Knowledge and Health Care Readiness among a Middle-Aged Group with Diabetes Risk Factors

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Background: *Most physical health problems result from chronic disease, in particular diabetes, the prevalence of which is increasing day by day. Preparing and planning for the prevention of this chronic disease would reduce the cost of caring for the elderly and improve their quality of life. This study of the knowledge and health behavior of middle-aged people with diabetes risk factors could help to identify problems and recommend preventive measures and a public health strategy for Thais in this risk category, both in the short- and long-term.*

Objective: *To assess the levels of knowledge, readiness and health behavior of middle-aged people at risk of developing diabetes.*

Material and Method: *This descriptive cross-sectional study was performed by interviewing patients at Rajavithi Hospital, Outpatients Department of Family Medicine who were between the ages of 40 to 60 years and at risk of developing diabetes. Preparedness, knowledge about the disease, and everyday health behaviors were examined with the use of an assessment form. Subjects who met the inclusion criteria were enrolled between September 2016 and May 2017.*

Results: *Education was one of the factors significantly affecting knowledge of the disease. Of subjects with a Bachelor's degree or equivalent, 63.6% had a low level of knowledge about diabetes, while those with moderate and high levels both accounted for 18.2%. Of participants whose education level was below bachelor's degree, the majority (84.1%) had a low level of knowledge about diabetes, while 13.8% had moderate levels and 2.1% had good knowledge. Personal disease was also a significant influence. Of participants with no comorbid disease, most (61.5%) had a low level of knowledge while 30.8% and 7.7% had moderate and high levels respectively. The vast majority (86.2%) of participants who had underlying diseases had a low level of knowledge about diabetes, while 11.5% and 2.3% had moderate and high levels respectively. Gender was a significant factor with regard to health care behavior. Most males (71.65%) had moderately good health care habits, while 22.1% and 6.3% had low and high levels respectively; in contrast, 37.6%, 57.3% and 4.5% of females had poor, moderate and good health care behavior habits.*

Conclusion: *The levels of knowledge and health care readiness of middle-aged people who were at risk of developing diabetes were generally low to moderate. The factors that had a significant association with knowledge about diabetes were education and personal disease, while the factor significantly associated with self-care behavior was gender, with males having better readiness than females.*

Keywords: *Readiness to prevent diabetes, Middle aged, Risk for diabetes, Education level, Diabetic knowledge*

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Thailand is rapidly becoming an aging society, as the average life expectancy of its population is rising. The aging population trend over the past 10 years is in line with demographic changes in Thailand, with both the number and proportion of people aged 60 and over increasing. The proportion of elderly people increased from 7.2% in 1990 to 9.2% in 2000, and 11.5% in 2005; furthermore, it is expected to reach 15.3% in 2019. The number of people over 60 years old will then be more than 10% of the population, and it is clear that preparations must be made to deal with the situation[1]. The major causes of the increase in the number of older people are advances in medicine and public health, such as the improved distribution of public health services and the implementation of family planning policies. The decrease in fertility of the population has led to a rise in the proportion of the elderly population with a longer life expectancy, but our readiness to enter the era of an elderly society is poor, displaying a lack of planning and preparation. Specifically, health policies still focus more on treatment options than on preventive approaches.

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A full report of the data analysis and the summary of the surveillance performance of prevention and control of non-communicable diseases by related agencies nationwide, 2008 to 2012, were issued by the Office of Non-communicable Disease, Department of Disease Control, Ministry of Public Health, together with the Faculty of Public Health University on 27 September 2013, summarizing the results of surveillance operations. With regard to prevention and control of non-communicable diseases, it stated that, "The lack of research highlights the need for systematic follow-up monitoring and performance appraisal to determine whether or not prevention and control measures have been successful. In a 2011 study, the highest prevalence (1.56) of diabetes mellitus was found in Khon Kaen, followed by Yasothon Province (1.47). In Service Network 7, all provinces showed high levels of diabetes mellitus over the two-year period, and overall severity was high. In Bangkok, the incidence of diabetes mellitus was higher than the national level, and the severity level was moderate to high"[2].

