

Relationships between Selected Variables and Adaptation in Women after Breast Surgery

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Abstract

OBJECTIVES: To investigate how married women with breast cancer adapted themselves after breast surgery and to evaluate selected variables related to adaptation.

MATERIAL AND METHODS: One hundred participants were married women with breast cancer who met the inclusion criteria from November 2017 to February 2018. To collect data, we compiled the demographic questionnaire and clinical data form, the adaptation of breast cancer questionnaire, and the social support scale. The data were analyzed using descriptive statistics, Chi-square test, and Pearson's product moment correlation.

RESULT: The average age of participants was 54.37 years (SD = 9.50). The mean duration after breast surgery was seven months (SD = 3.26). One-third of the participants (35 %) received a combination therapy of surgery and chemotherapy. The results showed that the participants had a high adaptation level. Among four modes of adaptation, high levels of adaptation were found for physiological and role-function modes, but moderate levels for the self-concept and interdependence modes. It was found that social support was positively related to adaptation ($r = 0.436, p < 0.05$).

CONCLUSION: The findings are significant for guiding the intervention by promoting social support among married women after breast surgery.

Keywords: adaptation, breast cancer, breast surgery, social support

Breast cancer is one of the most life-threatening cancers among women worldwide. The incidence of breast cancer has increased in both developed and developing countries. In 2018, the World Health Organization reported that there were more than 2 million new cases of breast cancer patients or 24.2 % of all newly diagnosed cancers among women around the world.¹ Approximately a quarter of total breast cancer cases was diagnosed in the Asia-Pacific region.² In Thailand in 2017, the Bureau of Health Policy and Strategy reported that the estimated number of Thai women with breast cancer death was 4,177.³ Surgery is usually the primary treatment and the cornerstone for the early stage of breast cancer women. The modified radical mastectomy (MRM) has been performed as the standard of traditional therapy for breast cancer surgery over the past few decades.⁴ However, the current surgical technique has become more developed with a less invasive procedures.

Breast conserving surgery followed by radiation has been more broadly performed.⁵ Moreover, sentinel lymph node biopsy (SLNB) has become a standard of care to examine the nodal staging of breast cancer. Women with breast cancer who undergo SLNB are more likely to have less incidence of lymphedema, stiffness of shoulder, numbness, and wound seroma compared with axillary lymph node dissection.⁶ Furthermore, breast reconstruction has become an available option leading to an improvement of body image, sexuality, and quality of life in women with breast cancer.⁷

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Although breast surgery has benefits in terms of enhancing overall survival and improving aesthetic outcome after treatment, its adverse outcome also affects both physical and psychological integrity of women with breast cancer. After breast surgery, women with breast cancer are at risk to possibly develop complications such as wound infection, seroma formation, hemorrhage

or hematoma, and lymphedema.⁸ In addition, they often reported high anxiety.⁹ The breast is the organ that represents the femininity of women. Appearance changes because of breast surgery leads women with breast cancer to face distress and body dissatisfaction.¹⁰ Women who lost their breast often report sexual problems adversely affecting their physical and emotional well-being especially women having a sexual partner.¹¹ The relationship with their spouses had changed and they abstained from social participation.¹²

In Thailand, few researchers have assessed the adaptation after breast surgery in the past ten years. At that time, MRM was performed in almost every patient regardless the metastatic of axillary lymph node. Most of the adaptation studies examine the relationships of adaptation with personal characteristics including age¹³⁻¹⁵, educational level^{13,16}, income^{13,16}; clinical characteristic including time after surgery; and social support.^{13,17} However, some variables had a positive relationship, negative relationship, or even no relationship with adaptation. Furthermore, women with breast cancer had received various types of surgery and additional treatment after breast surgery, which might affect their adaptation differently.

According to Roy's Adaptation Model, Roy views people as an adaptive system, consisting of input, process, and output, always interacting with the changing environment. The environment input (the stimuli) has an influence on personal behavior. However, people can adapt themselves depending on the focal and contextual stimuli and their adaptive level. When each person confronts stimuli, they will use specific coping mechanisms to handle these changes and express individual's adaptation through four modes of behavior including physiological mode, self-concept mode, role function mode, and interdependence mode.¹⁸ When people have an effective response, they will adapt themselves effectively.

