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RESEARCH ARTICLE

Exploring the Type 2 Diabetes Management in the Primary Care Setting in Ratchaburi Province, Thailand

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Abstract:

Purpose:

We aimed to describe the outcomes of primary care setting of type 2 diabetes patient at Sub-District Health Promoting Hospital (SDHPH).

Methods:

This study was a cross-sectional study on 1,890 patients with type 2 diabetes who were participating in the primary care research networks in the Ratchaburi Province of Thailand. Data was obtained through a self-administered questionnaire about the state of health and care. Patient medical records were used to examine the condition of complications, treatment and several indicators of DM care. The data was processed by using logistic regression to analyse the effect of independent variables on the dependent variable. The hypothesis-null was rejected at p-values <0.05.

Results:

The participants in this study were of age 57.56 years (SD=12.10), and most (55.58%) were female. Most respondents (36.20%) completed a Bachelor's degree and were working as employees (28.35%). Regarding duration of diabetes, the majority (28.35%) had 11-20 years. In terms of body mass index, 29.67% had body mass index between 25.0-29.9 (overweight). Regarding complications and comorbidities, the common complication and comorbidity was nephropathy (33.63%) while Ischemic heart disease was the major of other comorbid health problems (48.3%). Furthermore, patients were mostly taking Antihypertensive (67.80%) and ACE Inhibitor or ARB (59.00%). The majority of HbA1c level (42.74%) was lower than 7.0%. Regarding the logistic analysis, it showed that education and treatment significantly influenced Hemoglobin A1c level at significant levels of 0.05.

Conclusion:

Only modest numbers of patients achieved established targets of diabetes control. Reengineering primary care practice may be necessary to substantially improve health care.

Keywords: Diabetes control, Diabetes mellitus, Primary care, Reengineering primary care practice, Ratchaburi Province, Thailand.

1. INTRODUCTION

Diabetes Mellitus (DM) is a disease of chronic metabolic disorders characterized by hyperglycemia. This situation occurs because the body does not produce enough insulin hormones needed by the body to metabolize. Insulin hormone deficiency then results in high blood sugar levels. Diabetes can be divided into 2 types, namely type 1 or Type 2 relative diabetes [1 - 3].The development of DM in Thailand is very common, one of the causes is due to lifestyle changes that lead

to behaviors that are risky to DM [4, 5].According to the Department of Epidemiology, there were 393,887 newly diagnosed diabetic patients, accounting to 602.03 per 100,000 populations [6].Most patients were female, representing a rate of 685.07 cases per hundred thousand populations. The most common age group was age 60 or older. The disease rate was 1726.43 per 100,000 populations. The prevalence of diabetes among people aged > 60 was 1726.43 per 100,000 populations in Thailand [6].

Primary care setting helps to care patients and manage them effectively. People have access to first-line primary care services, and better quality health services[2]. Ratchaburi has

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been operating under the policy of developing primary care and primary care clinics. The plan to establish a family clinic in the year 2017-2026 included a total of 28 Cluster and 76 teams covering the population of 764,136 people in order to provide an accessible quality healthcare services. In the year 2017, 6 clusters and 16 teams were established, accounting for 21.05% of the total team. In addition, it has been reported that there are 11.06% of DM cases related to the diagnosis of several other diseases [7]. Comorbid diseases both acute and chronic are often experienced by patients with type 2 diabetes mellitus; this condition often makes doctors to deal with the main symptoms that appear first. This situation is increasingly complicated because not all patients get holistic care from various angles of health science, especially because the primary care system cannot provide a multi-discipline service [8].

The purpose of this study was to describe the results of type 2 DM management in primary health care from Sub-District Health Promoting Hospital (SDHPH). In particular, the specific objective of this study was to observe the practice of DM care, the complexity of the problems experienced by type 2 DM sufferers and health and non-health personnel involved in the team, control of cardiovascular related risk factors and the spectrum of interventions dealt by doctors treating them.

