Factors related to the health behaviors of individuals at risk of diabetes in a province in Northeast Thailand

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Abstract

Diabetes incidence rate is increasing in many developing countries, including Thailand. The prevalence of the disease has been growing. Researchers aimed to examine factors that could influence the health behavior of those people who were at risk and living in the poorest part of the country. A cross-sectional survey study was conducted in small and remote communities in the northeastern province of the country. The sample size of 200 cases were collected. Variables of interest were demographic data such as education, income, BMI and underlying diseases. Other variables were knowledge, social support and health behavior. The study found 86% of respondents had either sufficient or high knowledge level. All respondents had social support, but less than 50% had a high degree of health behavior. More than half of respondents had underlying diseases and about 62% did not have a normal BMI range. Income, underlying diseases, BMI, and glucose levels were significantly and negatively associated with health behavior (p-value < 0.010). Knowledge was significantly and negatively associated with health behavior (p-value < 0.010), whereas social support was significantly and positively associated with healthy behavior/lifestyle (p-value < 0.050). The findings showed that knowledge and social support had an important role and were significantly related to healthy behavior within the population.

Key words: diabetes type 2; knowledge; social support; behavior; lifestyle

ปัจจัยที่มีความสัมพันธ์ต่อพฤติกรรมสุขภาพของผู้มีความเสี่ยงต่อโรคเบาหวานในจังหวัดภาคตะวันออกเฉียงเหนือของประเทศไทย

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บทคัดย่อ

โรคเบาหวานกำลังเพิ่มขึ้นในประเทศกำลังพัฒนาหลายประเทศ รวมทั้งประเทศไทยด้วย อุบัติการณ์ของโรคนี้เพิ่มขึ้น นักวิจัยมุ่งหวังที่จะศึกษาปัจจัยที่อาจส่งผลต่อพฤติกรรมด้านสุขภาพของผู้ที่มีความเสี่ยงและอาศัยอยู่ในพื้นที่ยากจนที่สุดของประเทศ การศึกษาแบบสำรวจภาคตัดขวางได้ดำเนินการในชุมชนเล็กๆแห่งหนึ่งในจังหวัดทางภาคตะวันออกเฉียง เหนือของประเทศ โดยมีขนาดตัวอย่าง 200 ตัวอย่าง ตัวแปรอื่นๆได้แก่ ข้อมูลประชากร เช่น การศึกษา รายได้ ดัชนีมวลกาย และโรคประจำตัว และตัวแปร ความรู้ การสนับสนุนทางสังคม และพฤติกรรมด้านสุขภาพ การศึกษาพบว่าผู้ตอบแบบสอบถามร้อยละ 86 มีระดับความรู้เพียงพอหรือมีความรู้สูง ผู้ตอบแบบสอบถามทั้งหมดได้รับการสนับสนุนทางสังคม แต่ไม่ถึงร้อยละ 50 มีพฤติกรรมด้านสุขภาพในระดับสูง ผู้ตอบแบบสอบถามมากกว่าครึ่งหนึ่งมีโรคประจำตัว และประมาณร้อยละ 62 มีช่วงดัชนีมวลกายไม่อยู่ในช่วงปกติ รายได้ โรคประจำตัว ดัชนีมวลกาย และระดับกลูโคสในเลือดมีความสัมพันธ์เชิงลบอย่างมีนัยสำคัญกับพฤติกรรมด้านสุขภาพ (ค่า p-value < 0.010) ความรู้มีความสัมพันธ์เชิงลบอย่างมีนัยสำคัญกับพฤติกรรมด้านสุขภาพ (ค่า p-value < 0.010) ในขณะที่การสนับสนุนทางสังคมมีความสัมพันธ์เชิงบวกอย่างมีนัยสำคัญกับพฤติกรรม/วิถีชีวิตที่มีสุขภาพดี (ค่า p < 0.050) ผลการศึกษาแสดงให้เห็นว่าความรู้และการสนับสนุนทางสังคมมีบทบาทสำคัญและมีความสัมพันธ์อย่างมีนัยสำคัญกับพฤติกรรมที่มีสุขภาพ

คำสำคัญ : โรคเบาหวานประเภท 2; ความรู้; การสนับสนุนทางสังคม; พฤติกรรม; วิถีชีวิต

Introduction

Approximately 230 million Asian people are living with type 2 diabetes, which represents nearly 55% of the world's diabetic population. Over 425 million people have the disease worldwide. Almost 80% of diabetics live in developing countries (Mohan et al., 2020). The Department of Disease Control, Ministry of Public Health, Thailand reported that the diabetes situation within the country is of great concern. The diabetes rate in Thailand has showed an increasing trend, rising from 2,033 per 100,000 in 2010 to 2,228 in 2012 and 4,500 in 2018, respectively (Pokpermdee, 2020). Other developing Asian countries show a similar trend. China and India have the highest number of diabetics. Diabetes in Asia exhibits different features compared to Western countries. For example, Asian people with a low BMI can develop diabetes at an early age. In addition, Asians are more likely to have complications and suffer premature death. There are also differences in genetics, socioeconomic factors, and diabetes management (Rhee, 2015).

