

✧ RESEARCH PAPER ✧

Knowledge of heart attack symptoms and risk factors among native Thais: A street-intercept survey method

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Knowledge of heart attack symptoms and risk factors among native Thais: A street-intercept survey method

This study aimed to determine Thais' knowledge of heart attack symptoms and risk factors and whether that knowledge was related to age, gender or education. Via a street-intercept survey method, a convenience sample of people aged ≥ 35 years ($n = 192$) was recruited. Mean age was 47 ± 9.6 years (range 35–81), and 55.2% were female. Participants identified on average 5.6 of 9 heart attack symptoms (SD 1.8) and 5.3 of 8 heart attack risk factors (SD 2.1). However, 66.7% mistakenly thought the chest discomfort would be severe, sharp and stabbing, and many subjects erroneously selected symptoms that are actually stroke symptoms. There were no gender or educational differences in knowledge of heart attack symptoms and risk factors. Older adults recognized fewer total symptoms than did younger adults. These findings could direct health-care providers to help the Thai population differentiate symptoms of heart attack from stroke.

Key words: acute myocardial infarction, heart attack, knowledge, risk factors, symptoms, Thailand.

INTRODUCTION

Accurate identification of heart attack signs and symptoms might impact an individuals', family's or bystander's deci-

sion time in accessing health care during a heart attack. This in turn might influence the time-sensitive benefits of reperfusion therapy. Lack of knowledge of heart attack risk factors might impact risk reduction behaviours. A number of studies of heart attack knowledge have been conducted in the USA and other Western countries; however, in Thailand no studies have been conducted to identify the Thai people's knowledge of heart attack risk factors and symptoms.

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In Thailand, heart disease is the fourth-leading cause of death, following cancer, accidents and stroke.^{1,2} The heart attack incidence rate per 100 000 people has increased from 59.9 in 1998 to 297.1 in 2007.³ This rapid increase indicated a need for studying Thais' knowledge of heart attack symptoms and risk factors.

Srimahachota and colleagues surveyed 9373 acute myocardial infarction (or heart attack) patients from 17 hospitals in Thailand and found that their median time between symptom onset and reaching the hospital was 3.3 hours.⁴ As a result, many patients presented to the hospital with cardiogenic shock ($n = 871$, 9.3%) or cardiac arrest ($n = 393$, 4.2%).⁴ In Thailand, only a limited number of hospitals provide cardiac catheterization, thrombolytic drugs, balloon angioplasty and coronary artery bypass grafts. Almost no community hospitals provide thrombolytic drugs for acute myocardial infarction patients, but patients generally go to community hospitals that are nearby their homes. If they are diagnosed with a heart attack, the doctor will refer them by ambulance car to tertiary hospitals to be treated with thrombolytic drugs. However, some tertiary hospitals do not provide cardiac catheterization, balloon angioplasty or coronary artery bypass grafts. Therefore, if cardiac patients need more than thrombolytic drugs, they will be referred to heart centres.

In 2004, the National Household Education Surveys in Thailand found that the population reported having the following heart attack risk factors: cigarette smoking (22.9%), high serum total cholesterol (20.5%), hypertension (16.3%), obesity (7.6%) and diabetes (4.3%). Smoking prevalence was much higher among men than women (43:3).³ High serum total cholesterol level (> 240 mg/dL) was found in greater proportions in women than men (21:14), as was overweight or obesity (body mass index > 24 kg/m²) (43:28).⁵

A number of studies have examined the general public's knowledge of heart attack symptoms. Large telephone surveys in the USA and Australia found that 11–25% of respondents had a good understanding of heart attack symptoms.^{6–8} Investigators reported that age, gender and education influenced heart attack knowledge;^{6,9} however, this was not universal.^{10,11} A number of investigators noted that, when people recognized heart attack symptoms, they usually identified chest discomfort and shortness of breath.^{6,12,13} However, 33% of heart attack patients might not experience chest discomfort during a heart attack.¹⁴ Therefore, it is important that the

general population (including in countries like Thailand where the heart attack incidence is high and rising) know and be able to recognize the full spectrum of symptoms that might occur during a heart attack.

