnea	92	42.6
Cough	54	25.0
Wheezing	25	11.6
Sputum	45	20.8
History of vaccination		
None	14	13.0
Yes* (n=132)	94	87.0
pneumococcal	23	17.4
Influenza	15	11.4
Covid-19	94	71.2
Pulmonary rehabilitation participation		
No	73	67.6
Yes	35	32.4

* Can answer more than 1 item; **(antihistamines, systemic steroids, phosphodiesterase inhibitors)

Description of independent and dependent variables

COPD self-management behaviors consist of symptom management, daily life management, emotion management, and information management. The mean and standard deviation of COPD self-management and its subscales as shown in Table 3. The score greater than mean+1 SD was classified as having a high level of self-management, the score less than mean-1 SD was classified as having a low level of self-management, and the score greater than or equal to mean-1 SD and less than or equal to mean+1 SD were classified as having a medium level of self-management (Yang et al., 2019). The self-management level is shown in Table 3.

In this study, the self-management scores ranged from 2.2 to 3.9, and the mean score was 3.04 (SD = 0.35), which indicated a moderate level of COPD self-management. For subscales, emotion management had the highest mean score of 3.19 (SD = 0.39), the item with the highest score was " I will talk to the medical staff about things that are uneasy and annoying" ($M = 3.54$, $SD = 0.74$). Followed by " I think controlling the symptoms can lighten the burden on my family " ($M = 3.41$, $SD = 0.79$). The lowest score was " I will regulate my emotions (e.g., anxiety, depression, fear, pessimism) through exercises " ($M = 2.71$, $SD = 0.84$) (The detail was shown in Table 7, Appendix B).

The mean score of the daily life management dimension was 3.07 (SD = 0.51), and the item with the highest score was " When there is no edema and more phlegm, I will drink more water " ($M = 3.81$, $SD = 0.79$). The lowest score was " I take flu vaccination 1-2/year " ($M = 1.74$, $SD = 0.91$) (The detail was shown in Table 7, Appendix B).

The mean score of symptom management dimension was 3.00 (SD = 0.42), and the item with the highest score was " When I find it difficult to breathe. I inhale bronchodilators (e.g., salbutamol, terbutaline) " ($M = 3.94$, $SD = 0.96$). Followed by " I will consciously follow the doctor's advice to take the medicine on time " ($M = 3.90$, $SD = 0.64$). The lowest score was " When I have difficulty breathing, I will take oxygen 1-2 L/minute " ($M = 1.17$, $SD = 0.54$) (The detail was shown in Table 7, Appendix B).

The mean score of information management was the lowest and the score was 2.79 (SD = 0.49). The item with the highest score was " I keep disease-related documents completely (e.g., patient medical records, and medical examination results)" ($M = 3.95$, $SD = 0.59$). The lowest score was " I will surf the Internet or consult professional medical books for relevant information" ($M = 1.58$, $SD = 1.06$) Followed by "When I consult the healthcare staff, I will make a list of questions I want to ask" ($M = 1.65$, $SD = 0.89$) (The detail was shown in Table 7, Appendix B).

Table 3 Possible score, actual score, mean, and standard deviation of COPD self-management and its subscales (n= 108)

DV and subscales	Possible score	Actual score	<i>M</i>	<i>SD</i>	Level
COPD Self-management	1-5	2.2 - 3.9	3.04	0.35	Medium
Symptom management	1-5	2.2 - 4.5	3.00	0.42	Medium
Daily life management	1-5	1.7 - 4.2	3.07	0.51	Medium
Emotion management	1-5	2.3 - 4.1	3.19	0.39	Medium
Information management	1-5	1.5 - 4.0	2.79	0.49	Medium

Table 3 showed that the dyspnea scores ranged from 1 to 4, with a mean of 2.49 (SD = 0.89). The perceived stress scores ranged from 6 to 32 with a mean score of 18.94 (SD = 6.21), which indicated a moderate level of perceived stress. COPD knowledge scores ranged from 3 to 13 with a mean score of 7.46 (SD = 2.36). Perceived social support consists of family support, friend support, and other support. The overall perceived social support ranged from 2.3 to 6.7, which indicated a moderate level with a mean score of 4.86 (SD = 0.95). The mean score of family support was 5.23 (SD = 1.07), the mean score of friend support was 4.08 (SD = 1.31), and the mean of other support was 5.26 (SD = 1.02).

Table 4 Mean and standard deviation of the independent variables (IV) (n = 108)

IV	Range		<i>M</i>	<i>SD</i>	Level
	Possible score	Actual score			
Dyspnea	0 – 4	1 – 4	2.49	0.89	More breathlessness
Perceived stress	0 – 40	6 - 32	18.94	6.21	Moderate
COPD knowledge	0 – 13	3 – 13	7.46	2.36	Low
Perceived Social support	1 - 7	2.3 - 6.7	4.86	0.95	Moderate
Family support	1 - 7	2 – 7	5.23	1.07	High
Friend support	1 - 7	1 – 6	4.08	1.31	Moderate
Other support	1 - 7	2 - 7	5.26	1.02	High

Factors influencing self-management behaviors among adults with mild to moderate COPD.

Preliminary analysis was conducted to test the assumptions of the regression analysis which included checking the normality of the variables being studied, checking for outliers, autocorrelation, multicollinearity, homoscedasticity, and linearity. The normal distribution of the variables was tested through skewness/standard error, the Shapiro-Wilk test, and histograms. All variables conformed to a normal distribution. The scatter plot of the residuals showed that the assumptions of linearity, outliers, and homoscedasticity were met. The tolerance values were more than .2 and VIF values were less than 5 which means the absence of multicollinearity and the absence of autocorrelation was determined by looking at the Durbin-Watson value, which ranged within 1.5-2.5. Pearson's correlation test was performed to check the relationship among the studied variables. Table 5 illustrates the correlation matrix among the variables studied.

Table 5 Correlation matrix among the independent and dependent variables (n =108)

	COPD self- management	Dyspnea	Perceived Stress	COPD knowledge	Perceived Social support
COPD self-management	1.000				
Dyspnea	.256**	1.000			
Perceived Stress	-.369**	.074	1.000		
COPD knowledge	.456**	-.007	-.235*	1.000	
Perceived Social support	.527**	.170	-.371**	.296**	1.000

** p < .01 * p < .05

From the correlation matrix, COPD self-management was significantly correlated with dyspnea ($r = .256$, $p < .01$), perceived stress ($r = -.369$, $p < .01$), COPD knowledge ($r = .456$, $p < .01$), and perceived social support ($r = .527$, $p < .01$).

A Standard multiple regression was performed to check whether dyspnea, perceived stress, COPD knowledge, and perceived social support were able to predict COPD self-management. Results from the multiple linear regression analysis indicated that dyspnea, perceived stress, COPD knowledge, and social support explained 41.7% of the variance in self-management among adults with mild to moderate COPD in Colombo, Sri Lanka ($\text{Adj } R^2 = 41.7\%$, $R^2 = .439$, $F(4, 103) = 20.169$, $p < .01$). The analysis also showed that self-management among adults with mild to moderate COPD in Colombo, Sri Lanka was significantly predicted by dyspnea ($\beta = .212$, $p = .006$), perceived stress ($\beta = -.195$, $p = .018$), COPD knowledge ($\beta = .263$, $p = .001$) and perceived social support ($\beta = .366$, $p = .000$). The summary of regression analysis is presented in Table 6.

Table 6 Summary of regression analysis for variables predicting COPD self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka (n = 108)

Predicting variables	<i>B</i>	<i>SE</i>	β	<i>T</i>	<i>P</i> - value
Dyspnea	.208	.075	.212	2.785	.006
Perceived Stress	-.011	.005	-.195	-2.397	.018
COPD knowledge	.039	.012	.263	3.304	.001
Perceived Social support	.135	.030	.366	4.473	.000
Constant = 2.129, $R^2 = .439$, Adj $R^2 = 41.7\%$, $F_{(4,103)} = 20.169$, $p < .01$					

CHAPTER 5

CONCLUSION AND DISCUSSION

This chapter provides a summary and discussion of the study. The chapter also discusses the implication of the study findings in nursing practices and research. Recommendations for future research are also provided towards the end of the chapter.