Women with breast surgery will be confronted with stimuli that threatens the equilibrium of their lives and they will need to adapt themselves to a changing environment. Breast surgery (including, type of breast surgery, current treatment, time after breast surgery) is a focal stimulus. Social support is a contextual stimuli, and personal characteristics (e.g. age, educational level, and income) is an adaptive level for an individual's adaptation in this study. There are two possible ways to promote personal adaptation based on Roy's Adaptation Model, which are: managing the stimuli or increasing one's personal ability. Nurses play an important role to promote personal adaptive level, helping breast cancer women to adapt themselves to new challenges after breast surgery.

Thus, the purpose of this study was aimed to investigate the adaptation of married women after breast surgery and to determine the relationships among selected variables including age, educational level, and income, type of breast surgery, current treatment, social support, and adaptation. The findings from this study would be useful for health care providers to better understand adaptation among married women with breast cancer after breast surgery.

Material and Methods

This study was a descriptive correlational design. The sample size was calculated using the G* power software program.¹⁹ The effect size of 0.26 from previous study was used,¹⁴ as well as the power of 0.80, and the level of significance (α) of 0.05. After performing this G*power calculation, it was found that the estimated proper sample size was 90. In order to allow for the loss of participants due to unexpected situations, a total of 100 participants were recruited from one university hospital in Bangkok.

The inclusion criteria were as follows:

1. Thai women aged 18 and over.
2. Those with newly diagnosed with breast cancer at stage I, II, or III, and undergoing breast surgery between three months and one year.
3. Those who were married and stayed with their spouses.
4. Those who understood, and were able to communicate in the Thai language.
5. Participants aged 60 or over who were cognitive intact assessed by the set test and whose score was equal to or higher than 25
6. Those who were willing to participate in this study.

Instrumentations

The following three instruments were used to collect data in this study:

The Demographic Questionnaire and Clinical Data Form

Form was developed by the researcher to assess the personal characteristics and clinical information of the participants. The form was composed of two main parts:

- **Part 1:** to collect the demographic and socioeconomic information about women with breast cancer. The items covered the following: (a) age; (b) number of children; (c) child care; (d) educational level; (e) occupation; (f) income; (g) income sufficiency; (h) medical payment methods; (i) right- or left-handedness; (j) caregivers; and (1) care activities.
- **Part 2:** to assess the clinical information from the medical records of the participants. This information included the following: (a) time after breast surgery; (b) cancer stage; (c) cancer type; (d) side of breast surgery; (e) type of breast surgery; and (f) current treatment.

The Adaptation of Breast Cancer Questionnaire (ABCQ)

(ABCQ) was employed to evaluate adaptation by women with breast cancer. It was developed by Samranrat¹⁸ and modified from the adaptation questionnaire based on Roy's Adaptation Model. This questionnaire consisted of 46 items covering four modes of adaptation including physiological mode, self-concept mode, role-function mode, and interdependence mode. All of the items were scored using a five-point Likert scale (1 = absolutely disagree; 5 = absolutely agree). There are 20 positive items and 26 negative items (with the score reversed)

in the scale. The total possible score ranges from 46 to 230. A higher score on this questionnaire indicated higher levels of adaptation after breast surgery. The adaptation scores are divided into three levels, representing low (46-107), moderate (108-169), and high (170-230) levels of adaptation. The Cronbach's alpha coefficient of ABCQ of a pilot study with ten participants, who had similar demographic characteristics to the participants in the main study, was 0.81. The Cronbach's alpha coefficient for the main study was 0.83.

The Social Support Scale was employed to evaluate the social support of women with breast cancer. It was originally developed by Toljamo and Hentinen,²⁰ based on the concept of social support, as defined by House. This questionnaire was translated into the Thai language with minor modifications by Leelacharas.²¹ This questionnaire consists of 12 items with a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The negative questions had reversed scores. The total possible scores ranged from 12 to 60. Higher scores indicated that participants had higher levels of social support. The Cronbach's alpha coefficient of the Social Support Scale in a pilot study with ten participants, who had similar demographic characteristics to the participants in the main study, was 0.73. The Cronbach's alpha coefficient for the main study was 0.87.

Ethical considerations: This study was approved by the Ethical Review Committee for Research on Humans of the Faculty of Medicine of Ramathibodi Hospital of Mahidol University (No. 09-60-19).

Data collection

After the approval of the Institutional Review Board, participants who met the inclusion criteria were approached. They were informed of the purpose of the study, as well as the confidentiality of their responses and their right to refuse to participate at any time without any effect on their care or treatments they would receive from the hospital. If each person agreed to participate in the study, they were asked to sign the informed consent form prior to collection data.

