

FACTORS PREDICTING MATERNAL CAREGIVING BEHAVIOURS FOR LEUKAEMIC CHILDREN UNDERGOING CHEMOTHERAPY

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Abstract

Leukaemic children undergoing chemotherapy require substantial maternal care to enhance their quality of life. This cross-sectional predictive study aimed to describe the level of the maternal caregiving behaviours for leukaemic children undergoing chemotherapy; to examine the relationships between educational background, family income, social support, disease knowledge, attitude towards caregiving, self-efficacy and maternal caregiving behaviours towards such children, and to investigate the predictive ability of such factors for maternal caregiving behaviours. Data were collected from 90 mothers of children with leukaemia, who met the specified criteria, in paediatric haematology clinics of five tertiary hospitals in northern Thailand through sets of questionnaires and analysed by descriptive statistics, Pearson's correlation, Spearman's rank correlation coefficient and stepwise multiple regression from September, 2018 to May, 2019. We found that the mean score of maternal caregiving behaviour for children with leukaemia undergoing chemotherapy was at a moderate level (147.41 ± 23.04), the attitude towards caregiving and self-efficacy had a statistically significant positive relationship with the maternal caregiving behaviours ($p < 0.001$), while educational background, family income, social support and disease knowledge had no relationship with maternal caregiving behaviours. The attitude towards caregiving and self-efficacy could explain 18.8% of the variance in the maternal caregiving behaviours. The findings of this study serve as preliminary information for nurses to plan for promoting maternal caregiving behaviors by managing these predicting factors and to plan for further research to indicate causal factors of maternal caregiving behaviours.

Keywords: Behaviours, Caregiving, Children, Factors, Leukaemia, Maternal

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Introduction

Leukaemia is the most common cancer and the leading cause of death worldwide in children younger than 15 years old (American Cancer Society, 2019a; Leukemia and Lymphoma Society, 2019). It accounts for almost one out of three cancers and the peak age of incidence is 2-6 years old (Tubergen *et al.*, 2016. American Cancer Society, 2019a); In the United States, the average incidences of lymphoblastic leukaemia in children aged 1-4 years old and 5-9 years during 2013-2017 were 76.0 per million and 36.0 per million, respectively (National Cancer Institute, 2020). In Thailand, the incidence of this disease is increasing; according to the latest study by Bidwell *et al.* (2019), the incidence was 36.1 per million, which accounted for 34.8% of childhood cancers during 1990-2011. The greatest incidence rate in cases diagnosed at 0-4 years (123.7 cases per million person-years) and 5-9 years were 73.1 cases per million person-years. Additionally, the Chiang Mai registry contributed the largest proportion of cases (30.2%). According to the statistics of childhood leukaemia cases of the National Cancer Institute (2018) found that the number of leukaemia cases in the northern region was the highest by age 0-4 years (54.5 cases per one hundred thousand) and 5-9 years (19 cases per one hundred thousand).

Chemotherapy is the primary therapeutic modality for leukaemia in children, using anti-cancer (cytotoxic) drugs to destroy cancer cells (American Cancer Society, 2019b). As a result, children with leukaemia experience severe side effects (Rabin *et al.*, 2016), and also common complications of chemotherapy, such as infection, bleeding, and anaemia (Brundige, 2010a, 2010b; Triwaree *et al.*, 2012). Thus, both disease and treatment lead to numerous problems in children and require effective care for this group of children.

The demands of care for the toddlers and preschoolers with leukaemia appear to be crucial to keep their illness under control. These children are still unable to meet all their care needs by themselves due to developmental and health limitations (Kyle and Carman, 2017; Ministry of Public Health, 2018). Studies found that the children must rely on their mothers, who usually play the key role in their care (Orem, 2001; Jones, 2012; Klassen *et al.*, 2012; Williams *et al.*, 2013) and that the age of sick children was negatively correlated with the parent's participation in the care of hospitalized children (Kristensson-Hallstrom, 2000; Balling and McCubbin, 2001; Rattanapibun *et al.*, 2011). Based on the Self-Care/Dependent-Care Theory of Orem (Orem, 2001),

the efficient care provided by mothers for their children with leukaemia includes a response to three sets of self-care requisites: universal self-care requisites; developmental self-care requisites; and health deviation self-care requisites. Mothers' efficient responses to all three self-care requisites can contribute to good health, suitable development, fewer complications, a good quality of life (Punthmatharith *et al.*, 2008; Hatzmann *et al.*, 2009; Klassen *et al.*, 2011;) and improvement in well-being of children with leukaemia (Klassen *et al.*, 2007; Othman *et al.*, 2011). In contrast, mothers' inefficient care for leukaemic children may lead to severe complications of the disease and its treatment, such as infection (Pansiwarak, 2009; Promvise, 2011), and even death (Yilmaz and Ozsoy, 2010). Therefore, maternal caregiving behaviour is a major concern during the period of chemotherapy for leukaemic children.