2. METHODS

2.1. Research Location

The data was collected from Sub-District Health Promoting Hospital in Ratchaburi Thailand from January 2018 to March 2018. The participants were diabetic patients aged over 18 years old selected by multistage cluster random sampling. Ratchaburi is one of the western provinces of Thailand. The province is divided into 10 districts including Mueang Ratchaburi, Chom Bueng, Suan Phueng, Damnoen Saduak, Pak Tho, Ban Pong, Bang Phae, Photharam, Wat Phleng and Ban Kha. The first stage was performed to select 5 districts out of 10 districts [9]. They were Danein district Meuang district, Baang pair district, Potharam district and Wat Phleng district. At the second stage, among the total of 84 Sub-district Health Promoting Hospitals (SDHPH), 42 Sub-district Health Promoting Hospitals (SDHPH) were selected [10].Sub-district Health Promoting Hospital has a vital role in providing integrated health services for people, families and even individuals. The hospital is usually led by a director, medical personnel, nurses, public health experts, technicians and health analysts, dental health technicians, as well as traditional medicine technicians. In Thailand, one Health Promoting Hospital serves around 5,000 residents [11]. In the last stage, we selected patients with preset qualifications. The data of 1,890 patients of age over 15 years were collected, and 85 percent of them were successfully interviewed.

2.2. Ethical Considerations

The Institutional Research Board of Boromarajonani College of Nursing, Ratchaburi (IRB-BCNR) - Ministry of Public Health approved this study with the certificate of approval number BCNR. No. 01/2018.

2.3. Procedures

In this study, the term clinician in primary services includes general practitioners/family doctors, dentists, internist doctors, nurses, and Public health scholar, Thai traditional medicine and physical therapist. The criteria for patients included in this study were (1) type 2 DM declared by a doctor; (2) at least 18 years of age; (3) had visited primary care clinician at least once in the last 2 years; (4) speak and read Thai.

2.4. Measures

In the early stages, doctors complement self-administered questionnaires. The contents include patients' characteristics (including age, gender, and length of practice), diabetes-related complications and comorbidities, levels of glycosylated hemoglobin and cardiovascular drugs consumed by patients. In the next stage, if the doctor permits to participate in this study, the patient would complete the self-administered questionnaire. This questionnaire contained demographic data and data related to DM services and treatments received. When the patient conducts an inspection visit at the next health service, the doctor or the study coordinator would fill out the form related to the patient's DM condition from the patient's medical record, also including the examination of hemoglobin glycolysis (HbA1c).

2.5. Control Targets

The main indicator in controlling diabetes is HbA1c. If the value <7%, thisindicates controlled DM; 7.0% to 7.9% means it is moderately controlled and if >8%, it means it is uncontrolled. These categories are based on the standards of medical care in diabetes from the American Diabetes Association (ADA) [8] to classify action levels for HbA1c. For this study, the dependent variable was divided into categories; if the value <7% it indicates controlled DM coded as 1 while if the value >=7% it indicates poor controlled DM coded as 0.

2.6. Data Analysis

Analyses were performed with STATA Versions 5.0. The descriptive statistics were implemented to describe the variables by presenting the mean and standard deviation. To determine whether diabetes outcomes (HbA1c levels) were associated with patient characteristics, diabetes-related complications, practice design strategies, and diabetes and cardiovascular medications were assessed by using logistic regression analysis. Furthermore, logistic regression was applied to analyze the effect of the independent variables toward the dependent variable. The statistical significant was considered to reject hypothesis-null at < 0.05.

3. RESULTS

Table **1** presents the characteristics of 1,890 respondents. The mean age of respondents was 57.56 years (+12.10) and male respondents were more than women. Most respondents (36.20%) had a complete Bachelor's degree. The majority of the respondents were (28.35%) employees. Regarding the duration of diabetes, the majority (28.35%) had 11-20 year old disease. In terms of body mass index, 29.67% had body mass

index between 25.0-29.9 (overweight). Regarding complications and comorbidities, the major complication and comorbidity included nephropathy (33.63%) while Ischemic heart disease was the major of other comorbid health problems (48.3%). Furthermore, patients were mostly taking Antihypertensive (67.80%) and ACE Inhibitor or ARB (59.00%). The HbA1c level (42.74%) of majority was lower than 7.0%

Table 1. Characteristics of Study Patients (1,890 Patients).