To address the factors that influence risk reduction, a number of studies evaluated knowledge of heart attack risk factors. Zerwic and colleagues' study of coronary artery disease (CAD) patients with an open-ended question about cardiac risk factors found that 79% of the patients named at least one of three modifiable risk factors (smoking, hypertension and elevated cholesterol), but only 7% could recognize all three.¹⁵ Studies reported that fewer than half of subjects could identify diabetes as a risk for heart attack,^{15–17} even though diabetes is one of the major modifiable risks of heart attack.^{4,18} The purposes of this study were to determine knowledge of heart attack symptoms and risk factors among Thai people and to determine whether the Thai people's knowledge of heart attack symptoms and risk factors is related to age, gender or education.

METHODS

Design and study subjects

A street-intercept survey method was used in the study.^{17,19,20} The project staff approached eligible subjects who were in the designated area during the time of data collection and invited them to participate in the study. A convenience sample was recruited from public places, including temples, parks and business stores, located in Udonthani, Thailand. The subjects were eligible if they were (i) 35 years of age or older; (ii) able to understand Thai and able to read the materials; and (iii) alert and oriented to person, place and time. Institutional review board approval was obtained from the University of Illinois at Chicago. The study was explained using an information sheet in lieu of subject consent. Subjects were not asked to sign their name, as completion of the survey indicated their consent. After reviewing the information sheet and agreeing to participate in the study, subjects were asked to complete the questionnaire. Two hundred and fifty-four individuals were recruited to participate; however, 62 subjects had incomplete data and were removed from the data set. Therefore, a total of 192 subjects comprised the sample.

Instruments

The questionnaires were revised from Hwang *et al.*'s study.¹⁷ The instruments were composed of (i)

demographics; (ii) possible heart attack symptoms; and (iii) possible heart attack risk factors. The structured questionnaire included nine heart attack symptoms and nine symptoms not commonly experienced during heart attack, as well as eight heart attack risk factors and six risk factors not associated with heart attack. The heart attack symptoms and risk factors were also selected through extensive review of the literature.^{17,20,21} The non-heart attack symptoms and non-heart attack risk factors were selected because prior research had shown that individuals commonly associated these other symptoms with a heart attack or that Thai people often associated these with illness or poor health behaviours. The questionnaires were translated into Thai by the first author. Two bilingual individuals provided feedback on the translation, and consensus was reached on the final version.

Subjects responded yes or no to whether a particular symptom or risk factor was associated with a heart attack. One point was given for each correct answer and 0 for each incorrect answer, and the scores were summed.

Data analysis

Descriptive statistics (SPSS 16.0, SPSS Inc., Chicago, IL, USA) were used to identify any outliers and to generate means, percentages and standard deviations. Differences among variables were examined using *t*-tests and analysis of variance (ANOVA). Pearson's product-moment correlation coefficient was used to examine the relationship between age and knowledge. Chi-square was used to examine the association among gender, education and knowledge. A *P*-value < 0.05 was considered statistically significant in single-variable comparisons.

RESULTS

Demographic characteristics of the study

The mean age was 47 ± 9.6 years (range 35–81), and 55.2% of the sample was female. Seventy-four per cent of the sample was married, and 54.7% had only an elementary school education (six grades). The majority of the sample (63.5%) was employed. Seventy-six per cent of the subjects had family income < \$313 (€213) per month (Table 1).

Thais' knowledge of heart attack symptoms and risk factors

Participants identified on average 5.6 ± 1.8 (range 1–9) of 9 heart attack symptoms. The greatest number of

subjects knew that fatigue (79.7%) was a heart attack symptom, followed by chest discomfort (78.1%) and shortness of breath (70.8%). However, 66.7% mistakenly thought the chest discomfort would be severe, sharp and stabbing. Many subjects stated incorrectly that loss of balance (58.3%), weakness on one side of body (50%) and sudden severe headache (49.5%) were heart attack symptoms; these are actually stroke symptoms (Table 2).

