



**UNIVERSITI PUTRA MALAYSIA**

***PREDICTORS OF SELF-CARE BEHAVIOUR USING HEALTH BELIEF  
MODEL AMONG TYPE 2 DIABETES MELLITUS PATIENTS  
IN A DISTRICT OF PENANG, MALAYSIA***

**KANG CHIA YEE**

**FPSK(M) 2017 37**



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**By**

**KANG CHIA YEE**

**Dissertation Submitted to the Department of Community Health,  
Faculty of Medicine and Health Sciences, Universiti Putra Malaysia,  
in Fulfilment of the Requirements for the Degree of Master of Public Health**

**August 2017**

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Abstract of dissertation presented to the Department of Community Health,  
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**August 2017**

**Chairman: Dr. Salmiah Md Said**  
**Faculty: Medicine and Health Sciences**

**Background:** The prevalence of diabetes mellitus among Malaysian aged  $\geq 18$  years increasing from 11.6% in 2006 to 17.5% in 2015. The diabetes prevalence in Penang state was 18.1% in 2015. Only 21% of audited type 2 diabetes mellitus (T2DM) patients in Penang achieved hemoglobin A1c  $< 6.5\%$  in 2012. Positive self-care behaviour leads to good glycaemic control and reduce risk of diabetes complications.

**Objective:** The objective of this study is to determine the diabetes self-care behaviour and its predictors using Health Belief Model (HBM) among T2DM patients in government health clinics at Seberang Perai Selatan district, Penang.

**Methodology:** An analytical cross sectional study was conducted on 546 T2DM patients whose aged  $\geq 18$  years, they were recruited by simple random sampling method. Validated self-administered questionnaire was used, data were analysed using SPSS version 22.0.

**Results:** The respondents practised 3.4 (SD = 1.11) days diabetes self-care behaviour for the past 1 week. The predictors of self-care behaviour were self-efficacy (standardized  $\beta = 0.257$ ,  $p < 0.001$ ), knowledge (standardized  $\beta = 0.112$ ,  $p = 0.007$ ), female gender (standardized  $\beta = 0.107$ ,  $p = 0.010$ ), combination oral hypoglycaemic agents (OHA) and insulin (standardized  $\beta = -0.182$ ,  $p = 0.002$ ), monthly income  $< \text{RM}1,000$  (standardized  $\beta = -0.129$ ,  $p = 0.002$ ). The entire group of variables significantly predicted self-care behaviour [ $F(6, 539) = 15.79$ ,  $p < 0.001$ , adjusted  $R^2 = 0.140$ ] with the total variance of 14.9%. Self-efficacy was identified as the strongest predictor in self-care behaviour.

**Conclusion:** The findings enable us to identify the specific targeted groups with predicted lower self-care behaviour. This is useful in future planning and implementation of health intervention.

**Keywords:** self-care behaviour, Health Belief Model, type 2 diabetes mellitus



Abstrak disertasi yang dikemukakan kepada Jabatan Kesihatan Komuniti,  
Universiti Putra Malaysia sebagai memenuhi keperluan untuk  
Ijazah Sarjana Kesihatan Awam

**FAKTOR PERAMAL TINGKAH LAKU PENJAGAAN DIRI  
MENGUNAKAN MODEL HEALTH BELIEF DI  
KALANGAN PESAKIT DIABETES MELLITUS JENIS 2  
DI SEBUAH DAERAH DI PULAU PINANG, MALAYSIA**

Oleh

**KANG CHIA YEE**

**Ogos 2017**

**Pengerusi: Dr. Salmiah Md Said**  
**Fakulti: Perubatan & Sains Kesihatan**

**Latar belakang:** Prevalen penyakit kencing manis di kalangan penduduk Malaysia berumur  $\geq 18$  tahun meningkat dari 11.6% pada tahun 2006 ke 17.5% pada tahun 2015. Di Pulau Pinang (PP), prevalen penyakit kencing manis adalah 18.1% pada tahun 2015. Hanya 21% pesakit kencing manis jenis 2 (T2DM) di PP yang diaudit mencapai *haemoglobin A1c*  $< 6.5\%$  pada tahun 2012. Penjagaan diri yang baik akan mendorong kawalan paras gula dan mengurangkan risiko komplikasi T2DM.