A limited number of studies have investigated the association of diabetes with demographic data, knowledge and social support factors in Asian populations, especially people in remote areas. The aim of this study is to examine demographic data, knowledge about diabetes and social support factors associated with health behavior or lifestyle of people at risk of diabetes or prediabetes in communities in a remote town in Mahasarakham Province, Northeast Thailand, which is poorest region (GDP per capita) in the country. The researchers of this study considered knowledge about diabetes as a contributing factor and also examined if the factors of demographic data, knowledge and social support are correlated with the health behavior of people at risk of diabetes in the communities. In this area, the diabetes rate from 2011 to 2016 was 2,012, 2,177, 2,594, 2,824, 2,916 and 2,621 per 100,000, respectively. In addition, the average blood pressure of the population also increased.

Diabetes does not only place a physical burden on the individual, but also a psychological one. Studies show social support has a strong role to play in disease management by helping to control the disease as well as promoting dietary changes (Abu-Alfa et al., 2023; Messenger et al., 2019). Social support can come from a variety of sources such as family, friends and the network of health care providers (Ramkisson, 2017). Some diabetes patients have a hard time accepting they have the disease and struggle to cope with their daily routine, which could lead to problems controlling their health behavior. A study in Iran mentioned that diabetes not only affected diabetics directly but also distressed family members and their future prospects (Saghaee et al., 2020).

Knowledge as a preventative and control approach is used as a variable for this study. Diabetics need to know what could cause more severe symptoms, and also how to prevent the disease progressing (Lingam et al., 2018; Hipolito-Pascual, 2019) found there is association between knowledge and diabetes patients. The researchers also want to examine if diabetes patients are aware of the importance of regularly checking their blood sugar levels. Diabetics can be successfully and clinically managed well if they can control their behavior, and practice what they should do once they know or are informed about the disease (Binh, 2015; Kanojia, 2017; Gedik & Kocoglu, 2018).

Methods

This study is a cross sectional research and used a questionnaire to ask an at-risk population who resided in a designated district. The sample size of 356 was calculated using Daniel's sample size calculation (Daniel, 1999; Latif et al.,2011) since the researchers know the whole population number and got the sample size who voluntarily completed self-administered questionnaires to participate in this study. However, a total of 200 people (56%) responded to the questionnaire. The questionnaire was divided into four parts:

Part one is demographic information of the participants: gender, age, career, marital status, BMI etc.

Part two is about knowledge of diabetes

Part three is about social support

Part four is about lifestyle and health-related behavior

$$n = \frac{Z^2 p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2\ 0.365\ (0.635)}{(0.05)^2}$$

$$n = 356$$

n : Sample size

Z: Statistic for a level of confidence (for the level of confidence of 95%, which is conventional, Z value is 1.96)

p : Prevalence or proportion (%); in this province, the population at risk of diabetes is 365 per 100,000 which is 0.365

d Precision level = 0.05

The questionnaire consisted of 95 questions, which asked the participants about their perceptions, opinions and practices. The questionnaire employed a Likert-type scale to elicit responses. Participants responded to each question with one of the following five answers: regularly practice, practice often, practice sometimes, rarely practice and do not practice or strongly agree, agree, not sure, disagree and strongly disagree. The researchers requested ethics approval to conduct the study in diabetes risk groups from the Human Ethics Committee, Faculty of Public Health, Bangkok Thonburi University. The university approved the request and also provided a letter for the researchers to ask for cooperation from the village head, police chief and village health volunteers. These people helped the researchers to obtain completed questionnaires.

Ethics approval

The study was conducted after approval from the Human Ethics Committee of Bangkok Thonburi University (Ethics Ref No. COA. No. BTUPH 007)

Results

The researchers analyzed the data using SPSS (version 18). Demographic data is shown in Table 1. Knowledge was measured as a cognitive factor and was categorized into three levels (high, medium and low) and is shown in Table 2. Most of the participants have sufficient knowledge about the disease, diet and prevention. Social support factors and health behavior or lifestyle in diabetes risk group were analyzed using Pearson's Product Moment Correlation Coefficient. The results showed that all respondents received high social support in the area. However, nearly half of them have good healthy behavior (Table 3 & Table 4) . The calculated correlation coefficient was used to determine relationships and is shown in Table 5.