Fifty-four subjects (28%) correctly identified only four or fewer of nine heart attack symptoms, and 7 (3.6%) could correctly identify only one of nine heart attack symptoms. Many subjects in this study did not recognize other heart attack symptoms, such as generalized weakness (34%), sweating (37%), indigestion (47%), arm discomfort (49%) and vomiting (75%).

Participants correctly identified on average 5.3 ± 2.1 (range 0–8) of 8 heart attack risk factors. Of the three key modifiable risk factors—smoking, high blood pressure and high blood cholesterol—9% of subjects recognized none; 14% recognized one; 29% recognized two; and 48% identified all three. Most subjects recognized lack of physical activity (88.5%), high blood pressure (76%), high cholesterol (70.8%) and high-fat diet (70.3%) as heart attack risk factors. However, only 49% correctly identified diabetes as a heart attack risk factor, as did only 49% identify family history as a heart attack risk factor. Many subjects selected stress (79.2%) as a heart attack risk factor (Table 3).

Influences of demographics on knowledge

Age

Older adults recognized fewer total symptoms ($r = -0.14$, $P < 0.05$), but age was not related to the total number of risk factors recognized. Age was related to knowledge of several individual symptoms. Younger adults were more likely to recognize fatigue ($r = -0.21$, $P < 0.01$), generalized weakness ($r = -0.15$, $P < 0.05$) and shortness of breath ($r = -0.21$, $P < 0.01$). Age was not related to whether respondents knew that chest discomfort was a symptom.

Gender

Gender was not related to the total number of symptoms or risk factors recognized. Men were significantly more likely to recognize cigarette smoking as a heart attack risk factor than were women (men = 79.1%, women = 61.3%, $\chi^2 = 7.0$, $P < 0.01$).

Table 1 Demographic characteristics of the sample ($n = 192$)

Characteristics	Category	N	%	Mean (SD) (range)
Age (years)	35–44	91	47.4	47.1 (9.68) (35–81)
	45–59	79	41.1	
	≥ 60	22	11.5	
Gender	Male	86	44.8	—
	Female	106	55.2	
Marital status	Married	143	74.5	—
	Single (Never married)	15	7.8	
	Divorced	8	4.2	
	Separated	12	6.2	
	Widowed	14	7.3	
Education	Post-college	5	2.6	—
	College	20	10.4	
	High school	38	19.8	
	Middle school	23	12.0	
	Elementary school	105	54.7	
	None	1	0.5	
Occupation	Working	122	63.5	—
	Retired	7	3.6	
	Homemaker	52	2.7	
	Unemployed	11	5.7	
Family income (per month)	≤ \$156 (≤ €106)	84	43.8	—
	\$157–\$312 (€106–€212)	62	32.5	
	\$313–\$468 (€213–€319)	19	9.9	
	\$469–\$625 (€320–€425)	9	4.7	
	\$626–\$781 (€426–€531)	6	3.1	
	≥ \$782 (≥ €531)	12	6.2	

Education

Education was not related to the total number of symptoms or risk factors recognized. Subjects with education less than high school (< HS) ($n = 106$) were more likely to believe that sudden discomfort in one or both arms or shoulders was a heart attack symptom compared with those with at least a high school education (HS) ($n = 86$) (< HS = 62.2%, HS = 37.8%, $\chi^2 = 4.0$, $P < 0.05$).