**Objektif:** Objektif kajian ini adalah untuk menentukan tahap penjagaan diri dan faktor peramalnya dengan menggunakan model *Health Belief* (HBM) di kalangan pesakit T2DM di klinik kesihatan daerah Seberang Perai Selatan, Pulau Pinang.

**Metodologi:** Kajian keratan rentas analitika dijalankan atas 546 pesakit T2DM yang berumur  $\geq 18$  tahun, mereka dilibatkan dalam kajian melalui kaedah persampelan rawak mudah. Borang soal selidik yang mempunyai kesahan digunakan dalam kajian ini, data dianalisa melalui SPSS versi 22.0.

**Keputusan:** Responden mengamalkan penjagaan diri sebanyak 3.4 (SD = 1.11) hari dalam seminggu yang lepas. Faktor peramal penjagaan diri adalah efikasi diri (standardized  $\beta = 0.257$ ,  $p < 0.001$ ), berpengetahuan (standardized  $\beta = 0.112$ ,  $p = 0.007$ ), wanita (standardized  $\beta = 0.107$ ,  $p = 0.010$ ), menggunakan rawatan pil dan insulin (standardized  $\beta = -0.182$ ,  $p = 0.002$ ), berpendapatan bulanan  $< \text{RM}1,000$  (standardized  $\beta = -0.129$ ,  $p = 0.002$ ). Semua pembolehubah ini dengan ketara meramalkan penjagaan diri

[F (6, 539) = 15.79,  $p < 0.001$ , adjusted  $R^2 = 0.140$ ] dengan jumlah variasi 14.9%. Efikasi diri merupakan faktor peramal penjaagaan diri yang paling kuat.

**Kesimpulan:** Penemuan kajian ini membolehkan kita mengenalpasti golongan yang diramal rendah penjaagaan diri. Ini membantu dalam rancangan dan implementasi intervensi kesihatan pada masa depan.

**Kata Kunci:** penjaagaan diri, model *Health Belief*, diabetes mellitus jenis 2



## ACKNOWLEDGEMENTS

I would like to express my greatest gratitude to the following individuals who had guided and helped me along the way throughout my study.

My supervisors Dr. Salmiah Md Said and Dr. Rosliza Abdul Manaf who had spent their precious time to continuously guided and motivated me along the study period. They were dedicated supervisors who are willing to go extra miles for their students. They had diligently guided and corrected my study throughout the process, I had learned transcendence knowledge from them.

I would like to thank Dr. Tan Ming Yeong from International Medical University, Kuala Lumpur and Madam Siti Khuzaimah Ahmad Sharoni from Universiti Teknologi MARA, Shah Alam whose selflessness share their questionnaires.

My gratitude also goes to Dato' Dr. Sukumar Mahesan (Penang State Health Director), Dr. Rafidah bt Md Noor (*Seberang Perai Utara* District Health Director), Dr. Mohd. Ridzuan bin Janudin (*Seberang Perai Selatan* District Health Director) who allowed me to conduct the study in Seberang Perai Selatan and Utara districts.

To the staff in Bandar Tasek Mutiara, Nibong Tebal, Bukit Panchor, Sungai Acheh, Penaga and Mak Mandin health clinics, thank you for your cooperation, support and help throughout the study.

I would like to thank the Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia (JKEUPM) and National Medical Research and Ethics Committee (NMREC) of National Institute of Health, Ministry of Health Malaysia who approved my study.

Last but not least, my gratitude goes to my family members and those who had motivated, supported and facilitated me along the way during my study. I would not able to make it without them.



I certify that a Dissertation Examination Committee has met on 1<sup>st</sup> August 2017 to conduct the final examination of Kang Chia Yee on her dissertation entitled “Predictors of self-care behaviour using Health Belief Model among type 2 diabetes mellitus patients in a district of Penang, Malaysia” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Public Health.