Summary of Findings

This study aimed to describe the level of self-management behaviors and determine whether dyspnea, perceived stress, COPD knowledge, and perceived social support can influence self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka. The study was guided by the IFSMT by Ryan and Sawin (2009) and literature reviews about COPD self-management. This study used simple random sampling to recruit 108 participants at the central chest clinic in Colombo, Sri Lanka. Data were collected by self-report questionnaires using the demographic data questionnaire, the COPD Self-Management Scale (CSMS) (Yang et al., 2019), the Sinhalese version of the Perceived Stress Scale (PSS-10) (Mendis et al., 2023), the Chronic Obstructive Pulmonary Disease Knowledge Questionnaire (COPD-Q) (Maples et al., 2010), and the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1990). The researcher back-translated CSMS, COPD-Q, and MSPSS into Sinhala language and used the Sinhalese version in this study. Dyspnea level was taken from medical records because the doctors checked the dyspnea level by using a modified Medical Research Council dyspnea scale (Fletcher et al., 1960). Cronbach's alpha for the CSMS, PSS-10, COPD-Q, and MSPSS were .86, .83, .64, and .94 respectively.

The study results revealed that 50.9 % of participants were female, while 49.1% were male. Most participants (66.7 %) were above 55, with a mean age of 54.62. Most participants were married (62%), living with family or relatives (97.2%), and 63.9% had a family income of 30,000 – 80,000 LKR per month. The spouse was the main caregiver of more than half of the participants (55.6%). Only 6.5% of

participants had a vocational diploma or degree. The results showed that 45.4% of participants did not have any occupation, because most of the women stay as housewives in Sri Lankan culture. In addition to that, almost half of the participants had no history of smoking (50.9%) since women are less likely to smoke than men in Sri Lankan culture. 46.3% used biomass fuel for cooking, while 23.1% had inadequate ventilation levels in the kitchen.

The results showed that 36.7% of the participants were overweight or obese. The sample consisted of almost equal proportion of mild and moderate level COPD participants (mild = 48.1%, moderate = 51.9%), almost half of the participants (53.7%) had more breathlessness (mMRC value ≥ 2), and 59.3% had experienced frequent exacerbations. Bronchodilators (100%) and Inhaled corticosteroids (99.1%) were regular medications for COPD and nearly half of the participants 56.5% did not have any co-morbidities. Dyspnea (85.2%) and cough (50%) were most common respiratory symptoms. The findings revealed that 13% of participants had not taken any vaccine and the majority (67.6%) had no participation in the pulmonary rehabilitation program.

The mean score of overall COPD self-management behavior was 3.04 (SD = 0.35), indicating that the persons with mild to moderate COPD had a moderate level of self-management behaviors. For all participants, the highest mean score was in the domain of emotion management behaviors, while the lowest mean score was in information management behaviors. The mean score of dyspnea was 2.49 out of 4 (SD = 0.89). Furthermore, the study findings reported that the participants had a low level of COPD knowledge and a moderate level of perceived stress and social support.

There was a significant positive relationship between self-management behavior with dyspnea ($r = .256, p < .01$), COPD knowledge ($r = .456, p < .01$), perceived social support ($r = .527, p < .01$), and a negative relationship between self-management behavior with perceived stress ($r = -.369, p < .01$).

Results from a standard multiple linear regression revealed that dyspnea ($\beta = .212, p = .006$), perceived stress ($\beta = -.195, p = .018$), COPD knowledge ($\beta = .263, p = .001$) and perceived social support ($\beta = .366, p = .000$) can predict COPD self-management significantly in this study. The final regression model indicated that dyspnea, perceived stress, COPD knowledge, and social support can explain 41.7% of

the variance of COPD self-management among adults with mild to moderate COPD in Colombo, Sri Lanka.

Discussion

COPD self-management behaviors among adults with mild to moderate COPD

In this study, the mean score of COPD self-management behaviors among persons with mild to moderate COPD was 3.04 out of 5 ($SD = 0.35$). Compared with some previous studies, the present study's findings were a little higher than previous studies that showed the mean scores of CSMS were 2.71 and 2.82 (Sheng et al., 2023; Yang et al., 2019). Moreover, all subscales were at a moderate level, with the highest mean score shown in emotion management ($M = 3.19$, $SD = 0.39$), which was quite similar to the research of Yang et al. (2019). The lowest mean score shown in the information management domain is consistent with previous research findings (Sheng et al., 2023; Yang et al., 2019).

The study result can be explained by the IFSMT (Ryan & Sawin, 2009) which shows that individual and family factors such as gender, age, education, and income are related to self-management behavior outcome, which impacts COPD self-management behaviors of participants. This study consisted of almost equal proportions of males and females, while previous similar studies found the majority of male participants (Sheng et al., 2023; Yang et al., 2019). According to the literature, women are more actively engaged in self-management than men (Bringsvor et al., 2018).

The second reason may be age. While, previous research studied self-management in elder COPD persons (Sheng et al., 2023; Yang et al., 2019). This study focuses on adults, aged between 19 to 64 years old with a mean age of 54.6 years and they had no physical limitations and no cognitive impairment thus they were able to perform self-management activities. The literature reviewed showed that adults can be actively involved in managing their disease condition by taking responsibility and making decisions to manage their condition, having sufficient information to manage their health, ability to find good health information, rather than elders (Bringsvor et al., 2018; Scheffer et al., 2021; Yadav et al., 2020a). However,

14.8% of participants had a low level and 12.1% of participants had a high level of COPD self-management in this study.

In addition to that, all participants had mild and moderate levels of COPD and nearly half of participants reported having no co-morbidities. Rayan & Sawin (2009) explained that the complexity of the condition may affect the self-management process. Therefore, disease severity is vital in COPD self-management (Jolly et al., 2018) and the presence of more than one co-morbidity is negatively associated with self-management practices (Bringsvor et al., 2018; Yadav et al., 2020a).

Furthermore, the majority of study participants (97.2%) live with their families. Hence, family members can support some extent to manage their disease condition. The literature revealed that families' responsibilities increase in parallel with patients' disease conditions (Sigurgeirsdottir et al., 2020). Moreover, study results revealed that most of the participants had a middle level of family income per month. Therefore, family members can afford their expenses related to disease management which resulting a moderate level of self-management. Literature also showed that self-management practices were associated with family income (Yadav et al., 2020a).

The majority of participants had secondary level or less than secondary level education (76%) and only 6.5% of participants had a high level of education and completed a vocational diploma or degree. However, 72.2% of the participants had never surfed the internet or consulted professional medical books for relevant information (Appendix B Table 7). The literature showed that low levels of self-management practices were found to be positively associated with education level (Scheffer et al., 2021; Yadav et al., 2020a). Therefore, gender, age, complexity of disease condition, income level, and education level could be possible reasons for the moderate level of self-management in this study.

Emotional management had a higher score in this study. This can be due to most of the study participants being married, living with their families, and their spouse being their main caregivers. According to Rayan & Sawin (2009), social support (emotional, instrumental, or informational) directly affects self-management behaviors (Ryan & Sawin, 2009). Therefore, study participants may have good emotional support and social support from their families for their disease

management. In addition to that, in Sri Lankan culture most women are housewives. Therefore, they don't have employment stress and they have enough time to gather with their families.

Daily life management showed the second-highest mean score in this study. The majority of study participants were non-smokers because women do not tend to smoke in Sri Lankan culture. But they use biomass fuel for cooking which is different from Western culture. In the current study, nearly half of the participants (46.3%) used biomass fuel for cooking. Reviewed literature also showed that the use of biomass fuel for cooking was significantly associated with an increased risk of respiratory symptoms, which leads to acute exacerbation (Jayaweera et al., 2020). According to Ryan & Sawin, environmental factors can influence self-management behaviors (Ryan & Sawin, 2009). However, most of the participants (71.3%) practiced opening windows for ventilation (Appendix B Table 7) but nearly one-fourth of participants (23.1%) had inadequate ventilation levels in their kitchen, which resulting a moderate level of daily life management.

Even though symptom management showed a moderate level, the exacerbation rate was high among the study participants and nearly half (42.6%) were suffering from dyspnea. The IFSMT explained that physiological, structural, or functional characteristic of the conditions affects self-management behaviors (Ryan & Sawin, 2009). Study results revealed that 39.8% of participants never practiced breathing exercises (e.g., abdominal breathing, pursed lip breathing) at home (Appendix B Table 7). The other notable thing was the majority of participants had not taken pneumococcal and Influenza vaccines, and did not participate in a pulmonary rehabilitation program. However, the majority of participants (80%) inhaled bronchodilators when they had difficulty breathing (Appendix B Table 7).

