Quality of Life among Community-Dwelling Stroke Survivors

Panidchakul, K., & Boonsin, S.

Abstract—**Background: The prevalence of stroke has been increasing. Post-stroke survivors often have deformities which impact their quality of life. Objective: To examine the relationship between demographic data, ability of daily living, depression, social supports.and quality of life in post-stroke survivors. Methods: A cross-sectional, descriptive correlational design was used in the study. One hundred and three stroke survivors were selected from Saraburi hospital by using purposive sampling technique, and completed Socio-demographic characteristics, Barthel Activity of daily Living index, Thai Geriatric Depression Scale, Social Support Measure, and World Health Organization Quality of Life in Brief version. The overall reliability was 0.93. Data analysis: Data were analyzed by using percentage arithmetic means, standard deviation, Chi-square, and Pearson's Product Moment Correlation Coefficient.**
Results: Most of participants were males (56.3%), and married (63.1%), primary school educated (71.8%). Participants were, on average 62.59 years old and 54.01 months post-stroke. Average monthly income was 2231.07 bath. The major symptoms were hemiparesis (100%), imbalance movement (39.8%), aspirate and constipation (20.4%) respectively. Moreover, the majority showed depression at a normal level (65%), were able to perform their daily living activities (75.7%), the mean overall social support score was moderate level (M = 87.35, SD = 19.61), especially material and financial support (M =18.37, SD = 4.32). Regarding the quality of life, most participants perceived their quality of life either overall or individual dimension at a moderate level (M = 78.59, SD = 15.2). Chi-square and Pearson's Product Moment Correlation Coefficient were conducted to explore the relationships between those variables and quality of life. The results showed that social support, ability of daily living, and educational level were statistically significant positive relationships with the quality of life *(r=0.74, p<0.01, r=0.27, p<0.01, r=0.28, p<0.01)* respectively. In addition, there was statistically significant negative relationships between length of diagnosis with stroke, depression level and quality of life *(r= -0.21, p<0.05, r = -0.23, p<0.05)*. These results implied that the participants who had received more social support, more independence to perform their daily living, higher education, lower depression level, and shorter periods of stroke diagnosis were more likely to have a better quality of life. Conclusion: This finding will guide health care professionals to strengthen social support for improving quality of life in community- dwelling stroke survivors

Key words: quality of life stroke survivors

I. INTRODUCTION

Stroke is a disease associated with brain function impairment caused by an inadequate oxygen supply to the brain. The most common cause is blockage or rupture of arteries which supply the brain. According to the World Health Organization, approximately 6 million people worldwide have died because of stroke. Stroke causes approximately 10% of all deaths worldwide. Stroke is the second largest cause of death in China and Japan (WHO, 2005, cited in Samsen, 2010). Stroke has become a significant cause of death in Thailand. Approximately 690 out of 100,000 Thai people have stroke (Samsane, 2010). According to Public Health survey, reported that the number of patients with stroke admitted in hospitals across the country had increased 2.75 times in the past ten years (Public Health, 2007).

The impact of stroke causes many deformities for post-stroke patients. Ninety percent of those who survive from stroke suffer from remaining deformities due to physical problems such as weakness, partial or complete loss of movement and sensation, and communication limitations. They are also faced with emotional distress (Maksakulpan, et al., 2008). In addition, people living with stroke also face psychological and economic burdens leading to decreases in their quality of life.

Stroke survivors suffer from physical problems that impact their daily living. Some people living with stroke are faced with limitations of movement due to weakness in muscle, and defects in perception and sensation because of neurological function impairment. They are often unable to communicate with their families about what they need and how they feel. These impacts lead to other complications such as pressure ulcers, respiratory infection, urinary infection, and muscle and joint stiffness. Stroke survivors also face emotional distress and feelings of low self-esteem. The physical impact causes emotional distress leading to fluctuations in their mood, a lot of stress, confusion, which causes them to end up with depression. These patients gradually withdraw from society and friends; even withdrawing from their families because of low self-esteem and physical limitations (Teoh, Sims, & Milgrom, 2009; Taylor-Piliae, Hepworth, & Coull, 2013).

