UNIVERSITI PUTRA MALAYSIA

FACTORS ASSOCIATED WITH PERCEIVED QUALITY OF LIFE AMONG BREAST CANCER PATIENTS DURING TREATMENT AT NATIONAL CANCER INSTITUTE, PUTRAJAYA, MALAYSIA

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By

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

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Faculty : Medicine and Health Sciences

Breast cancer remains as the main cause of death among female worldwide. In light of its good prediction on survival of cancer, perceived quality of life (QoL) has been increasingly recognized as an important clinical outcome for oncology patients. This study aimed to determine the perceived QoL as well as its determinants among breast cancer patients during treatment.

This was a cross sectional study. A total of 179 breast cancer patients in National Cancer Institute, Putrajaya were recruited via purposive sampling. A set of interviewer-administered questionnaire was used, including European Organization for Research and Treatment of Cancer-Quality of Life-Core 30 (EORTC-QLQ-C30), modified Medical Outcomes Study Social Support Survey and International Physical Activity Questionnaire-short form aimed to ascertain the perceived QoL (primary measure), functional health and medical symptoms, social support and physical activity level, respectively. Physical functioning was measured based on the total mean score of 5 items in EORTC-QLQ-C30. Nutritional assessments of weight, height, mid-upper arm circumference (MUAC), triceps skinfold thickness, handgrip strength and presence of edema were performed using standard techniques. Biochemical data on serum albumin, hemoglobin level and neutrophils count were retrieved from medical report as secondary data. Patients' diet quality were evaluated using Healthy eating index-2015. Multiple linear regression was used to identify the factors contributing to perceived QoL.

Respondents' mean age and monthly income were 50.49 years and RM1962.83, respectively. A majority of the respondents was Malays (61.5%), married (68.6%), received secondary education (48.5%) and unemployed (60.9%). Slightly more than one-third of the respondents were diagnosed with cancer stage III, with mean duration

of diagnosis at 8.77 months. The mean score of perceived QoL was 69.43, with approximately 47% of respondents had poor perception of QoL. Among the functional domains, respondents had the lowest score on emotional functioning. A substantial proportion of respondents experienced fatigue (94.1%), pain (60.4%), appetite loss (45.0%), insomnia (45.0%), financial difficulties (41.4%) and constipation (33.1%). Slightly more than one quarter of the respondents had poor social support while 62.7% of them were physically inactive. Approximately one in five had low corrected arm muscle area. More than 90% of the respondents had poor handgrip strength and poor diet quality. In terms of diet quality, the scoring of whole grains, dairy, fatty acids and refined grains were less satisfactory with scores less than half of the maximum score. For bivariate results, MUAC and handgrip strength were positively associated with perceived QoL while respondents with earlier cancer stage experienced poorer perception of QoL.

In conclusion, breast cancer patients perceived their QoL as average during treatment, with emotional health was the most negatively affected. There were six factors associated with poor perception of QoL, which included early-stage cancer, lower handgrip strength and MUAC, better physical functioning, higher levels of fatigue and pain (R^2=0.522; adjusted R^2=0.457). To promote better QoL among breast cancer patients during treatment, appropriate strategies to improve MUAC and handgrip strength of the breast cancer patients are highly recommended.

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

FAKTOR-FAKTOR MENGENAI PERSEPSI KUALITI HIDUP DALAM KALANGAN PESAKIT KANSER PAYUDARA SEMASA MENJALANI RAWATAN DI INSTITUSI KANSER NEGARA, PUTRAJAYA, MALAYSIA

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Kanser payudara merupakan penyebab kematian dalam kalangan wanita di seluruh dunia. Memandangkan ciri ramalan yang baik untuk kelangsungan hidup kanser, persepsi kualiti hidup (perceived QoL) semakin dikenali sebagai hasil klinikal yang penting untuk pesakit kanser. Kajian ini bertujuan untuk mengenalpasti persepsi kualiti hidup serta penyumbangnya dalam kalangan pesakit kanser payudara.

