Exercise Behavior and Knowledge among the DM Type II Patients†

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Objective: *To study the exercise behavior and knowledge about physical exercise among diabetic patients. The authors explored the correlation between the exercise behavior and knowledge of physical exercise.*
Material and Method: *DM type II patients aged more than 18 years, who attended the DM clinic, Siriraj Hospital, Bangkok between April and August 2007 were randomly interviewed by using questionnaires while they were waiting to see their doctors.*
Results: *One hundred and ninety six patients were interviewed. They were 62 males and 134 females with an average age of 60.5 years. Most of them exercised regularly at least three times a week (65.8%). Most of them exercised by walking (67%). They liked to exercise in their houses (48.7%), and in the morning (41.8%). Health care providers provided knowledge about exercise (58.2%). The benefit of exercise known the least was that it could increase endorphin release (61.2%). The aerobic exercise principle known the least was the proper frequency of exercise (50.5%). In addition, the exercise principle in DM known the least was that the DM patients should consult their doctors before starting to exercise (49%).*
Conclusion: *Most of the DM patients exercised regularly, but some had insufficient knowledge. The researchers will take the results to provide the adequate knowledge to the DM patients in the future.*

Keywords: *Exercise behavior, Knowledge of physical exercise, DM patients*

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Diabetes mellitus is the most common endocrine disorder. It is no exaggeration to describe diabetes as one of the major contributors to ill health and premature mortality worldwide. The prevalence of diabetes worldwide, from the World Health Organization (WHO) studies in 2000, was 171 million. If the current trend continues, the number of people with diabetes is expected to more than double by 2030. In Thailand, the prevalence of diabetes is 1,536,000, and it is 46,903,000 in South East Asia[1].

The favorable effects of regular exercise have been reported for type II diabetes mellitus[2-4]. If the diabetes patients performed the exercise correctly, they will gain benefits of the exercise. The basic element of correct exercise includes a cardio-respiratory exercise prescription (frequency 3-4/week, duration 20-60 minutes and intensity 50%-80% VO2R or heart rate reserve). Exercise is effective in glucose control because it has an insulin-like effect that enhances the uptake of glucose even in the presence of insulin deficiency. Regular aerobic and resistance training combined with individualized diet therapy promote improved glucose tolerance, increased insulin sensitivity, improved cardiovascular function, improved lipids profiles, blood pressure reduction, weight management, increased physical work capacity, and improved well-being[2-7].

On the other hand, the diabetes type II patients who perform the exercise incorrectly, such as performing a too high intensity exercise, having poor glucose control before performing exercise, or lacking knowledge of signs of hypoglycemia will likely get complications from exercise, such as acute hypoglycemia, retinal hemorrhage, ischemic heart disease, or sudden death[8].

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Objective

The purposes of the present study were to explore the exercise behavior and knowledge of physical exercise among the diabetes type II patients in DM clinic of Siriraj Hospital, Bangkok. The factors correlated with the exercise behavior and knowledge of physical exercise, were also explored. Furthermore, when there was a lack of knowledge or misunderstanding about exercise, the health care providers planned the correct strategies to improve the diabetes patient's knowledge.

Material and Method

The diabetes type II patients, aged more than 18 years old, who attended the DM clinic, Siriraj Hospital between April and August 2007 were randomized by Systematic random sample from the registration order at the 1st, 4th, 7th, 10th, 13th, 16th, and so on.

The inclusion criteria were to include the diabetes type II patients who attended the DM clinic, Siriraj Hospital. The exclusion criteria were those diabetes patients who had a brain or spinal cord lesion or who had cardiopulmonary disease, with functional class two or more.

The sample size was determined by using the n Query Advisor 5.0 program™. One hundred and ninety six patients were required. The maximum error of 15% was expected from the "should-be-right" answers concentration. Furthermore, a 5% acceptable error has been defined. Moreover, 0.05 significant level and 95% CI was 0.15 ± 0.05 have also been marked out.

The diabetes type II patients were interviewed by using questionnaires and asking the questions in person while each one was waiting to see their doctors, which took about 15 minutes. Then the questionnaires were brought back and brochures showing how to exercise correctly with diabetes were provided to the patients. The questionnaire has been designed with regard to the reference provided by American Diabetes Association, Clinical practice recommendation, 1999 guideline[9]. It was divided into three major parts, demographic data, practice of exercise, and knowledge of exercise. This questionnaire was not used as a tool to evaluate the level of knowledge but to discover the points that the patients misunderstood. The results are expected to emphasize the points that the patients misunderstood, thus, used to improve the patient education program in the future. The interviewers, who were doctors and nurses, were trained. Inter-rater reliability was done among interviewers.

The project was approved by the Ethics Committee of the Faculty of Medicine Siriraj Hospital and was supported by Siriraj Routine to Research Management Fund.

Statistical analysis

Statistical analysis was done with SPSS version 13.0.

The frequency of demographic data, practice pattern of physical exercise, and knowledge of exercise were reported as percentage. The unpaired t-test was used to explore the difference of two quantitative data groups and the Chi-square test and Fisher's exact test were used to explore the relationships among qualitative data. One-way analysis of variance (ANOVA) was used to compare the difference of three or more groups of quantitative data. The Bonferroni method test was used to identify the specific differences when the ANOVA revealed significance.

