Stress, Chronic Illness, and Stress-predicting Factors among the Population Living in a Rurban Community in Thailand

Pantip Sangprasert,[1] Jeeraporn Kummabutr,[1] Nutchanart Bunthumporn,[1] Jaruwan Viroj[2], and Sucheera Phathayutawat,[3]

[1] Division of nursing, Faculty of Nursing, Thammasat University,

[2] Division of Biostatics, Faculty of Public Health, Mahasarakham University

[3] Department of Psychology, Faculty of Medicine, Siriraj Hospital, Mahidol University

Correspondence:
Pantip Sangprasert
Division of nursing, Faculty of Nursing,
Thammasat University,
Email address: pantips162@gmail.com

Abstract

Objectives: *To determine the characteristic of stress, chronic illness and to identify the predictive factors of stress among a sample of people aged 15 years and older living in rurban Pathum Thani province.*

Materials and Methods: *This study was a cross-sectional, descriptive study. Two kinds of instruments were used to collect the data. A series of questions related to a demographic data and the chronic illness identification were used. Another was the Thai Stress Test (TST 2000), containing questions to assess levels of stress experienced by the individuals. The study duration, in which six hundred sixty four people participated, was four months. Data were analyzed by a chi-square test, odds ratios, and multiple logistic regressions.*

Results: *The study results reveal hat 37.7% of the sample show stress, while 30.1% experienced chronic illness. Two predictive factors for participants' stress are their incomes and health status for diabetes mellitus. It was noted that the study group that disclosed the income they earned had higher stress, 1.14 times, than the group that did not report the income they received (95%Cl = 1.03 - 2.01, $p < .05$). People diagnosed as having diabetes mellitus suffered from more stress, 2.9 times, than those not having such disease. (95%Cl =1.35 - 6.23, $p < .01$).*

Conclusion and suggestions for further study: *Healthcare teams and associated agencies should explore stress management and characteristics of chronic illness proactive awareness campaigns in subjects suffering from stress who live in rurban communities, in conjunction with promoting economic growth.*

Key words: stress and predictive factors, chronic illness, rurban community

1. Introduction

Stress is bodily or mental tension resulting from factors that tend to alter existent equilibrium [1], and is commonly used in the psychological, biological, and medical sciences. The response is compensation for the body's physiological, behavioral and cognitive changes [2]. Hans Selye [3] described how the body or organism reacts to the stressors in term of general adaptation syndrome (GAS), composed of three phases: alarm, resistance, and exhaustion. The alarm phase is characterized by a flood of stress hormones that prepare the body for " fight or flight". In the resistance phase, the body returns to a less aroused state but one in which it continues to draw upon resources at an above normal rate. If the stress is not alleviated, the organism is likely to enter the third phase of exhaustion, in which body tissues begin to show signs of wear and tear, and susceptibility to disease and chronic illness increases, e.g., diabetes mellitus, hypertension, cardiovascular Problems, gastritis, and low immunity to disease. In addition, it can lead to psychological illness [4,5].

The stress of each individual person varies depending on personality, health, and interpretation of situations that happen in relation to the environment in different periods of time. In addition, as for stress measurements, a variety of tools were used such as medical and observational, and self-report questionnaires. Although the stress response of the body functions to maintain stability or equilibrium, a long-term activation of the stress system can have seriously negative consequences for the body [6]. The study of Ungsinun Intarakamhang and concerning the stress and coping of Thai people using qualitative and quantitative meta analysis of 490 theses and dissertations from 15 state universities during the years 1982-2007, found 397 stress projects with moderate stress levels at 55.41, low levels at 24.92, and slightly high and very high levels at 8.52 and 6.23 percent, respectively[7]. Overall, long-term excessive stress can lead to decreased concentration and poor decisions, which can affect mental and physiological health and result in chronic illnesses[5].

Medical and public health advances have resulted in an increase in the average life spans of Thai people to 69.6 years for males versus 76.9 years for females [8]. Despite these increases, chronic illnesses such as hypertension, diabetes, heart disease and stroke have become more prevalent. The first morbidity disease is hypertension, which increaes the risk of heart disease and stroke, the second cause of mortality in Thai people [9, 10]. Similarly, in 2025, these chronic illness may effect people around the world: 1.5 million people may suffer from hypertension, 170 million from diabetes, and 17 million may be at the risk of heart disease [11,12].