DISCUSSION

This study focused on Thai people's knowledge of heart attack symptoms and risk factors. These Thai respondents could identify more than half (5.6 ± 1.8) of the nine heart attack symptoms listed. More than 70% of subjects correctly recognized fatigue, chest discomfort and shortness of breath as heart attack symptoms. This finding is

consistent with previous studies that showed that the general public identified chest discomfort and shortness of breath as common symptoms of heart attack.^{12,13,17,20} Interestingly, fatigue (which was identified by many in our study) has only recently been increasingly recognized in the literature as a common symptom of heart attacks. However, many prominent heart attack organizations do not yet include it as such in their literature and websites.

Most subjects in this study incorrectly chose severe, sharp and stabbing chest discomfort; it was actually used as a non-heart attack symptom. Zerwic's study reported that most people overestimated the pain that would occur during a heart attack and did not understand the quality of pain that would be experienced.²⁰ The quality is more likely to be pressure or heaviness. A sharp or stabbing pain is generally not consistent with a heart attack.

Table 2 Knowledge of heart attack symptoms (*n* = 192)

Symptoms	Item selected as a heart attack symptom	
	N	%
Actual heart attack symptoms		
Fatigue	153	79.7
Chest discomfort	150	78.1
Dizziness	146	76.0
Shortness of breath	136	70.8
Generalized weakness	127	66.1
Sweating	122	63.5
Indigestion	102	53.1
One or both arm or shoulder discomfort	98	51.0
Vomiting	49	25.5
Non-heart attack symptoms		
Stabbing chest pain	128	66.7
Loss of balance	112	58.3
Weakness on one side of body	96	50.0
Sudden severe headache	95	49.5
Confusion	77	40.1
Upper back discomfort	76	39.6
Numbness on one side of face	73	38.0
Neck or jaw discomfort	53	27.6
Fever	44	22.9

In this study, some subjects could not identify classic heart attack symptoms: chest discomfort and shortness of breath. Roughly one-fourth of subjects could not correctly identify even five or more of the nine heart attack symptoms. Many subjects in this study also did not recognize other heart attack symptoms, such as generalized weakness, sweating, indigestion, arm discomfort and vomiting. These findings show that some Thais need to be targeted with education about heart attack symptoms. Hwang and colleagues' study reported that > 70% of the subjects did not recognize neck or jaw pain, upper back pain, sweating and general weakness as heart attack symptoms.¹⁷ However, sweating is a key symptom that is experienced by > 64% of heart attack patients²¹ and is an important symptom that leads patients to rapidly seek treatment.²² The present study found that 64% of the subjects recognized sweating as a heart attack symptom. It is important that individuals be able to identify all of the

Table 3 Knowledge of heart attack risk factors (*n* = 192)

Risks	Item selected as a heart attack risk factor	
	N	%
Actual heart attack risk factors		
Lack of physical activity	170	88.5
High blood pressure	146	76.0
High cholesterol level	136	70.8
High-fat diet	135	70.3
Smoking cigarettes	133	69.3
Obesity	128	66.7
Diabetes	94	49.0
Heart attack family history	94	49.0
Non-heart attack risk factors		
Stress	152	79.2
Drinking coffee	127	66.1
Trouble sleeping	121	63.0
Brisk physical exercise	84	43.8
High-sodium diet	83	43.2
Exposure to sunlight and heat	52	27.1

symptoms associated with heart attack because it is not possible to predict a particular set of heart attack symptoms that will occur.

In this study, as well as prior studies, half of all subjects erroneously selected symptoms that are actually stroke symptoms, such as loss of balance, weakness on one side of the body and severe headache.^{13,17} These findings indicate that health-care providers should help the Thai population distinguish symptoms of heart attack from those of stroke and increase knowledge of heart attack symptoms in order to enhance the ability to accurately recognize and interpret symptoms.

The findings of the study support previous studies that > 70% of subjects correctly recognized lack of physical activity, high blood pressure, high cholesterol and high-fat diet as heart attack risk factors.^{16,23,24} However, the subjects were not able to recognize all of the important cardiac risk factors, such as diabetes. These results indicate that the general population, as well as those who are at high risk for cardiovascular disease, should be educated about heart attack risk factors to prevent and reduce the morbidity of heart attacks.

