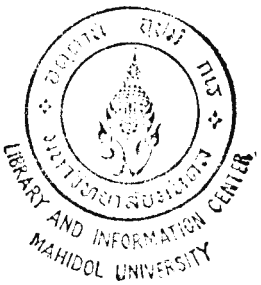

PATTERNS OF FATIGUE, RELATED FACTORS, AND SELF-CARE ACTIONS AMONG BREAST CANCER PATIENTS RECEIVING CHEMOTHERAPY

PIYAWAN PRITSANAPANURUNGSIE

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This descriptive study aimed to describe patterns of fatigue and self-care actions to manage fatigue among breast cancer patients receiving chemotherapy. This study also examines the relationship between fatigue and nausea and vomiting, sleep disturbances, and exercise. Purposive sampling was used to recruit 30 breast cancer patients who met the criteria from the outpatient chemotherapy clinic, Medical Department, Ramathibodi Hospital. The instruments used consisted of six questionnaires, as follows: the demographic information sheet, the revised Piper Fatigue Scale, the modified form of the Rhodes Index of Nausea and Vomiting Form II, the sleep disturbance scale, the exercise question, and the self-care record. Data were analyzed using the SPSS/FW program.

Results indicated that after receiving chemotherapy, the subjects experienced moderate fatigue and the mean scores of total fatigue reach higher on day 4 and slowly dropped till day 7, after that it increased again on day 8. The peak was found on day 9 and then gradually declined. The peak of fatigue related to chemotherapy administration. Cluster analysis was used to identify the patterns of fatigue. Four patterns of fatigue were identified; 1) severe and then gradually declining, 2) moderate and sustained, 3) moderate and then gradually declining, and 4) mild and then gradually declining. As to the relationship, there were positive relationships between fatigue and nausea and vomiting at the first, the second, and the third course of chemotherapy ($r = .356, .455$, and $.358$ respectively, all $p_s < .01$). Also there were positive relationships between fatigue and sleep disturbances in all courses of chemotherapy ($r = .468, .567$, and $.540$ respectively, all $p_s < .01$). No statistically significant relationship was found between exercise and fatigue. The most frequently used self-care action to manage fatigue was lying down and it's effectiveness was nearly complete relief.

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ปิยวรรณ ปฤษณภานุรังษี : แบบแผนของความอ่อนล้า ปัจจัยที่เกี่ยวข้อง และการดูแลตนเองของผู้ป่วยมะเร็งเต้านมที่ได้รับเคมีบำบัด (PATTERNS OF FATIGUE, RELATED FACTORS, AND SELF-CARE ACTIONS AMONG BREAST CANCER PATIENTS RECEIVING CHEMOTHERAPY) คณะกรรมการควบคุมวิทยานิพนธ์ : ศ. สมจิต หนุเจริญกุล Ph.D. รศ. วรชัย รัตนธราธร พ.บ., Dip. The American Board of Internal Medicine and Medical Oncology. 93 หน้า ISBN 974-665-062-9

การวิจัยเชิงบรรยายครั้งนี้มีวัตถุประสงค์เพื่อ ศึกษาแบบแผนของความอ่อนล้า ความสัมพันธ์ระหว่างอาการคลื่นไส้และอาเจียน ปัญหาในการนอนหลับ และการออกกำลังกายกับความอ่อนล้า ตลอดจนวิธีการและประสิทธิภาพของการดูแลตนเองของผู้ป่วยมะเร็งเต้านมที่มารับการรักษาด้วยเคมีบำบัดที่คลินิกเคมีบำบัด แผนกอายุรกรรม โรงพยาบาลรามาธิบดี จำนวน 30 ราย โดยเลือกกลุ่มตัวอย่างแบบเฉพาะเจาะจงตามเกณฑ์ที่กำหนด เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบสอบถามข้อมูลส่วนบุคคล แบบวัดความอ่อนล้า แบบวัดอาการคลื่นไส้และอาเจียน แบบวัดปัญหาในการนอนหลับ แบบวัดการออกกำลังกาย และแบบบันทึกการดูแลตนเอง วิเคราะห์ข้อมูลโดยการใช้โปรแกรม SPSS/FW

ผลการวิจัยพบว่า ภายหลังจากได้รับเคมีบำบัด โดยเฉลี่ยแล้วผู้ป่วยจะเกิดอาการอ่อนล้าในระดับปานกลาง และเพิ่มขึ้นสูงในวันที่ 4 หลังจากนั้นจะลดลงจนถึงวันที่ 7 และเพิ่มขึ้นอีกครั้งในวันที่ 8 สูงสุดในวันที่ 9 แล้วจะค่อยๆลดลงตามลำดับ ซึ่งความอ่อนล้าที่เกิดขึ้นนี้สอดคล้องกับการได้รับเคมีบำบัด เมื่อวิเคราะห์จัดกลุ่มแบบแผนของความอ่อนล้า พบว่าความอ่อนล้าเกิดขึ้น 4 แบบแผน คือ 1) เกิดอาการรุนแรง แล้วค่อยๆ ลดลง 2) เกิดอาการปานกลาง แล้วคงที่ต่อไป 3) เกิดอาการปานกลาง แล้วค่อยๆ ลดลง และ 4) เกิดอาการเล็กน้อย แล้วค่อยๆ ลดลงช้าๆ ในด้านความสัมพันธ์นั้นพบว่า ความอ่อนล้ามีความสัมพันธ์ทางบวกอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 ในชุดที่ 1 2 และ 3 ของเคมีบำบัด (r = .356, .455, และ .358 ตามลำดับ, p ทั้งหมด < .01) เช่นเดียวกันกับความสัมพันธ์ระหว่างความอ่อนล้า กับปัญหาในการนอนหลับ ซึ่งพบว่ามีความสัมพันธ์กันอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 ในทุกชุดของเคมีบำบัด (r = .468, .567 และ .540 ตามลำดับ, p ทั้งหมด < .01) ส่วนการออกกำลังกายนั้นไม่มีความสัมพันธ์กับความอ่อนล้าอย่างมีนัยสำคัญทางสถิติ ในทุกชุดของเคมีบำบัด สำหรับวิธีการดูแลตนเองนั้น พบว่าวิธีที่ผู้ป่วยส่วนใหญ่ใช้ และมีประสิทธิภาพมาก คือการนอนพัก

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CHAPTER I

INTRODUCTION

Background and Rationale

Breast cancer is a complex disease and is usually treated with multimodality therapies. In the past 40 years, breast cancer research has been focused on adjuvant therapy (Doig, 1988: 92). Even though chemotherapy is one of the most effective treatment modalities for breast cancer, several side effects of chemotherapy are unavoidable. These side effects include nausea, vomiting, anorexia, stomatitis, diarrhea, alopecia, and fatigue. Researchers have found that most patients receiving chemotherapy suffer and deteriorate from fatigue more than other side effects (Kuuppekomaki & Lauri, 1998: 364-369). Moreover, fatigue has an impact on self-care activities, self-concept, employment, social relationships, and individuals' quality of life (Aistars, 1987: 25; Ferrel, et al., 1996: 1542-1545; Rhodes, et al., 1988: 190; Skalla & Lacasse, 1992: 1537).

According to the Professional Nursing and Midwifery Act BE. 2540 (Revision of the Professional Nursing and Midwifery Act BE. 2528), symptom management is one of the nursing responsibilities (The Nursing Council of Thailand, 2540: 1-2). Nurses need to establish effective nursing interventions to manage fatigue in breast cancer patients receiving chemotherapy. Knowledge and understanding about patterns and factors associated with fatigue as well as self-care strategies to manage fatigue are area in need of research.

Fatigue, associated factors, and self-care management of fatigue have been subjects of research. The research literature reports that patterns of fatigue in cancer patients receiving chemotherapy are different and related to types of cancer and cytotoxic agents used in treatment (Richardson, et al., 1998: 17-30). Berger (1998: 51-62) found that fatigue scores in breast cancer patients receiving chemotherapy were higher at treatment time and lower at the cycle midpoints. Richardson and Ream (1996: 27) identified several factors that influenced the experience of fatigue in cancer patients receiving chemotherapy. They include illness factors, chemotherapy treatment, change and/or quality of sleep pattern, the presence of symptoms, a depressed mood, and demands of home and/or work. In term of self-care strategies for symptom management, Richardson and Ream in 1997 (35-43) identified 31 self-care activities initiated by chemotherapy patients in response to fatigue. However, these activities were effective at various levels with only partial relief, 54 % of the time and not effective at all for 9 % of the time.

As stated previously, there is limited research on fatigue, associated factors, and self-care management of fatigue. More important, most research of fatigue and cancer treatment have been conducted in western countries using populations dissimilar to Asians, and the findings may not be generalizeable to the Thai population. Genetic differences, environment, health beliefs, and cultural practices may influence response to chemotherapy. Little is known about fatigue in breast cancer patients receiving chemotherapy in Thailand. The purpose of this study is to explore patterns of fatigue, factors influencing the experience of fatigue, and self-care strategies to manage fatigue among breast cancer patients receiving chemotherapy in Thailand.

Conceptual Framework

Two models are used in the conceptual framework for this study. Orem's self-care theory addresses the concepts of self-care, and Piper Integrated Fatigue Model (IFM) addresses the concepts of fatigue.

According to Orem (1991, 1995), self-care is defined as the activities that individuals personally initiate and perform on their own behalf to maintain life, health, and well-being by prevention, alleviation, cure, or control of unwanted conditions, and also includes the seeking of and participation in medical care. Patients are conceived as active decision-makers who are responsible for fulfilling their self-care requirements. Self-care is a deliberate action, which is composed of two phases, intentional acts and productive actions. The first phase, intentional acts, relates to what the person plans, or intends to do, with respect to achieve a certain end or goal. The second phase, productive phase, consists of actions that a person performs and their effectiveness (Orem, 1995: 115-116; Hanucharurnkul, 2540: 23-25).

According to self-care theory, symptoms experienced by the patient such as fatigue, nausea, vomiting, and insomnia, are a component of the health state which is one of the basic conditioning factor (Orem, 1995: 203). The basic conditioning factor is purported to influence both therapeutic self-care demands and self-care agency. Therapeutic self-care demand is the totality of self-care actions necessary at specific times or over a duration of time to regulate individual's functioning and development (Orem, 1995: 461). Self-care agency is the power and capabilities of an individual to engage in self-care (Orem, 1995: 10).

Thus, health state, in which fatigue and other symptoms are included, is one of the factors which influence the therapeutic self-care demands and self-care agency.

Patients undergoing chemotherapy for breast cancer are living with the demands of symptom experience. Patients need to exercise their self-care agency by developing a new repertoire of skills and knowledge to meet therapeutic self-care demands, and this results in self-care actions.

Therefore, when patients are unable to meet their self-care requirements, nurses must work with them to maintain their health and well being. The nurse has the responsibility to assess the health state of every patient, in particular, what symptoms this patient experiences and how these symptoms interfere with the patient's ability to perform self-care activities. Therefore, nurses can help them to achieve their self-care. In this study, symptom of fatigue, which is one of the side effects of chemotherapy was chosen to be studied.

The Piper Integrated Fatigue Model (Piper, et al., 1987: 19) proposed the patterns most commonly reported to influence fatigue. These patterns include accumulation of metabolites, changes in energy and energy substrate patterns, activity/rest patterns, sleep/wake patterns, disease patterns, treatment patterns, environmental patterns, symptom patterns, psychological patterns, change in regulation/transmission patterns, social patterns, life event patterns, and innate host factors. Form this model, symptoms of nausea and vomiting, sleep disturbance, and exercise may be associated with the symptom of fatigue were examined in this study. Figure 1 demonstrates the theoretical integration of these factors, which forms the conceptual framework for this study.

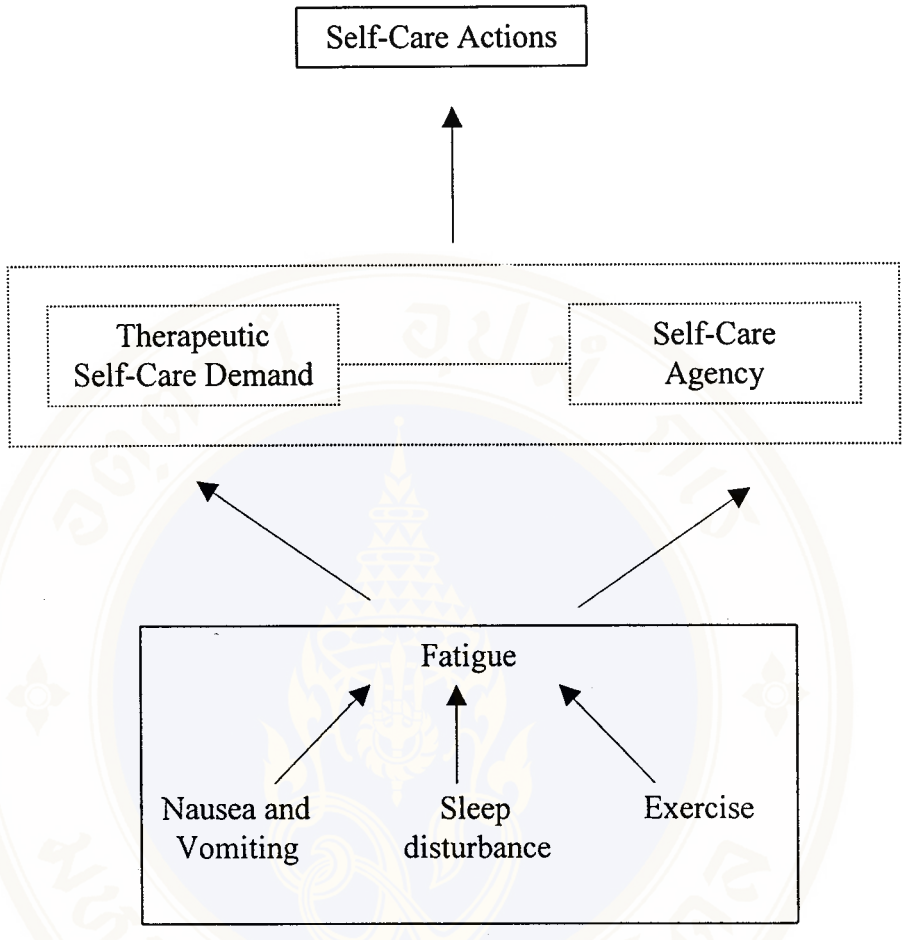

Figure 1. Conceptual framework for this study

Objectives of the Study

The following are objectives of this study.