Patient Characteristics	No (%)
Age (year) Mean / Standard deviation	57.56 / 12.10
Sex, male	1,050 (55.58)
Education	
Primary	153 (8.10)
Junior High	220 (11.65)
High school / Vocational	368 (19.49)
Diploma	330 (17.47)
Bachelor	684 (36.20)
Post graduate	120 (6.33)
Other	14 (0.76)
Occupation	
Farmers	120 (6.33)
Government	196 (10.38)
Contractor	283 (10.25)
Employees	411 (31.77)
Student	72 (13.80)
Business	536 (18.35)
Other	172 (9.11)
Duration of diabetes	
<5 year	590(31.23)
5-10 year	500 (26.45)
11-20 year	536 (28.35)
>20 year	264 (13.97)
Body Mass Index	
<18.5, underweight	296(15.76)
18.5-24.9, normal	217(11.49)
25.0-29.9, overweight	561(29.67)
30.0-34.9, obese class 1	411(21.77)
35.0-39.9, obese class 2	82(4.33)
>40 obese class 3	321(16.98)
Complications and Comorbidities	
Nephropathy	636(33.63)
Retinopathy	411(21.75)
Neuropathy	3255(17.19)
Coronary artery disease	239(12.62)
Multi-complication	239(12.62)
Other comorbid health problems	
Hypertension	231(12.2)
Ischemic heart disease	610(32.3)
Stroke	913(48.3)
Chronic obstructive pulmonary disease	215(11.4)
Drug Class or Description	
Insulin	828(43.80)
Oral diabetes medications	

Biguanide	659(34.89)
Sulfonylurea	828(43.81)
Alpha-glucosidase inhibitor	54(2.84)
Thiazolidinedione	432(22.87)
Antihypertensives	1281(67.80)
Aspirin	607(32.10)
Any lipid-lowering drug	1037(54.89)
ACE Inhibitor or ARB	115(59.00)
Diet	451(23.87)
HbA1c	
< 7.0%	808(42.74)
7.0% to 7.9%	415(21.95)
8.0% to 8.9%	299(15.84)
9.0% to 9.9%	205(10.86)
> 10.0%	163(8.61)

3.1. Factors Associated with HbA1c Level

Table **2** shows the logistic analysis which showed that education and treatment significantly influenced Hemoglobin A1c level at significant levels of 0.05. On the other hand, the age, occupation, and duration of diabetes did not affect Hemoglobin A1c level. Regarding education, patients who had Bachelor's degree (adjusted odds ratio 0.815, 95% CI 0.671-1.535. *p=0.044*) were less likely 0.815 times to had glycemic control compared to those who were not educated.

Furthermore, those who had post graduate education were less likely 0.568 times (adjusted odds ratio 0.568, 95% CI 0.559-1.922. *p=0.008*) to had glycaemic control compared to those who were not educated. Regarding treatment, patients treated by oral diabetes medications and Insulin (adjusted odds ratio 0.887, 95% CI 1.226-2.906. *p=0.004*) were less likely 0.887 times to had glycaemic control compared to those who were not taking any medication and were on diet.

4. DISCUSSION

This study shows that the average age tendency of respondents is 57.56 years [12 - 14]. In this study, male respondents dominated. Furthermore, during the study period, it was found that only about 42.74% of respondents' blood sugar was controlled optimally. This is lower when compared to the results of other studies that show the number 54.6% in the primary care setting as well. In Europe, patients who get treatment in primary are 42% -57% who have well-controlled glycemic levels. But on the contrary, in Asia, this figure only reached 21% of patients who had HbA1c below 7%, with a mean HbA1c of 8.6% [15]. According to study results in Asian countries, including Thailand, more than half of the patients did not have access to HbA1c. As in this study, only 83.9% of patients measured HbA1c which reached 100% in European countries [16 - 17].