Data analysis

All data obtained were analyzed using a program of statistical software. Descriptive statistics, including frequency, percentage, range of score, mean, and standard deviation (SD), were used to analyze the demographic and clinical characteristics of the participants, as well as their levels of adaptation and social support. Chi-square test was used to determine the relationships of adaptation for categorical variables including educational level, income, type of breast surgery, and current treatment. Pearson product-moment correlation coefficient was used to determine the relationships of adaptation and age, social support, and time after breast surgery.

Result

One-hundred married women with breast cancer were made up mostly of participants (65%) in middle adulthood age, with ages ranging from 33 to 75 years. More than half of the participants (52%) did not take care of their children because they were now grown up. Nearly half of the participants (46%) were well educated, with a Bachelor's degree or higher. Approximately 20% of participants were working as government officers. In terms of income, almost half of participants (45%) earned between 10,001 and 30,000 Thai Baht per month. More than half of the participants (52%) reimbursed their medical payments through government welfare. After their breast surgery, most of them (90%) had family caregivers taking care of them. Most family caregivers were husbands (45.76%) followed by their children (33.90%). The details of the demographic data are shown in Table 1.

Table 1: The demographic characteristics of participants (n = 100)

Variables	n (%)
Age	
< 40 years	
40 – 60 years	
> 60 years	
Educational Level	
No Formal Education	
Primary School	
Secondary School	
Diploma/Certificate	
Bachelor's Degree or Higher	
Occupation	
Unemployed	
Government Officer	
Housewife	
Retired	
Merchant	
Other (Employee, Business owner, Agriculturist)	
Average Monthly Income	
0-10,000	
10,001-30,000	
More than 30,000	
Medical Payment Methods	
Government Welfare	
Universal Health Coverage	
Self -paid	
Other (health/life Insurance, social insurance, state enterprise officer)	
Family Caregivers	
No	
Yes* (n = 90)	
Spouse	
Children	
Other (sister, mother, relatives, housemaid)	

*Answer more than 1

Almost half of the participants (49%) had been diagnosed with stage II of breast cancer. The average time after breast surgery was seven months ($SD = 3.26$). Most participants (66%) had undergone mastectomy, followed by breast conserving surgery (18%). Approximately 35% of the participants had received chemotherapy after breast surgery, as showed in the Table 2.

From one-hundred participants who met all inclusion criteria, seven participants could not respond to the part of the questionnaire regarding the parental role of role-function mode of ABCQ due to not having children and some children already having grown up. However, these seven participants still responded to all other parts of the questionnaire. The mean score of overall adaptation was 180.31 ($SD = 17.02$), indicating that the participants had a high level of adaptation. Among four modes of adaptation, the mean scores of the physiological mode (52.89 ± 5.51) and role-function mode (56.99 ± 6.73) were at high levels, whereas the mean scores of self-concept mode (40.53 ± 6.90) and the interdependence mode (30.19 ± 3.41) were at moderate levels, as shown in Table 3.

In this current study, the actual scores for Social Support Questionnaire ranged from 38 to 59. The results showed that the average score for social support was 49.96 ($SD = 5.30$). More than half of the participants (56 %) had a social support score higher than the mean score. The highest mean score of social support scale was "Follow-up visits in breast cancer clinic are

very important for getting information." (4.63 ± 0.58) whereas the lowest mean score was "Whenever I need help for breast cancer, I get help from other people with breast cancer." (3.54 ± 1.09).

Chi-square test used to examine the correlation between women's adaptation after breast surgery and the categorical variables: (1) education level; (2) income; (3) type of breast surgery; and (4) current treatment. As showed in Table 4, there was no significant association of adaptation with any categorical variables examined ($p > 0.05$).

Table 2: The clinical characteristics of participants (n = 100)

Variable	n (%)
Stage of Breast Cancer	
Stage I	31 (31)
Stage II	49 (49)
Stage III	20 (20)
Type of Breast Surgery	
Mastectomy	66 (66)
Breast Conserving Surgery	18 (18)
Mastectomy with Breast Reconstruction	16 (16)
Current Treatment	
Surgery	3 (3)
Surgery with Neoadjuvant Therapy	10 (10)
Surgery with Adjuvant Therapy	87 (87)

Table 3: Adaptation of women after breast surgery (n = 100)

Variable	Range		Mean \pm SD	Level
	Possible	Actual		
Overall adaptation (n = 93)	46 - 230	134 - 220	180.31 ± 17.02	High
- Physiological Mode	13 - 65	33 - 63	52.89 ± 5.51	High
- Self-Concept Mode	11 - 55	23 - 55	40.53 ± 6.90	Moderate
- Role-Function Mode (n = 93)	14 - 70	34 - 70	56.99 ± 6.73	High
- Interdependence Mode	8 - 40	18 - 36	30.19 ± 3.41	Moderate

Table 4: Relationships between educational level, income, type of breast surgery, current treatment and adaptation (n = 93).