Information management showed the lowest mean score in this study. Even if they visit the clinic every month, approximately one-fourth of the study participants (24.1%) have no source of COPD education or health information. This can be due to participants not having enough time to talk with nurses or doctors in the clinic, sometimes they only need to take medications and hurry to go back. Literature shows that regular communication with doctors and nurses can reduce exacerbation by 45%-60% (Park et al., 2020). Therefore, healthcare providers should pay attention to

communication and health education to reduce exacerbation rates among patients with mild to moderate COPD.

Factors influencing self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka.

Results from standard multiple linear regression revealed that dyspnea, perceived stress, COPD knowledge, and perceived social support can explain 41.7% of the variance in self-management among adults with mild to moderate COPD in Colombo, Sri Lanka. The study results revealed that dyspnea ($\beta = .212$, $p = .006$), perceived stress ($\beta = -.195$, $p = .018$), COPD knowledge ($\beta = .263$, $p = .001$), and perceived social support ($\beta = .366$, $p = .000$) could predict COPD self-management significantly.

The results of this study showed that dyspnea was significantly associated with COPD self-management ($r = .256$, $p < .05$) and that dyspnea can predict COPD self-management ($\beta = .212$, $p = .006$). Based on IFSMT disease conditions can affect the process dimension and ultimately outcome dimension (Ryan & Sawin, 2009). Dyspnea belongs to disease conditions and COPD self-management belongs outcome dimension in this theory. Reviewed literature showed that a lack of clinical symptoms may induce some patients to take therapy episodically, rather than daily (Aredano et al., 2020). A study done in Turkey revealed that there was a statistically significant between dyspnea and self-management behavior ($r = .14$, $p < .05$) (Kilic et al., 2021). Moreover, a study done in Italy showed that dyspnea can influence adherence to COPD therapy (OR 3.318, 95% CI 1.050-9.892, $p < .05$) (Aredano et al., 2020). However, contradictory results showed a study done in Norway, which revealed that higher dyspnea levels could influence emotional distress ($\beta = .15$, $p < .05$), resulting in poor self-management among COPD patients (Bringsvor et al., 2018).

The current study findings also revealed that perceived stress significantly correlates with COPD self-management ($r = -.369$, $p < .05$) and it can influence COPD self-management behaviors ($\beta = -.195$, $p = .018$). Perceived stress belongs to individual and family perception in IFSMT and individual cognitive status, perspectives, and information processing can enhance or diminish self-management behaviors (Ryan & Sawin, 2009). A study done in Spain revealed that perceived stress could influence quitting smoking in adults ($\beta = -.0164$, $p < .01$) (Barroso-Hurtado et

al., 2023), which plays an important role in daily life management among COPD patients. Furthermore, high stress had increased COPD-related emergency department visits (OR 2.51, 95% CI 1.06–5.98, $p=.04$) (Parekh et al., 2020). A study done in Denmark revealed that perceived stress was a significant predictor for disease management among COPD patients ($R^2 = .256$, $p<.05$) (Hansen et al., 2023). Therefore, the current study results complied with previous studies and IFSMT.

The study result revealed that participants had the mean score of COPD knowledge was 7.46 out of 13 (SD = 2.36), which indicated a low level of COPD knowledge. Furthermore, there was a significant association between COPD knowledge and COPD self-management ($r = .456$, $p < .01$), and COPD knowledge could predict COPD self-management behaviors ($\beta = .263$, $p = .001$). The relationship between COPD knowledge and COPD self-management can be explained by the IFSMT. The improvement of knowledge would increase the understanding of self-management behaviors of persons, noting that enhancement of knowledge and specific health beliefs are linked to engagement in self-regulation behaviors, which leads to engagement in self-management behaviors (Ryan & Sawin, 2009). According to the literature, it is a common finding that, COPD knowledge was a strong predictor of COPD self-management in many countries, many different settings, and across disease stages (Gupta et al., 2019; Lim et al., 2022; Sheng et al., 2023; Yadav et al., 2020a; Yang et al., 2019). Therefore, current study results are consistent with previous studies and IFSMT.

The study findings also revealed that perceived social support significantly correlates with COPD self-management ($r = .527$, $p < .01$) and it can predict COPD self-management ($\beta = .366$, $p = .000$). Ryan and Sawin (2009) explained in the IFSMT that social support could help improve knowledge, and self-regulation skills, and improve self-efficacy, thereby increasing self-management behaviors (Ryan & Sawin, 2009). In addition, positive social support is associated with improved COPD disease management behaviors and needs psychological support from families and close relationships for managing feelings and worries (Gardener et al., 2018; Lenferink et al., 2018). This result is unsurprising and consistent with previous research findings, which show that social support is a strong predictor of COPD self-management (Lan et al., 2022; Lim et al., 2022; Zhao et al., 2023). In this study,

family support and other close relationship support showed high scores. Therefore, social support can influence COPD self-management behaviors consistent with the previous studies and IFSMT.

Conclusion

In conclusion, this study provided insights into self-management behaviors among adults with mild to moderate COPD in Colombo, Sri Lanka. The study revealed that participants had moderate levels of COPD self-management behavior. Moreover, the findings showed that dyspnea, perceived stress, COPD knowledge level, and social support can predict COPD self-management behavior in a group of Sri Lankan COPD patients.

Limitations of the study

According to our knowledge, this was the first study providing insight into the factors influencing self-management behaviors among adults with mild to moderate COPD in Sri Lanka. However, this study has some limitations. First, the data were collected from one clinical setting in Colombo, Sri Lanka. Therefore, there may be limitations to generalization in remote areas where there is no available pulmonary rehabilitation program. Second, all participants had mild and moderate levels of COPD and we did not consider clinical differences among the elderly. Hence, it may not describe the full picture of self-management behavior among the Sri Lankan COPD population.

Implications of the findings

Nursing Practice

According to the study results, the majority of participants reported presenting with at least one exacerbation experience within a year, and more than half of them were hospitalized. Use of biomass fuel for cooking, inadequate ventilation levels in the kitchens, poor knowledge regarding; pulmonary rehabilitation programs, breathing exercises, vaccination, and use of inhalers, may be possible reasons for the

high rate of exacerbation and hospitalization among adults with mild to moderate COPD.

In addition, nearly one-fourth of participants reported not receiving information about COPD from doctors and nurses. Therefore, healthcare providers should increase advocacy and supervision of environmental arrangements, vaccination, and participation in pulmonary rehabilitation programs, and prolong medication adherence in mild and moderate COPD persons. Moreover, pay attention to mild to moderate COPD characteristics and develop personalized self-management plans for them and their families. Encourage communities to establish COPD rehabilitation associations to regularly educate and guide persons and their families about COPD rehabilitation to raise awareness and attention regarding COPD. This information provided the basis for drawing up interventions to improve self-management behaviors by targeting to reduce dyspnea and perceived stress and promote COPD knowledge, and social support, which can help the participants to reduce frequent exacerbations.

Nursing Administration

With the support of this research, nurse administrators can incorporate self-management behaviors assessment and education for people with mild to moderate COPD into job descriptions. Administrators can also include self-management behaviors in the standard of nursing care for persons with mild to moderate COPD.

