The Association between Stress and Intensity of Low Back Pain among Thai Nursing Students

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Abstract: Nursing students are subjected to many kinds of stress during their studying and stress leads to increase intensity of low back pain (LBP). The aims of this study were to determine the level of stress and intensity of LBP, to examine the association between stress and intensity of LBP, and to determine which kinds of stress was able to predict the intensity of LBP among 223 nursing students in Thailand. A self-reported questionnaire which was confirmed for quality and that was composed of individual data, stress, and intensity of LBP during the previous seven days, was used for collecting the data. Data were analyzed using descriptive statistics and Pearson's product correlation and stepwise multiple regression analysis. The results revealed that nursing students experienced stress at a moderate level (Mean = 2.91, S.D. = 0.54) and had intensity of LBP at a mildly moderate level (Mean = 3.47, S.D. = 1.66). The participants' self-perceived health status and relationship with teachers was able to predict the intensity of LBP among the nursing students at a percentage of 8.4 (p<.05). Institute administrators can use the findings of this study to promote health and to place emphasis on providing suitable social support and learning activities for nursing students.

Keywords: stress, intensity of low back pain, nursing students

1. Introduction

Nursing students are subjected to many kinds of stress during their studying in a nursing program. Evidence indicates that nursing students have higher levels of stress than students in other disciplines (Sritoomma, & Domkrang, 2017). The nursing program is designed to produce skilled and qualified nurses that are able to utilize their academic knowledge and skills in the practice of the profession (Alsaqri, 2017). The program covers four years and the nursing curriculum consists of theoretical and clinical courses.

Stress describes the psychological or physiological responses to stressors (Selye, 1976). During nursing education and training, nursing students are exposed to many factors that create stress (Paveen & Inayat, 2017), comprising academic, interpersonal, intrapersonal, and environment domains, including expectations of success in education, academic learning and teaching (assignments and work- loads), nursing practicums (taking care of patients), relationships with teachers, relationships with other students, expenses for study, self-perceived health status, and living in dormitories (Shdaifat, Jamama, & AlAmer, 2018; Elsayes, & Obied, 2018; Sritoomma, & Domkrang, 2017; Alsaqri , 2017; Paveen, & Inayat, 2017; Khater, Akhu-Zaheya, & Shaban, 2014; Moridi, Khaledi, & Valiee, 2014; Labrague, 2013; Shaban, Khater, & Akhu-Zaheya, 2012). Levels of stress and sources of stress have been reported in studies of nursing students in many countries. In Thailand, the study of Sritoomma and Domkrang (2017) reported that nursing students experienced a moderate level of stress. The finding of that study is similar to the study of Chan, So, and Fong (2009) where the students perceived a moderate level of stress. In addition, the finding of earlier studies by Shaban, Khater, and Akhu-Zaheya (2012) indicated that nursing students in Jordan perceived a moderate level of stress.

Low back pain (LBP) is an important health problem in the nursing occupation and affects nursing students before entering the health care workforce. One of the tasks of nursing students consists of manually handling and transferring patients and objects during their training activities and caring for conscious and unconscious patients which is similar to nursing work. Evidence indicates that stress is related to LBP in nursing students (Mitchell et al., 2009; Mitchell et al., 2010) and that it leads the development of LBP (Ghaffari, Alipour, Farshad, Jensen, Josephson, &

Vingard, 2008; Kyung-Jae, Joo Ja, & Jeung-Im, 2011). Additionally, stress increases the risk of LBP (Olivier, Mudzi, Mamabolo, & Becker, 2010). Most studies regarding the level of intensity of LBP and the association between stress and LBP have been conducted among nurses and hospital employees, while there has been limited research on the association between the stress and intensity of LBP among nursing students in Thailand. Therefore, it is expected that this study will provide a better way to help reduce the stress level and stressors among nursing students in order to prevent and decrease the intensity of their LBP.

2. Objectives

The purposes of this study were to determine the level of stress and intensity of LBP, to examine the association between stress and intensity of LBP, and to determine which kinds of stress can predict the intensity of LBP among nursing students in Thailand.

3. Ethical Considerations

Ethical approval was obtained from the Mae Fah Luang University Human Research Ethics Committee (Reference No. 09). The nursing students in the study were given an information sheet to read and the research's purpose, significance, benefits were explained verbally. Their participation in the study was voluntary.