In this study, slightly less than half (48%) of the subjects recognized all three key modifiable risk factors for heart attack: smoking, high blood pressure and high blood cholesterol. Momtahan and colleagues' study of cardiovascular patients and their significant others (spouse, family member or close friend) reported that only a small percentage of patients (4.2%) and their significant others (3.8%) could identify all three risk factors when asked open-ended questions.²⁵ However, in the same study, when subjects were given a multiple-choice format of risk factors, most patients (93%) and their significant others (96%) could correctly recognize all three. Zerwic and colleagues' study of CAD patients using an open-ended question found that most subjects (79%) identified at least one of three main modifiable risk factors, whereas a small number of subjects (7%) could name all three.¹⁵ These findings might be explained in that the open-ended questions might limit the subjects' recognition of cardiac risk factors. Structured questionnaires cue subjects and promote recognition of risk factors. Thus, subjects are able to recall more cardiac risk factors when presented with a structured self-administered questionnaire compared with being asked open-ended questions.

In this study, as well as previous studies in undergraduate students, almost half of subjects scored poorly on identifying diabetes and family history as heart attack risk factors.^{23,26} Zerwic and colleagues' study of CAD patients also reported that only 21% of diabetes subjects selected diabetes as a heart attack risk factor.¹⁵ Similarly, Hwang and colleagues' study of a convenience sample of Korean Americans found that < 50% identified diabetes as a risk factor of heart attack.¹⁷ However, Choi and colleagues' study found that most individuals with type 2 diabetes could identify diabetes (74.1%) and family history (72.7%) as cardiovascular risk factors.²⁷ It is possible that the general public, especially young people, do not recognize diabetes and family history as heart attack risk factors. Diabetes is one of the major risk factors of heart attack, followed by dyslipidaemia and hypertension. In Thailand, 44% of patients hospitalized with myocardial infarction have diabetes.⁴

This study, as well as previous studies of both cardiac patients and the general population, reported that stress was one of the most frequently cited causes of a heart attack.^{15,25,28} The effect of stress on heart disease is unknown but is likely to have at most a limited role. This study also found that there were no differences based on either gender or education in mean score of number of

heart attack symptoms and risk factors identified. There was also no age influence in mean score of number of heart attack risk factors identified. This result is consistent with some previous studies that showed no gender differences in knowledge of coronary heart disease risk factors.^{11,25,29} Contrasting findings were reported by Andersson and Leppert of people ≥ 50 years of age in Sweden: women had greater knowledge of cardiovascular risk factors than men.²⁸ The present finding is also in contrast to prior studies that indicated that more educated groups had a greater level of knowledge of cardiovascular symptoms and risk factors than less educated groups.^{6,25} A recent literature review by Jensen and Moser concluded that gender and age differences insufficiently influenced knowledge of heart disease.¹⁰ However, in our study, no forceful directions were indicated by the sporadic statistically significant relationships between knowledge and age, gender or education.

This study has a number of limitations. First, a small convenience sample of Thai people from one geographical area limits the generalizability of the study findings across Thai populations living in other geographic areas. Second, the closed-ended questions might not have fully reflected the participants' understanding of heart attack symptoms and risk factors. Further studies should be conducted using more representative samples and multidimensional measures of heart attack knowledge. Measures specific to general populations that are culturally appropriate might need to be developed for this purpose.

Conclusions

This study documented that Thai individuals have general knowledge about heart attack symptoms; however, many expect heart attacks to include symptoms more commonly associated with stroke. These findings could direct health-care providers to help the Thai population differentiate symptoms of heart attack from symptoms of stroke. Some subjects could not recognize chest discomfort and shortness of breath as classic heart attack symptoms; therefore, this group should be targeted for education about important heart attack symptoms. Improved knowledge of risk factors, particularly diabetes, is also needed.

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