Diabetes is a silent killer. The progression of the disease causes degeneration and diseases in every organ, and every system of the body, the causes of this disease are known, and its preventive care measures and guidelines are clear.

Therefore, studying the knowledge and health care readiness among this middle-aged group with diabetes risk is another way to help identify problems, and formulate guidelines and solutions to public health problems among Thai people. It could help to reduce the cost of medical treatment for many chronic diseases and bring about an improvement in the quality of life of the Thai people. The primary objective of the study was to assess the level of knowledge readiness among a middle-aged group with diabetes risk factors, and the secondary aim was to evaluate their level of health care habits.

Material and Method

A descriptive cross-sectional study was performed of patients at Rajavithi Hospital, Outpatient Department of Family Medicine. Middle-aged[3] patients considered to be at risk[4] of developing diabetes were interviewed to assess their levels of knowledge about diabetes and evaluate their behavior in everyday life. This survey employed a questionnaire assessment form, and patients who satisfied the inclusion criteria were interviewed between September 2016 and May 2017. The protocol of this research was reviewed and approved by the ethics committee of Rajavithi Hospital (No. 169/2559).

Study population

The subjects who fulfilled the requirements of the inclusion criteria were enrolled into the study.

The research assistants selected the preliminary samples.

Subjects were included who:

1) were patients in Rajavithi Hospital and aged 40 to 59 years;

2) were obese with a body mass index >25 kg /m^2[5];

3) had parents or siblings (direct relatives) who had diabetes mellitus;

4) were willing to co-operate in the study.

People were excluded who:

1) had diabetes or had been diagnosed with high blood sugar levels >110 mg%;

2) had illness or could not provide information during data collection;

3) supplied incomplete or duplicate questionnaires.

The samples were patients at the Outpatient Department clinics of Family Medicine, Rajavithi Hospital. Group sizes were determined using sample size calculations for proportions. Sample size calculation was n = 400 cases.

Study tools

The questionnaire for respondents consisted of 3 parts:

Part 1: General information about the participants including their gender, age, career, weight, height, level of education, domicile, illness, body mass index (BMI).

Part 2: Their knowledge of diabetes using a self-complete questionnaire containing 25 items taken from quizzes and interviews from other diabetes research[6-9].

Participants answered each question with "yes", "no" or "unsure". One point was awarded for the correct answer and 0 for the wrong answer or a reply of "unsure", and scores ranged from 0 to 25 points. Bloom's formula is divided into 3 levels. The high level is defined as scores more than or to equal 80% (20 to 25 points); the middle level defined as scores between 60 to 79% (15 to 19 points); and the low level is awarded for scores under 60% (0 to 14 points). This knowledge questionnaire aimed to test groups with

similar characteristics to the sample to verify the reliability of this research, and a Cronbach's alpha reliability of 0.70 or higher was used.

Part 3: Health care behaviors in daily life. The questionnaire consisted of 25 items: "practice regularly" (= 2) signified that the activity was performed on a routines basis or invariably; "practice sometimes" (= 1) indicated that the activity was carried out occasionally but not regularly; "never practice" (= 0) meant that the activity was never performed. Health behavior scores ranged from 0 to 50 points using the following scale: 40 to 50 points indicated good health behaviors; 30 to 39 points meant moderate health behaviors; and ≤29 points indicated poor health behaviors. Knowledge and strain pattern content validity, concurrent validity, and Cronbach's alpha reliability coefficient were set at greater than 0.7.

Data analysis

The investigator verified the completeness of the data in personal records. Health check record data were analyzed using SPSS program version 17.0.

1) Descriptive statistics were described as number and percentage.

2) Inferential statistics were used to compare qualitative data utilising Chi-square test.

A *p*-value of less than 0.05 was considered to be statistically significant.

Results

To establish the readiness of diabetes prevention in this middle-aged group who had risk factors of diabetes, the data collection questionnaire consisted of 3 parts: part 1, general characteristics; part 2, knowledge of diabetes; and part 3, information about everyday behavioral health habits.