Because of the importance of maternal caregiving for children with leukaemia, the behaviour of mothers of leukaemic children of various ages in Thailand has been reported (Jiraphunwanich, 2000; Wannapong and Chunpia, 2000; Insing, 2001; Charoenphol, 2005; Kaewbundit, 2006; Pansiwarak, 2009; Promvise, 2011). The results of the studies showed that this maternal caregiving behaviour was good. However, previous studies found that behaviours were unsuitable in terms of preventing and/or managing the side effects or complications of disease and treatment, where essential care procedures were not carried out, such as rinsing the children's mouths with normal saline after every meal they had mouth ulcers, having them wear masks when going outside or in public, not letting them play with children with respiratory diseases, washing hands before every meal (Wannapong and Chunpia, 2000; Insing, 2001; Kaewbundit, 2006; Pansiwarak, 2009), giving them medication as prescribed, and taking them regularly to follow-ups (Harissadee, 1998; Pansiwarak, 2009). Moreover, a pilot study by Insing (2001) found that mothers said they knew how to look after their children because they were advised by the doctors and nurses, but they could not follow the instructions because it was difficult to stop children playing together, as the children were thought to be disobedient. They also pitied the child because when cleaning the mouth sores the child would cry and writhe so much that the mouth sores bleed, causing the child to suffer greatly. From these phenomena, it could be concluded that mothers participated well in taking care of their children with leukaemia, but they still carried out some caring behaviours improperly and the care quality was not good enough. Therefore, the quality of maternal caregiving behaviours should be improved.

From the literature review, it was found that there have been few studies on factors related to maternal caregiving or dependent-care behaviours; most

caregiving behaviours focused on self-care (Callaghan, 2005, 2006; Dashiff *et al.*, 2006). The study conducted on the mothers of leukaemic children demonstrated that the factors influencing maternal caregiving behaviours were educational background (Jiraphunwanich, 2000), family income (Jiraphunwanich, 2000), social support (Charoenphol, 2005), knowledge (Kaewbundid, 2006), attitudes towards caregiving (Jiraphunwanich, 2000) and self-efficacy (Insing, 2001). However, the peak age of leukaemia is 2-6 years old, while the existing studies did not specifically focus on toddlers and preschoolers but on a wide range of ages and showed some methodological limitations, including using a descriptive bivariate relationship design and not using nursing theory as a study framework. Therefore, knowledge of the maternal caregiving behaviours towards leukaemic children undergoing chemotherapy is still minimal and needs to be expanded. Therefore, this study examined whether the concepts from Orem's Dependent-Care Theory were related to maternal caregiving behaviours towards children with leukaemia undergoing chemotherapy. The knowledge gained assist health care providers in early identification of high-risk mothers and design effective intervention programs that maximize optimal caregiving behaviors of the others. Once, adequately caregiving behaviors of the mothers can be enhanced, optimizing health outcomes of leukemic children can be achieved.

Materials and Methods

Study Sites and Participants

A cross-sectional study was conducted of mothers of leukaemic children aged 1-6 years undergoing chemotherapy who accompanied their child to the paediatric outpatient departments of five tertiary hospitals in northern Thailand, including Maharaj Nakorn Chiang Mai Hospital, Chiang Rai Prachanukroh Hospital, Buddhachinaraj Hospital (Phitsanulok), Sawanpracharak Hospital (Nakornsawan), and Lampang Hospital from September 2018 to May 2019. All hospitals were advance level hospital and similarly provide pediatric care to both in and out patients and information about current symptoms of their children, current treatment, and how to care for children from doctors and nurses. The participants in this study were purposely selected based on the following inclusion criteria: 1) playing a major role at home in taking care of their leukaemic children and these children receiving chemotherapy for at least 1-3 months; 2) being able to read and write Thai; and 3) willing to participate in the study.

The sample size was calculated using power analysis by G*Power software, version 3.1.936 (Buchner, 2010), using F-test (linear multiple regression: fixed model, R² deviation from zero), the effect size calculated from $R^2/1-R^2$, $\alpha=0.05$, $\beta=0.80$, with six predicting variables. Since there were no Thai studies investigating the factors predicting maternal caregiving behaviours for children with leukaemia, in this study the researcher estimated the effect size to be a moderate (R²) of 0.15 (Polit and Beck, 2010). The estimated sample size from the formula was 98 mothers.

Data Collection

Demographic Data were collected using a pre-specified recording form consisting of two parts: Part I: demographic data of mothers, including age, marital status, educational background, religion, occupation, family type, family income, number of children, child ordering, duration of care, duration of care for leukaemic children each day, burden of caring, the caregiving assistant, and underlying disease; and Part II: demographic data of the leukaemic children, including age, gender, age at diagnosis, duration and phase of chemotherapy, and side effects and complications of chemotherapy.

The Maternal Caregiving Behaviour Questionnaire, which provided data of maternal caregiving behaviours for leukaemic children undergoing chemotherapy was adapted from a previous study (Kanjana, 2006). Briefly, it consisted of 51 items, including caring needs universal self-care requisites (15 items), health deviation self-care requisites (30 items), and developmental self-care requisites (6 items). The questionnaire was a four-point Likert scale ranging from 1 (Never performed the activity) to 4 (Always performed the activity). The possible scores ranged from 51 to 204, and the scores were classified into three levels: low (51-102.00), moderate (102.01-153.01), and high (153.02-204). Higher scores indicate that mothers show appropriate caregiving behaviour.