In adalah kajian keratin rentas. Sejumlah 179 pesakit kanser payudara di Institusi Kanser Negara, Putrajaya telah diambil melalui persampelan purposive. Satu set soal selidik yang diisi oleh penyelidik termasuk *European Organization for Research and Treatment of Cancer-Quality of Life-Core 30, modified Medical Outcomes Study Social Support Survey* dan *International Physical Activity Questionnaire-short form* bertujuan untuk menilai persepsi kualiti hidup, kesihatan fungsian, gejala perubatan, sokongan sosial dan tahap aktiviti fizikal. Fungsi fizikal dinilai berdasarkan jumlah min skor 5 item dalam EORTC-QLQ-C30. Penilaian nutrisi termasuk berat badan, ketinggian, lilitan pertengahan lengan (MUAC), ketebalan lipatan kulit triceps, kekuatan genggaman dan keadaan edema telah dilakukan dengan menggunakan teknik piawai. Data biokimia mengenai tahap *albumin*, *hemoglobin* dan *neutrophils count* telah dikumpul dari laporan perubatan sebagai data sekunder. Kualiti diet pesakit dinilai dengan menggunakan *Healthy eating index*-2015. Analisis regresi linear pelbagai telah digunakan untuk mengenalpasti faktor yang menyumbang kepada persepsi kualiti hidup.

Min sisihan piawai umur dan pendapatan bulanan responden adalah 50.49 tahun dan RM1962.83. Kebanyakan responden adalah Melayu (61.5%), berkahwin (68.6%), berada di tahap peringkat menengah (48.5%) dan tidak bekerja (60.9%). Min sisihan piawai tempoh diagnosis adalah 8.77 bulan dan seramai 38.5% responden yang

didapati menghidap kanser peringkat III. Min skor persepsi kualiti hidup adalah 69.43, dengan anggaran 47% responden mempunyai persepsi kualiti hidup yang kurang baik. Antara domain berfungsi, responden mempunyai skor terendah dalam fungsi emosi. Sebilangan besar responden mengalami keletihan (94.1%), kesakitan (60.4%), kekurangan selera makan (45.0), masalah susah tidur (45.0%), masalah kewangan (41.4%) dan masalah sembelit (33.1%). Sedikit lebih daripada satu perempat responden mempunyai sokongan social yang kurang baik, manakala 62.7% responden adalah tidak aktif secara fizikal. Didapati anggaran satu dalam lima responden mempunyai *corrected arm muscle area* yang rendah. Lebih daripada 90% responden mempunyai kekuatan genggaman yang lemah dan kualiti diet yang kurang baik. Dari segi kualiti diet, skor bijirin penuh, tenusu, asid lemak dan bijirin halus adalah kurang memuaskan, dengan skor kurang daripada separuh skor maksimum. Untuk keputusan bivariat, *MUAC* dan kekuatan genggaman dikaitkan dengan persepsi kualiti hidup secara positif, manakala responden yang berada di peringkat awal kanser mengalami persepsi kualiti hidup yang kurang baik.

Kesimpulannya, pesakit kanser payudara menggangap *QoL* sebagai sederhana semasa menjalani rawatan, dengan kesihatan emosi yang paling teruk. Terdapat enam faktor yang menyumbang kepada persepsi kualiti hidup yang kurang baik termasuk peringkat awal kanser, kekuatan genggaman yang lemah, *MUAC* yang rendah, fungsi fizikal yang baik, tahap keletihan dan kesakitan yang tinggi (R^2=0.522; adjusted R^2=0.457). Untuk menggalakkan persepsi kualiti hidup yang lebih baik dalam kalangan pesakit kanser payudara yang menjalani rawatan, strategi berpatutan demi menambahbaik *MUAC* and kekuatan genggaman pesakit kanser adalah sangat digalakkan.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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This is to confirm that:

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LIST OF ABBREVIATIONS

15D	15-dimensional
AJCC	American Joint Committee on Cancer
BMI	Body Mass Index
CARES-SF	Cancer Rehabilitation Evaluation System-short form
CAMA	Corrected Arm Muscle AreaC
ER+	estrogen receptors-positive
EORTC-QLQ-C30	European Organization Research and Treatment of Cancer-Quality of Life Questionnaire-Core 30
EQ-5D	EuroQol-5D
FFQ	Food Frequency Questionnaires
FACT-G	Functional Assessment of Cancer Therapy Questionnaire-General
FLIC	Functional living index-Cancer
GHS	Global Health Status
HEI	Healthy Eating Index
HER2	Human epidermal growth factor receptors 2
IARC	International Agency for Research on Cancer
IPAQ	International Physical Activity Questionnaire
MET	Metabolic Equivalent Task
MUAC	Mid-Upper Arm Circumference
MREC	Ministry of Health's Research and Ethics Committee
mMOS-SS	modified Medical Outcomes Study Social Support Survey
MUFAs	Monounsaturated Fatty Acids
MLR	Multiple Linear Regression
NCI	National Cancer Institute
NCD	Non-communicable disease
QoL	Quality of life
PUFAs	Polyunsaturated Fatty Acids
PR+	progesterone receptors-positive
rTEM	Relative Technical Error of Measurement
RSCL	Rotterdam Symptom Checklist
SQLI	Spitzer Quality of Life Index
SDS	Symptoms Distress Scale
THIS	Total Hospital Information System
TSF	Triceps Skinfold
TNM	Tumour, Node and Metastasis
UAE	United Arab Emirates
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Breast cancer origins from the breast cells and grows out of control, with possibility of invading or spreading to distant areas of the body (American Cancer Society, 2016). In 2012, breast cancer was the most frequently occurring cancer in women, with an estimated number of 1.67 million cases and ranked first as cause of mortality, accounting for 25.1% of all cancers and 14.7% of cancer-related death worldwide (Ferlay et al., 2014). There was substantial increase in breast cancer incidence and its-related mortality from year 2008 to 2012, which is more noticeable especially in developing countries (Jemal, Bray, & Ferlay, 2011; Torre, Bray, et al., 2015). Due to aging and rapid growth of world population, it is projected that the number of new incidences and death of breast cancer will continue to increase (Ferlay et al., 2014).

Implementation of mammographic screening programmes has resulted in more diagnosis of breast cancer incidences (Desantis, Ma, Bryan, & Jemal, 2014). Together with the advances in cancer treatment, early detection strategy via screening programme has greatly improved the survival rate of breast cancer women (Miller et al., 2016). This beneficial effect was observed in most developed countries including the United States and United Kingdom, with about 40% of reduced mortality rate over the past three decades (Torre, Siegel, Ward, & Jemal, 2015b).

According to the Malaysian National Cancer Registry 2007-2011, breast cancer remains as the leading cancer incidence among Malaysian women, which accounts for 32.1% (n=18, 206) of all cancer cases. Due to high number of new cases reported, Malaysia has launched a breast cancer screening policy by offering Breast Self-Awareness, Clinical Breast Examination and mammography screening to public, especially for high-risk women aged 40 years and above (Ministry of Health Malaysia, 2010). This elucidates that the older adults are more susceptible to breast cancer.

In Malaysia, Chinese had the highest age-standardized breast cancer incidence rate with 41.5 per 100, 000, followed by Indian (37.1) and Malay (27.2). A similar picture was observed for Singaporean (National Cancer Institute, 2016). Different perceptions on cancer awareness as early detection, cultural beliefs and practices may explain the uneven distribution of breast cancer statistics across ethnic groups (Bhoo-Pathy et al., 2014). When comparison was made across ASEAN countries, the highest mortality rate of breast cancer was found in Malaysia, followed by Philippines and Indonesia (Ferlay et al., 2014). The growth in urbanization has urged nutrition transition in these countries towards the adaptation of westernized diet or uhealthy lifestyle, which increased the risk of developing breast cancer (Torre et al., 2015a).