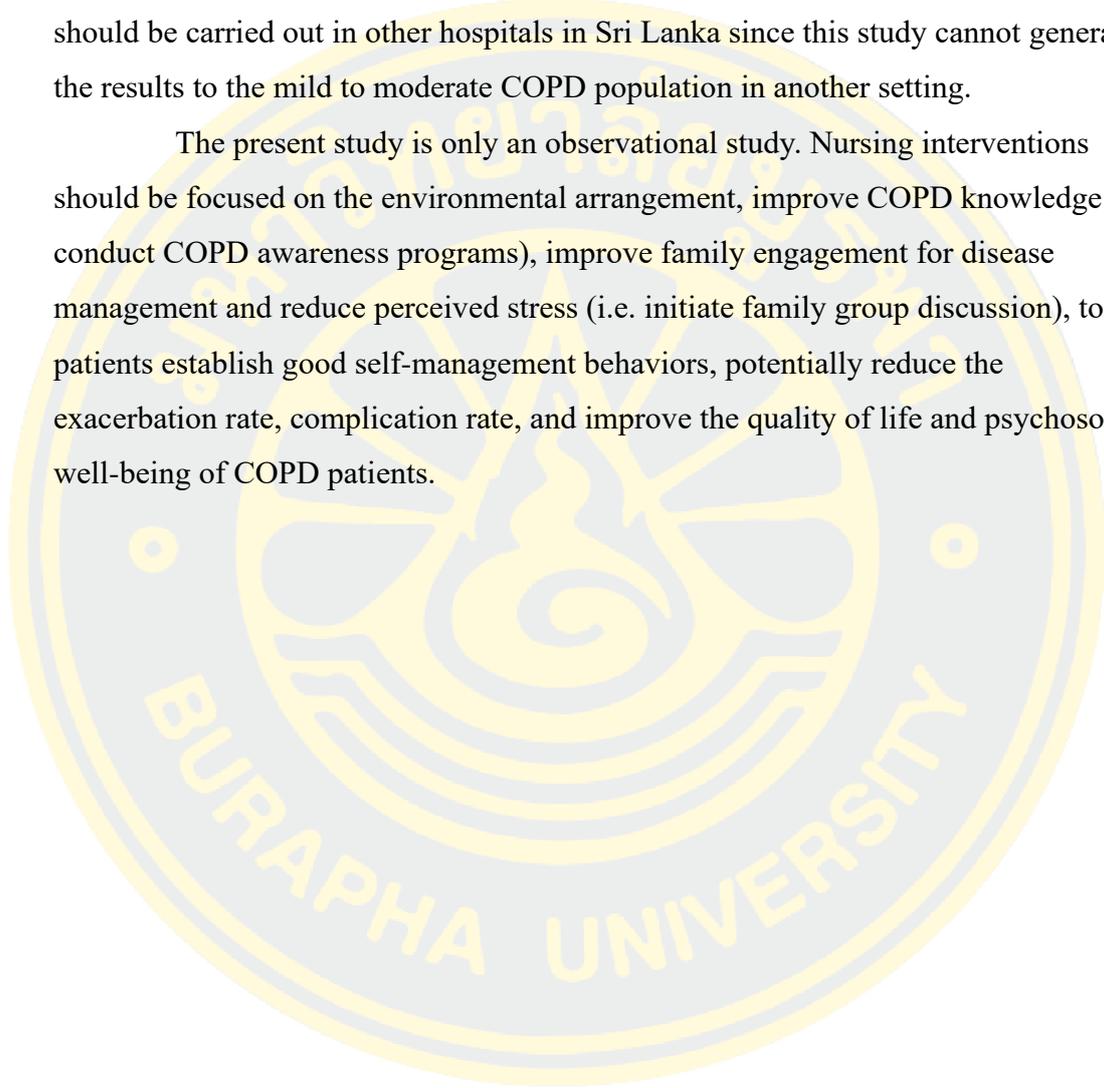
Nursing Education

Findings from the present study provide evidence for nursing knowledge about the influencing of dyspnea, perceived stress, COPD knowledge, perceived social support, and self-management behaviors among adults with mild to moderate COPD. These results can also serve as a reminder for nurse educators to take self-management behaviors among adults with COPD, dyspnea, perceived stress, COPD knowledge, and perceived social support into consideration while developing teaching-learning content about COPD care.

Recommendations for Future Nursing Research

The study enrolled participants from only a respiratory clinic in Colombo, which results may not represent the characteristics of the mild to moderate COPD population in the entire Sri Lanka. We recommend that, in the future, a similar study should be carried out in other hospitals in Sri Lanka since this study cannot generalize the results to the mild to moderate COPD population in another setting.

The present study is only an observational study. Nursing interventions should be focused on the environmental arrangement, improve COPD knowledge (i.e. conduct COPD awareness programs), improve family engagement for disease management and reduce perceived stress (i.e. initiate family group discussion), to help patients establish good self-management behaviors, potentially reduce the exacerbation rate, complication rate, and improve the quality of life and psychosocial well-being of COPD patients.



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APPENDICES



APPENDIX A

Questionnaires in English version

1. Socio-Demographic Questionnaire (SDQ)

Direction: Please read the questions in Part 1 carefully and give an honest answer.

Please choose the answer as follows by tick “√” in the box or write your answers in the space provided. Part 2 is to be completed by the researcher from medical records.

Part 1: General Information (To be completed by the participant)

1. Age:Years
2. Gender
 Male Female
3.to.....13
14. Number of family members?
15. Who is the main caregiver (relationship)?

Part 2: Health information (To be collected by researcher from patient records)

1. Duration of diagnosis of COPD years/months:
2. Weight: Height: BMI:
3.to.....8
9. History of Vaccination within the last 12 months
 None pneumococcal Influenza COVID-19
10. Participate in Pulmonary rehabilitation
 No Yes

2. COPD Self-Management Scale (CSMS)

Direction: We would like to know what you do to manage your condition in your daily life. Please read and think about it carefully and choose the suitable one for your condition. Please choose the answer as follows by ticking “√”.

Item	never	very few	sometimes	often	always
1. When there is no wheezing, I practice breathing exercises (e.g., abdominal breathing, pursed lip breathing)	1	2	3	4	5
2. When I find it difficult to breathe. I inhale bronchodilators (e.g., salbutamol, terbutaline)	1	2	3	4	5
3. When I have difficulty breathing. I will take oxygen 1-2 L/minute	1	2	3	4	5
4.....	1	2	3	4	5
5.....	1	2	3	4	5
6.....	1	2	3	4	5
7.....	1	2	3	4	5
8.....	1	2	3	4	5
9.....	1	2	3	4	5
10.....	1	2	3	4	5
11.....to.....38	1	2	3	4	5
39. If there are troubles, I will confide in my relatives and friends.	1	2	3	4	5
40. When I am in a bad mood. I will ask my family or friends for comfort and help.	1	2	3	4	5

3. Perceived Stress Scale (PSS-10)

Direction: The questions in this scale ask about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. Please read and choose the answer as follows by tick

Item	Never	Almost never	sometimes	Fairly often	Very often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3.	0	1	2	3	4
4.	0	1	2	3	4
5.	0	1	2	3	4
6.	0	1	2	3	4
7.	0	1	2	3	4
8.	0	1	2	3	4
9. In the last month, how often have you been angered because of things that happened that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

4. COPD Knowledge Questionnaire (COPD-Q)

Direction: This questionnaire asks you about your knowledge of COPD, and we can learn your understanding of COPD through this questionnaire. Please answer the following questions as honestly and clearly as possible, judge by your understanding, and tick the “YES” or “NO” box. If you do not understand the question or do not know the correct answer, please tick the “NOT SURE” box.

Item	Yes	No	Not sure
1. People with COPD should get a pneumonia shot.			
2. Using oxygen at home can help people with COPD live longer			
3.....			
4.....			
5.....			
6.....			
7.....			
8.....			
9.....			
10.....			
11.....			
12. People should only use their COPD inhalers (medicines) when they can't breathe.			
13. COPD can be reversed.			

5. The Multidimensional Scale of Perceived Social Support (MSPSS)

Direction: There are 12 sentences, each question has 7 answers. Please choose an answer after each sentence according to your actual situation. For example, choose “1” which means you really strongly disagree with this sentence, which states that your actual situation does not agree with this sentence; “7” means your actual situation does agree with this sentence; choose “4” which means in the middle of state; so on.

