

FACTORS ASSOCIATED WITH GLYCEMIC CONTROL IN TYPE 2 DIABETES PATIENTS AT PRIMARY CARE UNITS, PATHUMRAT DISTRICT, ROI-ET PROVINCE, THAILAND

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ABSTRACT: A cross-sectional study design was used to determine factors associated with glycemic control in type 2 diabetes mellitus (DM) patients who were referred to 13 Primary Care Units at Pathumrat District, Roi-Et Province, Thailand. The population of this study are 307 patients chosen by systematic sampling from 1,071 with type 2 DM in Primary Care Units. A questionnaire was used to collect information about the factors associated with glycemic control in type 2 DM patients including demographic characteristics, knowledge of diabetes, healthcare behaviors and psychosocial factors, and the glycemic level according to medical records. The data were collected in April, 2011. Statistical analysis included frequency, percentage, standard deviation, mean, median and the associations between study variables were tested by Chi-square test, Pearson Correlation and Spearman rank test.

The results showed that mean age of the subjects was 58.72±6.49 years, with 238 women and 69 men. The duration of DM was 6.24± 4.10 years. Approximately 42.7% of the subjects were obese (mean BMI 25.36±3.44). The mean glycosylated hemoglobin (HbA1C) level was 8.26±1.96% and the proportion of patients who had good control (HbA1C<7%) was 26.1% while 73.9% of the subjects had poor control. Statistically significant factors associated with glycemic control were; duration of diabetes ($r=0.185$, $p<0.001$), dietary habit ($r=-0.220$, $p\text{-value}<0.001$) and drug compliance ($r=-0.469$, $p<0.001$).

This study has indicated that care among patients with type 2 DM treated in primary care units was not achieved. The empowerment of DM patients in primary care units is a great challenge. Future studies could focus on effective strategies for DM care including drug compliance and diet control.

Keywords: Diabetes mellitus, Glycemic control, Factors associated, Primary care

INTRODUCTION

Diabetes Mellitus (DM) comprises a group of metabolic disorders. The pathogenesis of DM includes reduced insulin secretion, decreased glucose usage and increased glucose production, that requires continuing medical care and ongoing patient self-management education and support to prevent acute complications and to reduce the risk of long-term complications; such as blindness, kidney damage, cardiovascular disease, and lower – limb amputation. World Health Organization (WHO) estimates people in the world with DM will increase to 366 million by the year 2030 [1]. At the same time, the International Diabetes Federation (IDF) estimates of the prevalence of Impaired Glucose Tolerance (IGT) is 344 million and the number of people with diabetes has risen to 285 millions for 2010 increasing to 472 million and 438 million of people respectively by the year 2030 [2]. Measuring glycosylate hemoglobin is useful for predicting complication in patients with existing

diabetes. American Diabetes Association (ADA) [3] in its recent position statement stated that lowering HbA1C may be associated with reduction of microvascular, neuropathic and possibly macrovascular complications of diabetes mellitus. They suggested that more studies should be done to establish the relationship between HbA1C and macrovascular complications. According to ADA recommended that one perform the HbA1C test at least twice a year in patients who meeting treatment goals and perform the HbA1C test quarterly in patients whose therapy has changed or who are not meeting glycemic goals. For microvascular disease prevention, the HbA1C goal for non-pregnant adults in general is less than 7%.

Data from Bureau of Non Communicable Disease (NCD) found that more than 3 million people are living with diabetes in Thailand [4]. The prevalence of diabetes mellitus has significantly increased over recent decades to around 6.4 per 100 thousand in men and 7.3 in women. In Roi-Et Province, the DM patients admitted in 2007 to 2009 were 2,715 and 784 per 100 thousand and the mortality rate were 26.21, and 27.92 per 100 thousand, respectively. At

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Pathumrat hospital, Roi-Et Province, the data from diabetes clinic register of Information and Technology Center show that the number of type 2 diabetes patients for the year 2008, 2009 and 2010 have increased from 1,335, 1458, and 1,658 respectively. Most of them are type 2 DM patients (90%). The prevalence of type 2 DM is 34.1 per one thousand people and the re-admission ratio with acute short term complications (such as; hypoglycemia, hyperglycemia, and acute myocardial infarction associated with underlying diabetes) have increased to 54.3 per one thousand people. The multidisciplinary team of Pathumrat hospital is providing the diabetes clinic on Thursday weekly. Since 2006, patients are referred to 13 Primary Care Units for continuity of treatment and care by a nurse and other public health care team. There were 1,071 patients with type 2 DM who could control Fasting Plasma Glucose (FPG) <140 mg/dl and without underlying disease. There are clinical practice guideline for management of care and treatment including annual follow up for checking of foot, eye, and renal function. Nowadays, there are 9 people who have diabetes with chronic renal failure and on Continuous Abdominal Peritoneal Dialysis (CAPD), the highest number among districts in Roi-Et province. The diabetes clinic reports at Pathumrat hospital 2009 show that 9.47 % had HbA1C level <6.5%, 25.88% between 6.5-7.9% and 62.82% was >7.9%. Therefore, this study was designed to determine the factors associated with glycemic control in type 2 DM patients, the main barriers and facilitators to care in the Primary Care Units in Pathumrat District. The study results are intended for developing an implementation strategy to provide effective care, early prevention, reductions of disease specific complications (such as; end-stage renal disease, blindness, and lower extremity amputations) and better quality of care to diabetes patients.