Variable	Adaptation level		χ^2	p
	Moderate n (%)	High n (%)		
Education Level				
Secondary School or Lower	11 (22.0)	39 (78.0)	0.164 ^p	0.685
University or Higher	11 (25.6)	32 (74.4)		
Average Monthly Income (Baht)				
0 -10,000	5 (16.1)	26 (83.9)	2.359 ^p	0.307
10,001-30,000	13 (31.0)	29 (69.0)		
Over 30,000	4 (20.0)	16 (80.0)		
Type of Breast Surgery				
Mastectomy	14 (22.2)	49 (77.8)	0.222 ^p	0.637
Breast Conserving Surgery	8 (26.7)	22 (73.3)		
(BCS + Mastectomy with Breast Reconstruction)				
Current Treatment				
Surgery	1 (33.3)	2 (66.7)	0.988 ^p	0.610
Surgery with Neoadjuvant Therapy	1 (11.1)	8 (88.9)		
Surgery with Adjuvant Therapy	20 (24.7)	61 (75.3)		

Before running the correlational analysis, a one-sample Kolmogorov-Smirnov test was used for testing normality. The results showed "age," "social support," and "adaptation" were normally distributed. However, "time after breast surgery" was not normally distributed. Kurtosis (-1.56) and skewness (0.097) were further examined for this variable and the kurtosis and skewness were in the acceptable ranges, considering close to normal distribution. The linearity of each pair of variable was also examined. They all met the assumptions before running Pearson's Product-Moment Correlation. The results were that social support was positively related to adaptation ($r = 0.437, p < 0.05$). However, there was no relationship between age ($r = 0.085, p > 0.05$) and time after breast surgery ($r = 0.018, p > 0.05$) with adaptation, as showed in Table 5.

Table 5 : Relationships between age, time after breast surgery, social support, and adaptation (n = 93)

Variable	Adaptation (r)	p
Age	0.085	0.314
Time after Breast Surgery	0.018	0.922
Social Support	0.437	< 0.001

Discussion

The majority of the participants were married women of working age. The findings support that the incidence of breast cancer in women aged 40 and above was very high. Most participants had completed higher education. Although the monthly income was varied, most of them did not report financial problems. It is possible that they used the universal health insurance covering some curative treatments of cancer care. During the seven months after surgery, all participants had adapted themselves to their breast surgery. However, most of them still had to adapt themselves to adjuvant therapy of cancer treatment.

Women with breast cancer reported high levels of adaptation referring to good adaptation, and from a previous study it was reported that the adaptation in women with breast cancer undergoing chemotherapy were at moderate levels.¹³ One possible explanation could be that the current study recruited only non-metastasis women with breast cancer. Most of them were diagnosed in the early stage. In this current study, participants did not suffer from severe pain and distress symptoms that could affect the personal ability of adaptation. Additionally, most participants were married and had their family members such as spouses, their children or relatives taking care of them. They might help them in confronting with the difficult situations of adaptation. Moreover, this study was conducted in a university hospital with professionals who were experts in special care. All participants received health information regarding disease, prognosis, details of treatment, and specific care instructions. These might be useful for them to better adapt to both the disease and treatment.

Among four modes of adaptation, the mean scores of the physiological mode and role-function mode were at high levels, whereas the mean scores of self-concept mode and the interdependence mode were at moderate levels. When analyzing adaptation by item, the highest mean scores item belonged to role-function mode that was "teaching their children". At seven months after breast surgery, most participants still worked. They could perform daily activities and their tasks independently. Nearly a hundred percent of participants had children. Although breast cancer affected their mother roles, all participants had their spouse to assist them in a role of parenting. Furthermore, more than half of participants did not take care for their children because they were already grown up. As they were growing up, children became more independent, resulting in reducing some of the burdens of child care for the participants.

The lowest mean score item belonged to the interdependence mode which was "feeling uncomfortable to ask for help". The participants were working age people who accumulated both knowledge and life skills. Well-educated people tend to have a better understanding in managing their health. However, they are frequently faced with psychological problems. Surgery is an aggressive treatment that contributed to anxiety among women with breast cancer. Additionally, women with breast cancer were also worried about the cancer recurrence. Even though the participants had some consequences (limitation of arm function) after having breast surgery despite helping themselves, they sometimes still needed assistance.