Chronic disease is any abnormality or deviation from regular physical or mental health, which cannot be restored to normal and may lead to increasing disability[13]. Those with chronic illnesses need continuing care, treatment, rehabilitation, and support from families In turn, family members caring for dependents may suffer from mental, and physical stress. [4, 14]

Internal individual factors (individuality of persons), such as gender, age, and chronic illness as well as external individual factors (newly added experience from the environment), such as education, occupation, and income have an influence on stress. In addition, the external factor - the rapid socioeconomic changes in rurban communities, city - based urbanization [15], such as high competition with limited time and living in a broken family, and may also promote stress.

As we know, there are many factors that cause stress and one of them is chronic stress[13], Exploring the relationships, both of internal and external, of individual factors, is necessary, There needs to be early proactive screenings in the community. These can lead to prevention and reduced healthcare costs incurred from treatment in hospitals.

Objective:

To determine the characteristics of stress, chronic illness, and the predictive factors of stress among a sample of people 15 years and older living in rurban Pathum Thani province.

Methodology:

The study design was cross-sectional from July to November, 2010.

The population was men and women aged 15 years of age or older and living in a rurban community, Amphur Khongluang, Pathum Thani province.

The sample was selected using convenience sampling from a population who could read, write, and understand the questionnaires. The sample size was determined by the following equation [16].

$$n = \frac{Z^2\ \alpha/2\ P\ (1\text{-}P)}{d^2} \quad (1)$$

when $Z^2\ \alpha/2$ = the 95% reliability, is 1.96

P = Prevalence of stress in an online Thai stress assessment in 2010 found 42.17 percent[17].

d = Acceptable error level at 4%, is 0.04

representation of the formula $n = \frac{(1.96)^2\ 0.42\ (1\text{-}0.42)}{} = 584.88 = 585$ persons

To prevent attrition and incomplete data; the researcher increased the sample size by 20%. In this study, the sample size was 702 people, with 664 completing the questionnaire.

Tools:

A series of questionnaires were used to collect the data. They related to demographic data, the status of chronic illness identification, and questions to assess stress as follows:

1) Demographic data included age, gender, education levels, occupation, income and

2) The status of chronic illness identification: having or not having present illness which had continued medical treatment from physicians. This was recorded in demographic data.

3) The Thai stress test was developed from criteria based on the definition of stress. It is composed of 24 items and consists of two factors: 12 negative items and 12 positive items. The test has both construct validity and reliability: the total reliability coefficient for the Alpha, which was 0.84, and value, of the two scales ranged from 0.83 to 0.86. The total split half was 0.88, with the Alpha ranging from 0.85 to 0.91. The questionnaires contained three rating scales: often (3 points), sometimes (1 point) and never (0 point) and were then combined with the matrix and distribution Index of the TST. The four stress levels were divided into excellent mental health, normal mental health, mild stress, and stressful [18], shown in Table 1 and The distribution in Table 2.

Table 1. Matrix table for the index of TST.

Positive Scales score (Sum of Items 1-12)	Positive Scales score (Sum of Items 13-24)				
	12-36	9-11	6-8	3-5	0-2
0 - 1	1	2	3	4	5
2 - 3	2	3	4	5	6
4 - 5	3	4	5	6	7
6 - 7	4	5	6	7	8
8 - 36	5	6	7	8	9

Table 2. The distribution of the samples of the index of TST.

Score Group	Stress indicator (Level of stress)
1	Excellent mental health (and not faking)
2, 3, 4	Normal mental health
5, 6	Mild stress
7, 8, 9	Stress

In this research, the four stress levels in Table 2 were divided into two groups: one group with stress (people indicating mild stress and severe stress (stressful) and the other without stress (people who have normal or excellent mental health). The total reliability of the coefficient for the Alpha was 0.903 for 30 persons. Psychometricians have strongly recommended that test developers should begin by factor analyzing the items [19] that are obtained logically and empirically by using exploratory approaches: principal components, extracting factors, and varimax rotating factors procedures [20, 21].

Data collection and data analysis:

Data collection began after the research was approved by the ethics committee (No.IRB_NSTU 008/2010). In addition, descriptive statistical test of χ^2 , odds ratios, and multiple logistic regression were used.

2. Results

2.1. Demographic data of the sample

There were 664 persons in the sample, with females comprising 55.2 percent. Eighty-one percent of the sample group were between 15 to 60 years of age ($\bar{X}$ + S.D. = 43.9 + 16.8 years). A total of 51.9 percent had a primary education level and 36.9 percent were employed in factories. Housekeepers, traders, and farmers/agriculturists were 14.5%, 13.4%, and 12.4%, respectively. A total of 51.7 percent did not report their income. Meanwhile, 69.9 percent had no illness identification and 30.1% had chronic illness: 13.6% had hypertension or cardiovascular disease, 5.6% had diabetes, and 4.8% had respiratory conditions, such as asthma or allergies (Shown in Table 3).