This study found that the educational factor was one of the factors associated with patient glycemic control. This result is in line with a systematic study which states that the level of education and the role of nurses are associated to the level of patients' recovery [18 - 20].

Table 2. The Logistic Analysis of Factors Associated with HbA1c level (n= 1,890).

Characteristics	Odds Ratio	Standard error	p>z	(95% conf. interval)	
Age (year)	0.705	0.090	0.106	0.599	0.906
Sex (female is reference group)	1.887	0.426	0.004	1.226	2.906
Education (no educated is reference group)					
Primary	0.968	0.290	0.868	0.659	1.422
Junior High	0.935	0.285	0.736	0.635	1.369
High school / Vocational	0.873	0.293	0.537	0.566	1.345
Diploma	0.944	0.052	0.141	0.827	1.026
Bachelor	0.815	0.224	0.044*	0.671	1.535
Post graduate	0.568	0.490	0.008*	0.559	1.922
Other	0.873	0.293	0.537	0.566	1.345
Occupation					
Farmers	0.968	0.290	0.868	0.659	1.422
Government	0.935	0.285	0.736	0.635	1.369
Contractor	0.873	0.293	0.537	0.566	1.345
Employees	0.944	0.052	0.141	0.827	1.026
Student	1.015	0.224	0.944	0.671	1.535
Business					
Other					
Duration of diabetes					
<5 year	0.896	0.097	0.309	0.725	1.106
5-10 year	0.934	0.099	0.509	0.756	1.149
11-20 year	0.649	0.096	0.003	0.986	0.866
>20 year	1.694	0.222	0.000	1.973	1.948
Treatment (diet only is reference group)					
Oral diabetes medications	0.705	0.090	0.006*	0.599	0.906
Oral diabetes medications and Insulin	0.887	0.426	0.004*	1.226	2.906

*=Significant at 0.05

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Institutional Research Board of Boromarajonani College of Nursing, Ratchaburi (IRB-BCNR) - Ministry of Public Health approved this study with the certificate of approval number BCNR. No. 01/2018.

HUMAN AND ANIMAL RIGHTS

No animals/humans were used for studies that are the basis of this research.

CONSENT FOR PUBLICATION

Informed consent was obtained from all the participants involved in the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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REFERENCES

[1]   Harris MI. Health care and health status and outcomes for patients with type 2 diabetes. Diabetes Care 2000; 23(6): 754-8.
[http://dx.doi.org/10.2337/diacare.23.6.754] [PMID: 10840991]

[2]   Peterson KA. Diabetes management in the primary care setting: summary. Am J Med 2002; 113(Suppl. 6A): 36S-40S.
[http://dx.doi.org/10.1016/S0002-9343(02)01279-2] [PMID: 12431 760]

[3]   Grant RW, Cagliero E, Sullivan CM, *et al*. A controlled trial of population management: diabetes mellitus: putting evidence into practice (DM-PEP). Diabetes Care 2004; 27(10): 2299-305.
[http://dx.doi.org/10.2337/diacare.27.10.2299] [PMID: 15451891]

[4]   Aekplakorn W, Stolk RP, Neal B, *et al*. The prevalence and management of diabetes in Thai adults: the international collaborative study of cardiovascular disease in Asia. Diabetes Care 2003; 26(10): 2758-63.
[http://dx.doi.org/10.2337/diacare.26.10.2758] [PMID: 14514576]

[5]   Geis LS, Herman WH, Smith PJ. Mortality in noninsulin dependent diabetes.HarirsMDiabetes in America. 2nd ed. Bethesda, MD: National Institute of Health 1995; pp. 233-58.