The Social Support Questionnaire (SSQ) also adopted from published study (Hanucharunkul, 1988) to evaluate the mothers' perception of the support received from three social networks: family members; friends and relatives; and healthcare providers in promoting their caregiving behaviours. The total score ranges from 0 to 84. High score is a reflection of a high level of perceived social support divided into three levels: low (0-28), moderate (25-29), and high (57-84).

The Knowledge of Leukaemic Disease Questionnaire (Keawbundid, 2006) was used to evaluate the mothers' knowledge regarding leukaemia. There were 20 items of leukaemia knowledge: cause and symptoms (six items), treatment and complications (four items), and caring procedures (10 items). The answer was dichotomous (yes or no). Scores ranged from 0 to 20. A high score indicated a high level of knowledge about leukaemia and it was classified into three levels: low (0.00-6.60), moderate (6.70-13.30), and high (13.40-20).

The Maternal Perceived Self-Efficacy Scale (Chaisom, 2008) was used to evaluate the confidence of mothers in how effectively they could perform the tasks associated with providing care for their leukaemic children undergoing chemotherapy. It contained 38 five-point Likert items ranged from 1 (Not at all confident I can do that) to 5 (Extremely confident I can do that). A higher score indicated higher self-efficacy. The possible scores ranged from 38 to 190, and the scores were classified into three levels: low (38.00-88.67), moderate (88.67-139.34), and high (139.34-190.00).

The Attitude towards Caregiving for the Leukaemic Children Questionnaire (Jiraphunwanich, 2000) was used to evaluate the mothers' attitudes towards taking care of the leukaemic child. It consisted of 18 items with rating scale from 1 (disagree) to 3 (agree). A score of 1.66 or below indicated a bad attitude; 1.67-2.33 a moderate attitude; and 2.34-3.00 a good attitude towards care of the leukaemic child.

These research instruments were tested for their psychometric properties, including content validity for the Maternal Caregiving Behaviours Questionnaire and reliability for all research instruments. The content validity of the Maternal Caregiving Behaviours Questionnaire was examined by a panel of six experts. The questionnaire was judged as having acceptable content validity, if it had the item-level content validity (I-CVI) of .80 and the scale-level content validity (S-CVI) of .90 or above (Polit *et al.*, 2007). As a result, the I-CVI ranged from .80 to 1.00, and S-CVI was .91. The Cronbach's alpha coefficient testing in the study sample of the Maternal Caregiving Behaviours Questionnaire, the Social Support Questionnaire, the Knowledge of Leukaemic Disease Questionnaire, the Maternal Perceived Self-Efficacy Scale, and the Attitude towards Caregiving for the Leukaemic Children Questionnaire were 0.88, 0.91, 0.75, 0.94, and 0.77, indicating acceptable reliability.

The trained research assistants, who were registered nurses with experience in conducting research, identified potential participants from patient

records. On the appointment day, the trained research assistant screened each participant's eligibility. Potential participants were informed about the study and their ethical rights and were asked to participate. Those consenting to participate signed a consent form. Participants were given the questionnaires in complete privacy. As completing the questionnaires took approximately 90-120 min, participants could take a break or stop at their discretion and received refreshments during their answering of the questionnaires. Also, the confidentiality of the subjects was protected. They could withdraw from this study anytime and without any negative effects on their treatments or health care services. Data collection was undertaken concurrently at five hospitals from September 2018 to May 2019.

Data Analysis

Data analysis was conducted based on types of data and objectives of the study, and descriptive statistics were used to describe all study variables. Before regression analysis, linearity and homoscedasticity was analysed. Multicollinearity between the predictor variables was analysed (Tabachnick and Fidell, 2000). Pearson's product moment correlation coefficient was used to analyse the bivariate relationship between family income, social support, disease knowledge, self-efficacy, attitudes towards caregiving and maternal caregiving behaviours, while Spearman's rank correlation coefficient was used to determine the relationship between educational background and maternal caregiving behaviours. The classification of correlation coefficient base (r) was defined as follows: low (0.0-0.29), moderate (0.30-0.49), and high (0.50-1.0) (Burns and Grove, 2009). After testing for the assumptions of multivariate analysis, the predictability of the educational background, family income, social support, disease knowledge, self-efficacy, attitudes towards caregiving and maternal caregiving behaviours for leukaemic children undergoing chemotherapy were analysed using stepwise multiple regression analysis. A p -value of ≤ 0.05 was considered statically significant.

Ethical Issues

The study protocol was approved by the Research Ethics Committee at the Faculty of Nursing, Chiang Mai University (Research ID:2018-038/Study Code:2018-EXP030, May 11, 2018), the Research Ethics Committee at the Faculty of Medicine, Chiang Mai University (Research ID: 5625/Study Code: NONE-2561-05625, May 11, 2018), the Research Ethics Committee at Chiang Rai Prachanukroh Hospital (Research ID: research 412, August 27, 2018), Buddhachinaraj Hospital

(Research ID:077/ 2018, August 22, 2018), Sawanpracharak Hospital (Research ID: 40/2018, August 11, 2018), and Lampang Hospital (Research ID: 99/2018, August 20, 2018). All collected data were kept confidential.