Members of the Dissertation Examination Committee were as follows:

**Dr. Titi Rahmawati Hamedon**

**MD (UKM), M. Public Health (Occupational Health) (UKM)**

Senior lecturer (Medical)

Department of Community Health

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

(Chairman)

**Dr. Hayati Kadir @ Shahar**

**MBBchBAO (Ireland), M. Community Health (Epidemiology & Biostatistics) (UKM)**

Senior lecturer (Medical)

Department of Community Health

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

(Internal Examiner)

**Dr. Zainudin Mohd Ali**

**MD (UKM), M. Public Health (Epidemiology) (UM)**

State Health Director

Negeri Sembilan State Health Office

Ministry of Health Malaysia

(External Examiner)

---

**Professor Dato’ Dr. Abdul Jalil Nordin, DSIS**

**MD (UKM), MMed. (Radiology) (UM)**

Professor and Dean

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

Date:

This dissertation was submitted to the Department of Community Health, Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the Master of Public Health.

The members of the Supervisory Committee were as follows:

**Dr. Salmiah Md Said**

**B.Med.Sc. (UKM), MD (UKM), M. Education (UKM), M. Community Medicine (Epidemiology & Biostatistic) (UKM)**

Senior lecturer (Medical)

Department of Community Health

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

(Chairman)

**Dr. Rosliza Abdul Manaf**

**MBBS (UM), M. Community Medicine (Family Health) (UKM), PhD (Otago)**

Senior lecturer (Medical)

Department of Community Health

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

(Member)

---

**Professor Dato' Dr. Abdul Jalil Nordin, DSIS**

**MD (UKM), MMed. (Radiology) (UM)**

Professor and Dean

Faculty of Medicine and Health Sciences

Universiti Putra Malaysia

Date:

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Chairman of Supervisory Committee

Dr. Salmiah Md Said

B.Med.Sc. (UKM), MD (UKM), M. Education (UKM), M. Community Medicine (Epidemiology & Biostatistic) (UKM)

Signature: \_\_\_\_\_

Member of Supervisory Committee

Dr. Rosliza Abdul Manaf

MBBS (UM), M. Community Medicine (Family Health) (UKM), PhD (Otago)

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## LIST OF ABBREVIATIONS

AADE	American Association of Diabetes Educator
ADCM	Adult Diabetes Control and Management Registry
AOR	Adjusted odds ratios
CI	Confidence interval
€	Euro currency
ESRD	End stage renal disease
HBM	Health Belief Model
HR	Hazard ratio
IQR	Interquartile range
LTPA	Leisure time physical activities
MET	Metabolic equivalent of task
NHMS	National Health and Morbidity Survey
OHA	Oral hypoglycaemic agent
OR	Odds ratio
RCT	Randomized controlled trial
RM	Ringgit Malaysia
SD	Standard deviation
SDSCA	Summary of Diabetes Self-care Activities
SMBG	Self-monitoring of blood glucose
T2DM	Type 2 diabetes mellitus
WHO	World Health Organization

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

Diabetes mellitus is a chronic non communicable disease that is either due to pancreatic dysfunction whereby pancreatic cells unable to produce adequate insulin (Type 1 diabetes mellitus) or the insulin produced is dysfunction (Type 2 diabetes mellitus). In order to differentiate the type of diabetes, sophisticated lab test is required thus global separate prevalence data of these 2 types of diabetes is not available. Type 2 diabetes mellitus (T2DM) contributes to the majority burden of diabetes mellitus especially among adults.

World Health Organization (WHO) reported the tremendous increasing trend of diabetes mellitus from affecting 108 million adults in year 1980 to 422 million adults in year 2014 globally. About 9.1% or 1 in 11 person have diabetes mellitus worldwide (WHO, 2016). Diabetes mellitus directly caused 1.5 million deaths worldwide in 2012, and more than 80% of death happened in low and middle income countries. It was also the 8<sup>th</sup> leading cause of death globally in 2012. WHO estimated that in 2030, diabetes mellitus will be the 7<sup>th</sup> leading cause of death worldwide (WHO, 2016).

