ORIGINAL ARTICLE

Relationship between obesity and asthma among older adults in Thailand

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Abstract

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This cross-sectional study was conducted to determine the prevalence of asthma and to describe the association between asthma and obesity among older adults in the communities of Thailand. The multi-stage cluster sampling was used to draw a sample of 3977 adults aged 50 years and older from six regions. The data collection was conducted between January and March, 2016. A face to face interview with the structured questionnaire was used to collect data. Chi-square test and multiple logistic regression were used to examine associations between independent variables and asthma.

The results showed that the prevalence of asthma among older adults in the communities of Thailand was 2.1%. The association between obesity and asthma among this population was not significantly detected in this study. However, asthma was found to be significantly associated with types of residence (Adj. OR=2.01, 95% CI=1.06-3.83), ischemic heart disease (Adj. OR=4.31, 95% CI=1.63-11.42) and low back pain (Adj. OR=4.38, 95% CI=2.50-7.68) among older adults after adjusting for other factors.

The health personnel should initiate a system for searching asthmatic patients in the community, especially in the ischemic heart disease or low back pain patients. The relationship between obesity and asthma among older adults in Thailand is not clear and still needs further studies.

Keywords: Asthma, obesity, older adults, Thailand

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ความสัมพันธ์ระหว่างโรคอ้วนและโรคหืดในผู้ใหญ่สูงอายุในประเทศไทย

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การวิจัยนี้เป็นการศึกษาแบบตัดขวางเพื่อศึกษาความชุกของโรคหืด และเพื่อศึกษาความสัมพันธ์ระหว่างโรคอ้วนและโรคหืดในผู้ใหญ่สูงอายุในชุมชนของประเทศไทย โดยใช้การสุ่มตัวอย่างแบบแบ่งกลุ่มหลายขั้นตอน ตัวอย่างที่ศึกษาเป็นผู้สูงวัยอายุตั้งแต่ 50 ปีขึ้นไปจำนวน 3977 คน เก็บข้อมูลในช่วงเดือนมกราคมถึงมีนาคม พ.ศ. 2559 โดยวิธีสัมภาษณ์ด้วยแบบสอบถาม วิเคราะห์ข้อมูลด้วยการทดสอบไคสแควร์และการวิเคราะห์ถดถอยแบบลอจิสติคพหุคูณเพื่อศึกษาความสัมพันธ์ระหว่างตัวแปรอิสระและโรคหืด

ผลการศึกษาพบว่าความชุกของโรคหืดในผู้สูงอายุในชุมชนของประเทศไทยเป็นร้อยละ 2.1 ไม่พบความสัมพันธ์อย่างมีนัยสำคัญทางสถิติระหว่างโรคอ้วนและโรคหืดในการศึกษานี้ อย่างไรก็ตามพบว่าโรคหืดมีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับชนิดของที่อยู่อาศัย (Adj. OR=2.01, 95% CI=1.06-3.83), โรคกล้ามเนื้อหัวใจขาดเลือด (Adj. OR=4.31, 95% CI=1.63-11.42) และอาการปวดหลังส่วนล่าง (Adj. OR=4.38, 95% CI=2.50-7.68) ในผู้ใหญ่สูงอายุหลังจากการปรับด้วยอิทธิพลของปัจจัยอื่นๆแล้ว

บุคลากรทางด้านสาธารณสุขควรริเริ่มจัดระบบค้นหาผู้ป่วยโรคหืดในชุมชนโดยเฉพาะในกลุ่มที่เป็นโรคกล้ามเนื้อหัวใจขาดเลือดหรือผู้มีอาการปวดหลังส่วนล่าง การศึกษาความสัมพันธ์ระหว่างโรคอ้วนและโรคหืดในผู้สูงวัยอายุตั้งแต่ 50 ปีขึ้นไปในประเทศไทย ยังไม่มีผลสรุปที่ชัดเจนและต้องการการศึกษาเพิ่มเติมต่อไป

คำสำคัญ: โรคหืด โรคอ้วน ผู้ใหญ่สูงอายุ ประเทศไทย

Introduction

Asthma is common in the general population worldwide and is a major causes of health morbidities, health resource utilization and poor quality of life among older adults[1-2]. Asthma is a major public health problem because of their high and still rising prevalence in this population[3-6] and seem to be underestimated because of the difficult to diagnosis and differential diagnosis in the older adults. There are also rising of hospitalization and mortality rate of asthma, especially in the elderly[2]. The prevalence of asthma in elderly patients is estimated between 6.5% and 17%[7-8].