1. To describe patterns of fatigue among breast cancer patients receiving chemotherapy.

2. To examine relationships between fatigue, nausea and vomiting, sleep disturbance, and exercise.

3. To explore self-care actions performed by breast cancer patients receiving chemotherapy to manage fatigue.

4. To determine the effectiveness of self-care actions performed by breast cancer patients receiving chemotherapy.

Research Questions

1. Does the intensity of fatigue change over time during the course of chemotherapy treatment in breast cancer patients?

2. Are there identifiable patterns of fatigue among groups of breast cancer patients receiving chemotherapy?

3. What are the relationships between fatigue, nausea and vomiting, sleep disturbance, and exercise?

4. What self-care actions are performed by breast cancer patients receiving chemotherapy to manage fatigue?

5. What is the effectiveness of self-care actions performed by breast cancer patients receiving chemotherapy?

Scope of the Study

This prospective, descriptive study aims to describe patterns of fatigue, related factors, and self-care actions among breast cancer patients receiving adjuvant chemotherapy with Cyclophosphamide, Methotrexate, and 5-Fluorouracil (CMF) protocol. The sample of breast cancer patients was recruited from the outpatient chemotherapy clinic of the Medicine Department, Ramathibodi Hospital. Data was collected from November 1999 to July 2000.

Expected Outcome and Benefits

1. To provide knowledge for breast cancer patients who receive adjuvant chemotherapy to manage fatigue.

2. To develop nursing research for the development of nursing interventions for breast cancer patients receiving chemotherapy.

Definitions of Terms

1. Fatigue is a subjective experience of physical and mental tiredness, which occurs after receiving chemotherapy. It was measured by the total scores of the revised Piper Fatigue Scale.

2. Pattern of fatigue is a recurrent configuration of fatigue as measured by the total scores of the revised Piper Fatigue Scale on the first day of treatment until 28 days after receiving chemotherapy.

3. Nausea and vomiting is a subjective feeling of an unpleasant sensation experienced in the back of the throat and the epigastrium or a forceful expulsion of the contents of the stomach, duodenum, or jejunum through the oral/nasal cavity. It was measured by the sum of the scores of the modified form of the Rhodes Index of Nausea and Vomiting Form 2 (INV-2).

4. Sleep disturbance is a subjective experience of an insufficiency of sleep as measured by the sum of the score of 2 items of sleep disturbances on the Adapted Symptom Distress Scale Form 2.

5. Exercise is a series of physical movements or actions that patients undertake to elicit a beneficial or therapeutic response as determined by frequency and

duration of exercise that patients record in a dairy. The score 1- 5 was assigned by the investigator.

6. Self-care actions are activities that patients initiate and perform on their own behalf to manage fatigue. These were obtained from the patient's record in a self-care dairy. The effectiveness of these actions was measured by a scale developed by the investigator, with 1 being not relieved and 5 being completely relieved.

CHAPTER II

LITERATURE REVIEW

Literature related to patterns of fatigue, related factors, and self-care actions among breast cancer patients receiving chemotherapy are reviewed as follows:

1. Adjuvant chemotherapy for breast cancer
2. Fatigue; definitions, mechanisms, and patterns of fatigue in cancer patients receiving chemotherapy and associated factors
3. Intervention of fatigue
4. Self-care actions to manage fatigue

Adjuvant Chemotherapy for Breast Cancer

Breast cancer is a common cancer found in women. Although breast cancer begin locally, it can spread progressively to the axillary nodes, the internal mammary nodes, and distant sites such as the lungs, bones, and liver via the bloodstream (Veronesi, et al., 1995: 1245-1248). Many breast cancer patients who remain disease-free after local and regional treatment eventually relapse and die of or with overt metastasis. Therefore, the locoregional treatment like surgery or radiotherapy is insufficient to control the disease. Adjuvant chemotherapy, the systemic use of cytotoxic drugs following primary treatment, is applied to eradicate micrometastasis (Doig, 1988: 91). The goal of adjuvant chemotherapy is to cure, control, palliate, or prolong survival while maintaining the quality of life (Doig, 1988: 91-98).

The studies of adjuvant chemotherapy for breast cancer began in 1958 when the National Surgical Adjuvant Breast and Bowel Project (NSABP) undertook the first clinical trial of a drug, low doses of thio-TEPA, against hidden metastasis in premenopausal women who had four or more positive axillary nodes. This drug was administered for 2 days after mastectomy. The results of this study is reported as having a statistically significant improvement in 5- and 10-year survival rate (Case, 1984 cited in Doig, 1988: 92).

In the early 1970s, combination chemotherapy was introduced to treat locally advanced breast cancer, in combination with radiotherapy and/or surgery. The National Cancer Institute (NCI) began prospective, randomized clinical trials in 1972. The report showed that the combination of cyclophosphamide, methotrexate, 5-fluorouracil, vincristine, and prednisolone (CMFVP) prolonged disease free survival and lengthened overall survival in premenopausal women whose disease had spread to one or more lymph nodes (Cooper, et al., 1976 cited in Doig, 1988: 92). Four years later, Bonadonna and others (1976 cited in Doig, 1988: 92-93) at Instituto Nazionale Tumori in Milan, Italy, reported a response rate of 76% with the combination of cyclophosphamide, methotrexate, and 5-fluorouracil (CMF) in women with stage II breast cancer after surgery. After this time, there were several studies of adjuvant chemotherapy in cancer patients by many institutes for example, OSAKO, Guy's/Manchester, Danish Breast Cancer Cooperative Group, Southwestern Oncology Group (SWOG), Eastern Cooperative Oncology Group (ECOG), and West Midlands Oncology Association (Anderson & Kramer, 1991: 820-831).

The common regimens used for adjuvant chemotherapy of breast cancer are follows; (Ratanatharathorn, 1999: 28-31)

1. CMF :	Cyclophosphamide	100 mg/m^2	P.O	days 1-14
	Methotrexate	40 mg/m^2	I.V.	days 1, 8
	5-Fluorouracil	600 mg/m^2	I.V	days 1, 8
	Repeat every 28 days x 6 cycles			
2. CMF :	Cyclophosphamide	600 mg/m^2	I.V	days 1, 8
	Methotrexate	40 mg/m^2	I.V.	days 1, 8
	5-Fluorouracil	600 mg/m^2	I.V	days 1, 8
	Repeat every 28 days x 6 cycles			
3. FAC :	Cyclophosphamide	500 mg/m^2	I.V	day 1
	Adriamycin	50 mg/m^2	I.V.	day 1
	5-Fluorouracil	500 mg/m^2	I.V	day 1
	Repeat every 21 days x 6 cycles			
4. FAC :	Cyclophosphamide	100 mg/m^2	P.O	days 1-14
	Adriamycin	30 mg/m^2	I.V.	days 1, 8
	5-Fluorouracil	500 mg/m^2	I.V	days 1, 8
	Repeat every 28 days x 6 cycles			
5. AC :	Adriamycin	60 mg/m^2	I.V	day 1
	Cyclophosphamide	600 mg/m^2	I.V	day 1
	Repeat every 28 days x 6 cycles			
6. A-- CMF:	Doxorubicin	60 mg/m^2	I.V	day 1
	Repeat every 21 days x 4 cycles after that followed by CMF			
	Cyclophosphamide	600 mg/m^2	I.V	day 1
	Methotrexate	40 mg/m^2	I.V	day 1
	5-Fluorouracil	600 mg/m^2	I.V	day 1

Repeat every 21 days x 8 cycles

Although adjuvant chemotherapy is useful, its side effects are unavoidable. Because chemotherapy agents interfere not only with cell replication of tumor cells, but also the normal cells cannot divide or proliferate. The chemotherapy effects the bone marrow, gastrointestinal mucosa, gonads, and hair follicles, however it only causes temporary damage (Wilkes, 1996: 97). The common side effects of chemotherapy are bone marrow depression, nausea, vomiting, anorexia, stomatitis, diarrhea, alopecia, hyperpigmentation of nails and skin, sexual dysfunction, and fatigue (Foltz, et al., 1996: 681; Wikers, 1996: 98-186).

For women with breast cancer, the most common side effects of chemotherapy are changes in appearance, temperature and bowel movement changes, and fatigue. The most distressing effects were difficulty sleeping, nausea, fatigue, and temperature changes (Berman, 1993 : abstract).

Fatigue and Associated factors

Fatigue is a universal symptom. It has been studied for more than 75 years (Ream & Richardson, 1996: 521). Preliminary studies were conducted during the First World War when researchers investigated the impact of fatigue on the efficiency and productivity of the industrial workforce (Cameron, 1973 cited in Ream & Richardson, 1996: 521). Nurses began to investigate fatigue in 1972. Hart (1978 cited in Piper, 1989: 188) compared fatigue patterns in multiple sclerosis patients versus healthy control subjects. After this time, the number of nursing studies about fatigue has increased dramatically.

Both healthy and ill people are faced with fatigue. In a chronic illness such as cancer, it is a serious problem. Because the cause of fatigue is unclear and the treatment of the chronic illness is complex, management of fatigue becomes a challenge. To effectively support patients, who are suffering from fatigue, nurses must develop the understanding of this phenomenon.

Definitions of fatigue

Definitions of fatigue have been developed by the disciplines of physiology, psychology, ergonomics, medicine, and nursing (Aaronson, et al., 1999: 45-46; Ream & Richardson, 1996: 520-522; Richardson, et al., 1998: 18). In nursing perspective, definitions of fatigue take a broader and more holistic view. The North American Nursing Diagnosis Association defines fatigue as "the self-recognized state in which an individual experiences and overwhelming, sustained sense of exhaustion and decreased capacity for physical and mental work that is not relieved by rest" (Carpenito, 1993: 316). Following a concept analysis, Ream and Richardson (1996: 527) defined fatigue as "a subjective, unpleasant symptom which incorporates total body feelings ranging from tiredness to exhaustion creation an unrelenting overall condition which interferes with individuals' ability to function to their normal capacity". Fatigue has been described by patients as tiredness, weakness, lack of energy, exhaustion, lethargy, depression, inability to concentrate, malaise, asthenia, boredom, sleepiness, lack of motivation, and decreased mental status (Winningham, et al., 1994:24). However, a consistent definition of fatigue has not emerged.

Mechanism of fatigue

Although the prevalence of fatigue in cancer patients has been reported very high, little is known about its mechanism. Aistars (1987: 25-30) has

proposed a theoretical framework of fatigue in the person with cancer. This framework is based on the General Adaptation Syndrome of Selye. She believed that prolong stress is the main cause of chronic fatigue in the person with cancer. Another theoretical framework of fatigue in cancer is the Piper's Integrated Fatigue Model, which was developed by Piper, Lindsey, and Dodd (1987: 17-23). They defined fatigue as a subjective feeling of tiredness that is influenced by circadian rhythm and stated that "fatigue can vary in unpleasantness, duration, and intensity. When acute, it serves a protective function; when it becomes unusual, excessive or constant (chronic), it no longer serves this function and may lead to the evasion to activity with the desire to escape". In this framework, they address many potential causes of fatigue, guides the assessment of possible etiologic factors related to fatigue, and point out the importance of considering multiple aspects of manifestations of fatigue (Jacobs & Piper, 1996: 1197; Piper, et al., 1987: 19; Winningham, et al., 1994: 24). However, the relationships between the components of the model must be developed further (Richardson, et al., 1998: 18; Winningham, et al., 1994: 24).

According to the Piper's Integrated Fatigue Model, many researchers try to investigate the mechanism of fatigue. For example, the study of the effects of tumor necrosis factor (TNF) and exercise on skeletal muscle by St. Pierre, Kasper and Lindsey (1992: 419-425). However, the actual mechanisms that produce fatigue are still unknown and when fatigue becomes a chronic sensation, a combination of mechanisms may be involved (Piper, et al., 1987: 19-20).

Patterns of fatigue

Since fatigue is reported as a symptom experienced by cancer patients who are being treated with chemotherapy, radiotherapy, biological therapy, and

surgery, and including following treatment (Richardson, 1995:23-24). Nurses try to develop an understanding of fatigue. In the studies of fatigue in cancer patients receiving chemotherapy, researchers found that the prevalence of fatigue among these patients has been estimated around 80-96% (Ivine et al, 1991:189). Despite the prevalence of studies in the area of the pattern, intensity, and duration of fatigue, they usually limited by the numbers and timing of data collecting.

In 1991, Pickard-Holley (1991: 13-19) examined the relationship between fatigue and various physical and psychological factors in 12 ovarian cancer patients receiving chemotherapy on days 1, 7, 14, and 21 of the treatment course. The fatigue trajectory was found to peak at day 7, and to decline gradually back toward the baseline before the beginning of the next course. In this study, fatigue was measured by the Rhoten Fatigue Scale. Unfortunately, because the measurements of fatigue were taken only at 7-day intervals, the height of the peak could have occurred before or after day 7.

Ivine and others (1994: 367-378) surveyed 47 patients receiving chemotherapy for breast, lung or ovarian cancer both before and 10-14 days after treatment, and compared their levels of fatigue with healthy control subjects. The instrument for measuring fatigue was the Pearson Byars Fatigue Feeling Checklist. The results of this study was reported that the chemotherapy patients experienced a significant increase in fatigue 14 days after treatment, and these increases were significant greater than the fatigue reported by healthy control subjects. Even though, the pattern of fatigue in this study came from a variety of cancers, it may not be referred to all populations.

Berger (1998: 51-62) studied patterns of fatigue and activity and rest in 72 breast cancer patient receiving adjuvant chemotherapy. The Piper Fatigue Scale was used to measure fatigue at 48 hours after each treatment and at treatment cycle midpoints for three cycles. Each patient in this study received one of three treatment regimens; (1) cyclophosphamide, methotrexate, and fluorouracil (CMF), (2) doxorubicin and cyclophosphamide (A/C), and (3) Cyclophosphamide, doxorubicin, and fluorouracil (CAF). This study found that the total and subscale fatigue scores were significantly different overtime, with scores higher at treatment time and lower at cycle midpoints. Unfortunately, fatigue was measured only 2 times for each cycle and the score of fatigue was derived from the 3 regimen. This may not represent a certain pattern.

Suh and Lee (1998: 331) reported the different finding on pattern of fatigue. From their study, fatigue levels in 17 breast cancer patients receiving adjuvant chemotherapy who were in a nonrhythmic walking exercise program (control group) were found at peak at the end of the second week and declined gradually back toward the baseline before the beginning of the next cycle. The initial level of fatigue continued until the end of the second week and gradually decreased in the experimental group. Fatigue in this study was measured by the Piper Fatigue Scale at five times, before beginning chemotherapy and one time per week for four weeks. Like the study of Pickard-Holley, the measurements of fatigue were taken at 7-day intervals, the height of the peak is not known.