Although the survival rate of breast cancer patients has improved in the past 3 decades in Malaysia (Yip, Bhoo Pathy, & Teo, 2014), the overall survival rate of less than 50% was considered low as compared to high-income countries (Abdullah et al., 2013). To date, a multidisciplinary approach comprises of medical and allied health professionals was adopted to provide an integrated cancer care to patients and their families in several countries (Jacobson, 2010; Silbermann et al., 2013). This approach is in line with the priority of cancer care team on patients' quality of life, focusing on the multidimensional aspects of physical, psychological, and social functioning of the patients (Revicki, 1989).

Quality of Life has evolved greatly from the paradigm of oncology practice, whereby cancers' end-of-life care and treatment model has changed into an integration of life-extending treatments with main considerations of symptom relief (Kelley & Meier, 2010; Patel et al., 2014; Temel et al., 2010). Studies have demonstrated a close relationship between perceived QoL and survival in cancer (Kypriotakis, Vidrine, Francis, & Rose, 2016; Quinten et al., 2009). With this, assessment of perceived QoL is gaining recognition to be an effective prognostic indicator of cancer survival, which is imperative to decision making for treatment plan (Kane, Halpern, Squiers, Treiman, & McCormack, 2014). In light of the importance of perceived QoL, Food Drug Administration of the United States highly emphasized to focus perceived QoL as equally important as survivorship in the assessment of clinical benefits for cancer research (Fiteni et al., 2014).

A multimodality cancer therapy including surgery, radiotherapy, chemotherapy, hormonal and targeted therapy are not just offered to early stage cancer patients with curative intent. Instead, the oncology care is being offered simultaneously with non-hospice palliative care for patients with advanced cancer in order to stop or slow the growth of cancer (Kelley & Meier, 2010). Despite chemotherapy is very effective in prolonging patients' lifespan, adverse effects of fatigue, insomnia, depression and other systemic therapy side effects may deteriorate patients' perception of their QoL substantially (Høyer et al., 2011; Tiezzi et al., 2017; Yan et al., 2016).

In Malaysia, the perceived QoL among breast cancer patients receiving treatment had been reported to be average, with patients experienced poorest emotional function (Ng et al., 2015). This was consistently reported by other local studies among breast cancer patients with or without treatment (Sri Ganesh, Lye, & Lau, 2016) and newly diagnosed breast cancer patients (Yusuf, Ahmad, & Keng, 2013). When compared with studies using identical QoL assessment tool, the perceived QoL of Malaysians was lower than France during treatment (Manneville et al., 2017). This could be due to economic disparity across countries in light of the high prevalence of financial difficulties observed in Malaysia (Sri Ganesh et al., 2016). Aside from the burden of treatment cost, patients often worry about the cost of living due to reduced ability to work during treatment. Despite funding allocation policies for cancer patients could help to ease their burden, restraint financial assistance might exist in most of the low- and middle-income countries, including Malaysia.

The etiologies of poor perception of QoL among breast cancer patients are multifactorial. Lesson learnt from previous studies showed that social support, sociodemographic and medical factors influenced perceived QoL, regardless of the treatment phases (Høyer et al., 2011; Yan et al., 2016). Both emotional and instrumental supports are typically emphasized in the measure of perceived social support (Bottomley & Jones, 1997). Besides the commonly known social support (So et al., 2013), nutritional factors (Lis, Gupta, Lammersfeld, Markman, & Vashi, 2012) and physical activity level (Mandelblatt et al., 2011) may also affect the perceived QoL in breast cancer patients.

1.2 Problem Statement

Breast cancer remains as the most frequently occurring cancer among Malaysian women (National Cancer Institute, 2016). Although anticancer therapies are showed to be effective in prolonged lifespan, patients are suffering from various treatment-related side effects which deteriorate their perceived quality of life. Malaysian women with breast cancer moderately perceived their quality of life during treatment (Ng et al., 2015), which is comparable to eight countries in Southeast Asia, with mean score of perceived QoL at 69.7 after one year of diagnosis (The ACTION Study Group, 2017). This elucidates the possibility of long term negative impact of perceived QoL impairment during treatment.