4. Materials and Methods

A cross-sectional study was conducted among the nursing students in the bachelor degree program at the School of Nursing, Mae Fah Luang University in Chiangrai province and at the Boromrajonani College of Nursing, Sawan Pracharax-Nakhonsawan in Nakhonsawan province, Thailand. Questionnaires were administered to the population of 91 nursing students studying at the Mae Fah Luang University and to the 144 nursing students studying at the Boromrajonani College of Nursing, Sawan Pracharax-Nakhonsawan. They were second year, third year, and fourth year nursing students that had experienced LBP during the previous seven days. The data were collected between the January and March 2016. Of these 235 individuals, a total of 223 nursing students completed the survey, representing a response rate of 94.9%.

Data were collected using a self-administered questionnaire, which was divided into three parts: individual data (10 items), stress among the nursing students (48 items), and intensity of LBP during the previous seven days (2 items). The stress among the nursing students was measured using the stress questionnaire of Phochum (2001) (Thai version) in order to assess the sources of stress experienced by the nursing students. It consisted of a 48-item Likert scale with 8 factors, including 1) expectations of success in education (5 items), 2) academic learning and teaching (6 items), 3) nursing practicums (10 items), 4) relationships with teachers (6 items), 5) relationships with other students (6 items), 6) expenses for study (5 items), 7) self-perceived health status (5 items), and 8) living in dormitories (5 items). Each item was rated on a five-point scale (1= no stress, 2= mild stress, 3= moderate stress, 4= severe stress, and 5= very severe stress). Stress was divided into three levels: low (less than or equal to 1.67), moderate (1.68-3.34), and high (3.35-5.00).

A numeral 11- point scale was used to collect the data on the intensity of LBP among the students. The scale is a visual analogue scale (VAS) ranging from zero to ten points, where "zero" means absence of pain and "ten" means unbearable pain. The intensity of LBP was divided into three levels: low (less than or equal to 3 points), moderate (more than 3 to 7 points), and high (more than 7 to 10 points).

The self-reported questionnaire which was confirmed for quality and validity was examined by three experts. The reliability of the questionnaire on stress when tested using Cronbach's alpha was found to be 0.81.

Descriptive statistics including frequency, percentage, mean, and standard deviation were used to describe the characteristics of the study participants and the study variables. The analytical statistics comprised Pearson's product correlation and stepwise multiple linear regression analysis. The level of statistical significance was set at 0.05.

5. Results

5.1 Characteristics of the participants

The respondents included second year students (58.3%), third year students (30.9%), and fourth year students (10.8%). Most were female (97.8%). The participants' ages ranged from 19 to 23 years, with a mean age of 20.5. The BMI of the nursing students ranged from 15.4 kg/m^2 to 28.9 kg/m^2, with a mean BMI of 20.5 kg/m^2. The grade point average of the students ranged from 1.9 to 3.85, with a mean grade point of 2.97 (S.D. = 0.38). Almost all (99.6%) had no previous diseases related to LBP. Most of them had adequate expenses for studying (88.3%) and almost all (93.7%) received money from their parents.

5.2 The level of stress among the nursing students

The nursing students experienced overall stress at a moderate level (Mean = 2.91, S.D. = 0.54). In each domain, stress from expectations of success in education and from academic learning and teaching was at a high level. Stress from nursing practicums, relationships with teachers, relationships with other students, expenses for study, self-perceived health status, and living in dormitories was at a moderate level (Table 1).

Table 1. The Mean and Standard Deviation of Stress among the Nursing Students (N=223)

Stress	Mean	Standard deviation	Level
Stress from expectations of success in education	3.84	0.733	High
Stress from academic learning and teaching	3.45	0.652	High
Stress from nursing practicums	3.26	0.612	Moderate
Stress from relationships with teachers	2.66	0.820	Moderate
Stress from relationships with other students	2.57	0.901	Moderate
Stress from expenses for study	2.25	0.844	Moderate
Stress from self-perceived health status	2.78	0.845	Moderate
Stress from living in dormitories	2.53	0.995	Moderate
Overall stress	**2.91**	**0.540**	**Moderate**

5.3 The intensity of LBP during the previous seven days

Approximately three-fourths (60.1%) of the nursing students experienced the intensity of LBP at a low level (less than or equal to 3 points), followed by a moderate level (more than 3 to 7 points) (35.4%). The mean score for the intensity of LBP was at a mildly moderate level (Mean = 3.47, S.D. = 1.66). Table 2 presents the number and percentage of the nursing students classified according to the level of the intensity of LBP.

