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Improving asthma management and enhancing quality of life for adults in Thailand

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Abstract

The objective of this study was to examine the association between asthma control and quality of life among Thai asthmatic adults in Thailand. More than eighty percent of deaths from asthma disease occur in low- and middle income countries without proper treatment and care, which is mainly related to quality of life. This study conducted a cross-sectional study on asthma patients aged between 18 to 55 years (N = 114) recruited by random sampling methods at Phrapokkklao Hospital (Thailand). Self-administered questionnaires, including general characteristic questionnaire, asthma control test, Thai Perceived Stress Scale, and Thai Mini AQLQ questionnaire, were used to collect the data. Logistic regression models were used to identify the relationship between independent variables and quality of life. The result found that most asthma patients (34.2%) were classified as having uncontrolled symptoms. About 81.5% of asthma patients were defined as having moderate (score 14-26) to high stress (score 27-40). The mean score of QoL suggested by the asthma patients in this study was good QoL (score = 88.58). Moreover, this study found a significant positive relationship between asthma control and QoL in all dimensions ($r_s = 0.584$, $p < 0.001$). The linear regression model presented the association between asthma control and quality of life after adjusted age (years), gender (male/female), education (elementary to secondary, higher secondary school), medical use (yes/no), and stress (low stress, moderate to high stress). This study confirms the correlation between asthma control and quality of life ($\beta = 2.12$, $p < 0.001$).

Keywords: Asthma, Asthma control, Quality of asthma Life.

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Institutional Review Board Statement: The Ethical Committee of the Chulalongkorn University, Thailand (Ref. No. 048/2564) and Chanthaburi Research Ethics Committee/ Region 6, Thailand (Ref. No. 024/2564) has granted approval for this study on 1 March 2021.

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1. Introduction

Asthma is the most common chronic disease that causes irregular breathing difficulties. The WHO's global prevalence of asthma disease shows that more than 339 million people have faced asthma and over 80% of asthma-related deaths, especially in low- and middle income countries [1]. According to the data statistic from Global Burden of Disease in 2019, more than 260 million people globally had uncontrolled asthma [2]. Epidemiologic data on asthma among adults in Thailand was limited. The first study on the prevalence of adult asthma in Thailand reported 2.91% and the prevalence of wheezing symptoms was 13.7% [3]. The study found a relatively high prevalence of asthma-related symptoms in older age groups [3]. The survey of asthma control in Thailand found that 21.7% of adults with asthma reported one or more emergency room visits, 14.8% admitted to hospital, and 23.6% were absent from work [4]. The severity of asthma was significantly associated with the increased emergency health care use; 62.9% had intermittent asthma, 10.5% had mild persistent asthma, 17.6% had moderate persistent asthma, and 9.0% had severe persistent asthma [4]. According to the Global Initiative for Asthma (GINA) guidelines, it was reported that 4.9% of severe asthma was completely controlled, 61% was partly controlled, and 31.7% was uncontrolled in the past 4 weeks [4]. Asthma control may affect quality of life, which has been the focus of many published studies.

According to the WHO definition, quality of life (QoL) is defined as perception of each person in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, concerns, and standards [5]. The quality of life of patients with asthma was assessed by the Mini-Asthma Quality of Life Questionnaire, which included symptoms related to asthma, environmental responsive stimuli, avoidance of these stimuli, limitation of activities, and emotional disorder [6]. Asthma patients with poor QoL are mainly associated with harmful consequences, resulting in a high level of behavioral and emotional aspects [7]. Older age, female gender, low-income factors, active smoking, and poor control of asthma are associated with low QoL [8-10]. More physical activity and knowledge about asthma disease were associated with higher QoL, including better asthma control [11]. QoL of asthma patients was associated with asthma control [12]. Partially controlled and uncontrolled asthma had lower QoL scores [13]. There were few studies about asthma control and quality of life in children. However, there was limited study on asthma control and quality of life in adults with asthma. Therefore, the aim of this study was to examine the association between asthma control and quality of life among Thai asthmatic adults in Thailand.