Another study which aims to prospectively chart the onset, pattern, duration, intensity, and distress associated with fatigue, was carried out by Richardson, Ream and Wilson-Barnett (1998: 17-30). They examined fatigue in 109

patients receiving chemotherapy. In this study, the instrument that was used for measuring fatigue was a visual analog scale which measures different dimensions of fatigue: the extent of fatigue, the distress caused by this symptom, the degree to which it disrupted social activities, and the degree to which it interfered with work activities. The graphs derived from the data display four basic features of change, 1) dynamics at the start, middle, and conclusion of the diary, 2) large declines and improvements, 3) stability versus dynamic, and 4) parallel shifts. The different patterns are associated with a particular type of cancer, chemotherapy protocol, and methods of drug administration. For 5 breast cancer patients under treatment with the CMF protocol who received chemotherapy on days 1 and 8 and take an oral drug on day 1 to 14. Their fatigue remains relatively high for the first 14 days with a superimposed increase shortly after day 8. The limitations of this study were the small number of subjects in each chemotherapy protocol group, and patients were not of the same stage in their treatment course. Thus, the patterns of fatigue should be further investigated.

Associated factors

Fatigue is multifactorial and multidimentional. There are biological, psychological, social and personal factors that possibly influence onset, impact, expression, duration, and severity of the fatigue experience. The researchers try to identify specific factors that correlate with fatigue, but it is not clear.

According to the fatigue framework for the conceptualization of fatigue in healthy and in clinical populations proposed by Piper, Lindsey, and Dodd (1987: 17-23), there are several patterns which attribute fatigue. They are accumulation of metabolites, changes in energy and energy substrate patterns, activity/rest patterns, sleep/wake patterns, disease patterns, treatment patterns,

environmental patterns, symptom patterns, psychological patterns, changes in regulation/transmission patterns, social patterns, life event patterns, and innate host factors. The symptoms that may precede, accompany, or follow fatigue are nausea, vomiting, anorexia, pain, constipation, dyspnea, diarrhea, chills, perspiration, weakness, immobilization, thirst, hunger, itching, disorientation, pressure sores and insomnia (Piper, et al., 1987: 21).

Berger (1998: 55) studied the relationship between fatigue activity and rest in 72 patients during chemotherapy for breast cancer. Fatigue was measured at 48 hours after each treatment and at treatment cycle midpoints for three cycles by the Piper Fatigue Scale. The wrist actigraphs were used to measure activity and rest for 96 hours at each treatment and for 72 hours at each cycle midpoint. The results show that fatigue was negatively correlated with activity levels at all time except the cycle 2 midpoint and positively correlated with awaking at night only at the cycle 2 midpoint. However only 29-42 patients wore the actigraphs at each time. If all subjects wore wrist actigraphs at all the designated times, the results might be different.

Blesch and others (1991: 84-85) examined the behavioral, physical and biochemical factors that may be associated with fatigue on patients with breast and lung cancer receiving chemotherapy and/or radiation therapy. This study found that in 44 breast cancer patients, there was no significant correlation for any of the biomedical factors (serum albumin, hemoglobin, hematocrit, white blood count, serum sodium, serum potassium, serum calcium, serum alkaline phosphatase, serum bilirubin, SGOT, SGPT, narcotic use, antiemetic use, currently receiving antineoplastics, currently receiving radiation therapy) and fatigue. Pain and duration

of illness were the two physiologic factors (disease status at interview, stage of disease at diagnosis, duration of illness, medical treatment for cancer, height, weight, percentage change in weight, pain, and performance status) which correlated significantly with fatigue. In addition, psychological status significantly correlated with fatigue. There was no report on the relationship between fatigue and others behavioral variables (social support, marital status, employment, and sleep changes) in this study.

Irvine and others (1994: 373-378) studied the prevalence and correlation of fatigue in 54 patients receiving treatment with radiation therapy and 47 patients with chemotherapy for breast, lung, cervical, endometrial, or cervical cancer. They reported that hemoglobin and duration of treatment did not significantly correlate with fatigue. Symptom distress, mood disturbance, and alteration in one's usual functional activities positively related to fatigue. Negative correlation was found between fatigue and decreased weight, and white blood count decreasing at 10-14 days after chemotherapy. Of the symptoms, loss of appetite, shortness of breath, difficulty breathing, nausea, vomiting, and difficulty sleeping were all significantly related to fatigue at the last week of radiation therapy or 10-14 days after chemotherapy. The variables that significantly predicted fatigue were symptom distress and mood disturbance. Consistent with these findings, McCorkle and Young (1978, cited by Irvine, et al., 1991: 190) found a positive relationship between fatigue and mood, appetite, and insomnia in 60 cancer patients receiving chemotherapy and radiation therapy. In Thailand, Soivong (1995: 76) reported that nausea and vomiting correlated with fatigue in breast cancer patients receiving chemotherapy.

The result from the study of Pickard-Holley (1991: 13-19) show that no significant relationship between fatigue and age, stage of disease, course of treatment or depression in 12 adults with ovarian cancer receiving chemotherapy.

For the study in survivors of breast cancer, they also had both similar and different findings. Mast (1998: 139) studied 109 subjects, 1-6 years after treatment for stage I to III breast cancer with no metastasis, concurrent illness and treatment with chemotherapy. This study found that illness uncertainly had a positive relationship with fatigue. No relationships were found between fatigue and tamoxifen treatment, disease stage, age, and length of time since treatment.

Broeckel and others (1998: 1689-1696) examined the characteristics and correlation of fatigue in 60 women who had completed adjuvant chemotherapy for breast cancer. They reported that none of the demographic variables assessed (age, marital status, ethnicity, education, or employment status) were significantly related to fatigue. Similarly, none of the medical or treatment variables assessed (menopausal status, disease stage, time since breast cancer diagnosis, time since treatment completion, length of chemotherapy treatment, type of surgery, additional treatment with radiation therapy, or current use of tamoxifen) were significantly related to fatigue. Fatigue was significantly related to poorer sleep quality, more menopausal symptoms, greater use of catastrophizing as a coping strategy, and current presence of anxiety, mood, or adjustment disorder.

Piper, Weiss, and Mundy (1998: 308) identified risk factors of moderate and severe levels of cancer-related fatigue in 627 women survivors of breast cancer. They reported that the variables significantly predicted more severe levels of

fatigue. They included age, insomnia, disease recurrence, number of symptoms other than fatigue, and somatic and mood symptoms of depression.

Woo and others (1998: 915) reported that 332 breast cancer survivors, women who received combination therapy had significantly higher total fatigue scores than women who received radiation alone.

In addition, exercise is another factor, which may influence fatigue. However, the direction of the relationship is not clear. In the following section, the effect of exercise on fatigue will be presented.

Interventions of Fatigue

One of the reasons for the previous lack of interest in fatigue as a topic for research has been the lack of any effective interventions to improve it. The National Working Team on Fatigue in Sweden mailed a questionnaire to 422 oncology nurses in Sweden in order to determine the perception of nurses on the experience of fatigue in their patients and the nursing interventions to alleviate this symptom. Two hundred and thirteen questionnaires were returned (response rate = 49 %). The result of this study reported that these nurses regarded fatigue as the most common symptom in cancer patients, but there were few established nursing interventions. Nurses also wanted further education and tools for evaluation of fatigue, its causes and treatment (Magnusson, et al., 1997: 186-191). The patients undergoing treatment for cancer are often advised by the health care professionals to limit their activities and get plenty of rest when they are faced with fatigue.

There are only 2 interventions presented in the literature, exercise and group support. The recent evidence suggests that exercise is beneficial in cancer patients.

Mock and colleagues (1997: 991-1000) have reported the effects of a walking exercise program on fatigue, physical function, and emotional distress in 46 women beginning a six-week program of radiation therapy for early stage breast cancer. The result of this study indicated significant differences between groups on outcome measured. Fatigue and emotional distress decreased in the exercise group and remained consistently high in the usual care group while the score on physical functioning of the exercise group was higher than the usual care group. To support the effectiveness of the walking exercise on fatigue, Suh and Lee (1998: 331) show that the fatigue scores of the breast cancer patients in adjuvant chemotherapy who were in the experimental group (n = 17) weekly had significantly lower fatigue scores than those of the control group following the rhythmic walking exercise. Moreover, in the study on the effect of exercise on the patterns of daily fatigue in women with breast cancer receiving chemotherapy by Schwartz (1998: 310). The subjects who exercised (n = 16) demonstrated a mean percent increase in the 12-minute walking distance of 10.4 %, while the non-exercising subjects (n = 11) showed an average decline of nearly 16 %. She also suggested that a low intensity home-based exercise program was feasible for women with breast cancer receiving chemotherapy.

In contrast of this, there are some indications that patients themselves find that rest, rather than exercise is effective in relieving their fatigue. Nail and associates (1991: 883-887) reported that patient receiving chemotherapy found that naps and decreasing activity were moderately effective in reducing their fatigue. Rhodes, Watson, and Hanson (1988: 186-194) reported that in response to fatigue, nine cancer patients, who had received six cycles of chemotherapy, changed their self-care activities on the day of chemotherapy and the day following chemotherapy. They tried

to limit their expenditure of energy by (1) planning/scheduling activities and work, (2) decreasing nonessential activities, and (3) increasing dependence on others for home management (meal preparation, cleaning, grocery shopping), transportation and care dependence.

The result from the study by Graydon and others (1995: 23-28) in 99 women with breast, cervical, endometrial or ovarian cancer who receiving chemotherapy (45 women) or radiotherapy (54 women) reported that sleep and exercise were the most effective strategies to relieve their fatigue. The others effective strategies were walking, taking naps, talking to friends or doing something different.

One of the reasons that may explain the different finding is the total score of fatigue was varied. However, to manage fatigue effectively, the relationship between sleep and exercise should be examined.

Moreover, because fatigue was reported in correlation with emotional distress, psychological interventions is used for management of fatigue (Stone, et al., 1998:1673). Spiegel and others (1981: 527-533) studied the effect of weekly group support meetings for 58 patients with metastatic breast cancer. They found that after 1 year of regular meetings, the intervention group (n = 34) had significantly less fatigue than the control group (n = 24).

Self-Care Actions to Manage Fatigue

When fatigue disrupts patients daily lives, they initiated self-care actions to help them to manage fatigue and allow them to continue with their usual activities (Richardson & Ream, 1997: 41). There are some studies about self-care actions initiated by cancer patients receiving chemotherapy.

According to the study by Richardson and Ream (1997: 35-43), self-care actions initiated by 109 patients receiving different chemotherapy protocols in response to fatigue and their effectiveness were recorded in the self-care behavior record in their diary. Each patient was invited to maintain the diary for one course of chemotherapy. From this study, 693 actions were recorded by the patients in their diaries. Most of patients performed one action during a day in attempt to combat fatigue. Thirty-one different self-care actions were undertaken by these patients to manage their fatigue. The self-care actions were classified into seven categories; 1) modification/alteration in patterns of activity and rest, 2) psychological strategies such as listening to relaxation tapes or music, reading, or watching television, 3) attempting to preserve normality, 4) relieving symptoms and providing comfort, 5) social intervention like engaging in hobbies or holding a worthwhile conversation, 6) nutritional strategies, and 7) alteration in sleep/waking patterns. Modification of activity and rest pattern was the most common action taken by patients to relieve their fatigue. Therefore, not all of self-care activities initiated by patients were effective, providing only partial relief on 53.7 % of occasions and no relief on 9.4 % of occasions. Most frequent and partial of nearly completely relieved actions were rest/nap during the day, reading, walking, watching television, sleeping for the most of the day, went to bed early, undertaking household chores, having a worthwhile conversation, gardening, going to work, and engaging in social activities.

From the finding of Mock and colleagues (1997: 998), rest, naps, and quiet time were the most frequent self-care activities to relieve fatigue that were used by 46 women beginning a six-week program of radiotherapy for early stage breast cancer. The other groups of self-care activities were 1) sleeping at night, 2) reading, listening

to music, talking with friends, change of scenery, 3) scheduling of activity breaks, setting priorities, 4) walking, exercise, yoga, and 5) taking a medication.

Although patterns of fatigue in breast cancer patients receiving chemotherapy have been studied, they may not be a representation of the population. The limitations of the studies were the number of sample size, the number of data collecting, type of protocols, and the instruments used for measuring fatigue. In terms of fatigue and related factors, they have also been studied, but the results were not clear. The reason may be that the factors that correlated with fatigue are not just one factor. For self-care actions to manage fatigue, there were several actions initiated by cancer patients. Some groups of patients choose to limit their activities while another group preferred to exercise or do something different. From the different culture, health beliefs, and health care system, Thai patients may have others strategies to reduce fatigue. The understanding of patterns of fatigue, related factors, and self-care actions among breast cancer patients receiving chemotherapy will guide the strategies to manage fatigue or alleviate fatigue for these patients.

CHAPTER III

MATERIALS AND METHODS

This prospective and descriptive research studied the patterns of fatigue, the relationship between fatigue and nausea and vomiting, sleep disturbance, and exercise. In addition self-care actions and its effectiveness to alleviate the fatigue symptom among breast cancer patients receiving chemotherapy were studied.

Population and Sample

The population in this study is breast cancer patients receiving chemotherapy at the outpatient chemotherapy clinic, Medical Department, Ramathibodi Hospital according to the following criteria;

1. Women with an age ranged from 20 to 60 years.
2. Receiving adjuvant chemotherapy for breast cancer in the first three courses (the study followed the subject for 3 cycles to explore the relationship between courses of chemotherapy and fatigue; the normal regimen consists of 6 cycles).
3. The adjuvant chemotherapy is cyclophosphamide, methotrexate, and 5-fluorouracil (this regimen is the most commonly used for adjuvant chemotherapy).
4. Able to understand and speak Thai.
5. Agree to participate in this study.

Exclusion criteria:

1. Patients with recurrent breast cancer.

2. Patients with chronic illness such as hypertension, heart disease, and diabetes mellitus, and psychiatric patients.

The purposive sampling was used to recruit 30 breast cancer patients (an estimated number of patients who are new to receive adjuvant chemotherapy in 3 months) from the outpatient chemotherapy clinic, Medical Department, Ramathibodi Hospital.

Setting

The outpatient chemotherapy clinic of the Medical Department and the short stay service room at Sirikit Medical Center, Ramathibodi Hospital were selected for this study. The outpatient chemotherapy clinic is opened on Tuesday and Wednesday morning between 9.00 a.m. to 12.00 a.m. Four oncologists, 2 oncology nurse specialists and 2 general nurses operate the clinic. There are about 80-120 patients visit in this clinic each day. The oncologists evaluate the patients and prescribe medications, diagnostic tests, including chemotherapy agents. Two specialist nurses provide educative supportive care for the patients and their families, including coordinating care with other departments such as the ambulatory care unit for home care or social service for patients' welfare. The other two nurses mix and administer chemotherapy agents to the patients intravenously.

The short stay service room at Sirikit Medical Center, Ramathibodi Hospital is open between 9.00 a.m. to 11.00 p.m. This room provides for cancer patients who are working during therapy, or must receive chemotherapy for many hours. There are

one nurse, one practical nurse, and one clerk who provide prescriptive treatment and counseling to the patients.