Results and Discussion

Results

Demographic Characteristics of the Mothers of Leukaemic Children

The demographic characteristics of 90 participants are shown in Table 1. The participants' ages ranged from 21 to 48 years with an average of

32.82 years, and most of them were young adults (88.89%). Most of them were Buddhist, married and lived with their husbands. Regarding educational background, one-third of participants had finished secondary level. Over half were part of a nuclear family. The average family income was 19,166.44 baht/month. Most participants (76.67%) had an average family monthly income less than the Thai average reported in 2018 (26,946 baht/household/month). In addition, 41.11% of participants had only one child, and the leukaemic child was their first child (51.11%). The average duration of care for leukaemic children was 19.79 months and the caring time for leukaemic children was 18.56 hours per day. Most participants were

Table 1. Demographic Characteristics

Demographic Characteristics	Frequency (N =90)	(%)
Age (Year) (Range 21-48, $\bar{x}$ 32.82, S.D. 5.89)		
21-30	33	(36.67)
31-40	47	(52.22)
41-50	10	(11.11)
Marital status		
Married and live together with husband	72	(80.00)
Married but did not live together with husband	4	(4.44)
Widowhood / Divorced / Separated	14	(15.56)
Educational background		
Primary level	16	(17.78)
Secondary level	30	(33.33)
Vocational education	19	(21.11)
Bachelor degree	23	(25.56)
Master degree	2	(2.22)
Religion		
Buddhism	80	(88.89)
Christianity	10	(11.11)
Occupation		
Government officer / State enterprises employee	7	(7.78)
Agriculturalist	12	(13.33)
Merchant/ Business	16	(17.78)
Laborer	16	(17.78)
Paid employee	10	(11.11)
Unemployed	29	(32.22)
Family type		
Nuclear family	48	(53.33)
Extended family	42	(46.67)
Family income (baht/month) (Range 2,000-150,000, Median 11,850)		
< 26,018 ¹	69	(76.67)
≥ 26,018 ¹	21	(23.33)
Numbers of children		
1	37	(41.11)
2	35	(38.89)
3	15	(16.67)
4	3	(3.33)
Sick child ordering		
1 st	46	(51.11)
2 nd	31	(34.44)
3 rd	12	(13.33)
4 th	1	(1.11)
Duration of care for leukemic children (months) (Range 1-82, $\bar{x}$ 19.77, S.D. 16.55)		
≤ 12	40	(44.44)
> 12-36	42	(46.67)
> 36-60	7	(7.78)

Table 1. Demographic Characteristics

Demographic Characteristics	Frequency (N =90)	(%)
Caring time for leukemic children each day (hours/day) (Range 4-24, $\bar{x}$ 32.8218.56, S.D. 7.17)		
≤ 8	12	(13.33)
> 8	78	(86.67)
Perceived caregiving burden		
No	15	(16.67)
Yes	75	(83.33)
Expense	66	(37.08)
Caring time	37	(20.79)
Career	47	(26.40)
Having caregiving assistant		
No	19	(21.11)
Yes	71	(78.89)
Spouses	24	(33.80)
Relatives	47	(66.20)
Underlying disease		
No	85	(94.44)
Yes ²	5	(5.56)
Hypertension	2	(40.00)
SLE	1	(20.00)
Thyroid disorders	2	(40.00)
Migraine	1	(20.00)

¹ An average monthly household income of Thai people in 2019 (National Statistical Office, 2019)

² The response can be more than 1

burdened with the care of their sick child, which arose mostly from the expense burden, and had caregiving assistants, mostly their relatives. Most of the participants did not have underlying diseases.

Descriptions of the Study Variables, Correlation and Predictive Variables

The study variables include maternal caregiving behaviours, social support, disease knowledge, attitudes towards caregiving and self-efficacy. The mean score of maternal caregiving behaviours was at a moderate level, whereas the mean scores of social support, disease knowledge, attitudes towards caregiving and self-efficacy were at a high level, as shown in Table 2. Two of the variables, educational background and family income, were described earlier in the maternal demographic characteristics section.

According to Pearson's product moment correlation and Spearman's rank correlation coefficient, the finding showed that attitudes towards caregiving and self-efficacy had a moderately positive relationship with maternal caregiving behaviours ($r=0.363$ and 0.330 , $p<0.001$ respectively), while other variables had no relationship with maternal caregiving behaviours, as shown in Table 2.

Table 2 shows that the attitudes towards caregiving and self-efficacy were the predictive factors for maternal caregiving behaviours for leukaemic children undergoing chemotherapy

and accounted for 18.8% of the variance in maternal caregiving behaviours. In addition, the attitude towards caregiving was the strongest predictive factor of maternal caregiving behaviours for leukaemic children undergoing chemotherapy ($\beta=0.293$, $p<0.001$) followed by self-efficacy ($\beta=0.248$, $p<0.05$), respectively.