2. Materials and Methods

2.1. Study Design and Study Population

We conducted a cross-sectional study between March and April 2022. The population consists of patients who reported being diagnosed with asthma by a physician from Prapokkklao Hospital under the Ministry of Public Health and lived in private housing in Chanthaburi, Thailand. The asthma diagnosis focused on the result of FEV₁ (forced expiratory volume in one second) and FEC (forced vital capacity) ratios less than 75-80% combined with a history of asthma symptoms (wheeze, shortness of breath, chest tightness, and cough). The researcher selected the asthma patients, followed by the GINA classification of asthma severity. According to GINA criteria [14] asthma disease is classified into 4 stages: intermittent, mild persistent, moderate persistent, and severe persistent. Each stage was separated by the symptoms at daytime, symptoms at nighttime, FEV₁, and PEF variability. The asthma patients, ages 18 to 55, who were diagnosed by a physician in the mild persistent and moderate persistent stages and used reliever or controller medication, were selected. The G* Power program was used to calculate the population in this study (power 0.8 and significant level at 0.05) [15]. One hundred and fourteen participants were selected by using computers randomly to identify patient numbers.

2.2. Data Collection

A set of self-administered questionnaires was designed. Questionnaires consisted of 4 parts, including part 1 general characteristics, which was asked about general information, part 2 asthma control test [16] (5 items) was asked about asthma symptoms, part 3 Thai Perceived Stress Scale questionnaire was asked about the degree of stress in life over the past month [17]; and part 4 Thai Mini Asthma Quality of Life (Thai Mini AQLQ) was asked about asthmatics' quality of life in the past two weeks [18].

2.2.1. The Asthma Control (Independent Variable)

Asthma control means ability to control asthma symptoms (activity limitation, shortness of breath, nighttime and daytime symptoms, frequency of rescue medication use, and asthma symptom control) during the past month by using an asthma control test [16]. For the answer, each item has a Likert scale from 1 to 5, with a lower score indicating a worse symptom. The interpretation of the asthma control test in all items is that if the summary of the yield score is greater than 25, it means "controlled asthma symptom." On the other hand, if the summary of yield of the score is from 21 to 24, it means "partly controlled asthma symptom," and less than 20, it means "uncontrolled asthma symptom."

2.2.2. Thai Perceived Stress Scale

The Perceived Stress Scale Questionnaire in Thai was translated from PSS10 [19] by Wongpakaran and Wongpakaran [17]. The T-PSS-10 is a self-administered questionnaire to measure the degree of stress in life over the past month. For the answer, each item has a Likert scale from 0 (never) to 4 (very often). The interpreting of T-PSS-10 scores in a summary of all items is that scores range from 0 to 40, the score range 0-13 is interpreted as low stress, 14-26 is interpreted as moderate stress, and 27-40 is interpreted as high stress.

2.2.3. The Quality of Life (Dependent Variable)

The quality of life of asthma participants was evaluated in 4 domains: symptom domain, emotional domain, environmental domain, and activity domain, in the past two weeks, using Thai Mini Asthma Quality of Life Questionnaire [18]. The answer to each item has a Likert rating scale ranging from 1 to 7. For the symptoms, emotion, and environment domains, a score of “1” means feeling all the time, while “7” means never getting feeling. On the other hand, activity domains with a score of “1” mean totally limited, while “7” means not at all limited. The overall score is higher, indicating a better quality of life.

2.3. Statistics Analysis

SPSS version 28 was used for all statistical analysis in this study. Data were presented as frequencies and percentages. The Kolmogorov-Smirnov test indicated the data distributions were non-normal. Chi-square was utilized to test the association between categorical variable and asthma symptom control. Mann-Whitney U test was used to test the association between bivariate variables and asthma symptom control (score). We used Spearman correlations to investigate the relationship between asthma symptom control and overall quality of life. Linear regression models were used to study the relationship between several independent variables, such as dependent variables the quality of life.

2.4. Ethical Consideration

Ethical approval to conduct this study was sought from Ethics Review Committee of Chulalongkorn University (COA No.048/2564) and the Chanthaburi Research Ethics Committee/ Region 6 (COA No. 024/2564).