For the physiological mode, the early complications after having breast surgery such as seroma formation, wound infection, and hematoma could happen in a short period of time. At seven months post-operative breast surgery, these symptoms may disappear and would not have an effect on the adaptation of women with breast cancer. For the self-concept mode, more than three-fifths of participants had undergone mastectomy. The appearance change from breast cancer and its treatment resulted in the participants experiencing poor body image. They might have low confidence and difficulty in social activities.

Social support plays an important role to help women with breast cancer to experience less distress and to cope better with the disease. In this current study, most participants had high levels of social support. This finding is congruent with a prior study that social support of breast cancer survivor's ongoing treatment is available.²² The correlational analysis showed that social support was positively related to adaptation. It could be interpreted that participants who received support from available resources including family members, friends, health care providers, or patients with similar diseases had a good adaptation. Most participants had family members taking care of them continuously in various aspects of care involving physical, psychological, and social well-being after breast

surgery. The three most common care activities provided by family members were food provision and preparation, doing housework, and providing post-operative care following the guidance from health care providers. Family caregivers also helped married women with breast cancer to take their medication regularly, to perform exercise, as well as encouraging them to comply with the cancer treatment. All participants were married and stayed with their spouses. They had to adapt themselves due to the change of their body image. Talking and sharing problems between couples helped decrease stress in women with breast cancer. Additionally, their spouses also helped women with breast cancer in parenting their children.

There was no relationships between age, educational level, and income with adaptation. The majority of the participants were middle aged to old aged. They had been newly diagnosed with breast cancer and had undergone breast surgery. All of them were informed about the health education and care instructions after breast surgery from health care providers before being discharged from the hospital. This current study is congruent with the previous study that there was no association between age and adaptation among caregivers of older persons with chronic obstructive pulmonary disease.²³

Most participants had a high level of education. Education is one of the indicators representing the existing knowledge among individuals; however, participants could also gain more information from multimedia such as social media, internet, and television. They were able to search information regarding breast cancer care or related health problems. These might help them promote their adaptation.

Most participants reported sufficient income. They could access health care services. The finding does not support a previous study²⁴ showing a positive relationship between income and adaptation. It is possible that all participants in this study had their own health care insurance covering some curative treatments of cancer as well as the supportive and palliative care, making them more able to support themselves.

There were no relationships between the type of breast surgery, time after breast surgery, and current treatment with adaptation among participants. In this study, breast-conserving therapy and mastectomy with breast reconstruction were categorized in a similar group because women still retained their breasts. Both breast-conserving surgery and mastectomy are safe choices to control the disease. Persons who underwent mastectomy with breast reconstruction had better body image than those who only underwent mastectomy;²⁵ however, the appearance satisfaction between the two types of breast surgery is not different. Although breast reconstruction helps to

recreate their physical appearance, some women still perceive femininity and sexual attractiveness deficiency. Moreover, those who underwent mastectomy can use a mastectomy bra or bra pocket to improve their body image.

The time spanning from three months to one year after breast surgery of Thai married women and various types of treatment did not make adaptation different due to the duration of active oncological treatments. During this time, a number of women with breast cancer were still affected by side effects of the treatment or late complications (e.g., lymphedema or shoulder stiffness) after breast surgery, which could negatively affect their life and their adaptation. They were also anxious about cancer recurrence.

There were some limitations to this current study. This study was specific for married women with breast cancer who were living with their spouses; the generalizability of the study result was limited. Further study should be conducted in both married and single women with breast cancer in order to increase the generalizability of these research findings. Moreover, a qualitative study should be conducted, in order to thoroughly understand how married women with breast cancer adapt well after breast surgery.

Conclusion

The findings of this study are useful for health care providers to understand the adaptation of women after surgery based on Roy's Adaptation Model. Roy's adaptation model guides the researchers to view adaptation in a holistic way, including bio-psycho-social aspects. Breast surgery is a stimulus that directly influences the adaptation of women with breast cancer. After breast surgery, women with breast cancer reported high levels of adaptation during this period. However, the self-concept mode and the interdependence mode were at the moderate level. The higher level of adaptation among married women after breast surgery was associated with the relatively high level of social support. Nurses and/or health care providers should assess social support among married women after breast surgery. Furthermore, the findings are significant in guiding future interventions to promote social support among married women with breast cancer after breast surgery.