2.2 Stress

Forty-three point five percent of the sample had a normal mental health level and 36.6% had mild stress, 18.8% had excellent mental health, and 1.1% had severe stress respectively. The four stress levels were divided into two groups: one group contained 37.7 percent with stress (people indicating mild stress and stressful); the other group contained 62.3 percent with no stress (people who have normal mental health and excellent mental health) (Shown in Table 4).

2.3 Multiple factor analytics regression toward stress

2.3.1 Factors influencing stress by pair of univariate analysis

In the review of the literature on stress, eight factors were included: gender, age, educational level, income, illness identification from diabetes, musculoskeletal conditions, respiratory conditions, and hypertension or cardiovascular disease. The Chi-square test (at p-value < 0.25 at odd ratio) and the relationship between the factors and stress were used as pairs in univariate analysis, with four significant factors: income, diabetes, respiratory illness symptoms, and hypertension or cardiovascular illness, as shown in Table 5.

2.3.2 The Factors influencing stress by multivariate analysis

From the previous pairs of univariate analysis (p-value < 0.25), four factors were included in the initial model while controlling for other co-variation factors using multiple logistic regression. In the final logistic regression model, we found that two factors, income and diabetes Promoted stress.

Income: The group reporting their income had 1.44 times more stress than the group declining to report their income.

Diabetes: The group with diabetes had 2.90 times more stress than the group that did not have the illness as shown in Table 6.

3. Discussion

The sample of this study is from a rurban community, which can be defined as the expansion of the metropolitan area of Bangkok featuring new housing developments and industry [15]. These people need to transition from an agricultural-based society to an industrial society. In the sample, 36.9 percent were employed in factories. However, most of the volunteers had mild stress level (36.6%) and had gradually adaped to society Mild stress may not disturb health as much as severe stress (1.1%). The results of the study are relevant with the survey research of stress and coping behavior of out-patients in Yasothon Province which found that most of the volunteers had normal stress level (43.1%) [22]. The survey of the population living in the urban area, i.e., in Bangkok and Chonburi, have mental health problems, between 17.4 - 30 % [23,24,25,26]. Other research studies have found a 42.17 percent prevalence of stress, based on the online Thai stress assessment 2010, [17], with chronic emotional stress an established risk factor for the development of depression [27]. In addition, exposure to stress is a good predictor for depression [14,28]. According to one survey, one-third of the population had anxiety and depression in a village in the district of Hat Yai, Phuket Province [29]. However, the results of stress depended on multiple factors, both internal factors such as individual characteristics, and external factors such as their habitat condition, Also, different were the event periods of time, and scale of stress measurement [4,5].

One study about chronic illness and stress management found 30.1% of a sample of 300 chronic disease patients had been hospitalized at Thammasat for diabetes, hypertension, hypertension jointly with diabetes and the three diseases together, at 30.3%, 27.2%, 18.4%, and 9.8%, respectively. In addition, Patients with chronic diseases, Who had perceived stress and were in appropriate stress management

were 14.29% [30]. These chronic illnesses with major causes are related to behavior with minor causes being genetic. These required long-term care, depending on whether the patient had a caregiver [11,12]. These induced stress, both in patients and care givers, corresponding to the study. Those who had illnesses had more stress than those who did not have illnesses ($p = 0.001$) [22]. Stress and physical illness are closely related and cannot be separated. If there is an imbalance between physical and mental health, physical illness may occur due to stress.

The results of this study show influences of stress factors by pairs of univariate analysis we found for gender: females had more stress than male, age people over sixty years had more stress than younger people education: vocational diploma/bachelor's had more stress than the others. These did not have a statistically significant difference ($p < .05$). However, most volunteers with a chronic illness had more stress than others, as shown in Table 5. This results of the study are relevant with Yasothon Province Which found that gender did not have a statistically significant difference ($p< .05$) in stress level. However, other factors including age, education, occupation, and income, are related to stress levels and had a statistically significant difference ($p<.05$). In addition, elderly people had higher levels of stress than middle aged groups and farmers had the highest level ($p = 0.001$) [22]. Similar research studies such as comparative studies have found a statistically significant relationship between education and stress levels ($p < .05$) [31]. In addition, studies have found that age, educational level, and salary were negatively correlated with overall stress [32]. Other research papers on a group of soldiers found no correlation between stress and the factors of age, educational levels, and experiences in risky areas [33].