Instruments

1. **The demographic information sheet** included the information related to participant's age, religion, marital status, education, occupation, income, menopausal status, and cancer treatment experiences (See appendix B).

2. **The revised Piper Fatigue Scale (PFS)**, which consists of 22 items, 0-10 scales (Piper et al., 1998: 677-684). It has been used to measure four dimensions of subjective fatigue: behavioral/severity (six items), affective meaning (five items), sensory (five items), and cognitive/mood (six items). Each is assigned a numerical value for each response from 0, the least of perceived of fatigue, to 10, the most perceived of fatigue.

To score the PFS, add the items contained on each specific subscale together and divide by the number of items on that subscale. This will give a mean subscale score for the subject and keeps the subject's score on the original scale from "0" to "10". If there is a missing item data and the respondent has answered at least 75%-80% of the remaining items on that particular subscale, calculate the subscale mean score based on the number of items answered, and substitute that mean value for the missing item score (mean-item substitution). Recalculate the subscale score. A total fatigue score is calculate by adding the 22-item scores together and divide by 22 in order to keep the score on the same numeric "0" to "10" scale. The higher scores mean more fatigue.

The revised PFS was adapted from the PFS. The content validity of the PFS were determined by a literature review and reviewed by an 11-member national fatigue expert panel. Concurrent validity was established by significant correlation between the subscale and mood disturbance scores of the Profile of Mood States (POMS) and the Fatigue Symptom Checklist (FSCL) and total fatigue scores (Piper, et al., 1998: 678). To revised PFS, a 40 item, numeric scale version of the PFS was mailed to 2,250 women survivors of breast cancer to confirm the multidimensionality of the PFS and to reduce the total number of PFS items without compromising reliability and validity estimates. Seven hundred and fifty-five surveys (32%) were returned. Of these, 382 women met the methodological study's criteria for having completed each of the 40 items on the PFS (Piper, et al., 1998: 677).

A principal axes factor analysis with oblique rotation was used to analyze the items on the PFS. The final version of the PFS consists of 22 numerically scale items. The internal consistency reliability of the retained subscales, as measured by Cronbach's alpha ranged from 0.92-0.96 and the standardized alpha for the entire scale (22-items) of this instrument was 0.97 (Piper, et al., 1888: 680).

The revised PFS was translated into Thai language by the investigator. After translation, the Thai version of the revised PFS was evaluated for content validity by 5 experts, 2 oncologists, 1 oncology nurse, and 2 nursing instructors who are expert in cancer care. It was tested with breast cancer patients before language revision.

The Thai version instrument was tested with 10 breast cancer patients who have similar characteristics as the samples for 7 days. The internal consistency of this tool, which was measured by Cronbach's alpha, ranged from 0.97 to 0.99 for the entire scale and from 0.88-0.99 for the subscales.

This tool was tested with 30 samples for 84 days and has an alpha value for the entire scale ranged from 0.96 to 0.99, and subscales ranged from 0.88 to 0.99.

3. The modified form of the Rhodes Index of Nausea and Vomiting Form II (INV-2) is an 8-item, 5 point, Likert-type self-report instrument. This tool was modified from the INV-2 by Namjantra (1992). The INV-2 has been used to measure the patient's perceived frequency and distress of their nausea, vomiting, and retching and the duration of nausea and amount of vomiting (Rhodes, et al., 1987: 38).

To calculate the score from the modified form of the INV-2, reverse item 1, 2, 3, and 4. Assign a numeric value to each response from 0 being the least amount of distress, to 4 being the most distress. The total symptom experience from nausea and vomiting is calculated by summing the 8-item scores together. The potential range of scores is from "0" to "32".

The concurrent validity of the INV was estimated by comparing the ratings of patients with the rating of a family member the evening following chemotherapy using Spearman's correlation coefficient ($r = 0.87$, $n = 18$, $p < 0.001$). The construct validity of the INV was measured by the ability of the tool to discriminate between well citizens and cancer patients. Factor analysis supports the three experience subscales as unique and distinct.

The internal reliability of the INV was measured by two methods; the split-half correlation was 0.90, and Cronbach's Alpha was 0.89 to 0.97 over index administrations. Cronbach's Alpha for the INV-2 was 0.98 (Rhodes, et al, 1987: 38).

The INV-2 was translated into Thai by Namjantra (1992). The content validity of the Thai version was reviewed by 8 experts, 2 oncologists and 6 oncology nurse specialists. It was used with cancer patients receiving chemotherapy before the

language revision and changed format. In a study of 18 - 44 subjects, Namjantra reported that the internal consistency reliability measured by Cronbach's alpha ranged from 0.86-0.91.

Soivong (1995) revised this tool by changing the duration of measurement from 12 hours to 24 hours. In the study of 44 subjects, she reported that the internal consistency reliability measured by Cronbach's alpha ranged from 0.75-0.94.

Since the modified form of INV-2 was used in the prior studies with a similar sample of patients with cancer and yielded a high reliability, thus the pretest of this instrument was not performed. However when it was used in this study with 30 samples for 84 days, the Cronbach's alpha ranged from 0.86 to 0.98.

4. The sleep disturbance scale derived from the items of sleep disturbances on the Adapted Symptom Distress Scale (ASDS) Form II, developed by Rhodes and Watson (1987 cited in Simms, Rhodes, & Madsen, 1993:236). This scale is a 2-item, 5-point, Likert type self-report tool. The number value from 0 being no symptom experience, to 4 being most severe symptom experience, was assigned. The total experience score is calculated by summing the 2-item scores together. The total possible score ranged from "0" to "8".

The sleep disturbance scale was translated into Thai language by the investigator. After translation, the Thai version of this tool was evaluated for accuracy in translation by 5 experts, 2 oncologists, 1 oncology nurse, and 2 nursing instructors who are experts in cancer care. It was tested with breast cancer patients before language revision.

The Thai version tool was tested with 10 breast cancer patients who had similar characteristics as the samples for 7 days. The internal consistency of this tool,

which was measured by Cronbach's alpha, ranged from 0.79 to 0.98. When this tool was used with 30 samples for 84 days in this study, the Cronbach's alpha ranged from 0.85 to 0.99.

5. **The exercise question** was developed by the investigator. This questionnaire assesses the frequency and duration of exercise in each week. The score 1 to 5 was assigned according to the load of exercise determined by the American College of Sports Medicine (ACSM) (1990:265), which ranged from 1 means do not exercise, to 5 means exercise 3-7 days per week and more than 20 minutes each time was done.

This tool was evaluated for content validity by 5 experts, 2 oncologists, 1 oncology nurse, and 2 nursing instructors who are expert in cancer care. It was tested with 10 breast cancer patients who had similar characteristics as the samples to revise the question. Because it is a single question, the internal consistency reliability was not tested.

6. Self-care action record is an open-ended question that was adapted from Richardson (1994: 790-791). The subjects would record their self-care actions to manage fatigue at home. The investigator would review with the patients about their self-care actions at the appointment times.

In addition to recording the actions they undertook, subjects would be asked to evaluate the effectiveness of each of those actions on a 5-point scale according to the following criteria:

1 means not relieved

2 means partly relieved

3 means moderately relieved

4 means nearly completely relieved

5 means completely relieved

This record was evaluated for content validity by 5 experts, 2 oncologists, 1 oncology nurse, and 2 nursing instructors who are experts in cancer care. It was tested with 10 breast cancer patients before language revision.

Data Collection

After receiving the permission from the Faculty of Graduate Studies, Mahidol University, data collection were as follows:

1. Recruit all patients who met the criteria from an appointment list at the outpatient chemotherapy clinic on Tuesday and Wednesday morning.

2. Inform the patients the purpose of the study, the time required for participation, assurance of confidentiality, anonymity and freedom of withdrawal from the study at any time. The verbal explanation was given when there were some questions about the questionnaire.

3. To assure patient's understanding of all the questionnaires, after the patients agreed to participate in this study, the investigator explained the questionnaires to the patients and the patients would practices to answer all questionnaires. Then, the data were collected.

Procedures

1. The demographic information was collected at the initial contact. Data related to cancer diagnosis and treatment was obtained from the patient's record.

2. The patients and/or families would require keeping the dairy record of fatigue, nausea and vomiting, sleep disturbance, and self-care actions to manage fatigue and their effectiveness for 3 months. Each diary is a 7-day self-record. Four diaries were given to each subject for one treatment course.

The first diary was given to the subject on the first day of the first chemotherapy course. Each subject would answer the questionnaire related to fatigue, nausea and vomiting, and sleep disturbances in the evening at the same time every day. On day 7, the subject would answer the question on exercise. If the patients cannot read or write, the families would read the questionnaire to the patients and write the answers according to patients' choices. On the second time of chemotherapy administration in the first cycle, day 8 of the treatment, the investigator contacted the subjects again for a second interview and collected the first diary. The second, third, and fourth diaries were given to the subjects. The second and the third diary would be mailed to the investigator after the subjects completed each diary (researcher prepared an envelope with a stamp for the return diary). For subjects who had a problem to mail the diary back to the investigator, they could bring them back with the fourth diary. The fourth diary was obtained on the first day of a second treatment course. Thus, the data was continuously recorded for 28 days for each cycle. If the subjects forget to bring the first or the fourth diary with them at the appointment times, they could mail it back to the investigator. The procedure was conducted again in the second and the third treatment course. The total number of the diaries for each subject was twelve. The summary of data collection in each course of chemotherapy is shown in Figure 2.

Chemotherapy	A course of chemotherapy				A course of chemotherapy				A course of chemotherapy				
	Week				Week				Week				
Task	1 or d_1	2 or d_8	3	4	1 or d_1	2 or d_8	3	4	1 or d_1	2 or d_8	3	4	1 or d_1
Fatigue/ Nausea and vomiting/ Sleep disturbances/ Self-care actions	◄	.....	.....	.....	.....	.....	✏	.....	.....	.....	.....	►	
Exercise	*	*	*	*	*	*	*	*	*	*	*	*	
Review	✳	✳			✳	✳			✳	✳			✳

✏ The subjects recorded by themselves every day for 12 weeks

* The subjects recorded by themselves once a week

✳ The investigator reviewed with the subjects about their self-care actions at an appointment time

Figure 2. Diagram for Data Collection

Data Analysis

The statistical package for the social sciences for Windows (SPSS/FW) program was used for data analysis, as follows:

1. Descriptive statistics (mean, frequency, and percentage) was used to describe the sample.

2. Cluster analysis was used to identify the patterns of fatigue. The graph was then illustrated.

3. Friedman test was used to compare the difference of the mean scores of fatigue among treatment courses.

4. Friedman test was used to analyze the difference in the intensity of fatigue from the first day of the treatment course until the end of each course.

5. Spearman's rho correlation was used to analyze the relationships between fatigue and nausea and vomiting, sleep disturbance, and exercise.

6. Each self-care action, which was performed by the sample, was presented with frequency.

7. The average effectiveness of the self-care actions was determined through the mode and mean.

CHAPTER IV

RESULTS

The purpose of this descriptive research was to study the patterns of fatigue, related factors, self-care actions to manage fatigue and their effectiveness among patients with breast cancer receiving chemotherapy. The findings from this study are presented as follows;

1. demographic data of subjects
2. changes in intensity of fatigue
3. patterns of fatigue
4. relationship between the variables
5. self-care actions to manage fatigue and their effectiveness.

Demographic Data of Subjects

A total of 42 breast cancer patients who met the inclusion criteria were approached and asked to participate in this study. Of these, 38 initially agreed to participated, however 30 patients finished the study. Participants ranged in age from 36 to 59 years ($\bar{x}$ = 45.63). All of them were Buddhist. The majority of the participants marital status were married (63.3%) and Pre-menopausal (60%), and the educational backgrounds were primary school (40%). By occupation, 26.7% were government officer, and 10% were unemployed. A total family income was less than 5,000 baht per month (33.3 %). Only 26.7% of the participants had no economic problems. For method of medical payment, 36.7% could received total reimbursement

and 30% were totally self-paying. Twenty-two (73.3%) participants were diagnosed with Stage II disease. Most of subjects received Plasil and Decadron (93.3%) before cytotoxic administration (Methotrexate and 5-FU). Information about the demographic characteristics of study samples is listed in Table 1.

Table 1. Frequency and percentage of demographic characteristics of study sample (n = 30).

Characteristics		Frequency	Percentage
Age			
31-40		7	23.33
41-50		17	56.67
51-60		6	20.00
Range	36-59		
Mean	45.63		
SD	5.51		
Religion			
Buddhism		30	100.00
Educational background			
Primary school		12	40.00
Secondary school		6	20.00
Diploma		4	13.33
Bachelor's degree		8	26.67
Marital status			
Single		6	20.00
Married		19	63.33
Divorced/ Separated/ Widowed		5	16.67
Occupation			
Government officer		8	26.67
Business employee		4	13.33
Commerce		2	6.67
Farming		3	10.00
General employee		4	13.33
House wife		6	20.00
Unemployed		3	10.00

Table 1. Frequency and percentage of demographic characteristics of study samples (n = 30) (continued).

Characteristics	Frequency	Percentage
Family income/month		
< 5,000	10	33.33
5,001 - 10,000	5	16.67
10,001 - 15,000	3	10.00
15,001 - 20,000	3	10.00
20,001 - 25,000	3	10.00
25,001 - 30,000	3	10.00
> 30,001	3	10.00
Payment		
Total reimbursement	11	36.67
Insurance	1	3.33
Partially self-paying	6	20.00
Totally self-paying	9	30.00
Social welfare	3	10.00
Economic problems		
None	8	26.67
Mild	7	23.33
Moderate	9	30.00
Severe	6	20.00
Menopausal status		
Pre-menopausal	18	60.00
Post-menopausal	12	40.00
Stage of disease		
Stage I	8	26.67
Stage II	22	73.33
Antiemetic drug		
Plasil + Decadron	28	93.33
Zofran + Decadron	1	3.33
Zetron + Decadron	1	3.33

The study sample received a modified radical mastectomy (MRM) before receiving adjuvant chemotherapy with CMF protocol. Under treatment with this

protocol, subjects received bolus or short term infusion chemotherapy on days 1 and 8 and took an oral drug on day 1 to 14.

The data on fatigue, nausea and vomiting, and sleep disturbance should be obtained from 2,520 observations, but one subject forgot to record them for 4 days. Therefore, 2,516 observations of data collection were used for data analysis in these three variables. For exercise, the data was recorded once every week. Thus, the total was 360 observations but only 358 observations was use to determine the correlation.

Prevalence of Fatigue

All patients reported fatigue at some point during the course of chemotherapy. However one patient has fatigue on only the first and second, and none on the third course of chemotherapy.