3. Results

3.1. Characteristics of Study Population and Relationship between Level of Asthma Control

The demographic characteristics of the study population are presented in Table 1. Most asthma patients were female (57.9%). The mean age was 46.16 years. Of the 114 participants, 39 (34.2%) had an uncontrolled group, 51 (44.7%) had a partly controlled group, and 24 (21.1%) had a controlled group. The uncontrolled asthma group showed 53.8% males. On the other hand, most of the controls showed 87.5%. There was a statistically significant difference between the asthma group and gender ($p = .003$). For education level, most asthma patients had graduated from elementary to secondary school (63.1%). The major is a partly controlled group (70.6%) in high school. In contrast, most of the control (62.5%) showed in elementary to secondary school. There was a statistically significant difference between the asthma group and education level ($p = .013$). Seventy-eight asthma patients had underlying other diseases (allergy, gastro-oesophageal reflux disease (GORD), sinusitis), which were classified into a (69.2%) uncontrolled group and (88.2%) partly controlled group. Most of controlled group (75.0%) showed no underlying of others diseases. There was statistically significant difference between asthma group and the underlying disease level ($p < .001$). Most asthma patients (76.3%) did not take medicine. All controlled groups (100%) showed no use of medicine. There was statistically significant difference between the asthma group and medicine use ($p = .004$). Most of controlled group (87.5%) showed no family history of disease. There was statistically significant difference between asthma group and family history of disease ($p = .011$). Moderate to high levels of stress in asthma patients showed (92.3%) uncontrolled group. There was statistically significant difference between the asthma group and the level of stress ($p = .012$).

3.2. Asthma Quality of Life

Table 2 presents the mean score of total Thai Mini Asthma Quality of Life (Thai Mini AQLQ) at 88.58. The mean value of each domain was 29.58 (symptom domain), 18.08 (emotion domain), 15.97 (environment domain), and 24.95 (activity domain).

Table 1.
Characteristics of participants with different asthma control group (n=114).

General characteristics	Total N= 114	Asthma group			P-value ^a
		Uncontrolled n=39	Partly controlled n=51	Controlled n=24	
Age, years	Mean = 46.16, SD 7.84, min = 28, max = 57				
Gender					0.003*
Male	48 (42.1)	21 (53.8)	24 (47.1)	3 (12.5)	
Female	66 (57.9)	18 (46.2)	27 (52.9)	21 (87.5)	
Education level					0.013*
Elementary to secondary school	72 (63.1)	27 (69.2)	36 (70.6)	9 (37.5)	
Higher secondary school	42 (36.9)	12 (30.8)	15 (29.4)	15 (62.5)	
Alcohol consumption					0.485
No	78 (68.4)	24 (61.5)	36 (70.6)	18 (75.0)	
Yes	36 (31.6)	15 (38.5)	15 (29.4)	6 (25.0)	
Smoking status					0.142
No	75 (65.8)	21 (53.8)	36 (70.6)	18 (75.0)	
Yes	39 (34.2)	18 (46.2)	15 (29.4)	6 (25.0)	

General characteristics	Total N= 114	Asthma group			P-value ^a
		Uncontrolled n=39	Partly controlled n=51	Controlled n=24	
Exercise					0.204
No	66 (57.9)	27 (69.2)	27 (52.9)	12 (50.0)	
Yes	48 (42.1)	12 (30.8)	24 (47.1)	12 (50.0)	
Have underlying disease					<0.001*
No	36 (31.6)	12 (30.8)	6 (11.8)	18 (75.0)	
Yes	78 (68.4)	27 (69.2)	45 (88.2)	6 (25.0)	
Medical use					0.004*
Not use	87 (76.3)	30 (76.9)	33 (64.7)	24 (100)	
Use	27 (23.7)	9 (23.1)	18 (35.3)	0 (0.0)	
History of allergen					0.386
No	42 (36.8)	15 (38.5)	21 (41.2)	6 (25)	
Yes	72 (63.2)	24 (61.5)	30 (58.8)	18 (75.0)	
Family history of disease					0.011*
No	75 (65.8)	27 (69.2)	27 (52.9)	21 (87.5)	
Yes	39 (34.2)	12 (30.8)	24 (47.1)	3 (12.5)	
Stress					0.012*
Low stress	21 (18.4)	3 (7.7)	9 (17.6)	9 (37.5)	
Moderate to high stress	93 (81.5)	36 (92.3)	42 (82.4)	15 (62.5)	

Note: ^aChi-square test, *significant level *p*-value less than 0.05.

Table 2.
Thai mini asthma quality of life questionnaire (Mini AQLQ).