Discussions

The findings of this study revealed that average maternal caregiving behaviours for leukaemic children undergoing chemotherapy was at a moderate level, which indicated that mothers' caregiving behaviours were moderately appropriate, demonstrating that the mothers had not yet completely practised the care activities as recommended. This may be due to the complexity of the children's health conditions. The child with leukaemia receiving chemotherapy often suffers from both the disease and the chemotherapy. The major problems resulting from bone marrow failure induce pancytopenia (Brundige, 2010a, 2010b; Triwaree *et al.*, 2012), and these complications are difficult to manage. The mother may not be able to help the child as regularly as recommended. This is congruent with the pilot study of Insing (2001), conducted the relationship between mother's self-efficacy and caring behaviors in

Table 2. Descriptions of the Study Variables, Correlation and Predictive Variables

Descriptive Statistics of the Variables (N = 90)					
Variables	Possible Range	Actual Range	Mean	SD	Level
Maternal caregiving behaviors	51 - 204	94 - 198	147.41	23.04	Moderate
Social support	0 - 84	28 - 84	58.20	12.44	High
Disease knowledge	1 - 20	9 - 19	14.90	3.50	High
Attitudes towards caregiving	1 - 3	1.78 - 3	2.50	0.36	High
Self-efficacy	38 - 190	105-190	154.71	20.95	High
Correlation between Selected Study Variables and Maternal Caregiving Behaviors (N = 90)					
Variables	Maternal Caregiving Behaviors				
	r		p-value		
Educational background	.09 ¹		.37		
Family income	.13		.22		
Social support	.18		.09		
Disease knowledge	.16		.14		
Attitudes towards caregiving	.36		.00		
Self-efficacy	.33		.00		
Educational background	.09 ¹		.37		
The Stepwise Multiple Regression Analysis for Variables Predicting Maternal Caregiving Behaviors (N = 90)					
Variables	β (95%CI)	R ²	R ² Change	t	p
Constant	59.056 (19.42, 98.69)	-	-	2.962	.004
Attitudes towards caregiving	.293 (0.32, 1.73)	.132	.132	2.904	.005
Self-efficacy	.248 (0.05, 0.49)	.188	.056	2.457	.016

¹= Spearman's rank correlation analysis (rs)

preschool children with acute lymphoblastic leukaemia at four hospital in Bangkok, found that mothers said they knew how to look after their children because they were advised by doctors and nurses but could not follow the instructions because it was difficult to stop children playing together, and thought that they were disobedient. There was also a reason for pity because when cleaning mouth sores the child will cry and writhe so much that the mouth sores bleed, causing the child to suffer more. Therefore, the disease and the treatment led to moderate levels of caregiving behaviour among the majority of these participants.

In addition, another reason to explain this finding may be because of the characteristics of childcare among these mothers. In this study, nearly half of the leukaemic children (41.11%) were the first child of the family, which caused stress to the mothers. In addition, over half of participants were nuclear families (53.33%), whose parents were obliged to look after all family members, which may make the mother worry about her childcare role (McGrath, 2001; Svardsdottir, 2005). Moreover, most of the mothers (86.67%) cared for their leukaemic children more than 8 hours per day with an average of 18.56 hours, and 83.33% perceived caregiving to be a burden. This may cause the mothers to feel tired, which may affect their childcare behaviour. The Ministry of Labor of Thailand requires that all types of work should have a normal working time of no more than 8 hours per day, as working for longer can cause a person to be tired and affect their work efficiency. So, long hours of care may lead to moderate levels of caregiving

among the majority of mothers. This finding was inconsistent with previous studies on maternal caregiving behaviours, which found that the level of maternal caregiving behaviour for leukaemic children was good (Jiraphunwanich, 2000; Wannapong and Chunpia, 2000; Insing, 2001; Charoenphol, 2005; Kaewbundid, 2006; Pansiwarak, 2009; Promvises, 2011;).

In this study, the finding revealed that only two of the six variables, attitudes towards caregiving and self-efficacy, were related to maternal caregiving behaviour. These variables accounted for 18.8% of the variance in maternal caregiving behaviour for leukaemic children undergoing chemotherapy. This finding partially supports the study framework that views all variables as factors associated with maternal caregiving behaviour. The significant positive relationship between attitudes towards caregiving and maternal caregiving behaviour was consistent with previous studies. Jiraphunwanich (2000), studied the relationship between knowledge, attitude and practices of maternal health behaviour in taking care of leukaemic child attending at Queen Sirikit National Institute of Child Health, reported a low but significant positive relationship between attitude and maternal health behaviour. This study showed that most participants (60%) had high levels of attitudes towards caregiving. Attitude is the belief and the feelings of people towards such stimuli as people, things, actions, and other situations, including expression (Suwan, 1993). Attitude is an expression of practice and is related positively to practice. The positive attitudes of caregiving usually result from love. The mothers give their affection to

their child, especially when the child is sick, and the mothers must dedicate all of her time to caring for the child. One of the most important roles for women is the maternal role because when speaking of motherhood we often think of women who are kind and show generosity and unconditional love for their children (Soythongdee, 2009). A mother who loves her child will take good care of the child. A positive relationship between attitudes towards caregiving, self-care and self-care behaviour was reported in many groups of patients, such as diabetic patients (Pattama, 2001; Didarloo *et al.*, 2012; Ghannadi *et al.*, 2016; Karimy *et al.*, 2018), rheumatoid arthritis patients (Nadrian *et al.*, 2011), and multiple sclerosis and diabetic patients (Ridder *et al.*, 2004). Therefore, this study supports the association between attitudes towards caregiving and maternal caregiving behaviour.