Table 2. The Number and Percentage of the Nursing Students Classified according to the Level of
the Intensity of LBP during the Previous Seven Days (N=223)

Level of the intensity of LBP		N	%
Low	(less than or equal to 3 points)	134	60.1
Moderate	(more than 3 to 7 points)	79	35.4
High	(more than 7 to 10 points)	10	4.5

(Mean = 3.47 Standard Deviation = 1.66 Min = 1 Max = 10)

5.4 The association between stress and the intensity of LBP and the predictors of the intensity of LBP

Stress from expectations of success in education and from academic learning and teaching was seen to be positively related to the intensity of LBP during the previous seven days at the 0.05 level of statistical significance (r = 0.151, and 0.171, respectively). Stress from nursing practicums, relationships with teachers, relationships with other

students, and self-perceived health status was positively related to the intensity of LBP during the previous seven days at the 0.01 level of statistical significance (r = 0.191, 0.244, 0.219, and 0.246, respectively). On the other hand, stress from expenses for study and from living in dormitories was not related to the intensity of LBP during the previous seven days at the 0.05 level of statistical significance (Table 3).

Table 3. The Association between the Eight Variables of Stress and the Intensity of LBP during the Previous Seven Days using Pearson's Product Correlation Analysis.

Stress	Correlation coefficient (r)	p-value
Stress from expectations of success in education	0.151*	.025
Stress from academic learning and teaching	0.171*	.011
Stress from nursing practicums	0.191**	.004
Stress from relationships with teachers	0.244**	.000
Stress from relationships with other students	0.219**	.001
Stress from expenses for study	0.098	.144
Stress from self-perceived health status	0.246**	.000
Stress from living in dormitories	0.104	.121

* Correlation is significant at the 0.05 level.
** Correlation is significant at the 0.01 level.

Prior to analysis, the Komogorov-Smirnov test indicated that stress from expectations of success in education, academic learning and teaching, nursing practicums, relationships with teachers, relationships with other students, expenses for study, self-perceived health status, living in dormitories, and the intensity of LBP scores had a normal distribution. Multicollinearity verified by examining the correlation among the eight variables of stress was carried out and the results showed a low to moderate correlation with each other (r =.098 to 0.563).

The results of the stepwise multiple linear regression analysis showed that the predictors of the intensity of LBP during the previous seven days were stress from self-perceived health status and from the students' relationships with their teachers. The two variables altogether explained 8.4% of the variance in the intensity of LBP at the statistically significant level of 0.05 ($R^2 = 0.084$, p-value<.05). When considering the regression coefficient (Beta), stress from health status was found to be the most important variable and influenced the intensity of LBP at 17.3%, followed by stress from relationships with their teachers (17.0%). Table 4 presents the stepwise multiple linear regression analysis.

Table 4. Stepwise Multiple Linear Regression Analysis

Variables	b	Standard Error	Beta	t	p-value
Stress from self-perceived health status	0.341	0.141	0.173	2.421	.016
Stress from relationships with teachers	0.344	0.145	0.170	2.374	.018

Constant = 1.601; R = 0.290 $R^2 = 0.084$;   F = 10.096; *p-value<.05

The equation explaining the variance in the intensity of LBP during the previous seven days is as follows.

$$Y = b_0 + b_1 X_1 + b_2 X_2$$

Where Y = intensity of LBP during the previous seven days
b_0 = constant value
b_1 = regression coefficient value of stress from self-perceived health status
b_2 = regression coefficient value of stress from relationships with teachers
X_1 = stress from self-perceived health status
X_2 = stress from relationships with teachers

Therefore, the predicted intensity of LBP during the previous seven days

= 1.601 + 0.341 (stress from self-perceived health status) + 0.344 (stress from relationships with teachers).

This equation means that if stress from self-perceived health status increases 1 unit, the intensity of LBP will increase in an identical way by 0.341 units, controlling for other variables. In addition, the equation also means that if stress from the students' relationships with their teachers increases 1 unit, the intensity of LBP will increase in an identical way by 0.344 units, again controlling for other variables.

