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# Pilot study on barriers influencing the compliance towards exercise recommendation in patients with diabetes mellitus

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## Abstract

The purposes of this study were to identify the pattern of exercise, as well as to determine the possible barriers that influence compliance towards exercise in patients with diabetes. This was a cross sectional study with the sample of 127 patients who underwent follow up with Diabetes Clinic of Pulau Pinang Hospital. Random sampling technique used and subjects were given a questionnaire consists of questions on exercise habit and barriers to exercise compliance related to belief, knowledge, attitude, and environment. The data analyzed using descriptive statistics in SPSS version 12.0. More than half of patients with diabetes having exercised for less than 3 times per week as recommended, and claimed that they were not active in exercising. This showed poor exercise compliance among them. Patients' belief and knowledge towards exercising were not the barriers to exercise compliance. This can be explained as patient had the right belief and adequate knowledge regarding exercise requirements for them. The barriers to exercise compliance as determined in this study were the environmental factors, such as time constraint to exercise or having not enough time to exercise, busy with daily works, as well as no companion to exercise. Other barriers such as laziness to exercise, poor health condition, and tired were also reported. As a conclusion, environmental factors play an important role as a barrier towards exercise in diabetic patients.

**Key-Words:** Barriers, Compliance, Exercise, Diabetes mellitus

## Introduction

Physical activity or exercise plays is reported to be a very crucial role in health promotion and disease prevention in individual with diabetes.[1-3] The perfect types, frequency, intensity and duration of exercise are not well determined, but there are a few specific recommendation exists meant for exercise specifically for Type 2 Diabetes Mellitus.[2,3] Most of the recommendation is the engagement in aerobic exercise for example brisk walking, cycling, swimming and jogging, which involved muscular and respiratory systems. Other recommendation reported is resistance training such as exercise with free weights or weights machine that involving muscular strength to work against a resistive load.[3]

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Other review reported that patients with Type 2 Diabetes Mellitus need to accumulate a minimum of 150 min per week of moderate-intensity physical activity and/or 90 minutes per week vigorous intensity cardiorespiratory exercise for the improvement of cardiovascular risk. In addition, it is also encouraged for them to practice resistance training for 3 times per week. People with Type 1 Diabetes Mellitus however need to be aware of the incidence of hypoglycemia and need some preventive measures, in order to engaged in physical activities.[2]

The role of exercising as disease prevention is well-established. It was reported that the incidence of diabetes was reduced up to 58% in intensive lifestyle intervention including diet modification and exercise; for both gender possessed high risk of diabetes with impaired glucose tolerance, as what shown in the Finnish Diabetes Prevention Study.[4] Other studies also manifested that the combination of diet plus exercise and were significantly reduced the progression of diabetes in Impaired Glucose Tolerance group.[5,6] A study on individual without diabetes with elevated fasting and postload glucose plasma concentration showed reducing pattern of diabetes incidence in the

study group with lifestyle intervention comprising at least 150 minutes of physical activity per week.[7]

Besides being a preventive measure of the incidence of diabetes mellitus, there are tonnes of manifestations published regarding the positive impact of physical activity or exercise in patients with diabetes. Long term studies had shown that regular physical activity leads to better glycemic control via beneficial effects on carbohydrate metabolism and insulin sensitivit, in the prevention of cardiovascular disease,[1-3] in reducing levels of triglyceride-rich VLDL,[1,2] in reducing blood pressure levels, [1,2] and enhancing the weight loss among people with Type 2 Diabetes Mellitus thus reduce the risk of developing diabetes. [1-2,9]

Despite the clear importance to comply and adhere with exercise recommendation, many investigations reported that most of patient with diabetes did not comply with the said recommendation. A study reported that this said population exercised with 25% less in intensity.[10] Another studies showed that there are still a significant number of patients with diabetes were not complying with the minimum exercise requirement as recommended to them, and some results also reported no physical activity or exercising at all.[11-14]

This phenomenon resembles that even though so many recommendation exist in order to guide this people in exercising or engaged in physical activity, there are still lacking in the implementation of the recommendations and advices among them.