Diabetes mellitus causes enormous health expenditure and cost in term of direct diabetes treatment cost and indirect diabetes related complication expenditure. A study conducted in Poland from year 2005-2009 revealed that total cost spent on diabetes health care services and diabetic related complication was € 654 million that constituted 2.8% of their country total health care expenditure. In year 2009, the total diabetes expenditure in Poland was € 1.5 billion (Leśniowska, Schubert, Wojna, Skrzekowska-Baran, & Fedyna, 2014).

Untreated or poorly managed diabetes mellitus leads to macrovascular complications (coronary arteries diseases, peripheral arterial diseases, and stroke) and microvascular complications such as diabetic nephropathy, neuropathy and retinopathy. Quality of life in type 2 diabetes mellitus patients is compromised to a certain degree once end up in diabetes complications (Cheah et al., 2012). Thus having good glycaemic control in preventing diabetes complications is the mainstay of diabetes management.

Having positive diabetes self-care behaviour facilitates good glycaemic control. Self-care is defined as the daily tasks that the diabetes mellitus patients perform to manage their disease (Weinger, Butler, Welch, & La Greca, 2005). Diabetes self-care includes monitoring blood glucose, adhere to medications, healthy diet, physically active, good coping skills, efficient problem-solving skills, and risk-reduction behaviour (Shrivastava, Shrivastava, & Ramasamy, 2013). Good diabetes self-care behaviour is determined and affected by multiple factors, and one of the factor is self-efficacy, the individual's belief in his ability to control his diabetes mellitus (Gao et al., 2013).

Patients' attitude and belief towards diabetes disease substantially affect their behaviour in diabetes management. Health Belief Model (HBM) is a well known psychological model in evaluating a person's perception and belief towards the disease and subsequently predicts their behaviour. Thus in this study, HBM is used to explore the belief and perception (perceived susceptibility and severity of diabetes complications, perceived benefit and barrier of self-care behaviour, cue to action and self-efficacy) of type 2 diabetes mellitus patients towards self-care behaviour. In other words, it helps to determine the predictors of practising diabetes self-care. Understanding patients' perceptions towards diabetes mellitus allows us to have a clearer picture in explaining their health behaviour. Studies showed that perceived susceptibility and severity of the disease, and perceived benefit of recommended action project a positive behaviour change (Adejoh, 2014; Tunceli, 2015). On the other hand, perceived barrier discourages positive behaviour change (Ayele, Tesfa, Abede, Tilahun, & Girma, 2012).

## 1.2 Problem Statements

According to the Malaysia National Health and Morbidity Survey (NHMS) 2015 that involved 19,935 respondents, diabetes mellitus prevalence was 17.5% (3.5 million) among adults aged 18 years and above as compared to NHMS 2011 the diabetes mellitus prevalence was 15.2% or increased of 15.1% (Institute for Public Health, 2011, 2015). The diabetes mellitus prevalence in Penang state was 18.1% in year 2015, which was higher than the national diabetes mellitus prevalence (Institute for Public Health, 2015). In view of the high and rapidly increasing trend of diabetes mellitus prevalence, it is necessary for us to review and improve on our strategies in diabetic prevention and diabetes management.

In term of glycaemic control, according to the National Diabetic Registry report 2009-2012, the mean HbA1c in audited Type 2 diabetes mellitus (T2DM) patients followed up in health clinics in Malaysia was 8.1% in 2012 with only 23.8% of the patients achieved  $HbA1c < 6.5\%$ . In Penang state at the same year 2012, only 21% of audited type 2 diabetes mellitus patients achieved  $HbA1c < 6.5\%$ , the mean HbA1c was 8.0% (Mustapha & Azmi, 2013). The target of diabetes audit is to keep  $\geq 30\%$  of the T2DM patients with  $HbA1c < 6.5\%$ , there is still a large gap in order to reach this target. This reflected that majority of type 2 diabetes mellitus patients in Malaysia generally and Penang specifically were having uncontrolled diabetes.