In this study, the logistic regression model found that there was a relationship between two factors, income and diabetes with stress as follows. The group with diabetes had 2.90 times more stress than the group who did not have the illness (95%Cl =1.35 - 6.23, $p < .01$). Diabetes is a chronic physical illness necessitating care from a physician and the family, as well as self-care, in order to maintain the quality of life of patients. The effects of stress [4,5] include symptoms of fatigue and weakness, with many serious complications such as retinopathy (blindness), nephropathy (kidney failure), and peripheral neuropathy. Peripheral neuropathy causes inflammation of small vessels and neurons, resulting in insufficient blood supply to lower extremity organs, one of the most serious and costly complications of diabetes. In the worst case, this can require amputations [24]. According to World Health Organization's estimates, 40 to 70 percent of amputations worldwide are related to diabetes, while it is estimated that there will be 346 million diabetic patients in 2030 [34].

Diabetes mellitus is a serious common metabolic disorder wherein there is unstable control of blood glucose levels. Stress can lead to increased usage of glucose and energy. This stimulates the endocrine gland and releases a flood of stress hormones [36,37] such as cortisone from the adrenal glands, accelerating the release of glucose into the blood circulation to be used as energy for muscle contraction. If excessive cortisone is secreted, it will suppress the immune system and lead to memory loss [4,6, 38, 39]. The hormone insulin, released from beta cells of the pancreas, decreases glucose but stores glycogen in the liver and muscles through glycogenesis.

When stress begins, muscles constrict and the respiratory rate increases, consuming metabolic energy. The breakdown of stored energy increases blood glucose circulation and stimulates insulin production. Chronic stress can atrophy muscles and lead to fatigue and insulin resistance, decreasing the quality of life. This is consistent with a research study that found that one factor predicting the quality of life in diabetes patients was the absence of anxiety and fatigue [40]. Normal people who have stress, have an increased risk of developing diabetes mellitus; likewise, stress increases the risk of complications in diabetic patients.

The logistic regression model found that those who were willing to report their income on the survey had 1.44 times more stress than the group that did not report their income (95%Cl = 1.03 - 2.01, $p < .05$). Income is an indicator of economic conditions. Those that were willing to report their income were likely to have low average income and consequently can have more stress than those that did not report their income in the survey due to the sensitive nature of the information. This issue obviously requires further study and clarification. This finding is relevant with people who have a higher income, and have more stress than those with a lower income [22]. Results of this study should require a follow-up is patients with diabetes who did not provide their levels of income. This particular aspect can be a predictor of stress. Also, other factors should be investigated due to their predictive relationship to stress.

4. Conclusion and recommendations for further study

Two predictive factors for participants' stress were their incomes and a health status, diabetes mellitus. It was noted that the study group that disclosed the income they earned had higher stress than the group that did not report the income they received. Based on the findings of this study, the following can be recommended.

1) Health care teams and associated agencies should develop and implement proactive community physiology and psychology education campaigns aimed at primary prevention in high-risk groups with secondary and tertiary prevention in other chronic illness patients. These should be done in conjunction with stimulating economic growth in rurban communities, compared with urban society.

2) Other chronic illnesses are not statistically associated with stress. It is important for future research to explore these and other potential pathways in detail. The characteristics of chronic illness, such as severity, type and dose of drugs, and duration of disease, may complicate target organ damage (TOD) and other influencing stress factors, such as stress management.

3) The issue of adequate income should be studied in more depth in further research, with a focus on family members, extent of debt, etc. Proper financial management can improve Thai rurban communities and promote economic development, thus reducing stress in the Thai population.

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Table 3. General demographic data and Chronic illness (n = 664).