In conjunction, this study will be conducted in order to determine the barriers that may influence the compliance towards exercise recommendation compliance in patients with diabetes. Other objective was to determine the pattern of exercising among them.

## Methodology

This study designed as a cross sectional study, which was conducted from January to February 2009. It had been registered and approved by Clinical research Centre (CRC) Pulau Pinang Hospital with registration number 2009/04. It also approved by National Medical Research Register-MOH Research and Ethic Committee with ID NMRR-09-14-3246. The population involved in this study was patients who participated in Diabetes Clinic of Pulau Pinang Hospital, which was held on Monday (3-5pm), Wednesday (3-5 pm), and Thursday (9am-12 pm) every week.

Sample size calculated using Raosoft Programme. According to the record from diabetic clinic, the monthly average patients who showed up for follow up in diabetic clinic per month were about 230 patients. According to the Raosoft Programme,[15] a minimum sample of 145 were needed in order to produce 95% of confidence interval, and margin of error equals to 5%. Therefore 150 questionnaires distributed to 150 subjects by using random sampling technique. The questionnaire was developed based on few references [16-19] and also own questions. It consists of 2 parts, which are Part 1 and Part 2. Part 1 consists of questions on demographic of the patients. Part 2 is related to the exercise questionnaire, which scored in 5-point Likert Scale ranging from 1-5. There are 3 questions related to exercise habit and 11 statements to evaluate possible barriers influencing compliance towards exercise recommendation, which related to belief, knowledge, attitude, and environment factors. Questions that related to negative responses were scored in reverse manner. Face and content validation was done by supervisor, lecturers and endocrine specialist.

The inclusion criteria are the patients participated Diabetes Clinic of Pulau Pinang Hospital. Whereas, the exclusion criteria involving patient aged less than 16 years, and the patient who were unable to understand and write in Malay or English language, as the tool of data collection, which was a set of questionnaire was developed in only both language.

All the data collected entered into SPSS Version 12.0 and Microsoft Excel for analysis purposes. The data then analysed using descriptive statistic which are mean and mode, to suit the objectives of this study.

## Results and Conclusion

Out of 127 subjects, 44.1% (n=56) of them were male and 55.9% (n=71) of them were female. 69.3% (n=88) of the respondents were married and this showed that majority of the patients had family and therefore had good social support background. The age range reported the highest subject's age were from 51-65 years old (41.7 %, n=53), followed by 35-50 years old (27.6%, n=35), and the rest as stated in the table. Majority of patient suffered from diabetes for 0-10 years (66.9%, n=85). The results showed Malay as the highest respondents (51.2%, n=65) in this study. Other classifications involved the employment status of the patients. Most of the respondents were not having any job at the time, as 27.6% (n=35) of them were unemployed and 18.1% (n=23) of them were retired.

Table 2 reported the pattern of exercising habit among subjects. Only 32.3% (n=41) of subjects exercise for 3 to 7 times per week, where as 67.7% of them (n=75) exercise only 0 to 2 times per week. Regarding the preferences of sports, 62.2% of subjects that they loved sports activities (n=79), and 37.8% of them (n=48) did not. Only 42.3% of them (n=52) claimed that they

active in exercising, where as 59.1% (n=75) claimed did not active.

Table 3 consists of evaluation of belief of the patients towards effects of exercise towards their diabetes condition. The total of 86.7% of respondents (n=110) were strongly agreed and agreed (n=75) that 'daily exercise may control the diabetes condition.' Majority which include 86.7% of the subjects (n=110) believed that practicing daily exercise could prevent the occurrence of other diabetes complications. In term of the statement that 'practicing daily exercise could lead to hypoglycemia', percentage of 52% of subjects were strongly disagreed and disagreed (n=66) where as only 29.7% of them (n=35) strongly agreed and agreed with that.