There are several previous studies revealed that selected factors such as demographic characteristics, ability to perform daily living activities, social support, and depression were associated with quality of life in stroke survivors. However, there is no report of a previous study of the relationships between selected factors and quality of life of stroke survivors in this particular urban area, which is Pakpreaw subdistrict, Muang district, Saraburi province. In addition, socio-cultural influences in this particular area may impact daily living and quality of life in survivors with stroke. Therefore, the results of this study will not only provide

better understanding of relationships between selected factors and quality of life in this particular group, but they also provide guidance for health care professionals for on-going development of social support to strengthen the ability of post-stroke patients generally, for improving their quality of life.

II. PURPOSES OF STUDY

1. To determine demographic characteristics of post-stroke patients including gender, age, marital status, education, household income, length of time since diagnosis with community-dwelling stroke survivors.
2. To explore the relationships between demographic characteristics, ability of daily living, depression, social support, and quality of life in stroke survivors.

III. RESEARCH METHOD

This study used a descriptive research design to explore the relationships between the variables including demographic characteristics, ability of daily living, depression, social support, and quality of life in community-dwelling stroke survivors.

A. Population and Sample

Population: Stroke survivors living in Pakpreaw subdistrict, Muang district at Saraburi Province, and were being treated in Saraburi hospital.

Sample: The participants consisted of 103 post-stroke survivors (polit & Hungler, 1999).

This sample exceeded correlation statistics where the level of statistical significance was set at alpha equal to 0.05, a power of 0.80, and medium effect size. The sample was selected by purposive sampling technique. The inclusion criteria were the following:

1. The participants live in Pakpreaw subdistrict, Maung district, Saraburi province and were only being treated in Saraburi hospital.
2. Being diagnosed with stroke associated with either blockage or rupture of vessels including stroke cause by accident without loosing extremities.
3. Be alert and oriented based on Assessment of Cognitive Functioning score. The subjects must have scored on this test 23 or more points. 6 participants did not meet the screening criteria were not participate in this study
4. Willingness to participate in the study

B. Instrumentations

The instruments using in the study were:

1) *The Sociodemographic Characteristics* were developed by the researcher to obtain demographic information consisted of gender, age, marital status, education, household income, length of time since diagnosis with stroke, and remaining stroke symptoms.
2) *The Barthel Activity of daily Living index* was developed by Mahoney and Bathel (1992). The questionnaire consisted of 10 items focusing on ability of performing daily living, such as feeding, bathing, grooming, transferring, toileting, and eliminating. Participants who received 0-4 scores indicated they are unable to perform their daily living activities. They completely depend on others for help. In contrast, participants receiving a score of 12 or greater, indicated that they are able to perform their own daily living activities without assistance. The reliability was 0.91
3) *Thai geriatric Depression Scale (TGDS)* was developed by Puangwarin and colleage (2001). The instrument, which consisted of 30 items, measured the feeling of sadness and unhappiness. Scores ranged from normal to severe. A low score indicated close to normal depression, while a high score indicated close to severe depression. A score range from 0-12 equal to normal, 25-30 indicated severe depression. The reliability was 0.73.
4) *Social Support Scales* was developed by Cobb (1976) and Schaefer & colleague (1981), modified by Kultida Panidchakul (1990). The instrument consisted of 25 items, which included five content areas: (1) emotional support, (2) Appraisal support, (3) Social support and network, (4) Information support, and (5) material and financial support. Each category had five items. Each item was measured from 1 through 5 –point Likert's scale. (1=strongly disagree until 5= strongly agree). The reliability was 0.94.
5) *World Health Organization Quality of Life-Brief (WHOQOL-BREF-THAI)* was modified by Mahatnirunkul and colleague (1998). The instrument measured quality of life having four content areas which included, physical condition, emotional condition, social relationship, and environment. The instrument consisted of 26 items which measured on 1 through 5 – point Likert's scale. (1=strongly disagree, until 5= strongly agree). The reliability was 0.90

C. Data Collection

After receiving research approval from the director of Boromarajonani college of nursing, and the committee for the Protection of Human Subjects at Boromarajonani college of nursing, the researcher conducted a process of data collection, as follows:

1) Coordinated with the Primary Care Unit (PCU) at Saraburi hospital for permission and access to the name of the patients based on the inclusion criteria.
2) Selected participants using purposive sampling technique.
3) Recorded participants' names and telephone numbers for further contact.
4) Make a phone call to the subjects for participation, and for those willing to

participate, made an appointment for data collection,

5) Introduce the research team and explain the research topic, its purposes, and participants' rights during participation, especially confidentiality,

6) Process the consent form; all participants signed the informed consent if they agree to participate in the study.