Part 1: General characteristics

Males (400) accounted for 55.5% of the samples; 62.7% were in the age range of 50 to 59 years; 94.5% had education qualifications below bachelor degree; 44.3% worked for the government or state enterprises; 57.0% and 25.5% were domiciled in the central and northeastern regions respectively; 87.0% had underlying disease; 77.3% had BMI of between 25 to 30 kg/m^2, and only 22.7% had BMI of over 30 kg/m^2. (Table 1).

Part 2: Knowledge of diabetes

Most (83.0%) subjects had a low level of knowledge, while those with medium and high levels accounted for only 14.0% and 3.0%, respectively. Knowledge levels were similarly low in male (84.7%) and female (80.9%) participants. The factors that were significantly related to knowledge were education and underlying diseases. While 63.6% of subjects with a bachelor's degree or equivalent had a low level of knowledge, 82.4% of those with only undergraduate education had poor knowledge. Participants with underlying diseases were less likely than their counterparts with no disease to have low levels of knowledge (61.5% and 86.2%, respectively). With regard to occupation, overall, more than 80.0% of subjects in all career groups had poor knowledge; in particular, the vast majority (92.3%) of participants who were engaged in sales had low knowledge levels. With respect to the domicile factor, the majority (around 80.0%) of participants from all regions had similarly poor knowledge, and all those from the northern region had poor knowledge. Most (80.9%) subjects with BMI between 25 to 30 kg/m^2 had a low level of knowledge,

Table 1. General Characteristics (n = 400)

Characteristics	Number	%
Gender		
Male	222	55.5
Female	178	44.5
Age (years)		
40 to 49	149	37.3
50 to 59	251	62.7
Education		
Below bachelor's degree	378	94.5
Bachelor's degree/equivalent	22	5.5
Career		
Government/state enterprise	177	44.3
Private business	116	29.0
Occupation	92	23.0
Other occupations	15	3.7
Domicile		
Central	228	57.0
Northeast	102	25.5
Western	32	8.0
Eastern	24	6.0
Southern	10	2.5
North	4	1.0
Underlying disease		
No	348	87.0
Yes	52	13.0
BMI (kg/m^2)		
25 to 30	309	77.3
>30	91	22.7

Values are presented as n (%), BMI = Body mass index

Table 2. Factors associated with knowledge of Diabetes (n = 400)

Factors	Knowledge of Diabetes			
	Poor n (%)	Moderate n (%)	High n (%)	*p*-value
Total	332 (83.0)	56 (14.0)	12 (3.0)	
Gender				0.267
Male	188 (84.7)	30 (13.5)	4 (1.8)	
Female	144 (80.9)	26 (14.6)	8 (4.5)	
Age (years)				0.647
40 to 49	122 (81.9)	21 (14.1)	6 (4.0)	
50 to 59	210 (83.7)	35 (13.9)	6 (2.4)	
Education				0.002*
Below bachelor's degree	318 (84.1)	52 (13.8)	8 (2.1)	
Bachelor's degree/equivalent	14 (63.6)	4 (18.2)	4 (18.2)	
Career				0.081
Government/state enterprise	142 (80.2)	28 (15.8)	7 (4.0)	
Private business	79 (87.8)	10 (11.1)	1 (1.1)	
Occupation	77 (83.7)	14 (15.2)	1 (1.1)	
Merchant	24 (92.3)	2 (7.7)	0 (0.0)	
Others occupation	10 (66.7)	2 (13.3)	3 (20.0)	
Domicile				0.857
Central	190 (83.3)	30 (13.2)	8 (3.5)	
Northeast	84 (82.3)	16 (15.7)	2 (2.0)	
Western	27 (84.4)	4 (12.5)	1 (3.1)	
Eastern	19 (79.2)	5 (20.8)	0 (0.0)	
Southern	8 (80.0)	1 (10.0)	1 (10.0)	
North	4 (100.0)	0 (0.0)	0 (0.0)	
Underlying disease				<0.001*
No	32 (61.5)	16 (30.8)	4 (7.7)	
Yes	300 (86.2)	40 (11.5)	8 (2.3)	
Lipidemia	27 (90.0)	1 (3.3)	2 (6.7)	
Heart and blood vessels	193 (87.7)	23 (10.5)	4 (1.8)	
Liver disease	47 (82.5)	9 (15.8)	1 (1.8)	
Others diseases	33 (80.5)	7 (17.1)	1 (2.4)	
BMI (kg/m^2)				0.115
25 to 30	250 (80.9)	49 (15.9)	10 (3.2)	
>30	82 (90.1)	7 (7.7)	2 (2.2)	