The subjects were asked to identify the periods of the day when they experienced fatigue. In their diaries, they sometimes gave more than one response or failed to response. Of all the data obtained, the prevalence of fatigue within a day is shown in Table 2. Respondents reported that late afternoon and early evening (34.69% and 34.02%) were the usual periods that fatigue occurred.

Table 2. Prevalence of fatigue within a day.

Periods of day	Frequency	Percentage
Early morning	315	13.23
Late morning	320	13.44
Early afternoon	414	17.39
Late afternoon	826	34.69
Early evening	810	34.02
Late evening	467	19.61

Changes in Intensity of Fatigue

Mean of total fatigue scores and subscales scores of fatigue among three courses of treatment are displayed on Figure 3. Fatigue scores were the highest in the affective meaning subscale dimension at each time, followed by sensory, behavioral/severity, and cognitive/mood dimension. The patterns of fatigue score in each course seem to be the same.

The first research question concerns the changes in intensity of fatigue over the course and over time of treatment. To answer this question, Friedman test was used to analyze the data.

Changes in intensity of fatigue over course of treatment

Friedman test was used to analyze data for changes in intensity of total fatigue scores over a course of treatment. As shown in Table 3, no significant difference were recorded over course ($\chi^2 = .48$). Figure 4 displayed the plot of mean total fatigue scores in 3 courses. The total fatigue score was higher on day 4 then slightly decreased and raised again on day 8. The peak was found at day 9, then it gradually declined.

Table 3. Comparison of differences of total fatigue scores among three courses of chemotherapy by Friedman test.

PFS	course	n	Range	Mean	SD	Chi-Square
Total fatigue	1	29	0.23-6.72	3.01	1.62	.483[ns]
score	2	29	0.19-6.48	2.89	1.80	
	3	29	0.00-6.89	2.93	1.95	

[ns] $p>.05$

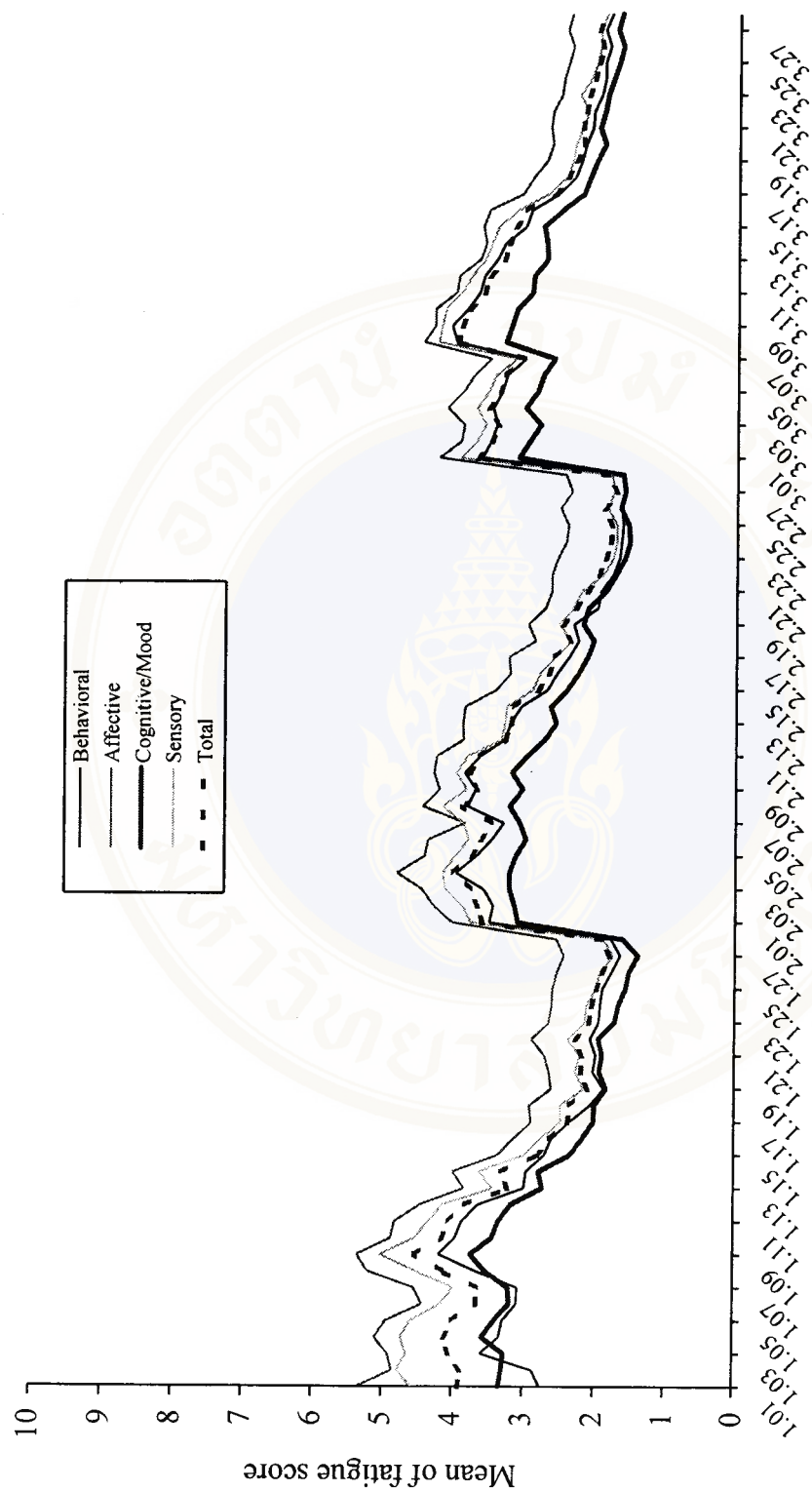

Figure 3. Plot of mean Piper Fatigue Scale Scores over time.

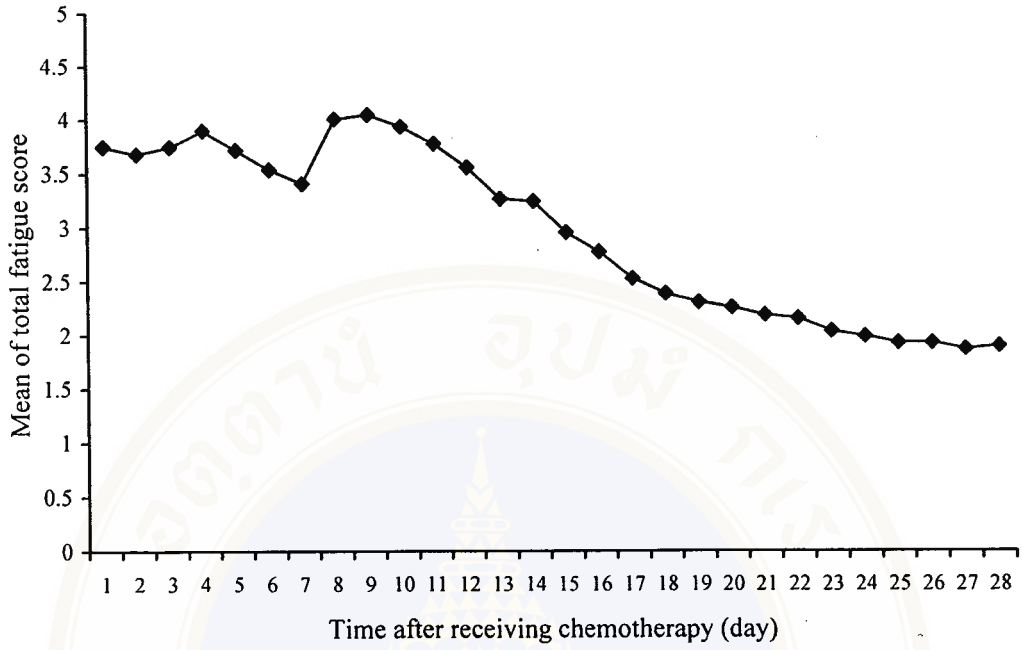

Figure 4. Plot representing the pattern of fatigue in three courses

Changes in intensity of fatigue over time of treatment

The Friedman test was employed to determine whether there were any significant differences in respondents' fatigue scores according to the days within a course. Friedman test was used due to the distribution of data was nonnormal (positive skew) and the data was obtained from a single sample. The result is shown in Table 4. It indicated significant differences between fatigue scores over time within a course of treatment. The higher intensity of fatigue was found on days 8, 9, and 10, and lowest on days 25 and 26.

Table 4. Comparison of differences of total fatigue scores over time within a course of treatment by Friedman test.

PFS	Times after receiving Chemotherapy (day)	n	Range	Mean	SD	Chi-Square
Total	1	90	0-10.00	3.75	2.37	755.95**
Fatigue	2	90	0-8.86	3.69	2.27	
Score	3	90	0-8.00	3.75	2.02	
	4	90	0-8.05	3.90	2.20	
	5	89	0-9.09	3.72	2.21	
	6	89	0-9.59	3.54	2.23	
	7	88	0-8.41	3.41	2.28	
	8	90	0-9.00	4.01	2.55	
	9	90	0-9.09	4.05	2.38	
	10	90	0-8.91	3.94	2.18	
	11	90	0-8.32	3.78	2.11	
	12	90	0-8.23	3.56	2.10	
	13	90	0-8.09	3.27	2.04	
	14	90	0-8.05	3.25	2.07	
	15	90	0-8.17	2.96	2.16	
	16	90	0-8.18	2.78	2.08	
	17	90	0-7.64	2.53	2.05	
	18	90	0-7.18	2.39	2.01	
	19	90	0-7.55	2.31	2.05	
	20	90	0-6.86	2.26	1.97	
	21	90	0-7.00	2.19	1.99	
	22	90	0-8.09	2.16	1.97	
	23	90	0-7.14	2.04	1.89	
	24	90	0-7.41	1.99	1.89	
	25	90	0-4.41	1.93	1.88	
	26	90	0-7.27	1.93	1.88	
	27	90	0-7.59	1.87	1.89	
	28	90	0-7.55	1.90	1.94	

** $p<.001$

Patterns of Fatigue

From the previous results, fatigue did not change over courses of treatment but changed over time within a course. The mean of fatigue scores on each day of three courses in used as data to illustrate a basis feature of change in Figure 4.

Fatigue occurred after receiving chemotherapy. It was found to peak on day 9 and declined gradually back toward nearly the baseline before the next course.

Because the intensity of fatigue among the sample within a day was scattered, patterns of fatigue were explored. Cluster analysis was used to identify them. The amount of patterns was determined by investigator.

From the pattern analysis, the intensity of fatigue (range 0-10) was divided into categories of mild (M = 0.00-2.99), moderate (M = 3.00-5.99), and severe (M = 6.00-10.00). Therefore, four patterns of fatigue were classified and mean scores of each group were plotted and displayed in Figure 5.

Pattern 1: Severe and then gradually declining (n = 8)

Pattern 2: Moderate and sustained (n = 20)

Pattern 3: Moderate and then gradually declining (n = 27)

Pattern 4: Mild and then gradually declining (n =33)

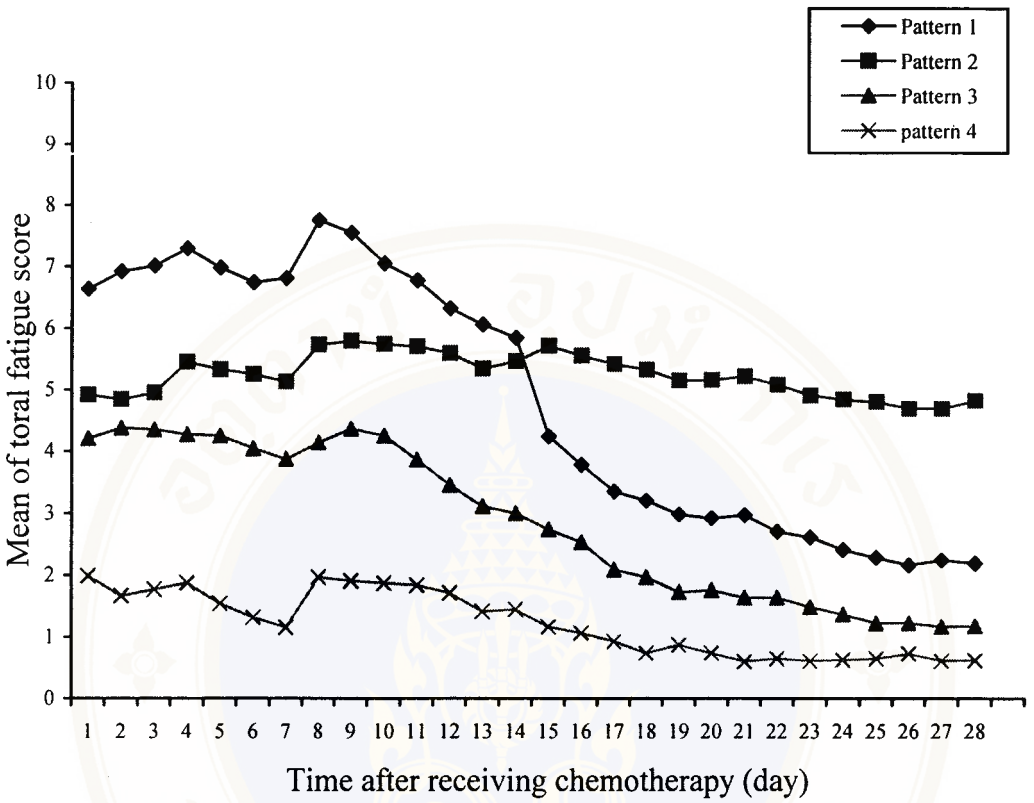

Figure 5. Plots representing patterns of fatigue

Fatigue was perceived by this sample as being approximately the same intensity with each treatment course, however some of them had a difference in intensity of fatigue. Nineteen patients had only one pattern, 9 patients had 2 patterns, while other 2 had 3 patterns as shown in Table 5.

Table 5. Number of patients in the patterns of fatigue.

Number of patterns	Category of pattern	Frequency
One	1	1
	2	5
	3	5
	4	8
Two	1 and 3	3
	2 and 3	2
	2 and 4	2
	3 and 4	2
Three	2, 3, and 4	2

Relationships among Variables

After receiving chemotherapy, some of the samples experience nausea and vomiting. The mean of nausea and vomiting scores were higher at 8, 9, 10, and 11. The peak of nausea and vomiting was found on day 9. After the first 2 weeks of chemotherapy administration, nausea and vomiting scores were declined as shown in Table 6.

Table 6. Descriptive statistic of nausea and vomiting scores after receiving chemotherapy.