[6]   Pratipanawatr T, Rawdaree P, Chetthakul T, *et al*. Thailand Diabetic Registry cohort: predicting death in Thai diabetic patients and causes of death. J Med Assoc Thai 2010; 93(Suppl. 3): S12-20.
[PMID: 21299087]

[7]   Bureau of Health Policy and Strategy. Ministry of Public Health. Thailand Health Profile 2010-2015 [Online] Available from http://www.moph.go.th /stat1.php

[8]   American Diabetes Association. Standards of medical care in diabetes--2008. Diabetes Care 2008; 31(Suppl. 1): S12-54.
[http://dx.doi.org/10.2337/dc08-S012] [PMID: 18165335]

[9]   Stamler J, Vaccaro O, Neaton JD, Wentworth D. Diabetes, other risk factors, and 12-yr cardiovascular mortality for men screened in the

Multiple Risk Factor Intervention Trial. Diabetes Care 1993; 16(2): 434-44.
[http://dx.doi.org/10.2337/diacare.16.2.434] [PMID: 8432214]

[10]   World Health Organization. The Kingdom of Thailand health system review. Health Syst Transit 2015; 5(5)

[11]   Bureau of Non-communicable Diseases, Department of Disease Control, Ministry of Public Health In: Report on Behavioural Risk Factors Surveillance System. BRFSS 2004.

[12]   Aekplakorn W, Stolk RP, Neal B, *et al.* INTERASIA Collaborative Group. The prevalence and management of diabetes in Thai adults: the international collaborative study of cardiovascular disease in Asia. Diabetes Care 2003; 26(10): 2758-63.
[http://dx.doi.org/10.2337/diacare.26.10.2758] [PMID: 14514576]

[13]   UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet 1998; 352(9131): 837-53.
[http://dx.doi.org/10.1016/S0140-6736(98)07019-6] [PMID: 9742976]

[14]   American Diabetes Association. Standards of medical care in diabetes. Diabetes Care 2004; 27(Suppl. 1): S15-35.
[http://dx.doi.org/10.2337/diacare.27.2007.S15] [PMID: 14693923]

[15]   Aekplakorn W, Stolk RP, Neal B, *et al.* INTERASIA Collaborative Group. The prevalence and management of diabetes in Thai adults: the international collaborative study of cardiovascular disease in Asia. Diabetes Care 2003; 26(10): 2758-63.

[http://dx.doi.org/10.2337/diacare.26.10.2758] [PMID: 14514576]

[16]   Chuang LM, Tsai ST, Huang BY, Tai TY. Diabcare-Asia 1998 Study Group. The status of diabetes control in Asia--a cross-sectional survey of 24 317 patients with diabetes mellitus in 1998. Diabet Med 2002; 19(12): 978-85.
[http://dx.doi.org/10.1046/j.1464-5491.2002.00833.x] [PMID: 12647 837]

[17]   Putzer GJ, Ramirez AM, Sneed K, Brownlee HJ, Roetzheim RG, Campbell RJ. Prevalence of patients with type 2 diabetes mellitus reaching the American Diabetes Association's target guidelines in a university primary care setting. South Med J 2004; 97(2): 145-8.
[http://dx.doi.org/10.1097/01.SMJ.0000076385.58128.92] [PMID: 14982 263]

[18]   Dunn N, Pickering R. Does good practice organization improve the outcome of care for diabetic patients? Br J Gen Pract 1998; 48(430): 1237-40.
[PMID: 9692 282]

[19]   Goudswaard AN, Stolk RP, Zuithoff P, Rutten GE. Patient characteristics do not predict poor glycaemic control in type 2 diabetes patients treated in primary care. Eur J Epidemiol 2004; 19(6): 541-5.
[http://dx.doi.org/10.1023/B:EJEP.0000032351.42772.e7] [PMID: 15330 126]

[20]   enders CM, Valk GD, Griffin SJ. Interventions to improve the management of diabetes in primary care, outpatient, and community settings: a systematic review. Diabetes Care 2001; 24: 1821-33.