The global prevalence of clinical asthma in adults was estimated to 4.3% in 2012 from the World Health Survey (WHS) which employed a standardized methodology to collect information in 70 countries by using a cross-sectional survey and was the largest multicenter survey of asthma in adult 18 years or older[8]. The number of asthma cases has more than doubled since 1980 and rates have increased over the past 20 years. In Thailand, research in adult asthma was limited. A nationwide cross-sectional survey of asthma in adult Thai population was 2.91% (95% CI = 2.32 to 3.50) in 2002. The prevalence of asthma in adult Thai population is relatively low as compared with western countries. However, higher prevalence of asthma in adult (11.6%) was presented in a study at Phitsanulok, Thailand in 2010[9]. Possible explanations for this increase prevalence of asthma worldwide included both lifestyle and environmental hypotheses. Lifestyle changes over the last 30 years are the most likely explanation for the increase in allergic disease over this period[2, 10-11].

Obesity is a huge problem in many countries around the world[12] and also a serious health problem in Thailand[12-13]. Because the increasing prevalence of asthma has coincided with an increase of body mass index (BMI) in both children and adults worldwide[5-6, 14], obesity is considered associated with asthma. Based on the literature review, it is hypothesized that obesity is the risk factors of asthma[14-16]. Asthma with relation to body mass index (BMI) in older adults has rarely been studied[17]. Asthma and obesity are share many comorbidity. The associated risk factors for these two diseases and their mechanism are now unclear and there are limited information about this topic. There are some researches in the childhood and adolescent, but not enough for defining relationship of asthma and obesity in older adults[2, 18-19]. The mechanism of this relationship may be from the interaction between genes and the environment in the pathogenesis of both disorders and involved with more than one biological mechanism. These mechanism leading to inflammatory process that is present in obesity and new information conclude that asthma is not only the inflammation of airway but also the systemic inflammation of disease[1-2, 15-16, 19]. For these reasons, more research is needed to further elucidate these 2 disorders and the multiple interrelationships that exist between them. Therefore, this study aimed to estimate the prevalence of self-reported of physician-diagnoses asthma and examine factors associated with asthma among adults aged 50 years and older who lived in communities in all regions of Thailand.

Methods

Study design

This study was one issue of the main project which studied about Thai older people entiled "The WHO study on global ageing and adult health (SAGE): Thailand study". The objective of the main study was to obtain reliable, valid and comparable data on levels of health on a range of key domains for older adults in the communities who are 50 years and older in different regions in Thailand.

This cross-sectional study was conducted at communities in Thaland. The sample size was estimated using a confidence interval of 95%, an acceptance error of 0.6%, and a prevalence of having asthma of 0.043[8]. The multi-stage cluster sampling was used to randomly selected 3,977 participants aged 50 years and older in fourteen districts from twelve provinces among all six regions of Thailand. Equal number of sample size was used in this study, therefore, 284 participants were randomly selected from each site. The data collection was conducted between January and March 2016. The process was categorized areas in each community by terrain in groups and then using systematic random sampling from the list of adults aged 50 years and older who were living in each area.

Research instruments

A face-to-face interview with a structured questionnaire was performed to collect the data. In general, the questionnaire contained closed ended questions. Established questionnaire from the study of Global Ageing and Adult Health (SAGE)[20] was modified according to the variables in the study. The questionnaire consisted of five sections: introduction, socio-demographic factors, body mass index, lifestyle factors including substance uses, diets and physical activities, and chronic condition factors including asthma diagnosis and other chronic diseases. The proposal of this study was approved by the Ethics Committee of Mahidol University.

Data management and statistical analysis

Online Medical Research Tools was used for data entering from all study sites. Descriptive Statistics was used to determine the prevalence of self-report of physician-diagnosed asthma and describe each independent variable. Chi-square test was used to determine association between body mass index and other factors with asthma. All variables statistically significant at p-value < 0.05 in the Chi-square test were included in the multiple logistic regression which was used to examine significant predictors of asthma.