Item	Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1. There is a special person who is around when I am in need.	1	2	3	4	5	6	7
2. There is a special person with whom I can share joys and sorrows.	1	2	3	4	5	6	7
3.....	1	2	3	4	5	6	7
4.....	1	2	3	4	5	6	7
5.....	1	2	3	4	5	6	7
6.....	1	2	3	4	5	6	7
7.....to.....10	1	2	3	4	5	6	7
11. My family is willing to help me make decisions.	1	2	3	4	5	6	7
12. I can talk about my problems with my friends.	1	2	3	4	5	6	7



APPENDIX B

Responses to questions on the COPD Self-management Scale (CSMS)

Table 7 The frequency, mean, and standard division of each score in each item of the COPD self-management scale (CSMS) (n = 108)

Item	N (%)					M	SD
	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5		
Symptom management							
1. When there is no wheezing, I practice breathing exercises (e.g., abdominal breathing, pursed lip breathing)	43 (39.8)	28 (25.9)	23 (21.3)	13 (12.0)	1 (0.9)	2.08	1.09
2. When I find it difficult to breathe. I inhale bronchodilators (e.g., salbutamol, terbutaline)	5 (4.6)	4 (3.7)	12 (11.1)	59 (54.6)	28 (25.9)	3.94	0.97
3. When I have difficulty breathing. I will take oxygen 1-2 L/minute	96 (88.9)	8 (7.4)	2 (1.9)	2 (1.9)	0 (0)	1.17	0.54
4. I will consciously follow the doctor's advice to take the medicine on time.	0 (0)	2 (1.9)	22 (20.4)	69 (63.9)	15 (13.9)	3.90	0.64
5. When dyspnea worsens acutely, I will ask for help (e.g., call an ambulance or ask family members to help send me to the hospital)	0 (0)	8 (7.4)	36 (33.3)	61 (56.5)	3 (2.8)	3.55	0.68

Table 7 (Continued)

Item	N (%)					M	SD
	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5		
6. When coughing and expectorating sputum, I will use effective methods to remove respiratory sputum (e.g., effective coughing, chest percussion)	1 (0.9)	9 (8.3)	44 (40.7)	53 (49.1)	1 (0.9)	3.41	0.69
Daily life management							
12. I take flu vaccination 1-2/year.	51 (47.2)	43 (39.8)	7 (6.5)	5 (4.6)	2 (1.9)	1.74	0.91
13. I will conduct cold protection training (e.g., wash my face with cold water in summer and autumn).	10 (9.3)	11 (10.2)	28 (25.9)	40 (37.0)	19 (17.6)	3.44	1.17
14. I will avoid eating raw, cold, hard food.	13 (12.0)	10 (9.3)	28 (25.9)	31 (28.7)	26 (24.1)	3.44	1.29
16. I will avoid eating foods with too much sugar and too many calories (e.g., soda, cola.)	10 (9.3)	8 (7.4)	21 (19.4)	43 (39.8)	26 (24.1)	3.62	1.19
17. When there is no edema and more phlegm, I will drink more water.	2 (1.9)	4 (3.7)	23 (21.3)	64 (59.3)	15 (13.9)	3.80	0.79

Table 7 (Continued)

Item	N (%)					M	SD
	Never	Very Few	Sometimes	Often	Always		
	1	2	3	4	5		
19. In cold weather, I will use heating facilities to increase the room temperature.	10 (9.3)	15 (13.9)	58 (53.7)	25 (23.1)	0 (0)	2.91	0.86
23. I will adjust my exercise according to my physical condition (just walk around the house when I feel uncomfortable).	13 (12.0)	29 (26.9)	52 (48.1)	14 (13.0)	0 (0)	2.62	0.86
26. when my condition is stable, I exercise more than 2-3 hours a week.	12 (11.1)	30 (27.8)	36 (33.3)	28 (25.9)	2 (1.9)	2.80	1.01
27. In winter, in order to prevent a cold, I will wear enough clothes to warm.	10 (9.3)	7 (6.5)	59 (54.6)	31 (28.7)	1 (0.9)	3.06	0.87
28. I will take care to avoid inhaling dust, smoke, or harmful gases.	17 (15.7)	32 (29.6)	23 (21.3)	29 (26.9)	7 (6.5)	2.79	1.19
29. I will choose appropriate ways to exercise (e.g., walking, jogging, bicycling, climbing stairs).	10 (9.3)	28 (25.9)	41 (38.0)	28 (25.9)	1 (0.9)	2.83	0.95
30. I will do housework according to my physical condition. (e.g., cleaning, grocery shopping)	3 (2.8)	9 (8.3)	32 (29.6)	56 (51.6)	8 (7.4)	3.53	0.86

Table 7 (Continued)

Item	N (%)					M	SD
	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5		
31. I will adjust sports velocities according to my health status.	10 (9.3)	34 (31.5)	40 (37.0)	23 (21.3)	1 (0.9)	2.73	0.93
32. I will often open windows for ventilation to fill the room with fresh air.	0 (0)	8 (7.4)	23 (21.3)	71 (65.7)	6 (5.6)	3.69	0.69
Emotion management							
15. I think controlling the symptoms can lighten the burden on my family.	4 (3.7)	7 (6.5)	40 (37.0)	55 (50.9)	2 (1.9)	3.41	0.79
18. I will try my best to change my mind that I am a burden to my family.	2 (1.9)	8 (7.4)	56 (51.9)	37 (34.3)	5 (4.6)	3.32	0.76
20. I will regulate my emotions (e.g., anxiety, depression, fear, pessimism) through exercises.	9 (8.3)	31 (28.7)	51 (47.2)	17 (15.7)	0 (0)	2.70	0.84
25. I will try to look on the bright side of things when I get into trouble things.	2 (1.9)	16 (14.8)	62 (57.4)	28 (25.9)	0 (0)	3.07	0.69
33. I will talk to the medical staff about things that are uneasy and annoying.	1 (0.9)	8 (7.4)	36 (33.3)	58 (53.7)	5 (4.6)	3.54	0.74
34. I will try to look on the bright side of life.	1 (0.9)	8 (7.4)	66 (61.1)	31 (28.7)	2 (1.9)	3.23	0.65

Table 7 (Continued)

Item	N (%)					M	SD
	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5		
35. When I am in a bad mood, I turn my attention to other things I want to do.	1 (0.9)	18 (16.7)	56 (51.9)	30 (27.8)	3 (2.8)	3.15	0.76
36. I will exchange psychological feelings with other similar patients.	1 (0.9)	38 (35.2)	55 (50.9)	14 (13.0)	0 (0)	2.76	0.68
37. I always tell myself to be optimistic.	1 (0.9)	9 (8.3)	67 (62.0)	31 (28.7)	0 (0)	3.19	0.61
38. I will control myself from losing my temper with others.	8 (7.4)	17 (15.7)	35 (32.4)	37 (34.3)	11 (10.2)	3.24	1.08
39. If there are troubles, I will confide in my relatives and friends.	6 (5.6)	8 (7.4)	42 (38.9)	47 (43.5)	5 (4.6)	3.34	0.89
40. When I am in a bad mood. I will ask my family or friends for comfort and help.	4 (3.7)	13 (12.0)	39 (36.1)	42 (38.9)	10 (9.3)	3.38	0.94
Information management							
7. I will exchange disease-related information with other COPD patients.	8 (7.4)	37 (34.3)	53 (49.1)	9 (8.3)	1 (0.9)	2.61	0.78

Table 7 (Continued)

Item	N (%)					M	SD
	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5		
8. I will surf the Internet or consult professional medical books for relevant information.	78 (72.2)	10 (9.3)	9 (8.3)	9 (8.3)	2 (1.9)	1.58	1.07
9. I will often read newspapers to learn disease-related information.	61 (56.5)	18 (16.7)	16 (14.8)	13 (12.0)	0 (0)	1.82	1.08
10. I keep disease-related documents completely (e.g., patient medical records, and medical examination results).	1 (0.9)	0 (0)	15 (13.9)	79 (73.1)	13 (12.0)	3.95	0.59
11. I will discuss with the healthcare staff other issues related to the disease (e.g., is the disease infectious?)	4 (3.7)	10 (9.3)	29 (26.9)	52 (48.1)	13 (12.0)	3.56	0.95
21. If I don't understand the treatment, I will consult the medical staff.	2 (1.9)	8 (7.4)	24 (22.2)	69 (63.9)	5 (4.6)	3.62	0.77
22. If I don't understand the test results, I will consult the medical staff.	3 (2.8)	9 (8.3)	31 (28.7)	50 (46.3)	15 (13.9)	3.60	0.93
24. When I consult the healthcare staff, I will make a list of questions I want to ask.	63 (58.3)	25 (23.1)	15 (13.9)	5 (4.6)	0 (0)	1.65	0.89



APPENDIX C

Permission letters to use instruments

Permission letter to use the COPD Self-Management Scale (CSMS)**The original version:**

From "rainy" <404669792@qq.com>;

04/10/2023 20:05

To Kanchana Weerasooriya

Subject: Permission to use COPD self-management scale

Dear Kanchana,

Thanks for your email.

I am glad you are interested in our scale and would like to give the permission to let you translate it into Sinhala version. You could find the English version attached in that published paper.

Best regards,

Prof. Caihong Zhang

The Modified version:

From Yang Hua yanghua1800@163.com

25/10/2023 11:53

To Kanchana Weerasooriya

Subject: Modified version of CSMS

Dear Kanchana Madumali Weerasooriya,

Thank you for your interest in the modified version of CSMS. We are delighted that you are interested in our study instrument.