MAQLQ Domain	Mean	SD	Min.	Max.
Overall scores	88.58	12.05	54	105
Symptom domain	29.58	4.66	15	35
Emotion domain	18.08	2.92	8	21
Environment domain	15.97	3.96	6	21
Activity domain	24.95	3.21	19	28

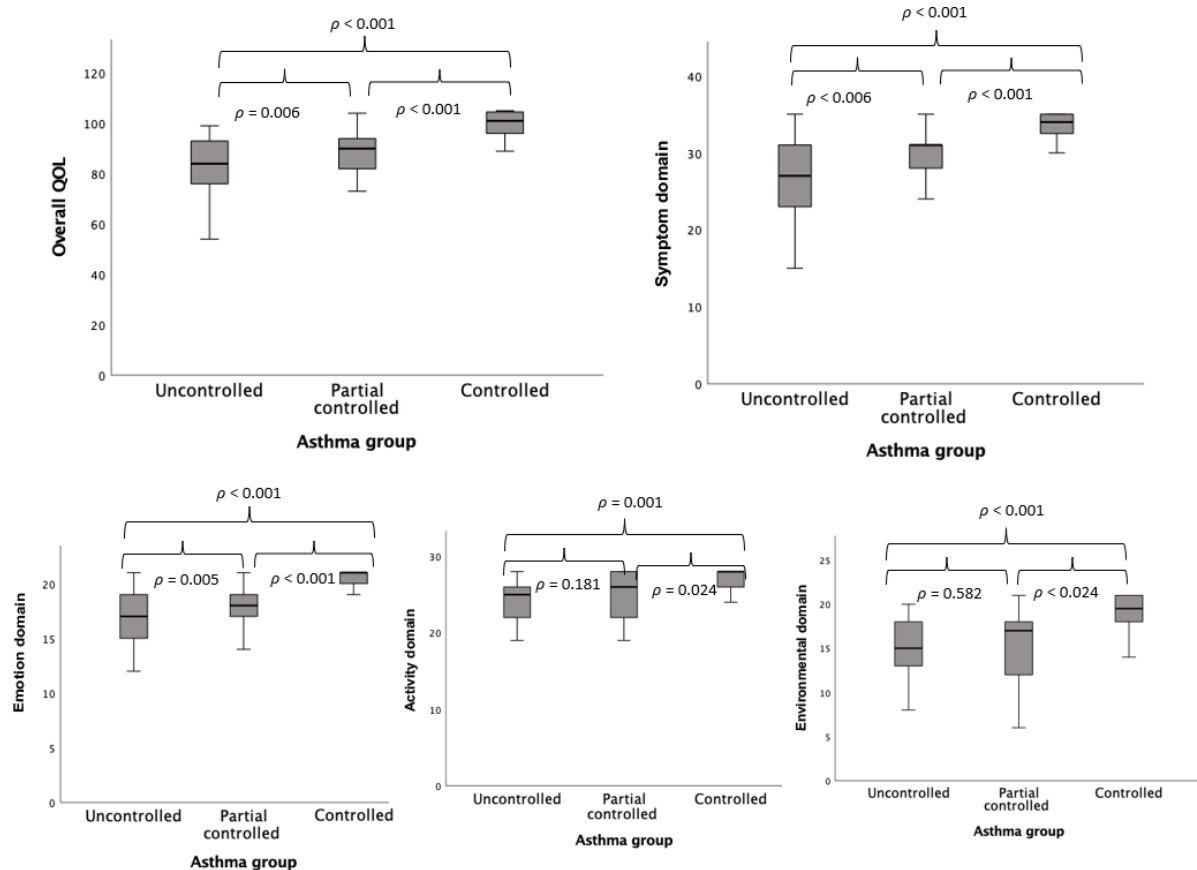


Figure 1. Asthma controlled group and score of asthma quality of life a) overall QOL b) Symptom domain c) Emotion domain d) Activity domain e) Environmental domain.