Times after receiving Chemotherapy (day)	n	Range	Mean	SD
1	90	0-23	4.72	6.16
2	90	0-24	5.41	6.66
3	90	0-25	5.51	6.27
4	90	0-24	5.76	6.86
5	89	0-25	5.89	7.08
6	89	0-25	5.38	6.66
7	88	0-22	4.88	6.14
8	90	0-24	6.44	7.10
9	90	0-24	7.06	6.94
10	90	0-23	6.71	6.68
11	90	0-24	6.33	7.01
12	90	0-25	5.16	6.41
13	90	0-25	4.86	6.35
14	90	0-26	4.48	6.30
15	90	0-23	3.77	5.71
16	90	0-22	3.42	5.31
17	90	0-20	2.70	4.84
18	90	0-20	2.07	4.22
19	90	0-20	1.96	3.99
20	90	0-20	2.06	4.07
21	90	0-20	1.76	3.86
22	90	0-20	1.73	3.71
23	90	0-17	1.49	3.48
24	90	0-16	1.40	3.37
25	90	0-16	1.29	3.27
26	90	0-16	1.27	3.29
27	90	0-14	1.34	3.43
28	90	0-14	1.26	3.26

As nausea and vomiting, the subject experienced sleep disturbance after cytotoxic administration. Sleep disturbance score was higher at day 1 then it was declined before increased again to peak at day 8 before gradually declined as shown in Table 7.

Table 7. Descriptive statistic of sleep disturbance scores after receiving chemotherapy.

Times after receiving Chemotherapy (day)	n	Range	Mean	SD
1	90	0-8	2.58	2.11
2	90	0-8	2.13	1.93
3	90	0-7	2.07	1.92
4	90	0-7	2.18	2.06
5	89	0-7	2.03	2.14
6	89	0-7	1.98	2.08
7	88	0-7	1.85	2.05
8	90	0-7	2.82	2.29
9	90	0-7	2.39	1.97
10	90	0-7	2.13	1.88
11	90	0-7	2.19	1.95
12	90	0-7	1.84	1.75
13	90	0-7	1.78	1.73
14	90	0-7	1.69	1.80
15	90	0-6	1.44	1.48
16	90	0-6	1.43	1.62
17	90	0-6	1.28	1.54
18	90	0-6	1.12	1.45
19	90	0-6	1.09	1.42
20	90	0-6	0.99	1.39
21	90	0-6	1.08	1.52
22	90	0-6	1.01	1.36
23	90	0-6	0.94	1.41
24	90	0-5	0.84	1.33
25	90	0-6	0.93	1.47
26	90	0-6	0.90	1.39
27	90	0-5	0.89	1.27
28	90	0-5	0.84	1.31

For exercise, some patients did not performed any exercises, some had irregularly exercises. The frequency of exercise performed by the sample was shown in Table 8, and type of exercise was illustrated in Table 9.

Table 8. Frequency and duration of exercise which patients performed in three courses of chemotherapy.

Exercise	No. of recorded
Do not exercise	76
Exercise 1-2 days weekly, less than 20 minutes each time	58
Exercise 1-2 days weekly, more than 20 minutes each time	15
Exercise 3-7 days weekly, less than 20 minutes each time	170
Exercise 3-7 days weekly, more than 20 minutes each time	41

Table 9. Type of exercises which patients performed (n = 30).

Type	No. of patients	Percentage
No exercise	4	13.33
Joint movement	9	30.00
Walking	4	13.33
Move arm and jogging	1	3.33
Move arm and walking	10	33.33
Walking and jogging	2	6.67

The third research question concerns the possible relationship between nausea and vomiting, sleep disturbance, exercise, and fatigue. Mean scores of fatigue, nausea and vomiting, and sleep disturbance were calculated weekly, and then Spearman's rank order correlation was performed to determine the relationships among these three variables along with exercise (since exercise were collected once a week). Results were reported in Table 10. Fatigue was positively correlated with nausea and vomiting at the first, second, and third courses of chemotherapy ($r = .356$, .455, and .358 respectively, all $p_s < .01$), and was also positively correlated with sleep disturbance in all courses ($r = .468$, .567, and .540 respectively, all $p_s < .01$). No statistically significant relationship was found between fatigue and exercise in all courses ($r = -.077$, .102, and .119

respectively, all $p_s > .05$). In addition, there was positive relationship between nausea and vomiting and sleep disturbance at all courses (r = .456, .538, and .464 respectively, all $p_s < .01$) as shown in Appendix F.

Table 10 . Spearman's rho correlation coefficients between fatigue and nausea and vomiting, sleep disturbance, and exercise.

Course	N	nausea and vomiting	sleep disturbance	exercise
1	118	.356**	.468**	-.077
2	120	.455**	.567**	.102
3	120	.358**	.540**	.119

** p<.01

Self-Care Actions to Manage Fatigue and Their Effectiveness

Self-care actions used by patients to manage fatigue

Twenty-eight different self-care actions were undertaken by patients to relieve their fatigue. Two thousand, three hundred and seventy-seven occasions were recorded by the subjects in their diaries. The self-care actions recorded were classified into five common categories based on the general sets of actions for meeting universal self-care requisites (Orem, 1995: 191-200). The categories of self-care behaviors are listed in Table 11. On the days when subjects were fatigued, they sometimes reported more than one action or often failed to perform self-care actions. Lying down was the most common action taken by patients to relieve their fatigue. It also was used by a large proportion (70%) of the study sample. The most common self-care actions were lying down, exercise, watching television, walking, and undertaking household chores. The less frequency used strategies were tell one-self: not to worry, engaging in hobbies, listening Tamma tape, massage, going shopping, and taking things easy.

Table 11. Categories of self-care actions.

Category of self-care	Percentage of subjects employed the action	Self-care strategy	number of occasions record for category
Maintenance of a balance between activity and rest	70.00	Lying down Rest	764
	60.00	Exercise Walking Gardening Taking things easy Finding something to do	494
	56.67	Watching television Listening to music Listening to Tamma tape Reading book Singing Taking meditation Praying Telling one-self: not to worry	549
Maintenance of a balance between solitude and social interaction	53.33	Talking with friends/ relatives Playing with children Engaging in hobbies Travelling	241
Promotion of normalcy	33.33	Going to work Doing household chores Cooking Going shopping	191
Prevention of discomfort and symptom distress	20.00	Taking medication Taking a bath Massage	70
Maintenance of sufficient intakes of food and water	20.00	Eating Drinking juice	68

The effectiveness of self-care

The self-care activities initiated by the patients provided moderate relief on 47.75% of occasions and nearly complete relief on 36.73% of occasion. Self-care actions, which contributed partial or complete relief from fatigue, were only 14.18% and 1.35% respectively.

The frequently used strategies to relieve fatigue and their effectiveness can be seen in Table 12. Lying down, praying, meditation, working, travelling, and listening to Tamma tape were the most effective activities to alleviate fatigue.

Table 12. Frequency of patients performing self-care and their average effectiveness when they experienced fatigue in a daily.

Frequency recorded Self-care actions	Number of recording	Mode effective rating *	Mean effective rating*
Listening Tamma tape	4	4	4.00
Praying	106	4	3.75
Working	41	4	3.73
Travelling	26	4	3.58
Meditation	61	4	3.56
Lying down	724	4	3.35
Cooking	12	3	3.33
Going shopping	6	3	3.33
Listening music	49	3	3.27
Taking a bath	45	3	3.27
Walking	142	3	3.25
Exercise	215	3	3.23
Talking with friends/ Relatives	122	3	3.22
Reading book	101	3	3.21

Table 12. Frequency of patients performing self-care and their average effectiveness when they experienced fatigue in a daily (Continued).

Frequency recorded Self-care actions	Number of recording	Mode effective rating *	Mean effective rating*
Undertaking house-hold shores	132	3	3.15
Eating	29	3	3.14
Rest	40	3	3.13
Finding something to do	95	3	3.05
Drinking juice	39	3	3.05
Singing	73	3	3.04
Gardening	33	3	3.03
Playing with children	90	3	3.00
Taking things easy	9	3	3.00
Engaging in hobbies	3	3	3.00
Watching television	152	2	2.93
Taking medication	20	3	2.75
Tell one-self: not to worry	3	3	2.67
Massage	5	3	2.60

* Effectiveness of self-care actions was recorded on a 5-point scale where 1 = not relieved, 2 = partly relieved, 3 = moderately relieved, 4 = nearly completely relieved, and 5 = completely relieved

Additional Findings

Perceived causes of fatigue

For each day on which subjects indicated that they had experienced fatigue, they were asked to remark on what they perceived had contributed to or caused the fatigue. A variety of responses was obtained and displayed in Table 13. Perceived causes of fatigue were classified into seven categories based on those reported by Piper (1989: 196). Subjects sometimes recorded more than one response or failed to respond to this item.

The most common cause of fatigue was chemotherapy. The second one was lack or change in sleep pattern. A variety of symptoms featured prominence, especially nausea and vomiting.

Table 13. Perceived causes of fatigue recorded in a diary.

Perceived cause of fatigue	sub-categories	No. response within Sub-categories (%)	
Treatment patterns	Chemotherapy	496	(40.92)
Sleep/wake patterns	Lack/change in sleep pattern	225	(18.56)
Symptom patterns	Nausea and vomiting	98	(8.09)
	Fever	22	(1.82)
	Dizziness	12	(0.99)
	Diarrhea	12	(0.99)
	Dysmenorrhea	6	(0.50)
	Stomachache	4	(0.33)
	Constipation	1	(0.08)
Other patterns	Lack of nutrition	77	(6.35)
	Hot weather	39	(3.22)

Table 13. Perceived causes of fatigue recorded in a diary (Continued).

Perceived cause of fatigue	sub-categories	No. response within Sub-categories (%)	
Activity/rest patterns	Working	76	(6.27)
	Visiting/waiting at hospital	21	(1.73)
	Exercise	1	(0.08)
Psychological patterns	Anxiety	61	(5.03)
	Stress	5	(0.41)
	Loss of willingness 5	(0.41)	
Disease patterns	Cancer	51	(4.21)

Other symptoms distress

On the same days as fatigue, other symptoms or problems occurred. Subjects were asked to record the presence of additional noteworthy symptoms. Responses to this question are shown in Table 14. Subjects sometimes gave more than one symptom. The most common additional symptom that occurred was nausea.

Table 14. Additional symptom distress recorded in a diary.

Category of symptom distress	sub-categories	No. response within sub-categories (%)	
Alterations in gastro-intestinal tract	Nausea	137	(29.27)
	Anorexia/received not enough food	24	(5.13)
	Flatulence	22	(4.70)
	Diarrhea	9	(1.92)
	Stomachache	6	(1.28)
	Constipation	5	(1.07)
	Oral mucositis	5	(1.07)

Table 14. Additional symptom distress recorded in daily diary (Continued).

Category of symptom distress	sub-categories	No. response within sub-categories (%)	
Alterations in sensation	Dizziness	60	(12.82)
	Headache	36	(7.69)
	Surgical pain	22	(4.70)
	Arm pain	19	(4.06)
	Body temperature change	18	(3.85)
	Hot at palms of hands	5	(1.07)
	Itching	5	(1.07)
	Dysmenorrhea	3	(0.64)
	Pain at scalp	1	(0.21)
Alterations in emotion	Easy to irritate	27	(5.77)
	Anxiety	8	(1.71)
Alterations in sleep/ wake patterns	Trouble sleeping	35	(7.48)
Others	Cough and throatache	14	(2.99)
	Visual disturbance	7	(1.50)

CHAPTER V

DISCUSSION

The discussion of the results is presented in the following order; change in intensity of fatigue, patterns of fatigue, relationship among variables, self-care actions to manage fatigue, cause of fatigue and others symptoms distress.

Change in Intensity of Fatigue

This study did not support the common perception among patients and nurses that the intensity of fatigue is highest in the first course of chemotherapy or increases over the courses of treatment. Fatigue levels were not significantly different over the course of chemotherapy treatment. This finding is consistent with the study by Burger (1998: 54) and Piper (1991: 348). However the intensity of fatigue changed over time, after administration of chemotherapy in each course. Overall patients experienced moderate levels of fatigue for the first 2 weeks of treatment with a slight decrease after day 4 and increased again to peak around day 9. Their fatigue gradually declined before their next course of treatment. Similar to the findings of Richardson, Ream, and Wilson-Barnett (1998: 17-30) this pattern appears to reflect the drug administration, Methotrexate and 5-FU on days 1 and 8, and Cyclophosphamide on day 1 to 14. These drugs have a plasma half-life in 20 minutes to 12 hours (Cyclophosphamide: 6-12 hours; Methotrexate: 2 hours, and 5-FU: 20 minutes) and a nadir period of 7-14 days (Burke, et al., 1996: 101, 243, 298, 361).

Most of the previous research using cross-sectional designs to describe fatigue supports a pattern in which fatigue peaks in the days after administration and increase again around the nadir period and then it declines before the next course of chemotherapy treatment (Burger, 1998: 54-55; Irvine, et al., 1994: 375; Pickard-Holley, 1991; 16-17; Richardson, Ream, & Wilson-Barnett, 1998: 21-27). In Thailand, Sanguanjiraphan (1997: 57) reported all subjects in her study described the feeling of tiredness, weakness, and did not want to do anything with a different intensity and timing from day 1 to day 15 after receiving chemotherapy. In contrast, Suh and Lee (1998: 331) reported higher fatigue scores on day 14. The different timing of measurements or different cytotoxic agents may account for the different findings.

Patterns of Fatigue

In this study, patterns of fatigue were identified by cluster analysis and the number of patterns was determined by the investigator according to the intensity and decline of each pattern. Within the 3 patterns of mild, moderate and then gradually declining, and severe and then gradually declining, the study indicated that 77.27% of the sample experienced fatigue during the first 2 week after receiving chemotherapy and then declined nearly to the base line before the beginning of the next course. However, in moderate and sustained pattern (22.23%), subjects continued to experience fatigue over time in the same level of intensity. Also in this study it was found that eleven patients had more than one pattern of fatigue. Thus, the drug protocol alone cannot fully explain patterns of fatigue. There might be other factors such as nausea and vomiting and sleep disturbance that contribute to fatigue.

Relationship among Variables

Nearly consistent with the conceptual model, there were a moderate relationship between fatigue and nausea and vomiting at the first, the second, and the third course of chemotherapy (r = .356, .455 and .358 respectively, all $p_s < .01$), and sleep disturbance in three courses (r = .468 , .567, and .540 respectively, all $p_s < .01$). But no relationship was found between fatigue and exercise in all courses (r = -.077, 102, and .119 respectively, all $p_s > .05$). However, a slightly negative correlation was found between nausea and vomiting and exercise (r = -.191, $p < .05$) at the first course and the second course (r = -.023, $p < .05$). Also there were a positive relationship between nausea and vomiting and sleep disturbance in three courses (r = .456, .538, and .464 respectively, all $p_s < .01$). As previous studies, Soivong (1995: 76) found a positive correlation between nausea and vomiting and fatigue in every day after drug administration in breast cancer patients. Negative correlation between nausea and vomiting and sufficiency of sleep at days 2, 3, 4, 5, 6, and 7 after chemotherapy was also reported. Like other studies, significant correlation between sleep disturbance and fatigue was found (DeMayer, 1991: 374; McCorkle & Young, 1978 cited by Irvine, et al., 1991: 192). These results support the view that nausea and vomiting and sleep disturbance are causing factors to maximized fatigue among the subjects.

