PUBLIC HEALTH RESEARCH

The Relevant Intervention Strategies for Improving Medication Adherence of Diabetic Patients

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ABSTRACT

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Introduction	Medication adherence is very important for the effective treatment or control of various health problems, including chronic disease like diabetes mellitus (DM). However, medication non-adherence among diabetic patients on follow-up treatment is still a global health problem. This study aimed to identify factors associated with medication adherence and to determine methods on how it could be improved.
Methods	A cross-sectional study was conducted on medication adherence among Malays, Iban and Melanau ethnic groups in Kota Samarahan and Sarikei, Sarawak using the Health Belief Model framework. Interviews with questionnaires, which were tested for its validity and reliability using the Cronbach's Alpha, were conducted to collect data on the respondent's socio-demographic and economic characteristics, and health beliefs of 442 respondents. Data was analyzed using SPSS version 17.0 for frequency distribution, measures of central tendencies, significance testing and logistic regression.
Results	The medication adherence rates were low in terms of all the treatment indicators such as amount of medication (31.7%), frequency (38.9%), duration (26%), and follow-up treatment (24.2%). The respondent's socio-economic and economic characteristics have statistically significant association with medication adherence. The respondents adhered towards medication because they believed in its benefits. They also took their medication because they believed in the severity of DM and their susceptibility to its serious complications. The cues to action (medication taking) such as worrying about their socio-economic well-being, effectiveness of medication, and health campaign on diabetic control have influenced medication adherence. However, forgetfulness, distance of clinic, and costs of transport have caused medication non-adherence.
Conclusions	The respondent's health beliefs in the benefits of taking medication, perceived severity and susceptibility to DM and its serious complications have contributed towards medication adherence. Their concerns about the socio-economic well-being, effectiveness of medication, and health campaign on diabetic control were positive cues to medication taking behavior. Therefore, modifying the respondent's related health beliefs and reinforcing the positive cues to actions are the relevant intervention strategies that could be used in improving medication adherence among diabetic patients.
Keywords	Diabetes mellitus - Health Belief Model - health beliefs - medication adherence - Sarawak.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder that cannot be treated, but can be controlled to prevent its complications[1, 2, 3, 4]. Medication adherence is very important in the control of the disease[5]. However, medication non-adherence is still a global health problem which is common among diabetic patients on follow-up treatment. The two main problems of non-adherence with diabetic regimens were exercise (85%) and dietary recommendations (62%). The other problems include oral hyperglycemic medication, insulin injection and follow-up treatment[6, 7]. The problem occurred due to long duration of treatment and lifestyles modification[8, 9]. There were several factors associated with medication adherence. These include characteristics of the disease[10, 11, 12, 13, 14], patient characteristics, patient-doctor relationship and the complex health care system[14, 15]. Medication non-adherence can result in worsening of the disease and development of complications[16, 17]. Besides, it may lead to treatment changes and failures[18, 19] and increase in health care costs[3, 20, 21]. Therefore, this study aims to identify factors associated with medication adherence and determine methods on how it should be improved.

METHODS

The cross-sectional study applied the Health Belief Model (HBM) framework to examine the relationship between diabetic patient's health beliefs and medication adherence. A stratified random sampling method was used to select 442 samples for the study. Data collection on the respondents' socio-demographic and economic characteristics, medication adherence, and health beliefs were obtained by questionnaire interviews (the questionnaires were tested for its reliability and validity using the Cronbach's Alpha). The collected data was analyzed using SPSS version 17.0 for frequency distribution, measures of central tendencies, significance testing and logistic regression.

RESULTS

Most of the respondents (61.6%) were 51 years old and above. About 63.8% were females, and belonging to Malay ethnic group (63.1%). They were mostly married (98.4%). Only 40.3% of the respondents have no formal education. About 91.1% of them were unemployed or housewives and 61.7% were having monthly income less than RM1000. The lowest adherence rate was for follow-up treatment (24.2%), and the highest (38.9%) for frequency in taking medication. There were statistically significant associations (p<0.05) between socio-demographic and economic factors such as age, race, education level, occupation, household income, distance of clinic, and transport

costs with medication adherence. Health beliefs about the seriousness of DM (Table 1), benefits of treatment (Table 2), and self-efficacy in taking medication (Table 3) also have statistically significant associations (p<0.05) with medication adherence. The multiple logistic regression analysis has shown that health beliefs about the severity of DM, benefits of treatment, and self-efficacy in taking medication were the three main predictors of medication adherence (Table 4).