Evaluation of knowledge as a barrier influencing compliance towards exercise was also evaluated. 77.2% of patient answer correctly (n=98) that they need to have 'light physical exercise for 30-45 minutes at least 3 times per week'. Moreover, the total of 68.6% of them (n=87) were strongly agreed and agreed that 'they had given enough information regarding the foods that are suitable for them.'

Attitude also was evaluated as a barrier influencing compliance towards exercise recommendation. A large proportion of subjects which was about 61.3% were strongly disagreed and disagreed (n=78); but only 31.0% (n=27) of respondents strongly agreed and agreed that shyness was a barrier for them to exercise. Besides, only a total of 21.3% subjects (n=27) were strongly agreed and agreed that they refused to exercise because of bored to exercise.

Other result reported on the evaluation of environment as the possible barrier influencing the compliance towards practicing exercise. High percentage of subjects, which was 44.1% stated that they were strongly agreed and agreed (n=56) to the fact that 'having not enough time was the reason for them not to exercise'. On the other hand, total percentage of 70.8% of respondents (n=85) stated strongly disagreed and disagreed that there were no suitable places for them to exercise. Besides, 82.0% of subjects (n=100) stated their disagreement to the fact that 'having no suitable sportswear' would be a barrier that influences the compliance towards exercising, and only 9.1% of them agreed. In addition, high percentage of 72.0% patients were strongly agree and agree that their family members encouraged them to practice daily exercise for 30-45 minutes at least 3 times per week.

Besides that, among the 127 respondents, 60.7% (n=77) of them reported other barriers for exercising. Out of the 77 answers, 24.7% (n=19) reported for both 'poor health condition' and 'busy with work' as the factors for noncompliance. This is followed by 'lazy' (20.8%, n=16), 'tired' (16.9%, n=13), and 'having no companion or partner' (13.0%, n=16.9%).

This study clearly showed that the rate of compliance towards exercise recommendation was still low among the patients. This result was supported by many other studies done. Various studies reported that only 15-70% of respondents met the minimum recommended exercise regimen, which is 3 times per week, minimum 20 minutes.[11-14,20-21]

There were many factors leading to low compliance rate of exercise regimen among patients with diabetes mellitus. This study showed that the most possible factor for exercise noncompliance is environmental factor, in the sense of 'lacking of time to exercise', 'poor health condition', 'busy with work', 'tired' and 'having no companion or partner', as answered by most patients. Almost the same factors reported by other studies, for example two studies revealed the barrier to exercise as 'lack of time to do' and 'too busy to exercise.'[12-13,20] Other separate studies showed that social environment as good communication with other spouses, partners and other family members were associated with greater regimen adherence in patients with diabetes.[22,23] Poor health condition resulted from diabetic complications such as extremity ulcers and associated diseases such as arthritis also reported as common barriers to comply with exercise regimens.[20,24-25]

Other studied environmental factors such as 'not enough places and facilities to exercise', and 'no suitable sportswear' were not the possible barriers to exercise in this population. Regarding family support, positive outcome were obtained where majority of patient's family members did support them to comply with minimum exercise recommendation, and clearly showed that family was not the barrier influencing noncompliance to exercise.

Besides, this study also showed that patient's attitude in term of 'lazy to exercise' is possibly a barrier towards compliance to exercise recommendation. This result supported by other studies that showing motivational and cultural causes were the factors of noncompliance to exercise regimens. [20] Another study by Akiko et al resembled the factor for exercise noncompliance as 'lack of mind' to do.[13] Other attitude elements such as 'shy to exercise' and 'bored to exercise' were not the possible barriers to exercise as most of the patients stated their opinion that both factors were not influencing their decision to comply with exercise regimen.