Values are presented as n (%), *p*-value from Chi-square test, * = Significant at $p<0.05$; BMI = Body mass index

while 90.1% of their counterparts with BMI more than 30 kg/m^2 had a low level of knowledge (Table 2).

Part 3: Health care behaviors practiced in daily life

The overall standard of health care behavior was poor in 29.0% of subjects, moderate in 63.5%, and high in 5.8%. Gender was the only significantly associated factor: males had poor, moderate and high levels at 22.1%, 71.6% and 6.3% compared to females at 37.6%, 57.3% and 5.1%, respectively. With regard to education, 40.9% of graduates had poor health habits while exactly half had moderate, and just under a tenth (9.1%) had high behavioral standards. Those with below-graduate education had poor, moderate and high standards at 28.3%, 66.1%, and 5.6%, respectively. With regard to occupation, 32.2% of subjects working for government or state enterprises had poor levels of health behavior, which was the worst of all career classifications, while 59.3% and 8.5% had moderate and high levels respectively. None of the participants in sales had high health behavior standards, while 26.9% and 73.1% had low and moderate levels of behavior. Northerners had relatively good health care behaviors, with 75.0% having moderate levels and just 25.0% with poor habits. With respect to underlying diseases, the sample with personal diseases had better health care behaviors than

Table 3. Factors associated with health care behaviors

Factors	Health care behavior			*p*-value
	Poor, n (%)	Moderate, n (%)	High, n (%)	
Total	116 (29.0)	261 (65.2)	23 (5.8)	
Gender				0.003*
Male	49 (22.1)	159 (71.6)	14 (6.3)	
Female	67 (37.6)	102 (57.3)	9 (5.1)	
Age (years)				0.134
40 to 49	51 (34.2)	88 (59.1)	10 (6.7)	
50 to 59	65 (25.9)	173 (68.9)	13 (5.2)	
Education				0.298
Below bachelor's degree	107 (28.3)	250 (66.1)	21 (5.6)	
Bachelor's degree/equivalent	9 (40.9)	11 (50.0)	2 (9.1)	
Career				0.397
Government/state enterprise	57 (32.2)	105 (59.3)	15 (8.5)	
Private business	23 (25.6)	64 (71.1)	3 (3.3)	
Occupation	20 (28.3)	62 (67.4)	4 (4.3)	
Merchant	7 (26.9)	19 (73.1)	0 (0.0)	
Others occupation	3 (20.0)	11 (73.3)	1 (6.7)	
Domicile				0.857
Central	66 (28.9)	148 (65.0)	14 (6.1)	
Northeast	33 (32.4)	63 (61.7)	6 (5.9)	
Western	5 (15.6)	26 (81.3)	1 (3.1)	
Eastern	8 (33.3)	15 (62.5)	1 (4.2)	
Southern	3 (30.0)	6 (60.0)	1 (10.0)	
North	1 (25.0)	3 (75.0)	0 (0.0)	
Underlying disease				0.399
No	19 (36.5)	31 (59.7)	2 (3.8)	
Yes	97 (27.9)	230 (66.1)	21 (6.0)	
Lipidemia	6 (20.0)	22 (73.3)	2 (6.7)	
Heart and blood vessels	70 (31.8)	139 (63.2)	11 (5.0)	
Liver disease	10 (17.5)	45 (78.9)	2 (3.5)	
Others diseases	11 (26.8)	24 (58.5)	6 (14.6)	
BMI (kg/m^2)				0.801
25 to 30	92 (29.8)	199 (64.4)	18 (5.8)	
>30	24 (26.4)	62 (68.1)	5 (5.5)	

Values are presented as n (%), *p*-value from Chi-square test, * = Significant at $p<0.05$. BMI = Body mass index

those in the group without personal disease, with 66.1% at the moderate level and 6.0% at the good level compared with 59.7% and 3.8%, respectively in the group without personal disease. BMI was not significantly associated with health care behavior readiness: levels among those with BMI of between 25 kg/m^2 and 30 kg/m^2 and more than 30 kg/m^2 were not statistically different (Table 3).