7) Explain the method of completing all instruments. Assistance from research team provided for some participants who were unable to read or write.

8) Check all instruments for correction and completion for further data analysis.

D. Data Analysis

Data were analyzed by using the SPSS statistical package. Descriptive statistics were used to analyze demographic data. Chi-square and Pearson's Product Moment Correlation Coefficient were used to analyze the relationships among demographic characteristics, ability of daily living, depression, and social support and quality of life in stroke survivors.

IV. RESULTS

TABLE I. DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANT (N =103)

Variables	N	Percent
Gender		
Male	58	56.3
Female	45	43.7
Age		
< 40	3	2.9
40-50	18	17.4
51-59	15	14.6
60-69	32	31.1
70-79	31	30
More than 80	4	4
Marital status		
Single	7	6.8
Marries	65	63.1
Divorce, Widow, Separate	31	30.1
Educational Level		
No education	7	6.8
Primary	74	71.8
High school	16	15.5
> High school	6	5.8
Personal Monthly Income (baht)		
<1,000	71	68.8
1,001-5,000	19	18.5
5,001-10,000	6	5.9
> 10,000	7	6.8
Length of Diagnosis with stroke (months)		
< 12	25	24.3
12-48	42	40.8
49-120	26	25.3
> 120	10	9.7
*Stroke Symptoms * *		
Weakness	103	100
Imbalance body movement	41	39.8
Constipation	21	20.4
Aspiration during feeding (37.5%),	21	20.4
Decrease in sensation	19	18.4
Less visual acuity	18	17.5
Speech deficits	10	9.7
Ability of daily living		
Dependent	10	9.7

Moderate dependent	15	14.6
Independent	78	75.7
Total	103	100.00

According to table I, fifty-eight out of one hundred and three participants were male (56.3%). Majority of the participants were married (63.1%) and graduated from elementary school (71.8%). The study revealed that most of the participant were able to perform all of the activities of daily living independently (75.7%). According to stroke symptoms, the participants were able to select more than one symptom. The most stroke symptoms were weakness (100%), imbalance body movement (39.8%), constipation (20.4%) and aspirate respectively.

TABLE II. FREQUENCY AND PERCENTAGE OF DEPRESSION AND QUALITY OF LIFE OF THE PARTICIPANT (N =103)

Variables	N	Percent
Depression		
Normal	67	65
Moderate	34	33
Severity	2	1
Quality of Life (Overall)		
Poor	10	9.7
Moderate	64	62.1
Good	29	28.2
Quality of Life (4 dimensions)		
Physical condition		
Poor	12	11.7
Moderate	79	76.7
Good	12	11.7
Emotional condition		
Poor	17	16.5
Moderate	69	67
Good	17	16.5
Social relationship		
Poor	25	24.3
Moderate	51	49.5
Good	27	26.2
Environment		
Poor	5	4.9
Moderate	55	53.4
Good	43	41.7

From Table II for depression level, the participants showed depression at a normal level (65%). Regarding quality of life, they perceived quality of life in overall at a moderate level (76.7%). Looking individually 4 dimensions, results also showed 4 dimensions individually were at a moderate level (physical = 61.2% emotional = 67% social relationship and environment = 53.4% conditions = 49.5%).

TABLE III. MEAN SCORE AND STANDAR DEVIATIONS FOR SOCIAL SUPPORT, ACTIVITY DIALY LIVING (N= 103)

Variables	Mean (M)	Standard deviation (SD)
Age	62.59	11.32
Personal Monthly Income (baht)	2,231.07	4287.96
Length of Diagnosis with stroke (months)	54.01	60.23
Social Support (Overall)	87.35	19.61
Emotional support	18.28	4.42
Appraisal Support	17.06	4.63
Social Support and Network	16.76	5.05

Information Support	16.89	5.02
Material and Financial Support	18.37	4.32
Ability of Daily Living	2.66	0.65
Quality of Life	78.59	15.12

Table III, The average age of the participants were 62.59 years. The average monthly income of the subjects was 2231.07 bath. The length of time since diagnosis with stroke was 54.01 months.

Regarding social support, the subjects have overall social support at a moderate level (M = 87.35, SD = 19.61). When each type of social support was explored, it was found that most of the subjects received material and financial support (M = 18.37, SD = 4.32).