To consider patient's body weight between days 1 and day 8 of chemotherapy on each course, this study found that 58.89 % of patients reported a decrease in body weight from 0.1 to 2.1 kilograms, 14.44% did not change, and 26.67% increase from 0.5 to 1.5 kilograms. The reason for decreasing body weight may result from nausea and vomiting which decreases energy intake and may have contributed to fatigue. However, after 3 courses 60% of patients reported an increase in their body weight

from 0.2 to 4.1 kilograms (details of body weight changes are shown in appendix C). This might be a result of patients effort to take more food to prepare themselves for the next course of chemotherapy. Sanguanjiraphan (1997: 51) reported that 70.9% of the sample changed their eating pattern by drinking milk or having supplement nutrition, 36.37 % of patients decreased food intake in the first 2 weeks after chemotherapy and increased after this time. Drinking juice such as molasses, toddy, coconut; Helblueboy syrup and warm water, and eating sweet fruit were the most effective self-care strategies which patients used to get enough nutrition and water which may the result for increasing weight (Soivong, 1995: 80).

Patients who had a higher score in the sleep disturbance scale reported that they needed more sleep during the day because they would like to maintain balance between activities and rest. Sleep deprivation can result in a variety of physiological and psychological conditions characterize by increase fatigue (Lubin, et al., 1976 cited by Irvine, et al., 1991: 197).

Subjects who are in pattern of fatigue 1, 3, and 4 had a higher score of nausea and vomiting and sleep disturbance in the first 2 weeks after the first day of drug administration than the last 2 weeks. Patients, who are in pattern 2, moderate and sustain, continue to experience nausea and vomiting and sleep disturbance over time (details are shown in appendix D). One patient who was in pattern 3 of fatigue in the first course of chemotherapy and pattern 1 in the second course reported that after receiving chemotherapy for the second course, she experienced severe nausea and vomiting and it lead to have not enough food and water. These reflect the relationship between fatigue and nausea and vomiting and sleep disturbance as found in this study.

Thus, effective management of nausea and vomiting, and sleep disturbance appears to be essential in maintaining lower levels of fatigue. Furthermore, fatigue, nausea and vomiting, and sleep disturbance may be interrelated as the side effects of chemotherapy.

Although, exercise was reported as a strategy to reduce fatigue (Mock, et al., 1997: 991; Schwartz, 1998: 310; Suh & Lee, 1998: 331), no significant relationship was found between fatigue and exercise. This might be because patients in this study did not perform exercise regularly and most of them exercised for less than 20 minutes each time while subjects who exercise in the pervious studies had approximately 30-minutes walking exercise (Schwartz, 1998: 310) or received exercise program (Mock, et al., 1997: 991; Suh & Lee, 1998:331). Some of patients in this study exercised only joint movement. Thus, they cannot receive the physical benefits from exercise (American College of Sports Medicine, 1990: 265). However, exercise was one of strategies used by the subjects to manage fatigue and its mode of effectiveness was moderately relieved. These patients may had psychological benefits which include, reduction of depression and anxiety, improvement of quality of life and self-concept, and decreased feeling of fatigue from exercise (Aistar, 1987: 28). Further study should be explored with carefully control for exercise.

Self-Care Actions to Manage Fatigue

All patients in this study experienced fatigue. The peak of fatigue was associated with the time after chemotherapy administration. Thus, fatigue is an unavoidable aspect of cancer treatment. It is unusual to find a specific correctable cause for fatigue. Therefore, patients who experienced fatigue must learn to live with it and find the strategies to manage fatigue.

In this study, subjects performed self-care actions only when it interfered with their daily activities or when they felt more fatigue. Self-care actions that were reported for use in managing fatigue by the patients in this study were similar to those reported by others (Gradon, et al., 1995: 25; Mock, et al., 1997: 998; Richardson & Ream, 1996: 39). Lying down, which is useful to maintain physical and psychological functioning was the most common strategy reported for managing fatigue. It gave nearly complete relief for effectiveness. In Sanguanjiraphan's study (1997: 56), 63.1% of patients rested and napped during the daytime, 74.3% reduced their workforce, 63.6% reduced their work time, and 78.2% reduced all their activities. Demark-Wahnefried and others (1997:1497-1498) also found that levels of physical activity decreased significantly during adjuvant chemotherapy as compared with baseline levels in breast cancer patients. Although patients are often advised to limit their activity and get plenty of rest while they experienced fatigue, exercise was reported as a second used strategy and its mode of effectiveness was moderate relief. Praying and meditation were others considering actions to reduce fatigue. Subjects reported that they felt calm and received more sleep after they performed these actions. Promotion of normalcy by going to work, doing household chores, cooking and going shopping, and maintenance of balance between solitude and social intervention, talking with friends/relatives, playing with children, engaging in hobbies, and travelling, were the next two categories of self-care which subjects performed. When patients undertook these actions, their concentration might have been on the activities and environment. This resulted in distraction from fatigue. However most of the strategies in this study gave a moderate relief to from fatigue.

Causes of Fatigue and Other Symptom Distress

Perceived causes of fatigue, from the perspective of the sample, were similar to those reported by Piper (1989: 196), although the rank order differed. Piper (1984 cited by Piper, 1989: 196) found that changes in the psychological patterns were the most frequently identified cause. However, in this study the sample most frequently cited treatment as the most commonly perceived cause of fatigue followed by change in sleep pattern and other symptom distress. Changes in psychological patterns was nearly the least frequently cited. This may be that the context of psychosocial support in Thailand and other countries are different. In Thailand, after diagnosed with cancer or receiving treatments, family, friends, relatives and also the health care team would take care and give mental support to patients. In this study, all patients received the telephone number of the investigator and the nurse specialist for consultation when they needed it. Four patients called the investigator from their home when they had some problem or symptom distress at home after receiving chemotherapy. These could reduce the feelings of anxiety, worry, stress, depression, and emotional strain. Counseling and supporting which includes instillation of hope, ego enhancement, and support about life style changes were reported as useful interventions in helping cancer patients manage fatigue (White, Nurmark, & Lansing, 1998: 330). These results are similar to Richardson and Ream's (1996: 28).

It is noted that, some patients reported visiting or waiting at the hospital was one factor causing to fatigue. This finding reflected that the system in the hospital should be improved.

Despite fatigue, nausea was the most common symptom distress and it also was reported as cause of fatigue. Soivong (1995: 82) reported many self-care actions

to manage this symptom. They took antiemetic drugs, taking endoxan soon after meal, eating sour fruit, stop eating, sipping warm water, drinking much water to induce vomiting, and trying not to worry about this symptom. These actions were the most effective to reduced nausea and vomiting. However, self-care actions to reduce fatigue and nausea and vomiting were most different.

In conclusion, all breast cancer patients experienced fatigue while receiving chemotherapy. According to the conceptual framework, fatigue was one of basic conditioning factors that influenced both therapeutic self-care demand and self-care agency. Even though the patients in this study experienced fatigue from mild to severe degree, they still find various strategies of self-care actions to manage this symptom. Also other symptoms resulted form chemotherapy such as nausea and vomiting and sleep disturbance were reported together with self-care actions to alleviate them. The findings support Orem's theory of self-care as a deliberate action in that after perceived fatigue and others symptom distress, a new set of demands was occurred. Patients then initiated self-care activities to alleviate fatigue and monitor the effectiveness of each of their self-care actions. However, sometimes this set of demand was out of the skill and knowledge of patients. Thus the nurse has to be responsible to assess these symptoms and work with patients to find appropriate self-care actions to reduce fatigue and other distress symptoms. However, this study shows the ability of patients in initiate actions to relieve their symptom distresses. Self-care actions performed by sample reflected that patients used a complementary therapy to manage fatigue. It seems to be holistic in nature, integration among body, mind, social, and spiritual.

CHAPER VI

CONCLUSION

Conclusion

This prospective and descriptive study aimed to describe patterns of fatigue, related factors, and self-care actions to manage fatigue among breast cancer patients receiving chemotherapy. The Orem's self-care theory and Piper Integrated Fatigue Model served as the study's conceptual framework. The sample was 30 breast cancer patients receiving the first three courses of adjuvant chemotherapy. This study was carried out at two settings, the outpatient chemotherapy clinic of the Medical Department and the short stay service room at Sirikit Medical Center, Ramathibodi Hospital. The data was collected from November 1999 to July 2000. All patients who meet the criteria were asked to participate in this study. The criteria for eligibility were 1) women with age range from 20 to 60 years old, 2) receiving adjuvant chemotherapy for the first three courses, 3) the adjuvant chemotherapy was cyclophosphamide, methotrexate and 5-fluorouracil, 4) able to understand and speak Thai and 5) agree to participate in this study. The exclusion criteria were patients with recurrent breast cancer and patients with chronic illnesses.

The instruments used in this study consisted of six questionnaires as follows: the demographic information sheet, the revised Piper Fatigue Scale (PFS), the modified form of the Rhodes Index of Nausea and Vomiting Form II (INV-2), the sleep disturbance scale, the exercise question, and the self-care record. The instruments were tested and passed the validity test by 5 experts. These instruments were used in a

trial run with a group of 10 breast cancer patients receiving chemotherapy for 7 days. The test had an alpha value of 0.97-0.99 on the revised PFS. The adapted form of INV-2 and sleep disturbance scale had an alpha value of 0.80-0.90 and 0.79-0.98 respectively. After being tested with a study sample, the revised PFS, the adapted form of INV-2, and the Sleep disturbance scale had an alpha value of 0.96- 0.99, 0.86-0.98, and 0.85-0.99.

Data was analyzed with SPSS/FW program by using descriptive statistics, Friedman test, Cluster analysis, and Spearman's rho correlation.

The results of this study indicated that fatigue varied throughout the day, more frequently occurring in the late afternoon (34.69%) and early evening (34.02%). Total fatigue scores were not significantly different over the course of treatment, but significantly different over time in the course, which the highest scores on day 9 and gradually decline after day 14 to nearly the baseline. Four patterns of fatigue were found; severe and then gradually declined, moderate and sustained, moderate and then gradually declined, and mild and then gradually declined. After following for 3 courses of chemotherapy, 11 patients had more than 1 pattern of fatigue. Fatigue has a positive correlation with nausea and vomiting at the first, second, and third course($r = .356$, .455, and .358 respectively, all $p_s < .01$), and sleep disturbance in three courses ($r =$ .468 .567, and .540 respectively, all $p_s < .01$). No correlation was found between fatigue and exercise. Twenty-eight self-care actions were practiced by 27 patients (mean = 2 actions daily). The most frequent categories of self-care action include maintenance of a balance between activity and rest, and maintenance of a balance between solitude and social interaction. Lying down (n = 724) was the most common

action taken by patients followed by exercise (n = 215), watching television (n = 152), walking (n = 142), undertaking household chores (n = 132), talking with friends or relatives (n = 122), pray (n = 106), and reading a book (n = 101). Lying down, praying, meditation, working, travelling, and listening to Tamma tape were the most effective activities to reduce fatigue. Result of this study also revealed that fatigue attributions are combination from multiple aspects. The most common factor of fatigue were chemotherapy (n = 496), lack/ change in sleep pattern (n = 225), nausea and vomiting (n= 98), and lack of nutrition (n = 77). Most common other symptoms distress while receiving chemotherapy was nausea (n = 137) and dizziness (n = 60).

Limitations

1. The lack of baseline data on fatigue, nausea and vomiting, sleep disturbance, and exercise in the sample. Measure of these variables before the first treatment would provide valuable data for comparison over time.

2. The lack of control over the degree of subject's participation in exercise

Recommendations

Nursing practice

1. Information on patterns of fatigue is significant for nurses to prepare patients for chemotherapy. Nurses have a responsibility to incorporate this into information for patients and family. If patients are informed about the pattern of fatigue is likely to follow, they will be able to incorporate this knowledge and use it to plans their activities.

2. Information that seek to reduce the high level of nausea and vomiting and sleep disturbance may hold promise in preventing or relieving fatigue experienced by patients receiving chemotherapy.

3. Information on self-care actions and their effectiveness are useful for nurses to assist patients to alleviate fatigue, especially for patients who do not develop self-care behaviors or who experience severe fatigue.

4. A diary in which patients could record intensity of daily fatigue and others symptom distress would by helpful in assisting them to communicate with the health care team.

Nursing research

1. The baseline data on fatigue and other variables in the sample should be assessed before starting chemotherapy or other treatments.

2. To compare the correlation between exercise and fatigue and type of exercise should be consider.

3. In order to collect data, categories of self-care should be provided as a data checklist because some patients ignored to write some words or sentences

4. Studies should be carried out with a large sample size to achieve more representation results.

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APPENDIX

APPENDIX A

CONSENT FORM

My name is Piyawan Pritsanapanurungsie. I am currently a master degree student in Adult Nursing at Mahidol University. I am conducting a nursing research project with breast cancer patients receiving chemotherapy. I would like to explain about this study to you to see if you are willing to participate in this study.

The proposes of this study are to describe patterns of fatigue, to examine the related factor, and to explore the self-care actions to manage fatigue in breast cancer patients receiving chemotherapy. This information will help nurses and other health care personnel to perform an appropriate nursing intervention for breast cancer patients receiving chemotherapy.

If you agree to participate, I will interview you about your personal history and self-care actions to manage fatigue. Moreover, you will asked to complete the instruments which measure your experience of fatigue, nausea and vomiting, sleep disturbance, exercises, and record the self care dairy for 3 cycle of chemotherapy. It will take you 20-30 minutes to complete this form. If you have any questions about these instruments, I would be glad to explain them to you. All your responses and the information from your hospital record will remain confidential and will used only for this study. Your identity will not be revealed.

There are no risks to participate in this study. Whether you participate in this study or not, you still receive nursing care as usual. Your participation is voluntary, you have right to participate or not participate. You are free to discontinue your participation at any time if you want, without explanation. It will not affect you in any way.

Thank you for your cooperation. Do you agree to participate in this study?

APPENDIX B

INSTRUMENTS

PART I: Demographic Data Form

Questionnaire number.....

H.N.....

Directions: Please fill in the blank or make ✓ in ❑ to the real situation.

1. Age.....years

2. Religion
   - ❑ Buddhism
   - ❑ Christ
   - ❑ Islam

3. Education background
   - ❑ Primary school
   - ❑ Secondary school
   - ❑ Diploma
   - ❑ Bachelor's degree
   - ❑ Master's degree

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•
•
•
•
•

11. Antiemetic Drug
    - ❑ Plasil + Decadron
    - ❑ Zofran + Decadron
    - ❑ Zetron + Decadron

PART II: The revised Piper Fatigue Scale (PFS).