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References

- Bray F, Ferlay J, Soerjomataram I, et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;68(6):394-424.
- Youlden DR, Cramb SM, Yip CH, et al. Incidence and mortality of female breast cancer in the Asia-Pacific region. *Cancer Biol Med* 2014;11(2):101-15.
- Bureau of Health Policy and Strategy. Number and mortality rates per 100,000 population by sex and causes of death. (Accessed May 4, 2019, at http://bps.moph.go.th/new_bps/sites/default/files/statistics60.pdf)
- Sakorafas GH, Safioleas M. Breast cancer surgery: an historical narrative part III from the sunset of the 19th to the dawn of the 21st century. *Eur J Cancer Care* 2010;19(2):145-66.
- Rahman GA. Breast conserving therapy: a surgical technique where little can mean more. *J Surg Tech Case Rep* 2011;3(1):1-4.
- Zahoor S, Haji A, Battoo A, et al. Sentinel lymph node biopsy in breast cancer: a clinical review and update. *J Breast Cancer* 2017;20(3):217-27.
- Lee C, Sunu C, Pignone M. Patient-reported outcomes of breast reconstruction after mastectomy: a systematic review. *J Am Coll Surg* 2009;209(1):123-33.
- Vitug AF. Complications in breast surgery. *Surg Clin North Am* 2007;87(2):431-51.
- Lim CC, Devi MK, Ang E. Anxiety in women with breast cancer undergoing treatment: a systematic review. *Int J Evid Based Healthc* 2011;9(3):215-35.
- Falk Dahl CA, Reinertsen KV, Nesvold IL, et al. A study of body image in long-term breast cancer survivors. *Cancer* 2010;116(15):3549-57.
- Mary P, Robin J, Susan RD. Sexual function after breast cancer. *J Sex Med* 2010;8(1): 294-302.
- Kocan S, Gürsoy A. Body image of women with breast cancer after mastectomy: a qualitative research. *J Breast Health* 2016;12(4):145-52.
- Poungsamai P, Choowattanapakorn T, Chimluang J. The relationships between age, education, uncertainty in illness, sense of coherence, social support and adaptation in breast cancer patients receiving chemotherapy. *JOPN* 2015;7(2):187-200.
- Soison A. The relationship between stimuli and adaptation of patients with total knee arthroplasty; 2010, Master's Thesis, Khonkean University, Khonkean. [In Thai]
- Yiadthaisong K, Sittipakorn S, Buatee S. Selected factors correlated with physical adaptation among stroke patients in rehabilitation phase. *Srinagarind Med J* 2015;30(5):491-7.
- Buapan A. Factors influencing adaptation in heart failure patients; 2008, Master's Thesis, Mahidol University, Bangkok. [In Thai]
- Samranrat J. The relationships between perceived severity of illness, spouse support, and adaptation of patients with breast cancer who have undergone mastectomy; 2005, Master's Thesis, Mahidol University, Bangkok. [In Thai]
- Andrew J, Roy SC. Essentials of the Roy Adaptation Model. Appleton-Century-Crofts, Norwalk, CT; 1986.
- Faul F, Erdfelder E, Lang AG, et al. G*Power 3.1.9.2. 2014. (Accessed November 12, 2018, at <http://gpower software.informer.com/3.1/>)
- Toljamo M, Hentinen M. Adherence to self-care and social support. *J Clin Nurs* 2001; 10(5):618-27.
- Leelacharus S, Orathai P. Construct validity of social support questionnaire in Thai women who diagnosed with hypertension. *Public Health Nurs* 2011;25(3):1-17.
- Oztunc G, Yesil P, Paydas S, et al. Social support and hopelessness in patients with breast cancer. *Asian Pac J Cancer Prev* 2013;14(1):571-8.
- Boonchoo B, Thongcharoen W, Thongcharoen V, et al. The Relationships between age, caregiving burden, social support, and adaptation of caregivers of older persons with chronic obstructive pulmonary disease. *Songklanagarind J Nurs* 2015;35(2):61-78.
- Kumto O, Soonthronchaiya R. Factors related to adaptation among older persons with depressive disorder. *J Psychiatr Ment Health Nurs* 2014;28(2):74-87.
- Fang SY, Shu BC, Chang YJ. The effect of breast reconstruction surgery on body image among women after mastectomy: a meta-analysis. *Breast Cancer Res Treat* 2012;137(1): 13-21.