Poor glycaemic control leads to increase risk of developing diabetes complications. This condition was seen in 2011, when the prevalence of diabetes macrovascular complications among Malaysian audited diabetes patients were ischaemic heart disease (4.8%) and cerebrovascular disease (1.1%). The prevalence of ischaemic heart disease and cerebrovascular disease among Malaysian audited diabetes patients increased to 5.3% and 1.3% in year 2012. The same increasing trend was also noted in term of prevalence of diabetes microvascular complications, in year 2011 the prevalence of nephropathy was 7.6% and retinopathy was 6.5%, however these prevalence increased to nephropathy (7.8%) and retinopathy (6.7%) in year 2012 (Mustapha & Azmi, 2013). The prevalence of diabetes complication among Malaysian remained increasing each year despite of our public health care service provide almost free of charge and comprehensive diabetes



treatment, our substantial effort in improving diabetic education and diabetes management guidelines, and the constant effort in improving the screening for diabetes complications.

High prevalence of diabetes mellitus and diabetes related complications reduces productivity of our population and causes enormous medical expenses in our country. Measures need to be taken to target this increasing trend of the diabetes mellitus and diabetes complication prevalence. Having good glycaemic control among diabetes mellitus patients is the ultimate goal in diabetes management in order to reduce risk of developing diabetes complications. Good glycaemic control is highly associated with positive diabetes self-care behaviour (Gao et al., 2013).

At present most of our diabetes management plans are focussed on improving health care system and health care services, there are limited local researches in exploring the patients' factors which lead to ineffective diabetes self-care management. The gap is noted especially local researches on behaviours factors that leads to poor glycaemic control are limited. It is timely now to explore diabetes mellitus patients' behavioural issue by using Health Belief Model. The model assists the health care providers to evaluate diabetes mellitus patients' perception and belief towards the disease. By using the findings of this study, a more effective diabetes management approach can be implemented in order to reduce the incidence of diabetes related complication.

### **1.3 Significance of Study**

In view of the increasing trend in the prevalence of diabetes mellitus and diabetes complications in Malaysia, with the heavy diabetes health expenditure burden, it is timely and vital for us to truly identify the predictors of diabetes self-care behaviours among T2DM patients in maintaining good glycaemic control.

Understanding the predictors and barriers in practising diabetes self-care behaviour facilitate the health care providers in managing glycaemic control, slowing the progression of diabetes mellitus and reduce the risk of diabetes complication development. It can also assists the health staff in planning the intervention targeting on the modifiable factors and empower the patients to change their behaviour in diabetes control. A robust, cost effective way of diabetes control measure is needed in order to break the cycle of devastating effect by poor glycaemic control.

### **1.4 Research Questions**

The research questions are

- a) What are the diabetes self-care behaviours have been practised by type 2 diabetes mellitus patients?
- b) What are the predictors of diabetes self-care behaviour using Health Belief Model (HBM)?



## 1.5 Objectives

### 1.5.1 General Objective

The general objective of this study is to determine the diabetes self-care behaviour and its predictors using Health Belief Model (HBM) among type 2 diabetes mellitus patients in health clinics at Seberang Perai Selatan district, Penang.

### 1.5.2 Specific Objectives

The specific objectives are:

- a) To describe the socio-demographic characteristics, diabetes profile, diabetes knowledge and health belief on self-care behaviour among type 2 diabetes mellitus (T2DM) patients.
- b) To describe the practice of diabetes self-care behaviour (self-monitoring of blood glucose, dietary control, physical activity, smoking cessation, foot care).
- c) To identify the association of diabetes self-care behaviour with
  - i. Socio-demographic characteristics (age, gender, educational level, employment status, marital status, monthly income).
  - ii. Diabetes profile (duration of diabetes mellitus, type of diabetes treatment).
  - iii. Knowledge in diabetes mellitus.
  - iv. Perceived susceptibility of diabetes complication.
  - v. Perceived severity of diabetes mellitus.
  - vi. Perceived benefit of diabetes self-care behaviour.
  - vii. Perceived barrier of diabetes self-care behaviour.
  - viii. Cue to action of diabetes self-care behaviour.
  - ix. Self-efficacy in diabetes self-care behaviour.
- d) To determine the predictors of diabetes self-care behaviour.