To the best of knowledge, most studies on factors related to perceived QoL in Malaysia have been conducted among breast cancer survivors (Mohammadi, Sulaiman, Koon, Amani, & Hosseini, 2013b), those yet to receive treatment (Yusuf et al., 2013) or groups of mixed treatment phases (Sri Ganesh et al., 2016), with limited studies available among breast cancer patients during treatment. An individualized quality care need to be intensively offered to cancer patients towards the goal of improving perceived QoL. This effort deliberately serves as an impetus for investigating the perceived QoL of breast cancer patients, enabling the evaluation of success and its extent accordingly.

Mounting evidence showed impaired perception of QoL along the journey of chemotherapy among the breast cancer patients due to poorly management of emotional problems such as fears of dying, feeling sad and worried about health (Bayram, Durna, & Akin, 2014). An inter-relationship of emotional health, perceived QoL and decision making process had been shown, indicating that patients' decision making and adherence to treatment plan hinge on the perception of health or life status (Kane et al., 2014). Despite the theoretical view of association between functional health and perceived QoL (Ferrans, Zerwic, Wilbur, & Larson, 2005), evidence on the linkage of medical symptoms and functional health with perceived QoL is highly lacking.

Social support from friends, family members and healthcare team play an important role in maximizing patients' perception of their QoL by trivializing experiences of treatment related-side effects (So et al., 2013; Yan et al., 2016). While poor social support potentially leads to poor adherence to treatment plan and perceived quality of life, the comprehensive assessment of perceived social support from different aspects,

including emotional, tangible, affectionate and positive social interaction (Sherbourne & Stewart, 1991) are highly lacking at the local context.

In addition, perceived QoL can be influenced by biological factors related to eating and physical activity behaviors. Cancer diagnosis, as well as exaggerated worry about health in general may urge breast cancer patients or survivors for lifestyle changes in Malaysia (Yong et al., 2014). However, various treatment-related side effects may discourage breast cancer survivors to practice an active lifestyle since treatment initiation (Kwan et al., 2012). Despite physical activity may potentially improve perceived QoL, cognitive function, depression, physical fitness and fatigue (Furmaniak, Menig, & Markes, 2016; Van Vulpen, Peeters, Velthuis, Van Der Wall, & May, 2016) by counteracting impaired muscle function and joints dysfunction (Klassen et al., 2016), little is known about the relative contribution of physical activity towards perceived QoL, particularly among patients during treatment.

Although breast cancer patients are highly motivated in seeking information about nutrition, their overall diet quality was poor during treatment (Custódio et al., 2016). Attributed to the altered taste induced by cancer treatment (Marinho et al., 2017), breast cancer patients reported reduced consumptions of fruits, vegetables and legumes, resulting in lacks of food varieties (Custódio et al., 2016) and possibly poor nutritional status. Indeed, nutritional deficiencies could compromise patients' immunity (Valdés-Ramos & Benítez-Arciniega, 2007), which further implicates unfavorable recovery progress as well as patients' tolerance to cancer treatment. This elucidates the importance of consuming an adequate diet throughout the cancer treatment. While a majority of existing studies focused on assessing the possible role of single nutrients on perceived QoL, an overall diet consumed as well as its conformance to requirement during cancer treatment is highly lacking. More studies are deemed required to provide a bigger picture of the influence of habitual dietary intake on perceived QoL in breast cancer patients during treatment. Specifically, limited knowledge about the determinants of perceived QoL in relation with nutrition parameters in local context has greatly initiated the effort to assess patients' nutritional status comprehensively in present study.

Healthy eating practice can promote a long term health in cancer patients by maintaining an optimal body weight range, regardless of the treatment phases (Rock et al., 2012). Routine assessments of anthropometric, biochemical and clinical data are performed by health professionals on cancer patients, in order to ensure their health is in good condition throughout treatments. A study in Canadia showed that breast cancer patients gained weight during chemotherapy (Vance, Mourtzakis, Mccargar, & Hanning, 2011). Excessive body weight, however, is not recognized as good nutritional status or any favorable condition for cancer patients.