As demonstrated in this study, the attitude towards caregiving was the strongest predictive factors for the maternal caregiving behaviour towards leukaemic children undergoing chemotherapy, accounting for 13.2% of the variance in behaviour. The mothers reporting higher attitudes towards caregiving were likely to practice proper caregiving behaviour. This finding was consistent with the studies of Karimy *et al.* (2018) and Didarloo *et al.* (2012) in which attitude towards self-care was reported as a significant predictor for self-care behaviour. They indicated that a positive attitude towards self-care will increase the possibility of better self-care practices, which supports these research results. According to this present study and the similar studies presented above, it seems that using attitude-improvement strategies might be conducive to improving caregiving behaviour.

Self-efficacy was another factor associated with maternal caregiving behaviour, which accounted for 5.60% of the total variance in maternal caregiving behaviour. This finding contributes to the growing literature on the role of perceived self-efficacy in maternal caregiving behaviour. Mothers of leukaemic children in the present study were found to have high perceived self-efficacy, meaning that they had higher confidence in providing caregiving to the child. This finding was similar to the result of Insing (2001), found a highly positive relationship between perceived self-efficacy and caregiving of mothers. It was consistent with Chaisom (2008), proceeded predicting factors of dependent care behaviors among mothers of toddlers with congenital heart disease at two tertiary public hospitals in Chiang Mai and Phitsanulok, found that mothers of toddlers with CHD who expressed higher self-efficacy were more likely to show good dependent-care

behaviour. The high self-efficacy among mothers in the present study was due to support received from the family. Data showed that most participants were married, lived with their husbands and had caregiving assistants who were a vital source of special support. This is consistent with the previous study of Chandate *et al.* (2015), which revealed that the marital relationship and social support could jointly predict a mother's ability to take care of children under one year of age. Another reason may be the nature and health outcome of the leukaemic children in the present sample. The children with specific disease such as leukaemia are vulnerable to adverse complications of the disease. From the findings, nearly half of the participants (46.67%) were taking care of leukaemic children for longer than 12–36 months and most of the children (75.56%) had been diagnosed with leukaemia for more than one year. Long duration of illness and several hospital admissions would increase the opportunities for these mothers to receive more information from healthcare providers, which would help them understand their child's illness-related events. In addition, in the paediatric outpatient departments of five tertiary hospitals in the present study, health education related to care of leukaemic children was arranged for these participants. Their health conditions and caregiving conditions were regularly monitored and advised on during their visits. Health suggestions or verbal persuasion, encouragement, support and reassurance were also provided to mothers by healthcare providers during their regular visits. This may help mothers to feel confident and gain a greater sense of control over their parenting role (Chaisom, 2008, Insing, 2001). Furthermore, follow-up physical examinations by paediatric oncologist that indicate a stable condition of the child may ensure that their caregiving behaviours are appropriate. Thus, the mothers of leukaemic children will develop a sense of self-efficacy and engage continually in caregiving behaviours towards their children. According to Orem's theory (Orem, 2001), self-efficacy is linked to the transitional capability of dependent-care operations in such cognitive processes as thinking, judging and deciding about dependent-care situations. Before a dependent-care action is performed, individuals will judge and make decisions about their capabilities to control or perform the action. For individuals who perceived that they had ability in dependent-care or self-efficacy, this situation will result in their carrying out the dependent-care action. Thus, it stands to reason that those mothers with higher perceived self-efficacy would be found to provide better maternal caregiving behaviour for leukaemic children undergoing chemotherapy.

In this study, self-efficacy was a predictive factor of maternal caregiving behaviour for leukaemic children. This finding was similar to the result of study in mothers for toddlers with CHD, in which self-efficacy significantly predicted maternal caregiving behaviour. However, in the previous study self-efficacy could explain only 43.80% of the variance in the mothers' dependent-care behaviour (Chaisom, 2008), while in this study it could explain 5.60% of such variance. This may be due to the care condition among mothers. This result was consistent with the studies of Karimy *et al.* (2016) and Venkataraman *et al.* (2012), who both found that self-efficacy was the most important predictor of self-care behaviour. Orem's theory (Orem, 2001) suggests that engagement in self/dependent-care involves the estimation of what can and should be done, to decide what will be done, and to produce care. The mothers of leukaemic children who perceived that they had the ability or self-efficacy for dependent-care would carry out dependent-care actions. The results of the current study provided particularly strong support to self-efficacy leading to a better maternal caregiving behaviour.