Table 1 Demographic Data

Demographic data	**Number** total 200 (%)	* **95% CI**
Age		
35 - 44	52 (26)	20.4- 32.5
45 - 54	21 (10.5)	6.9 -15.5
55 - 64	69 (34.5)	28.3 - 41.3
> 65	68 (29)	27.8 - 40.8
mean 39.9; *p*-value < 0.001		
Job		
Unemployed	20 (10)	6.4 - 15.2
Agriculture	140 (70)	63.1 - 76.2
House keeper	7 (3.5)	1.5 - 7.4
Own business	7 (3.5)	1.5 - 7.4

Demographic data	**Number** total 200 (%)	* **95% CI**
Vendor	26 (13)	9.0 -18.4
p-value < 0.001		
Marital status		
Single	4 (2)	0.5 - 5.0
Married	188 (94)	89.7 - 96.8
Divorced	3 (1.5)	0.3 - 4.3
Separated	5 (2.5)	0.8 - 5.7
p-value < 0.001		
Education level		
Primary	180 (90)	85.1 - 93.4
Secondary	18 (9)	5.6 -14.1
Bachelors and higher	2 (1)	0.3 - 3.6
p-value < 0.001		
Income (THB per month)		
5,000 -10,000 [USD 150 - 300]	120 (60)	53.1 - 66.5
10,001 - 15,000 [USD 301 – 450]	16 (8)	4.9 - 12.6
15,001 - 20,000 [USD 451- 600]	32 (16)	11.4 - 22.0
> 20,000 [> USD 600]	32 (16)	11.4 - 22.0
mean: THB13,500 [USD 400]; *p*-value < 0.001		
Underlying Disease		
With underlying disease	107 (53.5)	46.3 - 60.6
Without underlying disease	93 (46.5)	39.4 - 53.7
p-value > 0.01		
Relative with diabetes		
Direct relative with diabetes	7 (3.5)	1.4 - 7.1
No direct relative with diabetes	193 (96.5)	92.9 - 98.6
p-value < 0.001		
BMI		
20 – 23	75 (37.5)	30.7 - 44.6
> 23 - 25	93 (46.5)	39.4 - 53.7
> 25	32 (16)	11.2 - 21.8
mean 22.9; *p*-value < 0.001		
Glucose level (mg/dL)		
100 -110	117 (58.5)	51.7 - 65.1
111 -125	83 (41.5)	34.9 - 48.4
mean 105.9; *p*-value = 0.01		

Table 2 Knowledge level of study sample

Knowledge level	**Number** total 200 (%)	* **95% CI**
Low	14 (7)	4.2 -11.4
Medium	106 (53)	46.1 - 59.8
High	80 (40)	33.6 - 46.9
p-value < 0.001		

Table 3 Social support level of study sample

Social support level	**Number** total 200 (%)	* **95% CI**
Low	-	-
Medium	-	-
High	200 (100)	98.1 -100.0
p-value < 0.001		

Table 4 Behavior/lifestyle of study sample

Behavior/lifestyle level	**Number** total 200 (%)	* **95% CI**
Low	105 (52.5)	45.3 - 59.6
Medium	-	-
High	95 (47.5)	41.4 - 54.7

p-value > 0.010

Table 5 Correlation matrix of variables

Variables	Education	Income	Underlying disease	BMI	Glucose level	Knowledge	Social support	Health behavior
Education	1.00							
Income/Salary	0.33**	1.00						
Underlying disease	0.33**	0.23**	1.00					
BMI	-0.10*	0.55**	0.27**	1.00				
Glucose level	-0.24**	0.27*	0.05	0.27**	1.00			
Knowledge	0.30**	0.33**	-0.10	0.38**	-0.23*	1.00		
Social support	0.28*	0.10	0.54**	0.16	-0.33**	0.485**	1.00	
Health behavior	0.29**	-0.53**	-0.10*	-0.63**	-0.43**	-0.434**	0.25*	1.00