## 1.6 Hypotheses

The alternate hypotheses of this study are

*H<sub>1</sub>*: There is an association between diabetes self-care behaviour and socio-demographic characteristics (age, gender, educational level, employment status, marital status, monthly income).

*H<sub>2</sub>*: There is an association between diabetes self-care behaviour and diabetes profile (duration of diabetes, type of diabetes treatment).

*H<sub>3</sub>*: There is an association between diabetes self-care behaviour and knowledge in diabetes complication and its risk factors.

*H<sub>4</sub>*: There is an association between diabetes self-care behaviour and perceived susceptibility of diabetes complication.

*H<sub>5</sub>*: There is an association between diabetes self-care behaviour and perceived severity of diabetes mellitus.

*H<sub>6</sub>*: There is an association between diabetes self-care behaviour and perceived benefit of diabetes self-care behaviour.

*H<sub>7</sub>*: There is an association between diabetes self-care behaviour and perceived barriers of diabetes self-care behaviour.

*H<sub>8</sub>*: There is an association between diabetes self-care behaviour and cue to action of diabetes self-care behaviour.

*H<sub>9</sub>*: There is an association between diabetes self-care behaviour and self-efficacy of diabetes self-care behaviour.

## **1.7 Conceptual Definition of Terms**

### **1.7.1 Diabetes Self-care Behaviours**

The American Association of Diabetes Educators (AADE) established a framework for successful diabetes self-care and self-management named AADE7 Self-Care Behaviours. This framework includes monitoring blood sugar, stay active, healthy diet, adhere to medications, healthy coping, problem solving and reducing risks (American Association of Diabetes Educators, 2008). In this study, reducing risks and complications part was being assessed by foot care, smoking cessation, self-monitoring of blood glucose (SMBG). The healthy coping and problem solving are not being evaluated in this study.

### **1.7.2 Diabetes Complications**

Unfavourable evolution of diabetes mellitus and ends up in damage of kidneys, heart, eyes, nerves and blood vessels. It can be subdivided into macrovascular complications (coronary arteries diseases, peripheral arterial diseases and stroke) and microvascular complications (diabetes nephropathy, neuropathy and retinopathy). Macrovascular disease is the disease that affects large blood vessels of the body whilst microvascular disease involve small blood vessels.

### **1.7.3 Health Belief Model (HBM)**

Health belief model (HBM) is a psychological model that evaluate the individual's perception and belief towards illness, subsequently explain their health behaviour. It was first developed in 1950s by a group of social psychologists named Hochbaum, Rosenstock and Kegels who worked in the U.S Public Health Services. The model was used to explain the reason for failure of tuberculosis health screening offered in their service (Hochbaum, 1958). The original model consists of 4 domains which includes perceived susceptibility, perceived severity, perceived benefits and perceived barriers towards the disease. The cue to action and self-efficacy domains are added to the model later.

#### **1.7.3.1 Perceived Susceptibility**

One's belief in chances of getting the disease.

#### **1.7.3.2 Perceived Severity**

One's opinion in the seriousness of the condition or disease and the consequences of it.

#### **1.7.3.3 Perceived Benefits**

One's belief in the desired result of the advised action in order to decrease the risk or consequence of the disease.

#### **1.7.3.4 Perceived Barriers**

One's opinion in the obstacles in behavioural change to adapt the advised action.

#### **1.7.3.5 Cue to Action**

Object, event or people that move the person to change their behaviour.

#### **1.7.3.6 Self-efficacy**

The belief of diabetes patients in their capabilities in performing certain advised measures to control their blood sugar. The measures include adhere to diabetes treatment, self-monitoring of blood glucose (SMBG), dietary control, physically active, blood pressure control, smoking cessation and foot care.

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