3.3. Relationship between Asthma Group and Quality of Life

Figure 1 presents the mean overall and QOL scores. The mean scores of overall QOL in uncontrolled, partly controlled, and controlled groups were 82.15, 88.29, and 99.63, respectively. The maximum scores were 105, which occurred in controlled group, whereas the minimum scores were 54, which occurred in uncontrolled group. There were significant score differences the partly controlled group and controlled group ($\rho < 0.001$), the uncontrolled group and partly controlled control group ($\rho = 0.006$), the uncontrolled group and controlled group ($\rho < 0.001$). The mean scores of symptom domain in uncontrolled, partly controlled, and controlled groups were 26.69, 29.94, and 33.5, respectively. The maximum scores were 35, which occurred in all groups, whereas the minimum scores were 15, which occurred in uncontrolled group. There were significant score differences between the partly controlled group and controlled group ($\rho < 0.001$), the uncontrolled group and partly controlled control group ($\rho < 0.006$) the uncontrolled and controlled groups ($\rho < 0.001$). The mean scores of emotional domains in uncontrolled, partly controlled and controlled groups were 16.54, 18.12, and 20.5, respectively. The maximum scores were 21 which occurred in all group, whereas the minimum scores were 8, which occurred in uncontrolled group. There were significant score differences between the partly controlled group and controlled group ($\rho < 0.001$) and uncontrolled group and partly controlled control groups ($\rho = 0.005$) and uncontrolled group and controlled groups ($\rho < 0.001$). The mean scores of activity domain in uncontrolled, partly controlled and controlled group were 24, 24.88, and 26.63, respectively. The maximum scores were 28, which occurred in all group, whereas the minimum scores were 19, which occurred in partly controlled and uncontrolled groups. There were significant score differences between partly controlled group and controlled groups ($\rho = 0.024$) and uncontrolled group and controlled group ($\rho = 0.001$). The mean scores of environmental domains in uncontrolled, partly controlled and controlled groups were 14.92, 15.35, and 19, respectively. The maximum scores were 19, which occurred in controlled group, whereas the minimum scores were 6, which occurred in partly controlled group. There was significant score differences between the partly controlled group and controlled group ($\rho < 0.001$) and controlled group and uncontrolled control group ($\rho < 0.001$).

Table 3.
Association between asthma control and Thai Mini AQLQ.

Predictor	Spearman's coefficient (r _s)					
	Asthma control score	Mini AQLQ				
		Total	Symptom	Emotion	Environment	Activity
Asthma control test	1.00					
Mini AQLQ						
Total	0.584**	1.00				
Symptom	0.558**	0.859**	1.00			
Emotion	0.611**	0.748**	0.709**	-1.00		
Environment	0.433**	0.897**	0.684**	0.600**	1.00	
Activity	0.388**	0.702**	0.466**	0.300**	0.543**	1.00

Note: ** Correlation is significant at the 0.01 level (2-tailed).

3.4. Relation between Asthma Control and QOL

Table 3 from the spearman analysis shows that the asthma control score had a positive significant relation with total score of Mini AQLQ ($r_s = 0.584$, $\rho = <0.001$). Asthma control had a positive significant relationship with symptom domain ($r_s = 0.0558$, $\rho = <0.001$). Asthma control test had a positive and significant relationship with emotion domain ($r_s = 0.611$, $\rho = <0.001$). Asthma control test had a positive and significant relationship with environment domain ($r_s = 0.433$, $\rho = <0.001$). Asthma control test had a positive significant relationship with activity domain ($r_s = 0.388$, $\rho = <0.001$).

Table 4.
Linear regression model for QOL.

Dependent variables	Beta	95%CI	p-value
Overall QOL	2.12	1.461 - 2.780	<0.001
Symptom domain	1.069	0.833-1.305	<0.002
Emotion domain	0.631	0.477-0.784	<0.003
Environment domain	0.621	0.386-0.857	<0.004
Activity domain	0.439	0.243-0.635	<0.005

The models were adjusted for age (years), sex (male or female), education (elementary to secondary school or higher secondary school), medical use (yes or no), stress (low stress or moderate to high stress).

Independent variable: asthma control score.

Table 4 presents the model coefficients for QLQ. The models were adjusted for age, gender, education, medication, use and stress. The linear regression for all the variables is positive, indicating an increase in the asthma control score. The following variables were associated with a better quality of life: overall QOL ($\beta = 2.12$) and symptom, emotional, environmental, and activity domains ($\beta = 1.069, 0.631, 0.621, \text{ and } 0.439$, respectively).