MATERIAL AND METHODS

A cross-sectional study design was used to determine factors associated with glycemic control in type 2 DM patients who were 20-80 years and referred to 13 Primary Care Units at Pathumrat District. Out of 1,071 type 2 DM patients, 307 were chosen by systematic sampling procedure out of each Primary Care Unit that took care of these patients for more than 1 year. A face to face interview questionnaire was used to collect information about the factors associated with glycemic control in type 2 DM patients. The questionnaire collected information on demographic characteristics, knowledge of diabetes, healthcare behavior, psychological factors and the glycemic level reported in medical records. The data were collected by the researcher and health care provider team during April, 2011. Statistical analysis

frequency, percentage, standard deviation, mean, mode, median and the associations between study variables were tested by Chi-square test, Pearson Correlation and Spearman rank test.

RESULTS

The subjects mean age was 58.72 years (SD = 9.49), 238 were women and 69 men. The majority were married (73.6%), farmers (89.9%), graduated in primary school (87.6%), and had a household income of 3,000 baths per month. The mean duration of diabetes was 6.24 years, 60.9% had family history of diabetes, and 72.6% of the subjects had no other underlying disease. The data showed that approximately 42.7% of the subjects were obese and 24.4% were overweight (mean BMI 25.36±3.44). The mean glycosylated hemoglobin (HbA1C) level was 8.26±1.96% and the proportion of patients who had good control (HbA1c <7%) was 26.1% while 73.9% of the subjects had value ≥7% that was an indicator of poor control. In univariate analysis the demographic characteristics were no statistically significant associated with glycemic control but duration of diabetes was significantly associated ($r=0.185$, $p\text{-value}<0.001$), see (Table 1). The independent factor of dietary habit including of food consumption behaviors in daily life was significantly negatively associated with glycemic level in type 2 DM patients ($r=-0.220$, $p\text{-value}<0.001$). Total calories consumption per day was not significantly associated with glycemic control ($p\text{-value}=0.303$). Physical activity family support and mental stress were not significantly associate with glycemic level in type 2 DM patients ($p\text{-value} = 0.237$, 0.373 and 0.380 respectively). Drug compliance was significantly negatively associated with glycemic control ($r=-0.469$, $p\text{-value}<0.001$), In other words, low drug compliance was associated with high HbA1C level (Table 2). Physical activity and mental stress were not significantly associated with glycemic level in type 2 DM.

Table 1 The association of duration of diabetes with glycemic control in type 2 DM patients

Variable	r	p-value
Duration of diabetes	0.185*	0.001

* $p\text{-value}<0.05$

Table 2 The association of knowledge of diabetes and health behaviors with glycemic control in type 2 DM patients

Variable	r	p-value
Knowledge of diabetes	- 0.021	0.710
Dietary habit	-0.220**	0.001
Total Calories	0.059	0.303
Drug compliance	-0.469**	0.001

* $p\text{-value}<0.05$

DISCUSSION

The results of this study showed that 73.9 % of type 2 DM patients failed to control glycemic level. Poor glycemic control (HbA1C>7%) was found in other studies for example in Pennsylvania (75%) [5] and in nine country of Latin America (57.8%) [6]. A study of 48 primary health care units in Thailand found that 62.0% of type 2 DM patients had HbA1C >7% [7]. Another study found that 79.1% of patients had (HbA1C>7) [8]. In this study body mass index and health care access were not associated with blood sugar level and 40.0% of patients with poor glycemic control group had DM duration of more than 6 years.

Our results showed that nearly one half (49.8%) of the subjects had fair knowledge of diabetes and there was no association with glycemic control. Many subjects reported that they generally received health related knowledge through various media including television, newspaper and health education program at diabetic clinic in Primary care unit. Although, diabetic patients had knowledge of diabetes, they could not achieve diabetes control level as reported by another study [9]. These results are different from the Mayurasakorn's study [10] that found knowledge of diabetes education level to be significantly associated with glycemic control. This may be explained that the education level affects learning ability. But in our study, education level was not significantly associated with glycemic control. This might be due to the different education background of the majority of our sample population or due to the fact that they do not practice correct consumption habits even if they have correct knowledge of them. Our study, found dietary habits to be associated with glycemic control in type 2 DM patients. According to univariate analysis ($r=-0.220$, $p\text{-value} < 0.001$) more than half (52.1%) of the subjects had poor dietary habits. They eat much glutinous rice that has high carbohydrate content and many serving of sweet fruit such as; mangos, tamarind, bananas, watermelon. Our results agree with another study [11] which found dietary habits to be associated with glycemic control. Our result of significant negative association between drug compliance and glycemic control is confirmed by other studies that found poor plasma glucose control in patients having disagreement between the self reported dose of the antidiabetic drug and the dose reported in medical records [12] or in patients who took incorrect medicine and ran out of medicine [13].

RECOMMENDATION

The results of this study showed that 73.9 % of type 2 diabetes patients failed to control glycemic level. They should go to meet the physician and the dietician in the hospital for review of treatment and checking of their blood sugar again or every 3

month until they can control their glycemic level. Health care team should provide counseling for these diabetic patients and focus on dietary habits, and drug compliance. An experimental study using this health program can further be studied for its effectiveness in glycemic control.

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