Patient's belief regarding the effects of exercise to their diabetes condition was not a possible barrier influencing compliance towards exercise according to this study. This was because a significant number of patients had a positive belief that exercise may give positive impact in controlling their diabetes, hence won't be a barrier for them to comply with the right exercise recommendation. The role of health belief to influence compliance among individuals with diabetes had long been studied. Two studies suggested that health beliefs were minimally associated with compliance to specific aspects of diabetes control regimens and perceived severity as an individual health belief may be associated with increased compliance in diabetics. [26,27] Other study showed that aappropriate health beliefs can predict better adherence in patients with diabetes.[25,28] However, these studies did not examine the effects of health beliefs to the exercise compliance itself, and more on overall aspects of regimen compliance. Therefore, the difference of results between this study and others might be produced because of said matter.

Addressing on the knowledge as a factor, it is clearly shown in the results that knowledge was also not the possible barriers for noncompliance in this population. A significant number of patients stated that they already known and had good knowledge in the sense of recommended exercise for them. The statement was supported by majority of patients accurately answered the minimum exercise regimen recommended for them. From a study by Ranjini et al, the findings suggested that there was a significant weak correlation between knowledge and practice among the subjects. [12] Its results is a bit contradicted with this study's results, might be due to the fact that different question used to assess knowledge among subjects. Hence, in order to improve this pilot study, more questions to assess knowledge are needed in future.

In the sense of exercise, more than half of patients with diabetes mellitus had exercised for less than 3 times per week, as recommended, and claimed that they were not active in exercising. Patients' belief and knowledge towards exercising were not the possible barriers to exercise compliance. This can be explained as patient had the right belief and adequate knowledge regarding exercise requirements for them. The barriers to exercise compliance as determined in this study were the environmental factors, such as time constraint to exercise or having not enough time to exercise, busy with daily works, as well as no companion to exercise. Other barriers such as laziness to exercise, poor health condition, and tired were also reported in this pilot study.

In conjunction, in order to overcome the barriers influencing compliance towards exercise recommendation, an individual approach needs to be done by every diabetes educator. Every patient need to have specific goal in term of physical activity, therefore health care practitioner, especially pharmacist need to play a major role in establishing cooperation and providing suitable advices to the patients, in order to achieved the individual goal.

**Limitations**

This pilot study has its own limitation. Firstly, this study was only conducted in the Diabetic Clinic of Pulau Pinang Hospital. This meant that the results obtained may not be able to represents all of the diabetic patients in Malaysia and throughout the world. This can be explained by the differences in term of belief, knowledge, attitude, and environment among diabetic patients at different states all over Malaysia. Other limitation is bias results which may be produced as the patients might gave answers which can satisfy the researcher, and not the exactly what they were thinking about.

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**Table 1: Demographic Data of Subjects (N=127)**

| Variable | | Frequency | % |
|---|---|---|---|
| Gender | | | |
| | Male | 56 | 44.1 |
| | Female | 71 | 55.9 |
| Marital Status | | | |
| | Single | 34 | 26.8 |
| | Married | 88 | 69.3 |
| | Widow | 5 | 3.9 |
| Age (years) | | | |
| | 0-18 | 7 | 5.5 |
| | 19-30 | 21 | 16.5 |
| | 31-50 | 35 | 27.6 |
| | 51-65 | 53 | 41.7 |
| | 66-70 | 11 | 8.7 |
| Duration of diabetes (year) | | | |
| | 0-10 | 85 | 66.9 |
| | 11-20 | 30 | 23.6 |
| | 21-30 | 9 | 7.1 |
| | 31-40 | 2 | 1.6 |
| | 41-50 | 1 | 0.8 |
| Race | | | |
| | Malay | 65 | 51.2 |
| | Chinese | 37 | 29.1 |
| | Indian | 20 | 15.7 |
| | Others | 5 | 3.9 |
| Religion | | | |
| | Muslim | 68 | 53.5 |
| | Buddhist | 36 | 28.3 |
| | Hindu | 15 | 11.8 |
| | Christian | 5 | 3.9 |
| | Others | 3 | 2.4 |

| | | |
|---|---|---|
| Employment Status | | |
| Unemployed | 35 | 27.6 |
| Student | 11 | 8.7 |
| Private | 34 | 26.8 |
| Government | 20 | 15.7 |
| Retired | 23 | 18.1 |
| Self employed | 4 | 3.1 |