You have permission to use and translate this instrument for your study.

I wish the best for your research.

Hua Yang.

Permission letter to use the perceived stress scale (PSS-10)**The original version:**

From mapi-trust.org

12/10/2023 23:13

To Kanchana Weerasooriya

Subject: Permission to use PSS 10

Hello Kanchana,

Thank you for your interest in the PSS-10 - Perceived Stress Scale - 10 items.

As a not-funded academic user, you will not be charged for the use of this questionnaire. You can use Online Distribution to download any available translations of the questionnaire from [ePROVIDE](#).

Best regards.

The Sinhalese version:

From Arosha Dissanayake <arosha@med.ruh.ac.lk>

06/10/2023 21:09

To Kanchana Weerasooriya

Subject: Permission to use Sinhalese version of the perceived stress scale

Dear Kanchana,

Please go ahead and use the questionnaire our group validated.

I shall be much obliged if you could acknowledge the use of this questionnaire in your future publications.

You may acknowledge us as "Music therapy research group Sri Lanka".

Good luck on your study.

Best

Arosha

**Permission letter to use the COPD Knowledge Questionnaire
(COPD-Q)**

The original version:

From Franks, Andrea R <afranks@uthsc.edu>

20/09/2023 22:04

To Kanchana Weerasooriya

Subject: Permission to use the instrument (COPD-Q)

Dear Kanchana,

Thank you for your email. I am so pleased that you are using our work for your thesis. It has never been translated into Sinhala before.

I am attaching the questionnaire and the answer key for it, as well as the original paper and a paper that validated the instrument in Spanish. (I thought the methods might be useful to you.)

We are honored to have our work used in your research. We request that you cite us in your thesis and any publications that come from your project.

Sincerely,

Andrea Franks.

Permission letter to use the Multidimensional Scale of Perceived Social Support (MSPSS)

The original version:

From Zimet, Gregory D <gzimet@iu.edu>

29/09/2023 22:35

To Kanchana Weerasooriya

Subject: Permission to use the Multidimensional Scale of Perceived Social Support

Dear Kanchana Madumali Weerasooriya,

You have my permission to use the Multidimensional Scale of Perceived Social Support (MSPSS) in your research. I have attached the original English language version of the scale (with scoring information on the 2nd page), a document listing several of the articles that have reported on the reliability and validity of the MSPSS, and a chapter that I wrote about the scale.

I hope your research goes well.

Best regards,

Greg Zimet.



APPENDIX D

Proof letters of back-translation procedure

Dr. R.H.M.P.N. Rathnayake
 Ph.D. in Nursing (RUH, SL), BSc in Nursing Hon Sp (SJP, SL), RN
 Senior Lecturer
 Department of Nursing
 Faculty of Allied Health Sciences
 University of Ruhuna
 Sri Lanka.

27 October 2023.

To whom it may concern,

Re: the translation of study instruments

I, Dr. R.H.M.P.N. Rathnayake (PhD in Nursing [RUH, SL], BSc in Nursing Hon Sp [SJP, SL], RN), Senior Lecturer, Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna Sri Lanka, hereby certify that I get involved in the translation of the study instruments listed below (1 to 3) from English to Sinhala. Those 03 instruments will be used in the study of Ms. Kanchana Madumali Weerasooriya with the title "**Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease (COPD) in Colombo Sri Lanka**".

01. The COPD Self-Management Scale (CSMS)
02. The COPD Knowledge Questionnaire (COPD-Q)
03. The Multidimensional Scale of Perceived Social Support (MSPSS)

Best Regards



Dr. R.H.M.P.N. Rathnayake

Dr. NP Edirisinghe
 Senior Lecturer (Grade II)
 Department of Fundamentals of Nursing
 Faculty of Nursing
 University of Colombo,
 Sri Lanka.
 27 October 2023.

To whom it may concern,

Re: The translation of study instruments

I, NP Edirisinghe (Ph.D., B.Sc.N., Dip in IT, RN), Senior Lecturer (Grade II), Department of Fundamentals of Nursing, Faculty of Nursing, University of Colombo, Sri Lanka, hereby certify that I get involved in the translation of the study instruments listed below (1 to 3) from English to Sinhala. Those 03 instruments will be used in the study of Ms. Kanchana Madumali Weerasooriya with the title "**Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease (COPD) in Colombo Sri Lanka**".

01. The COPD Self-Management Scale (CSMS)
02. The COPD Knowledge Questionnaire (COPD-Q)
03. The Multidimensional Scale of Perceived Social Support (MSPSS)

Best Regards



.....
 Dr. NP Edirisinghe
 (PhD, B.Sc.N., Dip in IT, RN)
 Senior Lecturer (Grade II)

31/10/2023

To whom it may concern,**Re: the translation of study instruments**

I hereby certify that I get involved to prepare the reconciled Sinhala version of the study instruments listed below (1 to 3). The aim of the reconciled Sinhala version is the production of a translation that is conceptually equivalent to the original questionnaire and the language used should be colloquial and easy to understand by the target population. Those 03 instruments will be used in the study of Ms. Kanchana Madumali Weerasooriya with the title **“Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease (COPD) in Colombo Sri Lanka”**.

01. The COPD Self-Management Scale (CSMS)
02. The COPD Knowledge Questionnaire (COPD-Q)
03. The Multidimensional Scale of Perceived Social Support (MSPSS)

Best Regards



Prof. H.D.W.T. Damayanthi Dassanayake.
Professor in Nursing,
Department of Nursing,
Faculty of Allied Health Sciences,
University of Peradeniya,
Sri Lanka.

Dr. Pramudika Kariyawasam

04/11/2023

To whom it may concern,

Re: the translation of study instruments

I, Dr. Pramudika Kariyawasam (Ph.D. in Rehabilitation Science [HSUH, Japan], MPhil in Nursing [UOR, SL], BSc Nursing Special Degree Nursing Education [SJP, SL]), Senior Lecturer, Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna Sri Lanka, hereby certify that I get involved in the back-translation of the study instruments listed below (1 to 3) from **Sinhala to English**. Those 03 instruments will be used in the study of Ms. Kanchana Madumali Weerasooriya with the title **“Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease (COPD) in Colombo Sri Lanka”**.

01. The COPD Self-Management Scale (CSMS)
02. The COPD Knowledge Questionnaire (COPD-Q)
03. The Multidimensional Scale of Perceived Social Support (MSPSS)

Best Regards



.....
Dr. Pramudika Kariyawasam,
Ph.D. in Rehabilitation Science (HSUH, Japan), MPhil in Nursing (UOR, SL), BSc Nursing
Special Degree Nursing Education (SJP, SL)
Senior Lecturer
Department of Nursing, Faculty of Allied Health Sciences
University of Ruhuna
Sri Lanka.

Liz Joseph
24 Hospital Ave, Danbury CT 06810
November 11, 2023

To whom it may concern,

Re: the Comparison of original items of the questionnaires with back-translated items

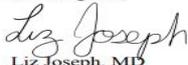
I, Liz Joseph, Internal Medicine Resident PGY3, hereby certify that I have been involved in comparing the original items with the back-translated English items of the study instruments listed below (1 to 3), that will be used in the study “**Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease (COPD) in Colombo Sri Lanka**” by Ms. Kanchana Madumali Weerasooriya.

I have added my comments if there are any in the study instrument comparison table (annexure 1).

1. The COPD Self-Management Scale (CSMS)
2. The COPD Knowledge Questionnaire (COPD-Q)
3. The Multidimensional Scale of Perceived Social Support (MSPSS)

Thank you.

Best Regards,



Liz Joseph, MD
Internal Medicine PGY3
24 Hospital Ave, Danbury, CT 06810



wanpenpin@yahoo.com

to Niphawan, me ▾

Fri, 10 Nov 2023, 06:10



Dear Kanchana,

Please see the comments on the back-translated items. Most of them are fine, with a few changes suggested.

I have also made cc Dr Niphawan for her information.

Best wishes,

Wanpen

บนวันเสาร์ที่ 4 พฤศจิกายน 2023 เวลา 10 นาฬิกา 39 นาที 45 วินาที GMT+7, Kanchana Weerasooriya, <kanchanaweerasooriya10@gmail.com> เขียน:





APPENDIX E

Participant information sheet and consent form



PARTICIPANT INFORMATION SHEET

IRB approval number: ... G- HS 122/2566

Title of the study: Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease in Colombo, Sri Lanka.