General demographic data and chronic illness	Number	Percent
Gender (n = 663)		
male	297	44.8
female	366	55.2
Age (n = 617)		
15- 60 years	500	81.0
Over 60 years	117	19.0
mean (standard deviation) years		43.9 (16.8)
median (lowest : highest) years		44.0 (15.0 : 86.0)
Educational levels (n = 649)		
not learning in class	26	4.0
primary	337	51.9
secondary	193	29.7
vocational Diploma/ Bachelor's	49	7.6
higher than Bachelor's degree	44	6.8
Occupations (n = 643)		
student and scholar	58	9.0
government / enterprises	28	4.4
commonly employed and in factories	237	36.9
farmers/agriculturists	80	12.4
traders	93	14.5
housekeepers	86	13.4
no occupation or elderly	61	9.5
Income/person (n = 597)		
Did not report income (n = 343)	343	57.5
Reported income (n = 254)	254	42.5
• less than 23,000 baht/year	7	2.8
• from 23,000 to 50,000 baht/ year	47	18.5
• more than 50,000 baht/ year	200	78.7
Chronic diseases (n = 664)		
Not having illness identification	464	69.9
having illness identification	200	30.1
(one person may have more than one illness)		
Diabetes illness (n = 664)		
no	627	94.4
yes	37	5.6
Hypertension or cardiovascular illness (n = 664)		
no	574	86.4
yes	90	13.6
Musculoskeletal illness (n = 664)		
no	632	95.2
yes	32	4.8
Respiratory conditions such as asthma, allergies (n = 664)		
no	643	96.8
yes	21	3.2

Table 4. The stress levels and groups of stress levels (n = 664).

Stress	Number (persons)	Percent
Level of stress (n = 664)		
Excellent mental health	125	18.8
Normal mental health	289	43.5
Mild stress	243	36.6
Stressful	7	1.1
Group of stress (n = 664)		
Had stress	250	37.7
Did not have stress	414	62.3

Table 5. The relationship between factors and stress according to pairs of univariate analysis.

Factors	Number (persons) of stress		OR	95% C1 (OR)	p-value (LR)
	not had n (%)	had n (%)			
Gender (n =663)					0.464
male	190 (63.97)	107 (36.03)	1		
female	224 (61.20)	142 (38.80)	1.13	(0.82 - 1.55)	
Age (n = 617)					0.628
15- 60 years	307 (61.40)	193 (38.60)	1		
Over 60 years	69 (58.97)	48 (41.03)	1.11	(0.73 - 1.67)	
Education levels (n = 649)					
not learning in class	15 (57.69)	11 (42.31)	1		
primary	217 (64.39)	120 (35.61)	0.75	(0.34 - 1.69)	0.494
secondary	122 (63.21)	71 (36.79)	0.79	(0.35 - 1.82)	0.586
vocational Diploma/Bachelor's	25 (51.02)	24 (48.98)	1.31	(0.51 - 3.41)	0.582
higher than Bachelor's degree	29 (65.91)	15 (34.09)	0.71	(0.26 - 1.91)	0.493
Income (n = 597)					0.027*
Did not report income	225 (65.60)	118 (34.40)	1		
Reported income	144 (56.69)	110 (43.31)	1.13	0.82 - 1.55	
Diabetes (n = 664)					0.005**
no	399 (63.64)	228 (36.36)	1		
yes	15 (40.54)	22 (59.46)	2.57	1.31 - 5.05	
Musculoskeletal illness (n = 664)					0.254
no	391 (61.87)	241 (38.13)	1		
yes	23 (71.87)	9 (28.13)	0.63	0.29 - 1.39	
Respiratory illness symptoms (n = 664)					0.061
no	405 (62.99)	238 (37.01)	1		
yes	9 (42.86)	12 (57.14)	2.27	0.94 - 5.46	
Hypertension or cardiovascular illness (n = 664)					0.096
no	365 (63.59)	36.41(209)	1		
yes	49 (54.44)41	(45.56)	1.46	0.93 - 2.29	

** p < .05 , ** p < .01*

Table 6. The final results of the multiple logistic regression model for determining the various factors leading to stress are as follows: (n = 664).

Factors	Coefficient	Standard error	OR	95% C1	p-value
Income					0.034*
Did not report income			1		
Reported income	0.36	0.17	1.44	1.03 - 2.01	
Diabetes illness					0.006 **
no			1		
yes	1.06	0.39	2.90	1.35 - 6.23	
constant	-0.70	0.12			

** p < .05 , ** p < .01*

Stepwise Logistic Regression: the backward elimination was

$$P(Y = 1/X) = 1/[1 + EXP(-0.70 + 0.36\ X_1 + 1.06\ X_2] \quad (2)$$

X_1 = income (reported income = 1, did not report income = 0)

X_2 = diabetes illness (yes = 1 , no = 0)

The Goodness of Fit test in the final model by Hosmer - Lemshow chi-square test found that the predictive factors of stress in this study are able to describe the inversion of variable stress at 30 percent (p-value = 0.30).

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Editorial Office:
Office of The Rector Building, 3rd Floor,
Thammasat University, Rangsit Campus
Khlongluang, Pathum Thani, 12121
THAILAND
Tel.: +66 2 564 4440-79 Ext. 1810
Tel./Fax: +66 2 564 3151