6. Discussion

6.1 The level of stress among Thai nursing students

The study findings demonstrated that the stress level of the Thai nursing students was at a moderate level. These results are consistent with the study of Sritoomma and Domkrang (2017), where it was seen that Thai nursing students experienced a moderate level of stress. The findings of the study are also similar to the study of Chan, So, and Fong (2009), who conducted a study of Hong Kong nursing students and found that they perceived a moderate level of stress. In addition, the findings of this study validate the findings of the earlier studies by Shaban, Khater, and Akhu-Zaheya (2012), that nursing students in Jordan perceived a moderate level of stress.

However, the results of the present study are different from the findings from Alsaqri (2017), where Saudi Arabian nursing students experienced a high level of stress, and those of Moridi, Khaledi, and Valiee (2014), where Iranian nursing students had a high level of stress during their learning and studying in the nursing program. This could be due to the different learning environments in each institution and different types of questioning used to collect the data. In this study, stress on the part of the nursing students was measured using the stress questionnaire of Phochum (2001) (Thai version) in order to assess the sources of stress experienced by the nursing students, whereas, the data from the other studies were collected using the Perceived Stress Scale (PSS).

6.2 The intensity of LBP during the previous seven days

Based on the present study, the results revealed that the intensity of LBP was at a mildly moderate level. Compared with the research findings from previous studies conducted among nurses in Turkey and Yemen (Ghilan, et al., 2013; Ovayolu, Ovayolu, Genc, & Col-Araz, 2014), where the nurses also reported severity of LBP at a moderate level, this could be due to the similar experiences in doing a lot of work and the students' responsibilities in their clinical practice taking care of patients.

6.3 The association between stress and intensity of LBP and the predictor of the intensity of LBP

The findings showed that stress from expectations of success in education, academic learning and teaching, nursing practicums, relationships with teachers, relationships with other students, and self-perceived health status was related to the intensity of LBP during the previous seven days. Moreover, the predictors of the intensity of LBP during the previous seven days were stress from self-perceived health status and the students' relationships with their teachers. The findings indicated that stress was related to LBP, especially the intensity of LBP. Stress affects LBP through two routes: neuromuscular tension and an increased sensitivity to pain in the spinal area (Bonger, 1993). Additionally, stress influences the perception of stress and increases muscle tension, and if this tension persists for a long period, it leads to the development of LBP (Ghaffari, Alipour, Farshad, Jensen, Josephson, & Vingard, 2008; Kyung-Jae, Joo Ja, & Jeung-Im, 2011). Further, stress increases the risk of LBP (Olivier, Mudzi, Mamabolo, & Becker, 2010). The findings of this study are consistent with the findings from Mitchell and colleagues (2009; 2010), where stress was associated with LBP in nursing students.

As the results indicate, the nursing students had stress from self-perceived health status. Self-perceived health status in this study refers to being always tired, having insufficient sleep, and being ill. A study of Elsayes and Obied (2018) reported that Egyptian nursing students slept less than 5 hours per day, which was insufficient. Also, a study of Labrague (2013) reported that nursing students in the Philippines slept only 5 to 6 hours per night.

The results of this study also indicate that stress from relationships with teachers was an important source of stress among the nursing students. This finding is consistent with the findings from Shdaifat, Jamama, and Al Amer (2018), where stress from teachers was significant and one of the most common sources of stress among nursing students. Additionally, the results of this study are supported by the results of the work of Khater, Akhu-Zaheya and Shaban (2014), where it was found that one of the most common stressors perceived by nursing students in Jordan was the stress from nursing teachers and staff.

7. Conclusion

The nursing students in this study experienced overall stress at a moderate level and intensity of LBP during the previous seven days at a mildly moderate level. The predictors of the intensity of LBP were stress from self-perceived health status and the students' relationships with their teachers. This study confirmed that stress, a psychosocial factor, is associated with the intensity of LBP.

8. Implications/ Recommendations

The findings of this research study can be used to promote health among nursing students. Institute administrators and nursing teachers should pay attention to the stress level of their students and place emphasis on providing suitable social support and learning activities in order to reduce the stress levels of nursing students. Moreover, education programs on the prevention of LBP and coping strategies, and stress management programs, should be developed in order to prevent and decrease the intensity of LBP for nursing students. Future research should be conducted using a qualitative approach in order to obtain more details concerning the sources of stress experienced by the nursing students.

9. Conflicts of interest
The author declares no conflicts of interest regarding this study.

10. Acknowledgements

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