The findings did not support the study framework and hypotheses, since they showed no relationship between educational background, family income, social support and disease knowledge and maternal caregiving behaviour for leukaemic children undergoing chemotherapy. In the framework, basic conditioning factors and self-care agency affected maternal caregiving behaviours. This study showed the selected basic conditioning factors, including attitudes towards caregiving and selected self/dependent-care agency, including self-efficacy, affect maternal caregiving behaviour. However, other selected factors were not associated with maternal caregiving behaviour. It may be that those variables were related to one another, although they were not as high as the criteria for multicollinearity.

Educational background, a basic conditioning factor, was not significantly related to maternal caregiving behaviour for leukaemic children undergoing chemotherapy, although educational background is one factor of the socioeconomic conditions that can affect value and the means that a person uses to meet their therapeutic self-care demands (Orem, 2001); parental education is important in determining healthcare services for children with special healthcare needs (Weller *et al.*, 2003). However, the research showed that educational background was not significantly related to maternal caregiving behaviour. The result of this research was consistent with the study of Charoenphol (2005), studied stress and parental

behavior in taking care of leukaemic children hospitalized at King Chulalongkorn Memorial Hospital, found that mothers with different educational levels showed no differences in their caring behaviour. The possible explanation for this finding may be the fact that all mothers regularly received advice from healthcare providers both as in-patients and in OPDs. The information received included their children's current symptoms, current treatment and how to care for their children, which may help mothers providing care for their child. Thus, mothers with high or low educational levels behave the same. In addition, with respect to the responsibility of the maternal role, maternal roles arise from the process in which mothers are successful in maternal roles and can combine behaviour of maternal roles with other roles with happiness and satisfaction with motherhood (Mercer, 1985). Most participants (88.89%) were in early adulthood; in the parental role, young adults have the desire to protect and care for the weak, to continue the family. Having children leads to learning about giving love without expecting compensation (Pengsatit, 2014). Thus, years of education may not have an effect on their caregiving behaviour. Nevertheless, due to current technological advances, together with the present being a social media era, these mothers can search out knowledge and care information for their leukaemic children from any resource, for example television, the internet and line application. Based on current and previous studies it seems that there are many hypotheses that should be further examined regarding the influence of educational background on maternal caregiving behaviour.

Family income, another basic conditioning factor, was not found to be significantly related to maternal caregiving behaviour for leukaemic children undergoing chemotherapy in this study. This was consistent with the study of Charoenphol (2005), that mothers with different family incomes showed no different caring behaviour, similar to that found for educational level. Mothers at all income levels receive information about diseases, treatment and the care of leukaemic children from health team staff, leading mothers to have the same knowledge and resulting in no difference in their childcare behaviour. Furthermore, the universal health care coverage scheme, which gives all people access to care may explain why family income was not related to caregiving behaviour. The government has a policy of developing the health system and society guarantees based on principles of efficiency and sustainability of national finances by focusing on service provision, public health and a comprehensive social protection system for all, and appropriately upgrading the health insurance system

to cover everyone equally (National Health Security Office [NHSO], 2019). Despite the average household income of Thai people indicate a minimum standard required for an individual in the family and might make interpreting finding difficult, it is important to keep in mind that this level of reported family income may not mean that they have poor resources or may not be able to exploit economic resources for their child's care. Moreover, approximately almost one-third of mothers in the present study (32.22%, $n=29$) were unemployed or were housewives unable to earn income on their own, but living with their husbands who may have the primary duty of earning money for the family. This may allow the mother to be at home and have the time to look after the leukaemic child fully (Chaisom, 2008).

Regarding social support, that was considered as basic conditioning factors, and the findings showed that participants had high perceived social support from families, friends and healthcare providers, but social support was not significantly related to their maternal caregiving behaviour. This finding was inconsistent with the framework that the availability and adequacy of resources can exert an influence on self-care or dependent-care according to Orem's theory (Orem, 2001). This result was also not consistent with the findings of a positive significant correlation between social support and maternal asthma management abilities reported by Santati (2005) where parents who received greater social support were more likely to show good caring behaviour (Charoenphol, 2005). The result was also inconsistent with the study of Jiraphunwanich (2000), which found that mothers with different levels of social support had indifferent of practice of health behaviours. However, the finding was consistent with the study by Chaisom (2008), who reported that perceived social support was not related to the dependent maternal care behaviour for toddlers with CHD. In addition, the findings of high social support in these participants are similar with prior studies that reported that the availability of social support was high among mothers of leukaemic children. This may be due to most of the mothers receiving similar information and support from healthcare providers. Also, the discrepancy of the findings that social support was not significantly related to maternal caregiving behaviours for these leukaemic children may possibly be due to the characteristics of the population. In addition, most of the participants (88.89%) were in early adulthood, a time when the body is full of strength and intelligence, emotional and social developments are completely relative. It is also the stage where they start to have a career and family and are ready, to a certain extent, to take care

of children (Havinghurt, 1972). In the parental role, young adults have the desire to protect and care for the weak, to continue the family. Having children leads to learning about giving love without expecting compensation (Pengsatit, 2014). When considering social support at each level, the participants received similar moderate to high levels. From the reasons mentioned above, these may lead to the result that social support was not significantly related to maternal caregiving behaviour.