* p-value < 0.05

** p-value < 0.01

Discussion

In our study, people classified as at risk of diabetes or prediabetes, according to American Diabetes Association criteria, were observed and investigated. They were analyzed by the following demographic data: age, gender, job, marital status, education level, income and BMI, similar to Yang's study that investigated diabetes in Asian low and middle income countries (Yang et al., 2019). Yang found people with type 2 diabetes had no relationship with BMI, which was similar to our study that found BMI had a low relationship not only with glucose level (Table 5) but also with waistline and gender (data not shown here). Our study found that age had a negative relationship (*p*-value < 0.010) with glucose level, which could be a good implication for people at risk and could be interpreted that at-risk people who are getting older are more likely to have lower glucose levels. This finding is not in line with other studies (Selvin & Parrinello, 2013; Kalyani et al., 2017). Moreover, regarding the other two important factors were investigated in this study, namely knowledge and social support, knowledge had negative association with health behavior, but social support had positive association with health behavior or lifestyle (Table 5). This infers the more knowledge a person has, the person practises less healthy behavior. Even though people are sufficiently informed about diabetes, this does not necessarily lead to better health behavior or a sustainable healthy lifestyle (Hood et al., 2015). This could be due to misconceptions of how a certain behavior or lifestyle is related to an important health outcome. Knowing what to do and actually doing it are two different things. Some individuals with diabetes may lack the motivation or confidence to make necessary changes to their behavior or lifestyle. Futhermore, not everyone may fully understand the information provided, leading to difficulties in translating knowledge into action. Therefore, knowledge and information alone cannot change behavior because a human being's behavior is very complex and sometimes illogical. A study regarding the driving force of human behavior is that humans seek to maximize their pleasure or gains and to minimize their pains and losses. Having information and knowledge about a high carbohydrate diet or eating a sweet

dessert could lead to diabetes. Probably because of consuming such a diet gives pleasure to humans, especially when they are hungry or stressed out. Emotion of individuals can affect behavior as they may struggle with feeling of denial, frustration, or fear which could hinder their ability to implement behavioural changes. Behavior changes are often challenging because they require individual to modify deeply ingrained habits and routines. Even with knowledge and information, breaking old habits and adopting new ones can be difficult and may require additional support, such as from healthcare professionals or social support and structure programs. Therefore, behavior changes resulting from possession of information and knowledge can be very difficult to achieve (Kelly & Barker, 2016). Nevertheless, other studies from developing countries in Asia (i.e. Mongolia, India, China) confirmed that education is an indicator for diabetes prevention efforts in rural areas (Mehta et al., 2016; Ramkisson et al., 2017; Qiu et al., 2020) However, our study showed a better behavior or lifestyle resulted in lower sugar levels in at-risk people (Table 5).

Our study had individual sugar level data as a biomarker and output of the study. The researchers found social support is an important factor and is negatively associated to glycemic control level (p-value = 0.010, Table 5. This means if an individual has strong social support, his/her sugar level will be low and one could be in glycemic control. The study also showed educational level has a statistically significant relationship with social support (p-value = 0.010). This is because better educated people may be more likely to be able to control their sugar level by copying the healthy behavior of their friends or neighbors in their community (Ramkisson et al., 2017). It also makes sense that they would listen to their peers or conduct a lifestyle that is beneficial to their health. However, some people could listen and practice healthy behavior if they have knowledge that is relevant to their own health circumstances (Beaser & Brown, 2013; Wu et al., 2019). Studies have shown that changing behavior in people at risk to diabetes is essential to delaying and preventing the onset of the disease (Trief, 2016; Venditti, 2016; Bourne et al., 2020).

Healthy behavior could be defined as engaging in physical activity, eating healthy food, reducing health risks as well as monitoring one's weight and health status. Furthermore, maintaining a change in behavior is not easy since it is an ongoing process for at-risk people to enjoy an optimal quality of life, health status, and a decreasing need for healthcare cost (Bircher, 2020). These are challenges for public health professionals in remote areas like a small community in Mahasarakham Province in Northeast Thailand, which is the largest region of the country where the population have low incomes and social inequality. In addition, there are not enough village health volunteers to educate and persuade community members to conduct healthy behavior throughout their life (Hanvoravongchai & Wibulpolprasert, 2015). Many Northeast people cannot afford healthy food and do not practice healthy behavior. The region is in a great need of development, even though the number people living below the poverty line in the region has declined considerably, from nearly 5.7 million in 2007 to 2.1 million people in 2020 (Jullanan, 2020).

A recent empirical investigation conducted from 2017 to 2019 by Asia Foundation, employed a robust methodology using simple random sampling techniques across a representative sample of 1,400 households. The study revealed a noteworthy outcome, indicating that an overwhelming majority of respondents, approximately 88%, were burdened by debt. This finding supports the prevailing notion that individuals residing in the Northeast region of the study area endure considerable financial hardship, impeding their capacity to procure nutritious food and encourage a healthy lifestyle.