Dear Participants

I am Ms. Kanchana Madumali Weerasooriya, a graduate student at the Faculty of Nursing, Burapha University Thailand. My study is entitled, “Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease in Colombo Sri Lanka”. The objectives are to assess COPD self-management and examine the Factors influencing COPD self-management among Adults with Mild to Moderate COPD who come to regular follow-ups at the central clinic in Colombo Sri Lanka.

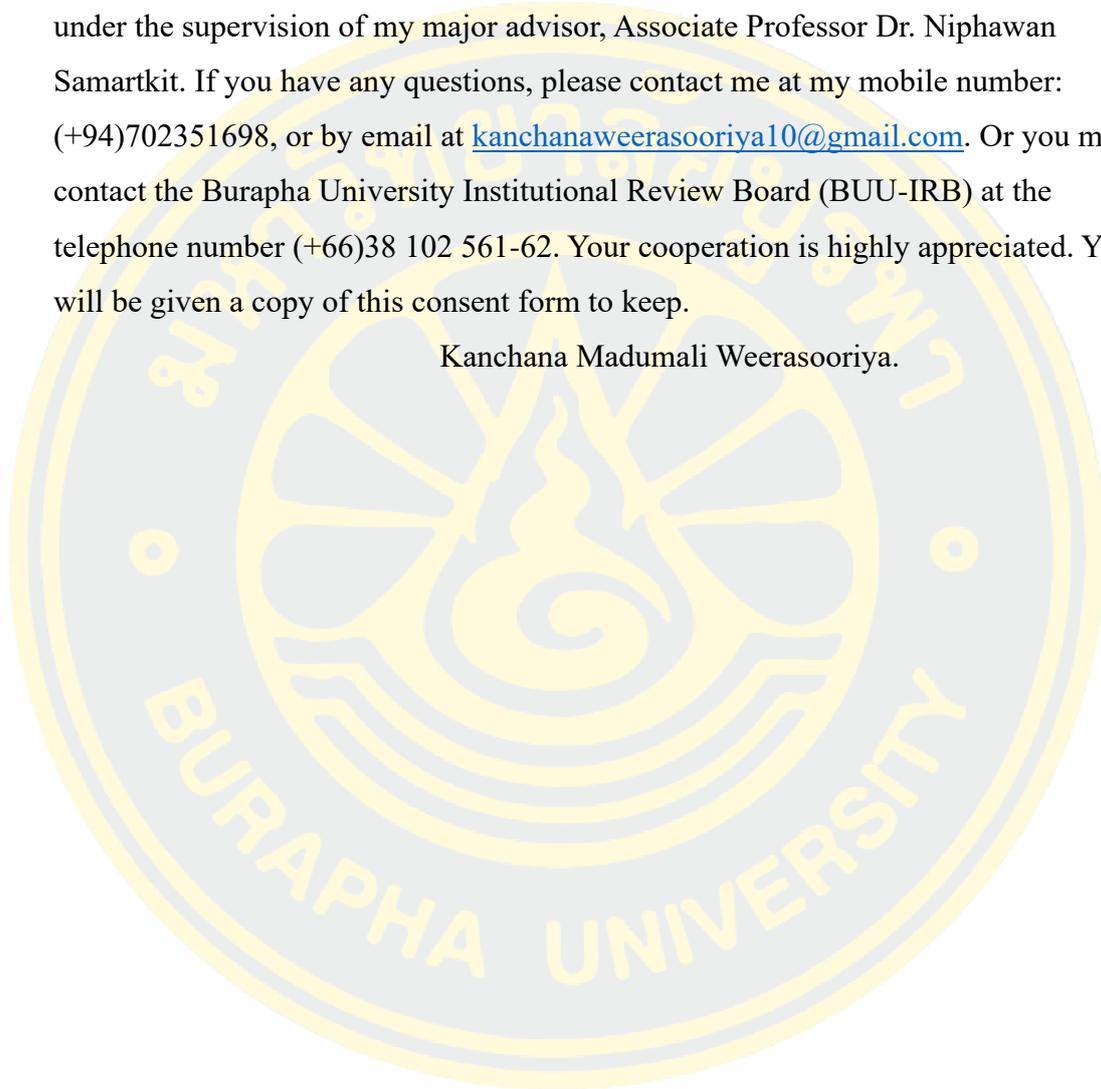
Participation in this study is voluntary. If you agree to participate in this study, you will be asked to answer a set of questions which take about 20-30 minutes. You will not get any direct benefits from participating in this study. However, the information collected from this study may be valuable in developing interventions that can help the hospital and the healthcare workers to provide advanced and better care to adults living with mild to moderate COPD. There will be no identified physical or psychological risk to the person participating in the study and no risk to society.

You have the right to end your participation in this study at any time, without having to inform the researcher, and it will not affect the quality of services you receive from the clinic. Any information collected from this study, including your identity, will be kept confidential. A code number will be assigned to you and your name will not be used. Findings from the study will be presented as a group of participants and no specific information from any individual participants will be

disclosed. All data will be accessible only to the researcher who will be destroyed one year after publishing the findings. You will receive a further explanation of the nature of the study upon its completion if you wish.

The research will be conducted by Ms. Kanchana Madumali Weerasooriya under the supervision of my major advisor, Associate Professor Dr. Niphawan Samartkit. If you have any questions, please contact me at my mobile number: (+94)702351698, or by email at kanchanaweerasooriya10@gmail.com. Or you may contact the Burapha University Institutional Review Board (BUU-IRB) at the telephone number (+66)38 102 561-62. Your cooperation is highly appreciated. You will be given a copy of this consent form to keep.

Kanchana Madumali Weerasooriya.





PARTICIPANT'S CONSENT FORM

Research Code:G- HS 122/2566

Research Title: Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease in Colombo, Sri Lanka.

Date Month Year

Before signing the consent form for this research participation, I was provided the information about the purposes and the processes of the research in the participant information sheet, which the researcher has given to me. I have fully understood the preceding explanation and the researcher has undertaken to answer my questions willingly and without concealment to my satisfaction.

I know that it will take 20-30 minutes to complete the questionnaire and I voluntarily agree to participate in this research project. I understand I can withdraw from the research project at any time without giving a reason, and without it affecting any benefits that I am entitled to.

I have been given explicit guarantees that my information and identity will be kept confidential and will be shared only in the summary of research results. Disclosure of my information to the relevant authorities requires my permission.

I have read and fully understood the above statements in all respects and have signed this consent document willingly. In the case that I cannot read or write, the researcher has read the statement in the consent form to me until I fully understand it well. Therefore, I willingly signed or stamped my thumb on this consent form.

Participant's signature

(.....)

Researcher's signature

(.....)



APPENDIX F

Ethical approval letter and data collection letter

สำเนา

ที่ IRB3-016/2567



เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS122/2566
 โครงการวิจัยเรื่อง : Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease in Colombo, Sri Lanka
 หัวหน้าโครงการวิจัย : MISSKANCHANA MADUMALI WARNAKULA ROYAL WEERASOORIYA
 หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์
 อาจารย์ที่ปรึกษาโครงการหลัก (สภานិพนธ์/ งานนิพนธ์/ วิทยานิพนธ์/ ศษญีนิพนธ์) : รองศาสตราจารย์ ดร.นิการวรรณ สามภรณ์กิจ
 หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์
 อาจารย์ที่ปรึกษาโครงการร่วม (สภานิพนธ์/ งานนิพนธ์/ วิทยานิพนธ์/ ศษญีนิพนธ์) : ผู้ช่วยศาสตราจารย์ ดร.เขมรดี มาลีสิงบุญ
 หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์
 วิธีพิจารณา : Exemption Determination Expedited Reviews Full Board

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 2: 29 January 2024
2. Research Protocol Version 1: 16 September 2023
3. Participant Information Sheet Version 2: 29 January 2024
4. Informed Consent Form Version 2: 29 January 2024
5. Research Instruments Version 1: 16 September 2023
6. Others (if any) Version :-

วันที่รับรอง : วันที่ 5 เดือน กุมภาพันธ์ พ.ศ. 2567

วันที่หมดอายุ : วันที่ 5 เดือน กุมภาพันธ์ พ.ศ. 2568

สำเนา

ลงนาม Assistant Professor Ramorn Yampratoom
 (Assistant Professor Ramorn Yampratoom)
 Chair of The Burapha University Institutional Review Board
 Panel 3 (Clinic / Health Science / Science and Technology)