**Table 2: Pattern of Exercise among Subjects (n=127)**

| Question | Frequency | % |
|---|---|---|
| FREQUENCY OF EXERCISE PER WEEK | | |
| 0-2 times per week | 86 | 67.7 |
| 3-7 times per week | 41 | 32.3 |
| PREFERENCE OF SPORTS AMONG SUBJECTS | | |
| Like sports | 79 | 62.2 |
| Does not like sports | 48 | 37.8 |
| SUBJECT'S PERCEPTION ON THEIR EXERCISE ACTIVITY | | |
| Active in exercising | 52 | 40.9 |
| Not active in exercising | 75 | 59.1 |

**Table 4: Other Barriers to Practice Regular Exercise (n=77)**

| Other Barriers | Frequency | % |
|---|---|---|
| Busy with Work | 19 | 24.7 |
| Poor Health Condition | 19 | 24.7 |
| Lazy | 16 | 20.8 |
| Tired | 13 | 16.9 |
| No Companion or Partner | 10 | 13.0 |

**Table 3: Factors Influencing Compliance towards Exercise Recommendation among Subjects (n=127)**

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| Questions | Strongly disagree No (%) | Disagree No (%) | Neutral No (%) | Agree No (%) | Strongly Agree No (%) | Mean (SD) |
|---|---|---|---|---|---|---|
| **BELIEF VS EXERCISE** | | | | | | |
| Daily exercise can control diabetes? | 4 (3.1) | 2 (1.6) | 11 (8.7) | 35 (27.6) | 75 (59.1) | 4.4 |
| Practicing daily exercise will reduce the risk of other diabetes complications such as kidney damage? | 3 (2.4) | 3 (2.4) | 11 (8.7) | 42 (33.1) | 68 (53.6) | 4.3 |
| *Daily exercise cause you to get hypoglycaemia (a condition where blood glucose level is low)? | 17 (13.4) | 49 (38.6) | 26 (20.5) | 21 (16.5) | 14 (11.0) | 3.2 |
| **KNOWLEDGE VS EXERCISE** | | | | | | |
| You need to have light physical exercise for 30-45 min at least 3 times per week? | 3 (2.4) | 13 (10.2) | 13 (10.2) | 42 (33.1) | 56 (44.1) | 4.0 |
| You are given enough information about the type of exercises that are suitable for you? | 5 (3.9) | 15 (11.8) | 20 (15.7) | 52 (41.0) | 35 (27.6) | 3.8 |
| **ATTITUDE VS EXERCISE** | | | | | | |
| *Shy to exercise is the reason you did not practice daily exercise. | 42 (33.0) | 36 (28.3) | 18 (14.2) | 12 (9.4) | 19 (15.0) | 3.5 |
| *Daily exercise is boring and make you refused to exercise | 34 (26.8) | 49 (38.5) | 17 (13.4) | 17 (13.4) | 10 (7.9) | 3.7 |
| **ENVIRONMENT VS EXERCISE** | | | | | | |
| * Having not enough time to exercise is the reason you did not practice daily exercise | 21 (16.5) | 28 (22.0) | 22 (17.3) | 35 (27.6) | 21 (16.5) | 3.0 |
| *You did not exercise because there is no suitable place for you to exercise. | 35 (27.6) | 57 (44.9) | 13 (10.2) | 17 (13.4) | 5 (3.9) | 3.8 |
| *You did not exercise because not having the suitable sportswear? | 61 (48.0) | 44 (34.6) | 11 (8.7) | 3 (2.4) | 8 (6.3) | 4.1 |
| Your family members encourage you to do exercise for at least 30-45 minutes 3 times per week? | 6 (4.7) | 16 (12.6) | 13 (10.2) | 39 (30.7) | 53 (41.8) | 3.9 |

*Question 3,6,7,8, 9 and 10 were coded in reverse manner