Results

More than half of the respondents were female (63.1%) as shown in Table 1. Around one third of the respondents aged 50-59 years and 60-69 years (37.6 and 35.9 % respectively). The median age was 62 years. Majority were married (70.3%), mainly graduated primary school (63.9%) and live outside municipal area (69.4%). Most of the respondents had universal coverage (84.4%) and nearly all of the respondents were Thai people (99.1%). Religion denomination were Buddhism (92.9%). With regard to the current family income, 52.7% had less than 10,000 baht per month. This study defined asthma as self-reported of patient-diagnosed asthma. The older adults reported that asthma was 2.1% in this study (Table 1).

Table 2 describes the association between asthma and the socio - demographic factors. The association between types of residence and asthma was nearly significant (P-value = 0.051). Living outside municipal area was 1.8 times more likely to have asthma than those living inside municipal area. There was no significant association between asthma and other socio-demographic factors.

The respondents' body mass index (BMI) was categorized into two levels including non-obesity and obesity. There was no statistically significant between obesity and asthma. Older adults who were obese were less likely to report asthma than those who were non-obese (Table 3).

Table 1 Distribution of respondents by socio-demographic factors and asthma

Variables	Number	Percent
Gender	**3977**	
Male	1466	36.9
Female	2511	63.1
Age group (years)	**3768**	
50 - 59	1418	37.6
60 - 69	1353	35.9
70 - 79	712	18.9
≥ 80	285	7.6
Median = 62 , QD = 7, Min = 50 , Max = 97		
Marital status	**3894**	
Single	230	5.9
Married	2738	70.3
Divorced/Separate	159	4.1
Widow	767	19.7
Health insurance coverage	**3929**	
Universal coverage	3314	84.4
Social security	78	1.9
Government enterprise	517	13.2
Types of residence	**3906**	
Inside municipal area	1197	30.6
Outside municipal area	2709	69.4

Table 1 Distribution of respondents by socio-demographic factors and asthma (cont.)

Variables	Number	Percent
Religion denomination	**3934**	
Buddhist	3656	92.9
Christian	79	2.0
Muslim	191	4.9
Others	8	0.2
Current family income (Baht/month)	**3689**	
Less than 10,000	1943	52.7
10,001 – 20,000	1189	32.2
20,001 – 30,000	332	9.0
Asthma	**3464**	
Yes	74	2.1
No	3390	97.9

Table 2 Association between socio-demographic factors and asthma

Socio-demographic	n	Asthma		Crude OR (95% CI)	P-value
		Yes (%)	No (%)		
Gender	**3464**	**74**	**3390**		
Female	2511	2.1	97.9	1	
Male	1466	2.3	97.7	1.09 (0.68-1.75)	0.718
Age group (years)	**3295**	**74**	**3390**		
50 - 59	1256	2.1	97.9	1	
≥60	2039	2.1	97.9	1.05 (0.64-1.70)	0.861
Types of residence	**3408**	**72**	**3336**		
Inside municipal area	1075	1.4	98.6	1	
Outside municipal area	2333	2.4	97.6	1.77 (0.99-3.14)	0.051
Occupation	**3074**	**66**	**3008**		
Agriculturist	1763	2.2	97.8	1.01 (0.62-1.65)	0.970
Non-Agriculturist	1311	2.1	97.9	1	

Table 3 Association between obesity and asthma

BMI (kg/m^2)	n	Asthma		Crude OR (95% CI)	P-value
		Yes (%)	No (%)		
Non-obesity BMI < 30	3123	2.2	97.8	1	
Obesity BMI ≥ 30	226	0.4	99.6	0.19 (0.03-1.40)	0.104

Regarding chronic condition factors, there were statistically significant associations between ischemic heart disease, low back pain, knee arthritis and cataract with asthma. There were no statistically significant association between hypertension, diabetes, stroke and depression with asthma. (Table 4).

Table 4 Association between chronic condition factors and asthma

Chronic diseases	n	Asthma		Crude OR (95% CI)	P-value
		Yes (%)	No (%)		
Hypertension	**3298**	**71**	**3227**		
Yes	1136	2.3	97.7	1.10 (0.68-1.80)	0.697
No	2162	2.1	97.9	1	
Diabetes mellitus	**2923**	**70**	**2853**		
Yes	634	2.7	97.3	1.16 (0.67-2.02)	0.594
No	2289	2.3	97.7	1	
Stroke	**3219**	**67**	**3152**		
Yes	107	2.8	104	1.37 (0.43 – 4.45)	0.596
No	3112	2.1	97.9	1	
Ischemic heart disease	**3224**	**65**	**3159**		
Yes	67	9.0	91	5.17 (2.15-12.42)	<.001**
No	3157	1.9	98.1	1	
Depression	**3272**	**66**	**3206**		
Yes	70	4.3	95.7	2.23 (0.68 – 7.28)	0.184
No	3202	2.0	98.0	1	

Table 4 Association between chronic condition factors and asthma (cont.)