TABLE VI. CHI-SQUARE ANALYSES FOR RELATIONSHIP BETWEEN THE GENDER, MARITAL STATUS, AND QUALITY OF LIFE (N=103)

Variables	Chi-square (X^2)	p - value
Demographic Characteristics		
Gender	0.474	0.145
Marital Status	-0.023	*0.39*

*$p<0.05$, **$p<0.01$

From table VI, Chi-Square was used to determine the relationships between demographic characteristics and quality of life. The results of the analysis revealed that there were no statistically significant relationship between gender, marital status, and quality of life.

TABLE V. PEARSON'S PRODUCT MOMENT CORRELATION FOR RELATIONSHIP BETWEEN THE DEMOGRAPHIC CHARACTERISTICS, ABILITY OF DAILY LIVING, DEPRESSION, SOCIAL SUPPORT, AND QUALITY OF LIFE (N=103)

Variables	Pearson Product - moment correlation (r)	p - value
Demographic Characteristics		
Age	- 0.094	0.347
Educational Level	0.275**	0.005
Personal Income (month)	0.177	0.073
Length of Diagnosis-with stroke	-0.205*	0.038
Ability of Daily Living	0.268**	0.006
Depression	-0.227*	0.021
Social Support (Overall)	0.740**	0.000
Emotional support	0.545**	0.000
Appraisal Support	0.687**	0.000
Social Support and - Network	0.620**	0.000
Information Support	0.632**	0.000
Material andFinancial-Support	0.604**	0.000

*$p< 0.05$, **$p <0.01$

Table V, Pearson's Product Moment Correlation was also conducted to analyze the relationships among demographic characteristics, activity of daily living, depression, social support, and quality of life. The results also found that there were statistically significant positive relationship between education *(r= 0.275, p<0.05)* ability of daily living *(r= 0.268, p<0.01)* and quality of life in post-stroke patients. Overall social supports were divided into 5 types of social support. The results found that overall social support *(r= 0.740, p<0.01)*, emotional support *(r= 0.545, p<0.01)*, appraisal support *(r= 0.687, p<0.01)*, social support and network *(r= 0.620, p<0.01)*, information support *(r= 0.632, p<0.01)*, and material and financial support *(r= 0.604, p<0.01)*, had a statistically significant highly positive correlation to quality of life.

Moreover, there were statistically significant negative relationship between length of diagnosis with stroke *(r = -0.205, p<0.05)*, depression *(r = -0.227*, p<0.05)* and quality of life in stroke survivors.

V. DISCUSSON

This research study to determine the relationships among factors associated with quality of life in post-stroke patients. The discussion was divided into two parts: (1) The relationships between demographic characteristics, and quality of life in post-stroke patients, (2) The relationships among ability of daily living, depression, and social support and quality of life in community-dwelling stroke survivors.

To describe the results of the first part, the study revealed that there was not a statistically significant relationship between gender, age, marital status, personal income and quality of life in post-stroke patients. However, there was statistically significant positive relationships between education and quality of life in post-stroke patients *(r=0.275, p<0.01)* which indicated that those who have higher education will have a higher level of quality of life. This finding was consistent with a previous studies in elderly patients with stroke during recovery phase which showed that educational level was found to positively correlate with quality of life (Hongsawat, 2008; Bualeang, 2010).

There was statistically significant negative relationships between length of time since diagnosis with stroke and quality of life in post-stroke patients *(r= -0.205, p<0.05)* which indicated that those who have a longer period of time with stroke will have a lower quality of life (Bualeang, 2010).

At the second part, the study found that there was a statistically significant positive relationship between the ability of daily living and quality of life in post-stroke patients *(r=0.268, p<0.01)*. This indicated that stroke survivors who have more ability to perform their daily living activities will have a higher level of quality of life than stroke survivors who have less ability of performing their daily living activities. The study also found social support has positive highly statistically significant relationship to quality of life in stroke survivors *(r=0.740, p<0.01)* which implied that stroke survivors who received more support will have high level of quality of life than those who receive less support. These findings were supported by Bualeang's study (2010) which indicated that there was significant

positive relationship between ability of daily living, social support and quality of life in elderly stroke patients during recovery phase. Also, this finding is similar to the longitudinal study over 6 months of Teoh, et al. (2009) showing that social support and physical functioning were significantly associated with heath-related QOL at ever time in community-dwelling stroke survivors.