Disease knowledge was another dependent-care agency variable that was found to be high among mothers in the present study. However, it was not related to caregiving behaviour, as proposed. This finding was consistent with the study of Chaisom (2008) who reported that the maternal CHD knowledge was not associated with the dependent-care behaviour. This finding did not support the Self-Care/Dependent-Care Theory of Orem (Orem, 2001) which posits that dependent-care agency is the learned human capability that gives individuals the power to engage in the deliberate actions of dependent-care. The dependent-care agent or the provider of dependent-care needs to have knowledge of self-care requisites and the means to meet them. Knowledge of leukaemia is, therefore, an important key in assisting mothers to understand all of their child's self-care requisites and to meet some or all of them. The mothers must gain knowledge of elements specific to their child's situation, especially the situation that can precipitate an adverse complication of the disease and the action that they can take to prevent or diminish such complications. This result is not inconsistent with the research findings of a positive relationship between knowledge and caregivers' behaviour of children with leukaemia at tertiary hospital in southern Thailand (Kaewbundid, 2006), where the study the relationship between perception of disease, selected factors and maternal behaviors in caring for children with CHD at King Chulalongkorn Memorial Hospital and Siriraj Hospital, reported mothers who received greater levels of knowledge were more likely to show good care behaviour towards children with CHD (Asumpinzub, 1997). However, an explanation for this discrepancy might be due to clustering non variables of disease knowledge scores among participants. Most of them had high levels of disease knowledge, which may partly be due to continuing care providing opportunities to obtain information from the healthcare providers or from other parents. In addition, the mothers received the same amount of information concerning the disease, treatment and caring for leukaemic children from healthcare

providers in all hospitals to the same standard, such as ThaiPOG (Thai Pediatric Oncology Group [ThaiPOG], 2016). Moreover, nearly half of the participants (46.67%) had cared for leukaemic children for longer than 12–36 months, and most of the children (75.56%) had been diagnosed with leukaemia for more than one year. It is possible that the duration of care and the time since diagnosis may help mothers adapt to the situation and have the time to get information from various resources (Sen-Ngam *et al.*, 2005; Wills, 1999) such as healthcare providers, other mothers of children with leukaemic disease, brochures and the internet. Therefore, the different level of disease knowledge did not result in different maternal caregiving behaviours. Another reason might be that although knowledge is a necessary component of the decision making about dependent-care actions, by itself it may not be sufficient to result in changes in dependent-care behaviour. This result might also suggest that health education, the use of teaching methods alone, is not enough to promote maternal caregiving behaviour for leukaemic children undergoing chemotherapy.

This study revealed that only 18.8% of the variance in maternal caregiving behaviours was explained by two variables: attitudes towards caregiving and self-efficacy, which were derived from dependent-care agency. Regarding the Self-Care/Dependent-Care Nursing Theory (Orem, 2001), self/dependent-care behaviours are influenced by basic conditioning factors and self/dependent-care agency, while this study found that only dependent-care agency affected maternal caregiving behaviours. This may partly be due to those variables being related to each other, although they were not as high as the criteria for multicollinearity; social support, family income and educational background had significant positive relationships with attitudes towards caregiving; and social support and attitudes towards caregiving had a significant positive relationship with self-efficacy. The findings from this study partially support the study framework that views all variables as factors associated with maternal caregiving behaviours for leukemic children undergoing chemotherapy.

For the study-size issue, the researcher reviewed the medical records of all leukaemic children undergoing chemotherapy aged 1-6 years to recruit potential respondents who met the inclusion criteria. However, during data collection some leukaemic children did not come for the appointment or were admitted or died before the appointment, therefore leaving only 90 mothers who met the inclusion criteria. With this number,

the researcher examined the power of test and the effect size backwards by G*Power software, version 3.1.9 (Buchner, 2010) and found that the power of test was 0.80 and the effect size was 17, which were acceptable. In addition, the ratio between the sample size and number of independent variables should never fall below 5:1, and the desired number of observations for each independent variable is 15-20 (Hair *et al.*, 2010). Thus, 90 mothers were sufficient to verify this study result.

The limitation of this a cross-sectional descriptive design is that the sample was purposively selected only from tertiary hospitals. Thus, this may limit the generalizability of the findings to hospitals with other care levels. The study should be replicated with larger sample size and more representative areas should be added to be able to extrapolate the findings to other regions. However, there are relatively low predictive powers of predictors in this study, which suggests that there are other variables that may represent antecedent factors. Further model-testing studies are recommended to identify variables that may directly or indirectly affect maternal caregiving behaviors. In addition, all basic conditioning factors and all dependent care agencies which have a positive and negative relationship to maternal caregiving behaviors are needed to further study in order to cover Orem's nursing theory. Furthermore, experimental studies to test the effect of a program for enhancing maternal caregiving behaviors can be planned.

Conclusions

In conclusion, attitudes towards caregiving and self-efficacy influence maternal caregiving behaviours for leukaemic children undergoing chemotherapy. The findings of this study are beneficial for nurses working in paediatric oncology units to integrate a comprehensive assessment of the attitude towards caregiving and self-efficacy into the nursing care for such children. In addition, nurses and physicians can help maintain maternal caregiving behaviour by promoting a positive attitude towards caregiving and self-efficacy for their mothers.

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