DISCUSSION

Most of the respondents who perceived that DM was a serious disease and that they were susceptible to its complications were compliant towards medication. This finding was consistent with that of other study[4] on a similar subject. There was statistically significant association (p<0.05) between these perceptions and medication adherence. This indicated that perceptions regarding the severity and susceptibility to DM were factors that can predict medication adherence among the respondents. Those who believed about the severity and susceptibility to the disease would be adherent with the prescribed medication[4, 22].

The subject's health beliefs about the benefits of taking treatment were also significantly associated (p<0.05) with medication taking behavior. This finding concurred with that of other study[23] which revealed the significant association between belief about the benefits of taking medication and medication adherence. This implied that the positive beliefs about taking medication were predictors of medication adherence.

It was discovered that some respondents faced certain barriers in adhering with the diabetic treatment regimens, in terms of the frequency in taking medication as well as attending follow-up treatment. The respondent's beliefs about these barriers have statistically significant association (p<0.05) with medication adherence. Other researchers[24, 25] have reported the same finding, which concluded that beliefs about barriers in taking medication would result in medication non-adherence.

There were statistically significant associations (p<0.05) between health beliefs about self-efficacy in taking medication and medication taking behavior. This finding was similar to that reported by other researchers[26], which showed that health beliefs of self-efficacy in taking medication have influenced the patients' medication adherence.

CONCLUSIONS

The respondent's health beliefs about the severity of DM and their susceptibility to the complications of the disease have positively contributed towards medication adherence. They would also take their medication, if they believed in its benefits. The subjects' concerns about their socio-economic

well-being, beliefs in the effectiveness of medication, and health campaign on diabetic control were positive cues to medication taking behavior. Modifying the related health beliefs and reinforcing the positive cues to actions are the relevant intervention strategies that could be used in improving medication adherence of diabetic patients.

Table 1 Distribution of mean scores of health beliefs about perceived susceptibility and severity of DM and medication adherence

	Mean scores of health beliefs on medication adherence							
Variables			**Problem in:**					
	Amount	**Frequency**		**Duration**		**Follow-up**		
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Perceived susceptibility and severity (mean ± sd)	13.4± 5.5	15.7± 6.7	2.8± 4.4	16.2± 7.4	14.1± 6.0	14.1± 5.8	14.1± 6.5	14.2± 3.8
p value	0.001		0.001		0.972		0.912	

p value reached from independent sample *t* test
Note: Yes = Have problem (Non-adherent)   No = No problem (Adherent)

Table 2 Distribution of mean scores of beliefs about benefits of taking medication and medication adherence

	Mean scores of health beliefs on medication adherence							
Variables			**Problem in:**					
	Amount	**Frequency**		**Duration**		**Follow-up**		
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Benefits of taking medication (mean ± sd)	14.9± 4.3	17.7± 4.4	14.1± 3.8	18.5± 4.3	15.7± 4.7	16.0± 4.0	15.8± 5.0	15.7± 2.8
p value	0.001		0.001		0.478		0.864	

p value reached from independent sample *t* test
Note: Yes = Have problem (Non-adherent)   No = No problem (Adherent)

Table 3 Distribution of mean scores on beliefs about self-efficacy in taking medication and medication adherence

	Mean scores of health beliefs on medication adherence							
Variables			**Problem in:**					
	Amount	**Frequency**		**Duration**		**Follow-up**		
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Self-efficacy in taking medication (mean ± sd)	19.8± 3.0	19.3± 3.1	20.1± 3.0	18.8± 3.0	19.7± 3.1	19.4± 3.0	19.2± 3.1	21.0± 2.5
p value	0.119		0.001		0.409		0.001	

p value reached from independent sample *t* test
Note: Yes = Have problem (Non-adherent)   No = No problem (Adherent)

Table 4 Factors affecting medication adherence: Multinomial logistic regression
0=Non-adherent (RC); 1= partially adherent; 2=completely adherent

Independent variables	Partial adherence		Complete adherence	
	β	OR (95% CI)	β	OR (95% CI)
Previous condition of DM				
Not serious	-0.727***	0.483 (0.312, 0.749)	-1.22**	0.295 (0.13, 0.672)
Serious (RC)	-	-	-	-
Health Belief Model				
Perceived susceptibility and severity of DM	0.033	1.034 (0.984,1.086)	-0.008	0.992 (0.902, 1.09)
Benefit of taking medication	0.173**	1.189 (1.104, 1.282)	0.162*	1.176 (1.027, 1.346)
Barriers in taking medication	-0.031	0.970 (0.893, 1.053)	0.092	1.097 (0.936, 1.284)
Self-efficacy of taking medication	-0.077**	0.926 (0.858, 0.999)	-0.041	0.960 (0.833, 1.106)
Intercept	-0.452		-0.377	
Model Chi square		92.486		
df		12		
n		442		
RC		Reference Category		

*$p<0.05$, **$p<0.01$, ***$p<0.001$

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