There was a weak linear, negative relationship between depression and quality of life in post-stroke, which was insignificant $(r=-0.227, p>0.05)$. This finding was inconsistent with a previous study which indicated that depression was correlated with quality of life in adult patients with stroke at Songkla Princess Hospital (Sathirapanya, 2005). However, our findings are similar to the study of Taylor-Piliae, Hepwort & Coull (2013) and Teoh, et al. (2009) revealed that poor quality of life and low social support contributed significantly to the severity of depressive symptoms among stroke survivors.

VI. CONCLUSIONS

This study was a descriptive research study to explore the relationships among demographic characteristics, ability of daily living, depression, and social support and quality of life in post-stroke patients. The sample in this study consisted of 103 post-stroke patients who were selected by purposive sampling technique. The criteria for subject selection included, (1) patients were being treated in Saraburi hospital (2) living in Pakpreaw Subdistrict, Muang District, Saraburi province. The instruments used in the study consisted of 5parts which included (1) The Socio-demographic Characteristics, (2) Barthel Activity of daily Living index, (3) Thai geriatric Depression Scale, (4) Social Support, and (5)World Health Organization Quality of Life-Brief.

The results of study revealed as follows:
1) There was statistically significant negative relationship between length of time since diagnosis with stroke and quality of life in community-dwelling stroke survivors $(r = -0.205, p<0.05)$
2) There was statistically significant positive relationship between education and quality of life in stroke survivors $(r = 0.275, p<0.01)$
3) The majority of stroke survivors were able to perform their daily living without assistance (71.4%), and there was statistically significant positive relationship between ability of daily living and quality of life in stroke survivors $(r= 0.268, p<0.01)$.
4) The majority of stroke survivors received social support at the highest level and there was statistically significant highly positive relationship between overall social support and quality of life in stroke survivors $(r= 0.740, p<0.01)$. Moreover, there were highly significant relationship between social support in each area and quality of life including emotional support $(r= 0.545, p<0.01)$, appraisal support $(r= 0.687, p<0.01)$, social support and network $(r= 0.620, p<0.01)$, information

support $(r = 0.632, p<0.01)$, and material and financial support $(r = 0.604, p<0.01)$.
5) The majority of post-stroke patients had low level of depression (46.4%), which was significantly negative correlated to quality of life in stroke survivors $(r= -0.227, p>0.05)$.

VII. RECOMMENDATIONS

The study findings will provide guidance for health care professionals for on-going development of support systems and health care services to strengthen the ability of community-dwelling stroke survivors in Pakpreaw Subdistrict, Muang District, Saraburi province for improving their quality of life as follows:
1. Providing knowledge and encouraging awareness and concerns of the importance of effective rehabilitation for community-dwelling stroke survivors to increase their activity daily living and survivor's self esteem.
2. Encouraging social participation for stroke survivors and their families especially concerning and providing social support in terms of appraisal support, social support and network as well as material and financial support to those community-dwelling stroke survivors living alone in community.

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REFERENCES

[1] Bualeang, A. *Factors related to quality of life among older adults with stroke recovery.* Unpublished master's thesis, Mahidol University, Bangkok, Thailand, 2010.

[2] Cobb, S. Social Support as a Moderator of life stress. *Psychosomatic Medicine*, *38* (September - October), pp.300-314, 1976.

[3] Carod-Artal, FJ. Determining quality of life in stroke survivors. *Expert review of Pharmacoeconomics & Outcome research.*, vol.12 no.2, pp. 199-211, 2012.

[4] Hongsawat, S. *Quality of life of diabetes mellitus patients in Chombung Crown Prince Hospital.* Unpublished master's thesis, Mahidol University, Bangkok, Thailand, 2008.

[5] Jitapunkul, S. *WHOQOL-BRFF-THAI.* Retrieved July 20, 2011, Available: www.dmh.moph.go.th/test/whoqol., 2009.

[6] Jitapunkul, S. *Principles of geriatric medicine.* (2th ed.). Bangkok: Chulalongkorn University Publishing, 1999.

[7] Kannasude, P. *Statistics for research in behavioral science.* (2th ed.). Bangkok: Chulalongkorn University Publishing, 1995.

[8] King, RB. Quality of life after stroke. *Stroke,* vol. 27, pp. 1467-1472, 1996.