Chronic diseases	n	Asthma		Crude OR (95% CI)	P-value
		Yes (%)	No (%)		
Low back pain	**3353**	**72**	**3281**		
Yes	1169	3.9	96.1	3.40 (2.09-5.53)	<.001**
No	2184	1.2	98.8	1	
Cataract	**3262**	**67**	**3195**		
Yes	228	4.8	95.2	2.70 (1.39-5.22)	0.003*
No	3034	1.8	98.2	1	
Knee arthritis	**3392**	**73**	**3319**		
Yes	311	4.2	95.8	2.20 (1.19-4.05)	0.012*
No	3081	1.9	98.1	1	

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

Associated lifestyle factors in this study included substance use, diets and physical activities. The association between all lifestyle factors and asthma was not be detected in this study (Table 5).

Table 5 Association between substance use, diets and physical activities with asthma

Variables	n	Asthma		Crude OR (95% CI)	P-value
		Yes (%)	No (%)		
Alcohol consumption	**3424**	**72**	**3352**		
Yes	3026	2.5	97.5	1.23 (0.63-2.42)	0.545
No	398	2.0	98.0	1	
Tobacco use	**3437**	**73**	**3364**		
Yes	368	2.7	97.3	1.33 (0.68-2.62)	0.405
No	3069	2.1	97.9	1	
Types of diets					
Fast food	**3427**	**74**	**3353**		
Never/sometimes	3400	2.1	97.9	1	
Often	27	3.7	96.3	1.75 (0.24-13.10)	0.584

Table 5 Association between substance use, diets and physical activities with asthma (cont.)

Variables	n	Asthma		Crude OR (95% CI)	P-value
		Yes (%)	No (%)		
Sweet beverage	**3426**	**74**	**3352**		
Never/Sometimes	2953	2.0	98.0	1	
Often	473	3.2	96.8	1.61 (0.90-2.86)	0.106
Physical activities					
Moderate-intensity activity continuously at ≤ 10 mins	**3415**	**73**	**3342**		
Yes	717	1.7	98.3	1	
No	2698	2.3	97.7	1.36 (0.73-2.54)	0.336
Moderate intensity exercises that cause large increases in heart rate	**3350**	**72**	**3278**		
Yes	815	2.0	98	1	
No	2535	2.2	97.8	1.13 (0.64-1.98)	0.674

By using multiple logistic regression, the results showed that asthma was statistically associated with types of residence, ischemic heart disease and low back pain after adjusted for other factors. After adjusting for other factors, older adults who had low back pain were about 4.4 times more likely to report asthma than those who did not have (Table 6).

Table 6 Multiple logistic regression for predictors of having asthma

Variables	Adj. OR	95% C.I. for OR		P-value
		Lower	Upper	
Types of residence				
Outside municipal area	2.01	1.06	3.83	0.033*
Inside municipal area	1			
Ischemic heart disease				
Yes	4.31	1.63	11.42	0.003**
No	1			
Low back pain				
Yes	4.38	2.50	7.68	<.001**
No	1			
Body mass index (kg/m^2)				
<30	1			
≥30	0.23	0.03	1.65	0.142

*p-value < 0.05, ** p-value < 0.01

Discussion

From this study, prevalence of self-reported of physician-diagnosed asthma among older adults aged 50 years and over in community of Thailand was 2.1% which was lower than previous study. There are few studies in Thailand about prevalence of asthma in older adult population[20]. Previous studies in Thai adults reported prevalence of asthma between 2.9 and 12.1%[9-10]. Asthma is a chronic condition which the prevalence has increasing worldwide[3-6], ranging from 10% in East Africa to 49% in Northern Europe[3-4].