Directions: For each of the following questions, circle the number that best describes the fatigue you are experiencing now. Please make every effort to answer each question to the best of your ability.

---

1. To what degree in the fatigue you are feeling now causing you distress?

No distress **A great deal of distress**

0 1 2 3 4 5 6 7 8 9 10

.
.

7. To what degree would you describe the fatigue, which you are experiencing now as being:

Pleasant **Unpleasant**

0 1 2 3 4 5 6 7 8 9 10

.
.

12. To what degree are you now feeling:

Strong **Weak**

0 1 2 3 4 5 6 7 8 9 10

.
.

17. To what degree are you now feeling:

Patient **Impatient**

0 1 2 3 4 5 6 7 8 9 10

.
.

22. To what degree are you now feeling:

Able to think clearly **Unable to think clearly**

0 1 2 3 4 5 6 7 8 9 10

PART III: The modified form of the Rhodes Index of Nausea and Vomiting Form II (INV-2).

Directions: For each of the following questions, please circle the number that most clearly corresponds to your experience in the last 24 hours.

A). How many times you threw up?

1. 7 or more
2. 5 to 6
3. 3 to 4
4. 1 to 2
5. no

B). How much discharge when you threw up?

1. 3 cups of coffee or more
2. 2 to 3 cups of coffee
3. ½ to 2 cups of coffee
4. less than ½ cup of coffee
5. none

.
.
.
.
.

H). How much distress when you have had a periods of retching or dry heaves without bringing anything up?

1. none
2. mild
3. moderate
4. great
5. severe

PART IV: The sleep disturbance scale.

Directions: For each of the following questions, please circle the number that best describes how you have felt in the last 24 hours.

A).

1. I cannot sleep.
2. I have trouble sleeping most of the time.
3. I frequently have trouble sleeping.
4. I occasionally have trouble sleeping.
5. I sleep well

B).

1. When I have trouble sleeping, it causes me distress as severe as can be.
2. When I have trouble sleeping, it causes me great distress.
3. When I have trouble sleeping, it causes me moderate distress.
4. When I have trouble sleeping, it causes me slight distress.
5. I feel good about the amount of sleep I get.

PART V: The exercise question.

Directions: Please circle the number that describes about exercise you perform this week.

In this week, how often do you exercise, and how long do you perform it each time?

1. do not exercise
2. 1-2 days weekly, less than 20 minutes each time.
3. 1-2 days weekly, more than 20 minutes each time.
4. 3-7 days weekly, less than 20 minutes each time.
5. 3-7 days weekly, more than 20 minutes each time.

What type of exercise which you perform? .....

PART VI: Self-care action record

Directions: Please could you tick the boxes, which indicate the periods of the day when you felt fatigued. If you felt fatigued on different occasions, you can tick more than one box.

- ❑ early morning
- ❑ late morning
- ❑ early afternoon
- ❑ late afternoon
- ❑ early evening
- ❑ late evening

Did you perform any actions, which you hoped would relieve your fatigue today? Please tick the appropriate box

- ❑ Yes.
- ❑ No.

If you answered yes, please complete the following section:

Action taken	Effectiveness of action in relieving fatigue (please tick a box)				
	not relieved	partly relieved	moderately relieved	nearly completely relieved	completely relieved
1.					
2.					
3.					
4.					
5.					

When feeling fatigued today, what do you believe contributed or caused your feeling?

_____

_____

Did you experience any other symptoms or problems today?

Please tick the appropriate box.

❑ No.

❑ Yes. Please describe _____

_____

APPENDIX C

CHANGES IN BODY WEIGHT

Table 12. Percentage of body weight change between day 1 and day 8

Between day 1 and day 8	Weight loss	No change	Weight gain
The 1st course	19 (63.33%)	2 (6.67%)	9 (30.00%)
The 2nd course	14 (46.67%)	4 (13.33%)	12 (40.00%)
The 3rd course	20 (66.67%)	7 (23.33%)	3 (10.00%)
Total	53 (58.89%)	13 (14.44%)	24 (26.67%)

After 3 courses of chemotherapy 10 patients reported decrease in their body weight (33.33%), 2 patients (6.67%) had no change and 18 (60.00%) had weight gain.

APPENDIX D

NAUSEA AND VOMITING SCORES AND SLEEP DISTURBANCE SCORES AMONG GROUP OF SAMPLES (CLUSTER)

Table 16. Mean of nausea and vomiting score among groups of samples

Day	Pattern 1	Pattern 2	Pattern 3	Pattern 4
1	11.88	2.90	5.85	2.61
2	14.25	3.10	6.67	3.00
3	13.63	3.35	6.93	3.15
4	14.88	4.95	6.59	2.85
5	15.25	5.25	7.52	2.42
6	14.63	5.65	6.22	2.15
7	14.13	5.15	5.52	1.94
8	15.75	6.10	7.44	2.94
9	15.25	6.50	8.93	3.27
10	14.25	6.35	8.19	3.27
11	12.63	6.20	6.59	4.03
12	11.88	5.60	4.11	3.48
13	11.50	6.35	3.93	2.45
14	11.00	5.75	3.37	2.39
15	4.13	5.75	3.63	2.03
16	3.50	5.45	3.00	2.00
17	2.50	4.95	1.89	1.61
18	2.00	3.80	1.37	1.12
19	1.88	3.60	1.26	1.06
20	2.63	3.60	1.41	1.03
21	2.00	3.25	1.15	.79
22	1.63	3.40	.93	.91
23	1.00	2.95	.96	.73
24	1.00	2.80	.74	.79
25	.63	2.70	.70	.67
26	.63	2.45	.74	.73
27	2.13	2.30	.70	.79
28	1.88	2.35	.48	.76

Table 17. Mean of sleep disturbance scores among groups of samples

Day	Pattern 1	Pattern 2	Pattern 3	Pattern 4
1	4.25	2.60	2.74	2.12
2	4.75	2.30	2.22	1.39
3	4.38	2.20	2.11	1.45
4	4.50	2.45	2.11	1.58
5	4.38	2.20	2.30	1.21
6	4.25	2.30	2.04	1.24
7	4.13	2.25	1.85	1.06
8	5.00	3.10	3.19	1.88
9	4.50	2.50	2.67	1.61
10	3.88	2.65	2.37	1.18
11	4.00	2.75	2.26	1.42
12	3.63	2.25	1.85	1.18
13	3.63	2.00	1.78	1.24
14	3.75	2.10	1.52	1.12
15	2.00	2.40	1.19	.97
16	1.75	2.30	1.15	1.09
17	1.63	2.40	.89	.85
18	1.38	2.30	.67	.79
19	1.00	2.15	.59	.88
20	1.00	2.00	.70	.61
21	1.13	2.25	.67	.70
22	1.13	1.90	.70	.76
23	1.00	2.00	.48	.73
24	.75	1.95	.30	.70
25	.88	2.20	.33	.73
26	.75	1.80	.33	.91
27	.88	1.95	.33	.76
28	.88	1.75	.33	.76

APPENDIX E

PLOT REPRESENTING PATTERNS OF FATIGUE IN EACH COURSE

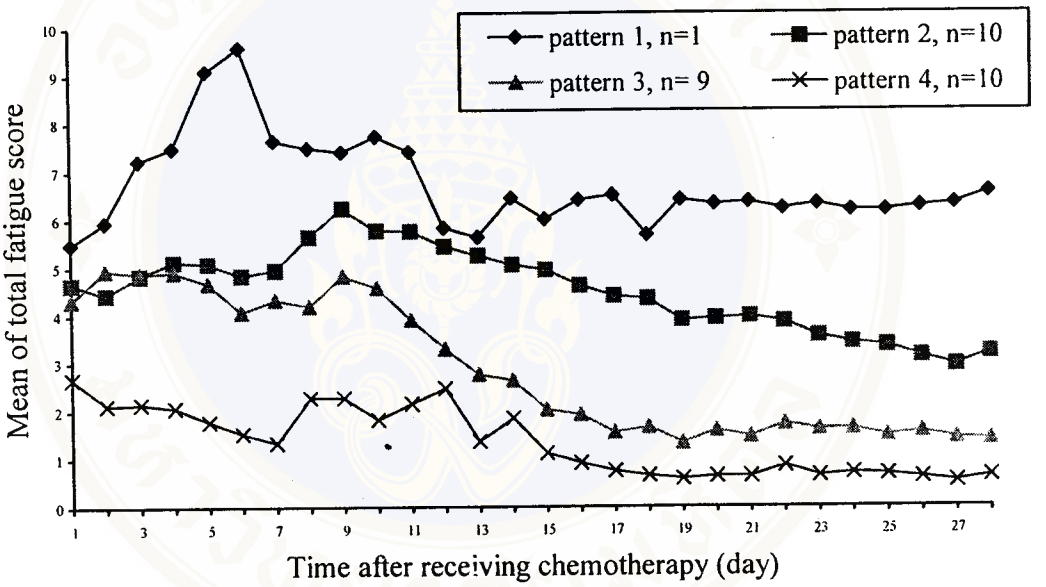

Figure 6. Plots representing patterns of fatigue in course 1

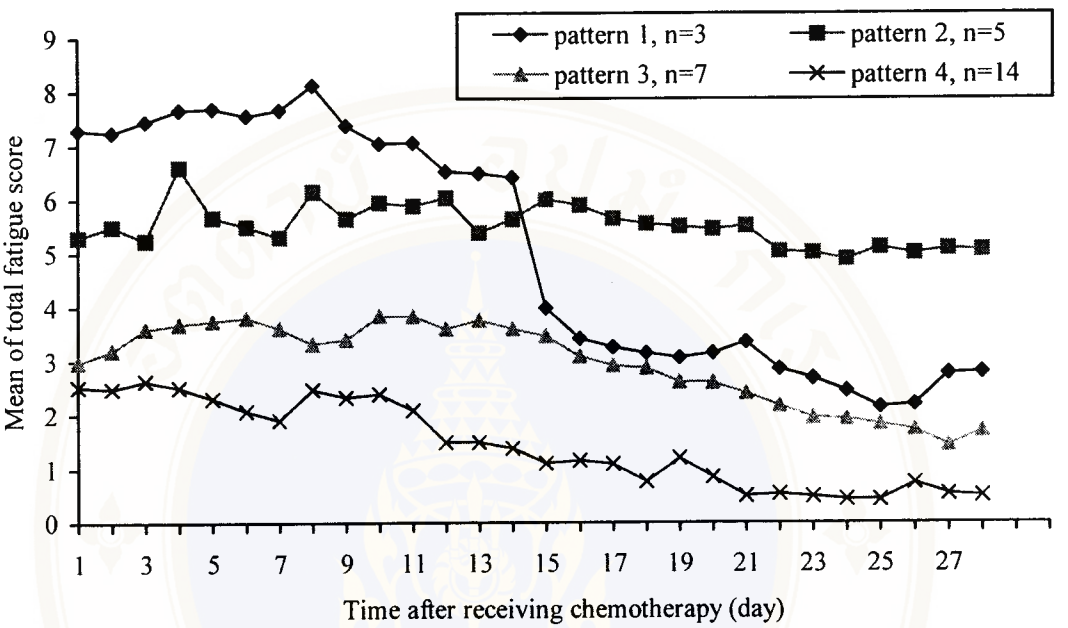

Figure 7. Plots representing patterns of fatigue in course 2

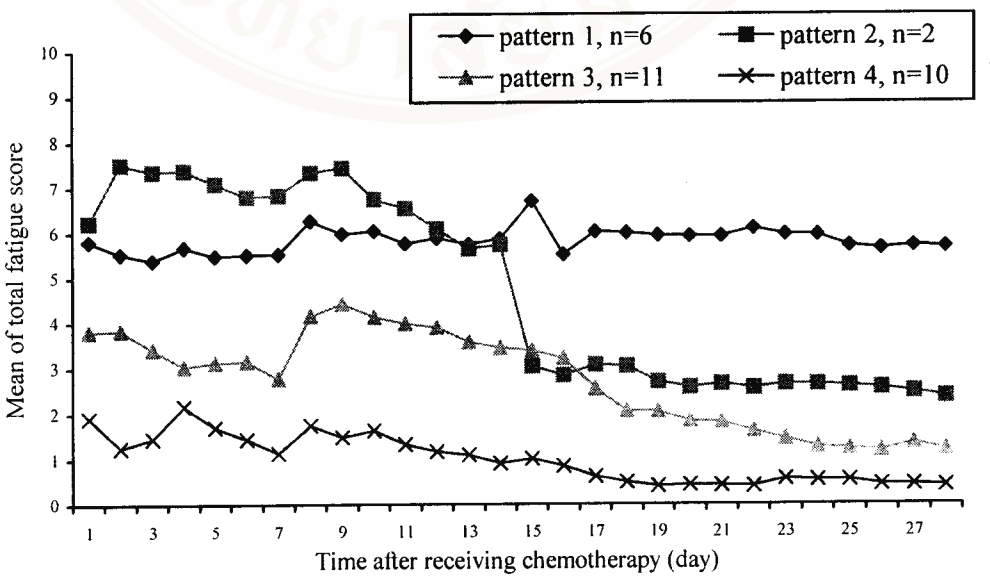

Figure 8. Plots representing patterns of fatigue in course 3

APPENDIX F

RELATIONSHIP AMONG OTHERS VARIABLES

Table 18. Spearman's Rho correlation between nausea and vomiting, and sleep disturbance, and exercise.

Course	N	Sleep disturbance (r)	Exercise (r)
1	118	.456**	-.191*
2	120	.538**	-.203*
3	120	.464**	-.100

Table 19. Spearman's Rho correlation between body weight and fatigue, nausea and vomiting, and sleep disturbance

Course	N	Fatigue	Nausea and Vomiting	Sleep disturbance
1	30	.005	.173	-.026
2	29	.045	.173	.025
3	29	-.135	.041	-.020

APPENDIX G

LIST OF EXPERTS

For fitting the conceptual definition and method of measurement, the content validity of the instruments was determined by five experts included:

1. Associate Professor Vorachai Ratanatharathron
   Department of Medicine, Faculty of Medicine, Ramathibodi Hospital
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DATE OF BIRTH	12 February 1970
PLACE OF BIRTH	Chiang Mai, Thailand
INSTITUTIONS ATTENDED	Chiang Mai University, 1988-1992: Bachelor of Nursing Science Mahidol University, 1998-2000: Master of Nursing Science (Adult Nursing)
GRADUATE STUDY FUNDED	University Development Committee (U.D.C.)
POSITION & OFFICE	1992-1993, Faculty of Medicine, Chiang Mai University. Position: Nurse 3 1993-Present, Department of Fundamental, Faculty of Nursing, Chiang Mai University. Chiang Mai, Thailand. Position: Instructor