** หมายเหตุ การรับรองนี้มีรายละเอียดตามที่ระบุไว้ด้านหลังเอกสารรับรอง **



Research Ethics Committee
 A SIDCER (Strategic Initiative for Developing Capacity in Ethical Review) assigned REC
 Faculty of Medical Sciences, University of Sri Jayewardenepura
 Gangodawila, Nugegoda, Sri Lanka



Chairperson
 Prof. Renu Wickremasinghe
 BSc, PhD

Secretary
 Dr. Sithara Dissanayake
 MBBS, MD (DR),
 DCHMS (UK)

Committee Members

Prof. S. Prathapan
 MBBS, MSc, MD (Gen Med)

Prof. Chandima Kulaschoka
 MBBS(Col), Diploma in
 Pathology, MD Hematology

Dr. Chandana Weerage
 MBBS, PhD

Dr. Theodor Disanayake
 MBBS, Dip (Med Micro), MD
 (Med Micro)

Dr. Luchinda Arachchige
 MBBS, MD (Psychiatry)

Dr. Malura Jayawardena
 MBBS, MD (DAG AND DPM,
 MRCPSC(UK))

Dr. Yajna Senarathne
 MMS (Dent), BScMS2

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 (Med Micro)

Date: 21.03.2024

our ref: ERC 44/23

REC meeting date: 22- of February 2024

Ms. KMW Royal Weerasooriya,
 Faculty of Nursing,
 Burapha University,
 Long Had Bangsean Road,
 Saensuk,
 Thailand.

Dear Ms. Weerasooriya,

Application Number: 44/23

Title: Factors Influencing Self-Management Behaviors among Adults with Mild to Moderate Chronic Obstructive Pulmonary Disease in Colombo, Sri Lanka.

I am pleased to inform you that the FMS/USJP REC at its meeting held on the above-mentioned date has granted ethical approval for your project as per details given below:

The ethical approval for your project is effective from the above-mentioned REC meeting date.

We affirm that none of the proposed study team members were present during the decision-making process of the REC. The quorum requirements were met.

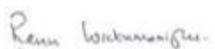
The approval is valid until one year from the date of sanction. You may make a written request for renewal / extension of the validity, along with the submission of annual status report. Please note that ethical approval would be revoked if any alteration is made to the project without obtaining prior written consent from the research ethics committee.

As the Principal Investigator, you are expected to ensure that procedures performed under the project will be conducted in accordance with all relevant national and international policies and regulations that govern research involving human participants.

- a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. etc.)
- b. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Research Ethics Committee for approval.

Thank you.

Yours Sincerely,


 Prof. Renu Wickremasinghe,
 Chairperson


 Dr. Sithara Dissanayake
 Secretary



MHESI 8137/245

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

February 12th, 2024

To Director of National Program for Tuberculosis Control and Chest Disease

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments (Try out)

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Kanchana Madumali Warnakula Royal Weerasooriya to collect data for testing the reliability of the research instruments.

Ms. Kanchana Madumali Warnakula Royal Weerasooriya, ID 65910018, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Factors influencing self-management behaviors among adults with mild to moderate chronic obstructive pulmonary disease in Colombo, Sri Lanka" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 30 adults aged 18-64 years old with mild to moderate COPD (FEV1 \geq 50%) who were treated in the Central Chest Clinic in Colombo, Sri Lanka.

The data collection will be carried out from March 1 - 7, 2024. In this regard, you can contact Ms. Kanchana Madumali Warnakula Royal Weerasooriya via mobile phone +94-70-235-1698 or 098-578-6365 or E-mail: kanchanaweerasooriya10@gmail.com or 65910018@go.buu.ac.th

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

ผศ.ดร. มณฑนา รุ่งสโรภาส

(Assist. Prof. Dr. Montana Rungsiyopas)
Vice-Dean for Academic Affairs

Acting of Dean of Graduate School, Burapha University

Graduate School Office
Tel: +66 3810 2700 ext. 705, 707
E-mail: grd.buu@go.buu.ac.th
<http://grd.buu.ac.th>



MHESI 8137/246

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

February 12th, 2024

To Director of National Program for Tuberculosis Control and Chest Disease

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Kanchana Madumali Warnakula Royal Weerasooriya to collect data for conducting research.

Ms. Kanchana Madumali Warnakula Royal Weerasooriya, ID 65910018, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Factors influencing self-management behaviors among adults with mild to moderate chronic obstructive pulmonary disease in Colombo, Sri Lanka" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 108 adults aged 18-64 years old with mild to moderate COPD (FEV1 \geq 50%) who were treated in the Central Chest Clinic in Colombo, Sri Lanka.

The data collection will be carried out from March 8, 2024 to May 31, 2024. In this regard, you can contact Ms. Kanchana Madumali Warnakula Royal Weerasooriya via mobile phone +94-70-235-1698 or 098-578-6365 or E-mail: kanchanaweerasooriya10@gmail.com or 65910018@go.buu.ac.th

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

มณฑนา รุ่งสโรภาศ

(Assist. Prof. Dr. Montana Rungsiyopas)

Vice-Dean for Academic Affairs

Acting of Dean of Graduate School, Burapha University

Graduate School Office
Tel: +66 3810 2700 ext. 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

	<p> ජාතික සෞඛ්‍ය සේවා දෙපාර්තමේන්තුව කාශ රෝග පාලන මධ්‍යස්ථානය NATIONAL PROGRAMME FOR TUBERCULOSIS CONTROL & CHEST DISEASES </p> <p> සෞඛ්‍ය අමාත්‍යාංශය කෘතාර්ථ අමාත්‍යාංශය MINISTRY OF HEALTH </p>				
මගේ අංකය My No.	} NPTCCD/Research/2024/Approval/6/4	ඔබේ අංකය Your No.	}	දිනය Date	} 20.02.2024

Ms. Kanchana Madumali Warnakula Royal Weerasooriya

Student – Master of Nursing Science

Faculty of Nursing

Burapha University

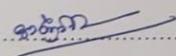
Approval to conduct research on Factors influencing self-management behaviors among adults with mild to moderate chronic obstructive pulmonary disease in Colombo, Sri Lanka"

This is with reference to your letter dated 12/02/2024, requesting to conduct the above-mentioned study at the Central Chest Clinic, Colombo.

You are hereby granted permission to carry out the research at the Central Chest Clinic, after obtaining the ethical approval from a local ethical review committee. Patient identification details should not be extracted from the patients and confidentiality should be maintained.

A copy of the final report has to be submitted to the National Programme for Tuberculosis Control and Chest Diseases on completion of the study.

I wish the you all the best in carrying out the study successfully.


 Director/NPTCCD

Dr. R. Pramitha Shanthilatha
 Director
 National Programme for Tuberculosis Control
 & Chest Diseases
 No. 555/5, 4th Floor, Elvitigala Mawatha,
 Narahenpita, Colombo 05.

සෞඛ්‍ය සේවා දෙපාර්තමේන්තුව, අංක 555/5, ඒල්විගලා මාවත, කොළඹ 05, ශ්‍රී ලංකාව
 Public Health Complex, No. 555/5, Elvitigala Mawatha, Colombo 05, Sri Lanka

☎ +94 112368276	☎ +94 11 2368276	Web site	http://www.nptccd.health.gov.lk
General	dirnptccd@health.gov.lk;	Director	nptccddirector@gmail.com

BIOGRAPHY

NAME Kanchana Madumali Warnakula Royal Weerasooriya

DATE OF BIRTH 19 January 1988

PLACE OF BIRTH Badulla, Sri Lanka

PRESENT ADDRESS No 655, Millennium City, Athurugiriya, Colombo, Sri Lanka.

POSITION HELD 2011 - 2016 Registered Nurse, Provincial General Hospital, Badulla, Sri Lanka.
2016 - Present Registered Nurse, National Hospital Colombo, Sri Lanka.

EDUCATION 2022-2024 Master of Nursing Sciences (International Program), Faculty of Nursing, Burapha University, Chonburi, Thailand.
2017 - 2019 Bachelor of Science Honours in Nursing, KAATSU International University, Sri Lanka.
2008 - 2011 Diploma in Nursing, Nursing Training School, Badulla, Sri Lanka.