Aware of the multifaceted challenges faced by the population, it is important to underscore the critical stereotypes and prejudiced perceptions that have emerged. Specifically, an

article highlights the prevailing characterization of Northeast residents as being stupid, poor, and sick (Jullanan, 2020). The label of "stupid" is recognized to them due to their limited access to pertinent information and educational resources, which hinders their ability to acquire knowledge and make informed decisions. Furthermore, their financial circumstances are predominantly modest, primarily attributable to their engagement in agricultural occupations, and earning inadequate incomes. Consequently, this economic deprivation perpetuates a state of chronic impoverishment among the population. Lastly, the widespread prevalence of sickness within this community can be attributed to their insufficient means to afford nourishing food and engage in healthy behaviors, thus worsening their vulnerability to health issues. Overall, these findings contribute to the evidence indicating the risky socio-economic circumstances faced by individuals residing in the Northeast region. Moreover, they underscore the urgent need for targeted interventions that address the root causes of these issues and aim to better the living conditions and well-being of this population.

Many studies have consistently highlighted the significant impact of social support on individuals living with diabetes, and these findings align with the conclusions drawn from the present study pertaining to individuals at risk of developing diabetes (Rintala, 2013; Oftedal, 2014; Karimy et al., 2018; Sürücü et al., 2018). Social support encompasses a range of valuable forms, including the provision of assistance by friends and family members who aid in implementing necessary physical and dietary changes, as well as offering emotional care and support. This direct form of support plays a crucial role in enabling individuals to help one another effectively. When it comes to the management of behavior and lifestyle changes associated with diabetes, social support emerges as the primary and most influential source of assistance. The involvement of friends and family members in supporting individuals with diabetes is instrumental in promoting and sustaining positive changes in their behavior and lifestyle choices. Whether it's encouraging regular exercise, promoting a healthy diet, or assisting with medication adherence, the support provided by social networks significantly contributes to the overall life management of people at risk of diabetes.

Furthermore, this study brings attention to the positive effects of strong social support on reducing the emotional stress that individuals with prediabetes experience in their daily lives. The presence of a robust support system, consisting of understanding and empathetic individuals, has been shown to alleviate the burden of emotional distress commonly associated with living with people at risk of diabetes. By providing an outlet for sharing concerns, fears, and frustrations, social support acts as a buffer against the emotional toll of managing the condition, thereby enhancing overall well-being. Importantly, the study also sheds light on the well-being levels of individuals at risk of diabetes, who receive high levels of social support. The findings indicate that individuals in this group, who have a strong network of support from friends and family, tend to experience better overall well-being. This suggests that the positive impact of social support extends beyond those already diagnosed with diabetes and can also significantly benefit individuals in the pre-diabetic stage, potentially mitigating the progression to full-blown diabetes and promoting a healthier lifestyle.

In general, emotional support is part of social support. In this study, people at risk of diabetes received such support from friends and family members, including their spouse, to cope with the stress of maintaining their health, especially with regards to their blood sugar levels. This is in agreement with Soltero, E.G., et al. Study (Soltero et al., 2019) which noted that social support is essential in managing people with diabetes and helps them to conduct healthy behavior and lifestyle. People at risk of diabetes or prediabetes usually needed assistance, mainly

about exercise and diet. Ramkisson study (2017) noted that prediabetics need help from people who have had similar experiences and therefore who are more likely to understand what could stimulate bad eating habits or other unhealthy behaviors or lifestyle. Social support may help to decrease a stressful situation. In DAWN 2 study (Burns et al., 2013) 37% of family and friends of diabetics did not know how they could care for them and therefore needed to seek professional advice from public health professionals on how to deal with precarious situations for diabetics. Other social support could come from public health professionals who can engage people to be motivated and make correct or appropriate decisions on their daily diet and to conduct consistent physical activity in order to control their daily glycemic level.

Conclusion

The study showed knowledge had an important role but was negatively and significantly related to healthy behavior of the population i.e. regular exercise, being active, healthy and balanced diet. Individuals usually share their common knowledge and practice, which could motivate them to change behavior and overcome various problems. Social support from friends, family members and neighbors was statistically and significantly related to healthy behavior of the sample at risk to diabetes. The population sample learned to help each other and discussed their concerns and fears. They were advised and encouraged by social support members to cope with aspects or situations that they do not think they can control in order to consistently conduct healthy behavior.

To enhance behavior change in people at risk of diabetes, a comprehensive approach is necessary. This may involve personalized counseling, support groups, setting realistic goals, addressing psychological barriers, providing accessible healthcare, and creating an environment that promotes healthier choices. Healthcare professionals play a crucial role in helping individuals prior to diabetes navigate these challenges and facilitating behavior change through ongoing education and support.

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