[9] Kompayak, J. Social support: concept and application. *Journal of Nursing Science Chulalongkorn University,* vol.2, no.6, pp. 96-105, 1989.

[10] Lynch, BE., Butt, Z., Heinemann, A., Victorson, D., & et al. A qualitative study of quality of life after stroke: the importance of social relationships. Journal of rehabilitation medicine, vol.40, no.7, pp. 518-523, 2008.

[11] Mahatnirunkul, S., et al. Comparison of the WHOQOL-100 and the WHOGOL-BREF (26 items). *Journal of Mental Health of Thailand,* vol.5, no. 3, pp.5-15, 1998.

[12] Maiyathat Samsen. *Almost five hundred thousand Thai people getting sick from stroke disease.* Retrieved June 20, 2011, Available: http://www.thaihealth.or.th/healthcontent/news/4463., 2010.

[13] Masskulpan, P. Anxiety and depressive symptoms after stroke in 9 rehabilitation. *Journalof the medical Association of Thailand,* vol.91, no.10, pp.1595-1602, 2008.

[14] Opara, JA. & Jaracz, K. Qulaity of life of post-stroke patients and their caregivers. *Journal of Medicine life,* vol.3, no.3, pp. 216-220. 2010.

[15] Polit, D. F., & Hungler, B. P. *Nursing research: Principles and methods* (6th ed.). Philadelphia: Lippincott, 1999.

[16] Puangwarin, N. *Stroke.* (2th ed.) Bangkok: Rearnkaew Press, 2001.

[17] Sathirapanya C. & Sathirapanya, P. Factors influencing depression among patients with stroke. *Songkla Med,* vol.23 (Suppl 2), pp.229-237, 2005.

[18] Schafer, C., et al. The health – related function of social support. *Journal of Behavioral Medicine,* vol.4, pp.381-405, March- December, 1981.

[19] Sirikangwalkul, A. Influential Factors on Health-Related Quality of Life in Stroke Patients. *Bulletin of the department of medical services,vol.* 27, no.6, pp.239-247, 2002.

[20] Taylor-Piliae, RE, Hepworth JT., & Coull, BM. Predictors of depressive symptoms among community-Dwelling stroke survivors *Journal of Cardiovascular Nursing,* vol. 28, no. 5, pp. 460-467, Sept-Oct 2013.

[21] Teoh, V. & Sims, J., & Milgrom, J. Psychosocial predictrs of quality of life in a sample of community-dwelling stroke survivors: a longitudinal study. *Top Stroke Rehabilitation*, vol.16, no.2 , pp. 157-166. Mar-Apr 2009.

[22] Tildens, V.P. Issuse of conceptualization and measurement of social support in the contruction of nursing theory. *Research in Nursing and Health,* vol.8, pp.201-202, June 1992.

[23] White, N.E. , et al. Coping, social support, and adaptation to chronic illness. *Western Journal of Nursing Research,* vol. 14, pp. 211-225, April 1992.

Dr. Kultida Panidchakul was born in Bangkok, Thailand in 1964. She earned her Master of Science in Nursing *(Medical and Surgical Nursing)* at Mahidol University, Thailand during 1996 and graduated Ph.D. in Nursing *(Functional Health Status of Individuals and Community)* at University of Alabama at Birmingham, Alabama, USA in 2003. Presently, she works as a Head of Research Center, at Boromarajonani College of Nursing, Saraburi. Her research of interests focus on Health Promotion and disease prevention among patients at risk for stroke / or cardiovascular disease. Moreover, Health Promotion in working- age people applying Transtheoretical Model.

Publications:

- **Panidchakul, K**. & Boonsin, S. Determinants of Readiness to Adopt Regular
 Physical Activity among Working-Age People: A Transtheoretical Model. *Journal of Public Health Nursing* 2010; 2: 28-38.
- Boonsin, S. & **Panidchakul, K.** The Study of Regular Physical Activity among Teachers Working
in Health Promotion School: A Transtheoretical Model. *Thai Journal of Nursing* 2010; 1: 59-70.
- **Panidchakul, K**. & Samranbua, A. An Application of Transtheoretical Model to Promote Exercise. *Journal*
of Boromarajonani College of Nursing, Nakhonratchasima 2013; 19(1): 66-76.

Dr. Panidchakul participated in Thai professional and society memberships. She is also a member of Thai Nursing Association and Thai Nursing Council in Thailand.