A breast cancer study conducted in United State indicated that high body mass index may lead to physical malfunction in relation to pain, fatigue and physical distress during radiotherapy (Fang et al., 2013). Given anti-cancer therapies especially chemotherapy is detrimental to immune response, a close monitoring of complete blood count is necessary throughout treatments. Chemotherapy induces declined in serum hemoglobin

and pre-albumin level in breast cancer (Bicakli et al., 2014; Dolan et al., 2010), which may result in fatigue. A systematic review emphasized that muscle strength is remarkably poor in breast cancer patients as a result of treatment-related factors (Hidding, Beurskens, Wees, Laarhoven, & Sanden, 2014), providing valuable implications for perceived QoL during cancer treatment (Christensen et al., 2014). Finding of a Malaysian study showed that more than half of breast cancer survivors experienced weight increment after four years of diagnosis (Yong et al., 2011). Despite the existence of the above potential associations, studies on the above nutritional parameters in relation with perceived QoL among breast cancer patients during treatment are sparse in Malaysia, elucidating the necessity of conducting current study.

Throughout the arduous treatment journey, it is noteworthy to identify cancer patients who are at high risk of getting poor perception of QoL. In addition to sociodemographic, medical characteristics and treatment modalities, patients' perceived QoL can be indirectly influenced by multiple factors such as social support (So et al., 2013), physical activity level (Mandelblatt et al., 2011) and nutritional status (Lis et al., 2012) during cancer treatment. Unfortunately, there are still lacking of multi-factorial approach in the analysis with the consideration of these factors as previous studies mostly using bivariate analysis in data analysis and interpretation.

In general, this study was conducted to address several research questions as follows:

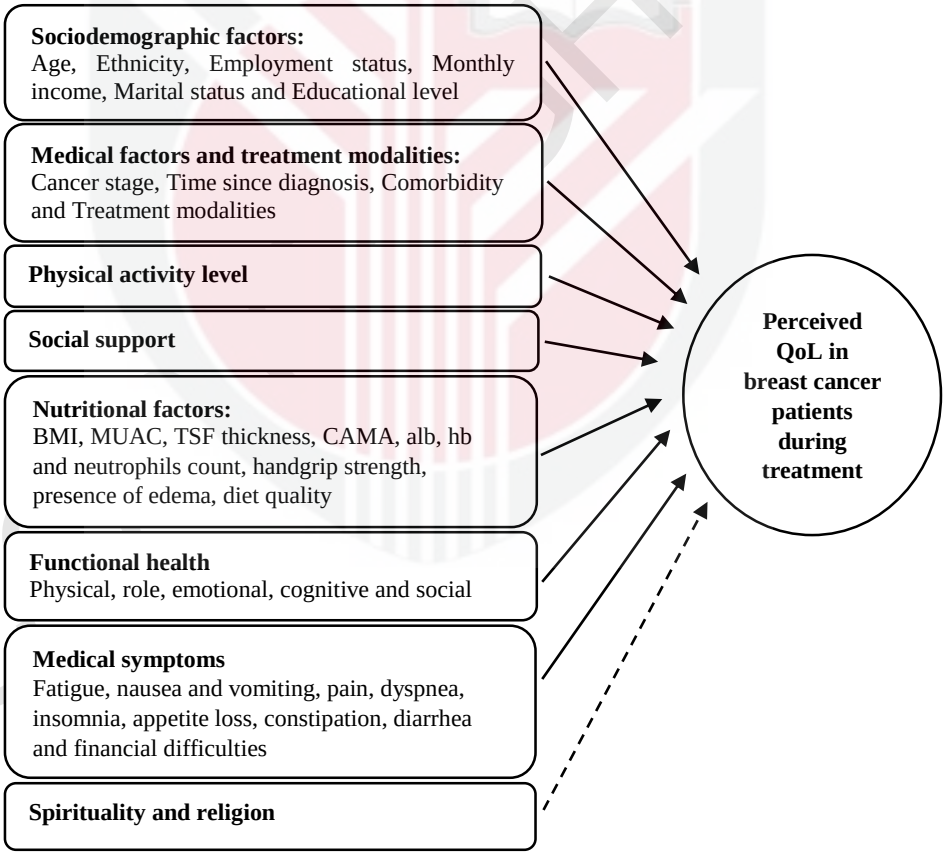
1. What are the perceived QoL, functional health and medical symptoms reported among breast cancer patients during treatment?
2. What are the status of anthropometric, biochemical, clinical and dietary intake among breast cancer patients during treatment?
3. What is the physical activity level in breast cancer patients during treatment?
4. How do breast cancer patients perceive their social support during treatment?
5. Do sociodemographic, medical characteristics, treatment modalities, social support, physical activity level, functional health, medical symptoms, parameters of anthropometric, biochemical, clinical and dietary associate with perceived QoL in breast cancer patients during treatment?
6. What are the factors contributing to perceived QoL in breast cancer during treatment?