Conclusion

The results of this study show that knowledge levels about diabetes mellitus in middle-aged people with diabetes risk factors were low (overall low score 83.0%) and levels of readiness for self-care behavior were moderate (overall 65.2%). The significant factors related to knowledge about diabetes mellitus were education and underlying diseases. The only factor that had a significant relationship with self-care behavior was gender (males being better than females). Middle-aged people at risk of developing diabetes were not ready to prevent diabetes in the future, lacking knowledge about the disease and practicing poor health care behaviors.

Discussion

Diabetes mellitus is a disease which causes

the body's cells to become abnormal in the process of turning blood sugar into energy. When sugar is not used, the blood glucose level becomes higher than normal. In Thailand in 2015, due to changes in lifestyle, there were 11,625 deaths, representing an average of 32 deaths per day, or 17.83 deaths per hundred thousand of population.

In this study, we found that education was one of the key factors in readiness of diabetes prevention in middle-aged people at risk of becoming diabetic. Of those with a bachelor degree or equivalent, 63.6% had a low level of knowledge about diabetes with the rest having a moderate and a high level of knowledge at 18.2% equally, while 84.4% of participants with a lower than graduate education, had a very low level of knowledge about diabetes. With regard to health care behaviors, males had a moderate level of health care behavior at 71.6% and a good level at 6.3%, which was higher those of their female counterparts.

Other studies of knowledge and behavior, diet and exercise in groups who were at risk of developing diabetes[10,11] found that 62.6% of the subjects had a high level of knowledge about food consumption and exercise, and 67.3% and 21.3% had moderate and high compliance levels respectively with good food consumption and exercise, while 89.3% had accurate knowledge and 10.7% had inaccurate knowledge. A study of self-care behaviors of diabetic patients comparing personal factors and blood glucose levels[12], in which the majority (80.2%) of the samples were female, taking into account marital status, primary education, agricultural occupation, diabetes over 10 years, the overall self-care behaviors of diabetic patients were moderate, with no significant associations with age, gender, or education level. Awareness and intervention status were also studied of patients without diabetes [13], and 16.8% of non-diabetic adults who responded to the surveillance questionnaire were found to be not at risk of diabetes, while 38.5% were at risk. Young adults with high education, no smoking, and low body mass index had less chance of developing diabetes than their older counterparts. A study using predictive modeling of the effectiveness of educating about diabetes and monitoring before its onset [14]during self-care of non-diabetic.patients with diabetes mellitus found that diabetic patients had a higher level of intervention after being informed of measures which could help to prevent diabetes, and as a result, the number of people with diabetes decreased. Diet control, reduced weight, increased exercise and non-smoking had positive effects on the treatment of elderly people who had diabetes[15]. Positive lifestyle changes have been found to reduce the incidence of type 2 diabetes in those with impaired glucose tolerance[16].

This study is another attempt to help us predict future problems and to establish guidelines to solve Thailand's public health problems, reduce the cost of medical treatment for many chronic diseases, and enhance the quality of life of the Thai people; however, this study investigated only the readiness of middle-aged people who were at risk of developing diabetes. Further studies should focus on designing education strategies with interventions to find solutions to specific problems or specific issues.

What is already known on this topic?

Knowledge, behavior, diet and exercise are important to diabetic patients, and young people with good health care have less chance of developing diabetes than older people.

What this study adds?

Knowledge levels about diabetes of middle-aged people with diabetes risk factors were low, and compliance with healthy self-care behavior was only moderate.

Potential conflicts of interest

None.

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