The explanation for the low prevalence of asthma in this study was may be from under - diagnosed of asthmatic patients in the communities of Thailand as same as the elderly people worldwide which under-diagnosed of asthma from literature reviews. Another reason for the low prevalence of asthma in this study was the varying of asthma prevalence from many reasons. For example, geographic area or different regions around the world. The developing countries have less information about asthma compared with developed countries. Other influence factors were age and sex of the respondents in each studies. Moreover, diagnosis of asthma from many ways were important and influence prevalence of asthma, for example diagnosis of asthma from sign and symptoms of asthma, prevalence of wheeze within the past 12 months, self-reported of the physician-diagnose asthma and the records of hospitals. All of these methods influenced to the prevalence of asthma in each studies.

In addition, the explanation for the low prevalence of asthma in this study was under - diagnosed of asthmatic patients in the communities of Thailand or may be from methodology of the study. If the study was conducted in out-patient department, the prevalence of asthma might be higher. Study area was important and contributed to the prevalence of asthma in each study. Since low reporting rate of asthma (2.1%) in this study, older adults in communities should more screened for asthma.

With regard to the association between asthma and obesity, the result from this study showed that the older adults who were obese were less likely to have asthma than non-obese ones. However, there was no statistically significant association. This result was against with many previous studies which found that obesity was associated with asthma[5-6, 17]. On the other hand, some studies reported that asthma was not associated with asthma as same as this study[21-22].

From literature reviews, conclusion that not only body mass index which related to asthma. Gender, ethnics, economics and other factors were influenced to the relationship between body mass index and asthma. Some studies investigated that obesity was associated with asthma severity and health care utilization of asthmatic patients. For example, a cross-sectional study of 352 adult subjects with physician-diagnosed asthma from a community-based Chicago cohort found that obese participants were more likely to have urgent care for asthma than non-obese subjects and obesity was related to worse asthma-specific quality of life[23]. It was interesting that there were many studies worldwide reported that asthma was associated with obesity only in women[5, 17, 24].

In conclusion, the relationship between obesity and asthma in older adults may be not from the same mechanism in children. From literature reviews, asthma in older adults may not only atopic or may be not atopic[24] but suggested the involvement of different pathophysiological mechanisms with multiple factors such as metabolic syndrome[24], inflammation, oxidative substance[21], hormonal change 17 and genetic involvement[6]. The causal pathway is remained unknown and required further investigation[24].

With regard to types of residence where older adults lived during this study, there was a significant association between types of residence with asthma. The older adults who lived outside municipal area or rural area were about two times more likely to have asthma than those living inside municipal area. This was consistent with the previous studies in U.S. and French that farm worker who lived in rural area were more likely to have asthma[25-26]. Many allergens from plants in rural area might affect asthma which compatible with the hygiene hypothesis. This finding represented that the old hypothesis such as hygiene hypothesis was remained explained some aspect of asthma in older adults.

From this study, there was significant association between asthma and ischemic heart disease after adjusted with potential confounders. The older adults who had ischemic heart disease were nearly 4.3 times more likely to report asthma than older adults who did not have. This result was consistent with many previous studies. Asthma was associated with atherosclerotic disease in several studies in America and Canada[27-29] but there was rarely study about this topics in Asia. Some studies found that this association might be limited to women[28]. In conclusion, coronary

heart disease was associated with asthma but need further investigation and more studies about relationship between asthma onset and coronary heart disease, especially in developing country[27-29].

From this study, asthma was significant associated with low back pain after adjusted with other factors. Older adults who had low back pain were nearly 4.4 times more likely to report asthma than those who did not have. This result was consistent with the previous study. There was rarely study investigated about this association. There was evidence that the effects of pro-inflammatory cytokines on the hypothalamic-pituitary-adrenal (HPA) axis lead to the hypothesis that allergic reactions, as markers for inflammation-associated activation of the HPA axis, result in aberrant responses to subsequent stressors. The data from 6,836 US adults aged 20-39 years from the Third National Health and Nutrition Examination Survey (1988-1994) showed that association between low back pain in the past 12 months and history of asthma were detected. Subjects with a history of any allergy were more likely to report low-back pain (odds ratio = 1.51, 95% CI= 1.16-1.96)[30].

Recommendations

1. The prevalence of asthma from this study and many previous studies in Thailand were lower than other countries and under the estimated level. Therefore, the health personnel should initiate a system for searching asthmatic patients in the community, especially in older adults.

2. The results showed that ischemic heart disease and low back pain were chronic condition factors which associated with asthma in older adults. For this reasons, the health personnel should do screening asthma in these groups.

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