1.3 Justification of Study

This study served as the fundamental study for future studies regarding the determinants of perceived QoL during treatment in breast cancer. It is hope with the establishment of determinants of impaired perception of QoL among breast cancer patients during treatment, more effective strategies can be formulated to improve perceived QoL among the breast cancer patients during treatment. On the other hand, this proposed model can be explicitly used to predict the perceived QoL of breast cancer patients who are receiving treatments in other institutions. The acquisition of the factors associated with perceived QoL data provides a strong impact on clinical decision making and future treatment policies to improve patients' perception of their QoL.

1.4 Conceptual Framework

Theoretically, perceived QoL could be affected by multiple factors, including medical symptoms and functional health, as well as the characteristics of individual and environment (Ferrans et al., 2005). It is deduced that there are associations between social support (So et al., 2013), physical activity level (Mandelblatt et al., 2011), nutrition-related parameters (Lis et al., 2012), sociodemographic, medical charecteristics and treatment modalities (Abu-Saad Huijer & Abboud, 2012) with perceived QoL among breast cancer patients during treatment. As supported by a previous study, functional health and medical symptoms were associated with perceived QoL (Den Oudsten, De Vries, Van der Steeg, Roukema, & Van Heck, 2009). In view of the existence of independent association between each factor and perceived QoL, a hypothesis was formulated in which perceived QoL could be attributed to a combination of all the factors mentioned above. Besides the above factors, possible linkage exists between spirituality and religion with perceived QoL (Peteet & Balboni, 2013), but this factor was not investigated in the current study. Figure 1 illustrates the conceptual framework based on the identification of key concepts and relationship between the concepts of perceived QoL in breast cancer during treatment.



Note: BMI=body mass index; MUAC=mid-upper arm circumference; TSF=tricep skinfold; CAMA=corrected arm muscle area; alb=albumin; hb=haemoglobin

Figure 1: Conceptual Framework

1.5 Study Objectives

1.5.1 General Objective:

To investigate factors associated with perceived QoL among breast cancer patients during treatment at National Cancer Institute, Putrajaya, Malaysia.

1.5.2 Specific Objectives:

a. To determine the perceived QoL of breast cancer patients during treatment.
b. To identify sociodemographic, medical characteristics, treatment modalities, social support, diet quality, physical activity level, functional health, medical symptoms, parameters of anthropometry including fat and muscle mass, biochemical and clinical among breast cancer patients during treatment.
c. To determine the associations of sociodemographic, medical characteristics, treatment modalities, social support, diet quality, physical activity level, functional health, medical symptoms, parameters of anthropometry, biochemical and clinical with perceived QoL in breast cancer patients during treatment.
d. To determine factors contributing to perceived QoL in breast cancer patients during treatment.

1.6 Alternative Hypothesis:

a. There are significant associations of sociodemographic, medical characteristics, treatment modalities, social support, diet quality, physical activity level, functional health, medical symptoms, parameters of anthropometry, biochemical and clinical with perceived QoL in breast cancer patients during treatment.
b. There are significant contributors to perceived QoL in breast cancer patients during treatment.

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