4. Discussion

This study presents the association between asthma control and quality of life among Thai adults living in Chanthaburi province, Thailand. The main associated variables with asthma control symptoms are gender, education level, underlying disease, medication use, family history of disease, and stress. These findings indicated an association between gender and asthma symptom control, in line with previous literature [20, 21]. The previous studies supported the idea that female adults have an increased prevalence and severity of asthma due to genetic, hormonal, and epigenetic factors [20]. Moreover, female hormones are influenced throughout the lifetime and associated with poor asthma control [22]. These findings indicate that there is a correlation between the level of education and asthma control. This study supports the results of study in 2022 [23], which showed an association between primary education and uncontrolled asthma. Another important finding from our study is the underlying disease and medication use related to asthma control. Allergic rhinitis is found in asthma patients and other diseases respectively, such as gastroesophageal reflux disease (GERD), sinuses, hypertension, and hyperlipidemia. Asthma patients who developed the symptoms of these diseases above are directly related to the respiratory system and find it difficult to control asthma. The findings were consistent with a study in 2006 [24], which indicated that GERD may support uncontrolled asthma. Other studies found a significant correlation between asthma and allergic rhinitis [25, 26]. The behavior of medicine usage may relate to the asthma control. Some medications (aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs), and beta blockers) may accelerate asthma symptom because they could increase airway reactivity, which causes bronchospasm and nasal obstruction. This result corresponded to previous literatures indicating that about twenty percent of asthma patients explained hypersensitivity to NSAIDs and aspirin [27, 28]. In contrast, the study in 2021 indicated that the usage of beta blockers was not related to increased asthma exacerbations [29]. Our study findings revealed that stress was associated with asthma control, consistent with the results of the study conducted by Sagmen, et al. [30]. Stress may cause many severe symptoms afterwards. For example, insomnia is the primary asthma control symptom. A study by Sundbom, et al. [31] showed an association between insomnia and poor asthma control [31]. Management of stress may help patients reduce asthma symptoms, which influences to asthma control. The family health history is another important risk factor for asthma. These findings indicate an association between family health history and asthma control. The findings were consistent with the survey study, which showed the family history of asthma had the strongest association with asthma prevalence [32]. On the contrary, the study showed that family history of asthma was not a significant factor in asthma control.

The association between asthma and QoL may relate to socio demographics, disease, and asthma severity. The participants in this study have mild and moderately persistent asthma. The study by Luyster, et al. [33] indicated that asthma patients with severe persistent stage had more exacerbated asthma control and asthma QoL than non-severe persistent asthma [34]. Our findings show that overall asthma quality of life is determined as good QoL, which could be explained by smoking and drinking behavior. About 92% of participants do not smoke, and 79% of participants do not drink alcohol. According to the previous studies, they indicated poor health behaviors associated with nighttime symptoms, which affect quality of life [35]. On the contrary, the Nalina and Chandra [36] study collected data from participants with mild to moderate persistent asthma. The results showed that older age, females, family history of asthma, and BMI contribute to poor quality of life [35]. Other important findings from our study were that asthma control had a significant positive relationship with total scores of QoL, including symptom, emotion, environment, and activity domain, along the lines of previous studies [34, 36].

The strengths of this study comprise the screening of asthma severity by a physician and randomly selected participants by computer to avoid selection bias. Moreover, the use of Thai Mini Asthma Quality of Life Questionnaire in the methodology, which is a validated tool utilized to assess asthma quality of life. In contrast, the strength of Kharaba, et al. [8] study was the geographical distribution of participants enrolling from different community pharmacies across Lebanese [8]. Several limitations of this study must be taken into consideration. Firstly, this study is a cross-sectional study that does not determine causes and effects of the relationship. Secondly, the independent variables in this study consider the effects on asthma control. However, not all variables consider for QoL. A multivariate analysis is used to eliminate confounding variables. Thirdly, self-administered questionnaires are used to collect the data from asthma patients. Hence, it may reduce research bias because the participants fill out the questionnaire by themselves. Lastly, the generalization of the study findings might be limited. Therefore, it is recommended that further studies with a larger sample size and larger area be conducted.

5. Conclusion

Of the 114 asthma patients who did respond to self-administered questionnaires, thirty-nine (34.2%) were classified as having uncontrolled symptoms, fifty-one (44.7%) were classified as having partly controlled symptoms, and twenty-four (21.1%) were classified as having controlled symptom. Ninety-three (81.5%) asthmatics are defined as having moderate to high stress. The mean score of QoL suggested for the asthmatic in this study was good QoL. Moreover, this study found a positive relationship between asthma control and QoL.

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