Results

One hundred and ninety six diabetes type II patients were interviewed. There were 62 males and 134 females with an average age of 60.5 years old. Most of them were married (64.3%) and had graduated from primary school (44.4%). Most of the diabetes patients were unemployed (41.3%) and had more than six hours per day free time (35.7%). Monthly income range was less than 5,000 Baht. Sixty-nine percent of them had co-morbid diseases that included hypertension, hyperlipidemia, and heart disease (39.1%, 29.4%, and 14.7%, respectively) (Table1).

Regarding the practice pattern of exercise, most of the diabetes type II patients practiced exercise regularly at least three times a week (65.8%). The duration of exercise was 30-60 minutes (33.7%) with 58.2% who had practiced regular exercise for more than 1 year. They liked to exercise alone at home in the morning and paid no additional expenses. The physical exercises done most often among the diabetes patients were walking (67%), calisthenics exercise, jogging, attending aerobic exercise class, using an exercise machine, and Ti Chi. Thirteen percent of the diabetes patients did not practice exercise. The major reason was not feeling healthy enough (46%) (Table 2).

The frequency of practicing the physical exercise among these patients was related to co-morbid diseases, acquisition of knowledge, and preference of exercise (Table 3).

Table 1. Demographic data

Characteristics	Number (percent)
Gender	
Male	62 (31.6)
Female	134 (68.4)
Age group (year)	
18-29	5 (2.6)
30-39	8 (4.1)
40-49	17 (8.7)
50-59	47 (23.9)
> 60	119 (60.7)
Marital status	
Single	70 (35.7)
Married	126 (64.3)
Educational levels	
Primary school	87 (44.4)
Secondary school	10 (5.1)
Tertiary school	21 (10.7)
Certification	25 (12.8)
Bachelor degree	43 (21.9)
Master & PhD	10 (5.1)
Occupation	
Unemployed	81 (41.3)
Students	1 (0.5)
Government employees	43 (21.9)
Working in private companies	16 (8.2)
Others	55 (28.1)
Monthly incomes (Baht)	
Less than 5,000	74 (37.8)
5,000-10,000	48 (24.5)
10,001-30.000	54 (27.6)
30,001-50,000	13 (6.6)
More than 50,000	7 (3.6)
Co-morbid disease	
No 61 (31)	
Yes	135 (69)
Hypertension	77 (39.1)
Hyperlipidemia	58 (29.4)
Heart diseases	29 (14.7)
Musculoskeletal problems	26 (13.2)
Asthma/pulmonary problems	3 (1.5)
Others	39 (19.8)
Free time (hours per day)	
None	10 (5.1)
< 1	3 (1.5)
1-2	38 (19.4)
3-4	43 (21.9)
5-6	32 (16.3)
> 6	70 (35.7)

The mean VAS score of the prevalence of exercise and the perceived benefits of exercise were 7.49 and 8.42 respectively.

Table 2. Practice Pattern of Physical Exercise

Practice pattern of physical exercise	Number (percent)
Frequency	
Every days	62 (31.6)
3-5 times per week	67 (34.2)
1-2 times per week	31 (15.8)
1-2 times per month	5 (2.6)
Less than 1 time per month	5 (2.6)
No exercise	26 (13.3)
Duration	
Less than 30 minutes	59 (30.1)
30-60 minutes	66 (33.7)
More than 60 minutes	11 (5.6)
Uncertain	34 (17.3)
Continuation of exercise	
Less than 3 months	22 (11.2)
3-6 months	14 (7.1)
More than 6 months-1 year	19 (9.7)
More than 1 year	114 (58.2)
Time of the day	
Morning	82 (41.8)
Late morning	8 (4.1)
Afternoon	4 (2.0)
Evening	45 (23.0)
Before bedtime	2 (1.0)
Uncertain	29 (14.8)
Place	
House	96 (49.0)
Nearby the house	45 (23.0)
Park	25 (12.8)
Sport club	16 (8.2)
Stadium	6 (3.1)
Uncertain	8 (4.1)
Companions	
None	106 (54.1)
1-2	21 (10.7)
3-5	15 (7.7)
More than 5	28 (14.3)
Expenses	
Yes	51 (26.0)
No	145 (74.0)
Type of exercise	
Walking	132 (67.3)
Calisthenic exercise	36 (18.4)
Jogging	25 (12.8)
Attending aerobic exercise class	20 (10.2)
Using exercise machine	18 (9.2)
Tai Chi	9 (4.6)
Others	41 (20.9)
Self-pulse monitoring	
No	139 (70.9)
Yes-some times	24 (12.2)
Yes-every times	7 (3.6)

Table 2. (Cont.)

Practice pattern of physical exercise	Number (percent)
Reason for no exercise (26)	
Feel Unhealthy	12 (46.2)
Lack of time	10 (38.5)
No Motivation	5 (19.2)
No Joy	5 (19.2)
No Companions	2 (7.7)
Others	12 (46.2)

Table 3. Factors related to high frequency of exercise

Factors	p-value
Gender	0.29
Age	0.35
Occupation	0.14
Education	0.30
Monthly income	0.39
Co-morbid diseases	0.03*
Free time	0.76
Acquisition of knowledge	0.04*
Perceived benefits	0.91
Preference of exercise	0.001*

* Significant at p-value < 0.05

Regarding the knowledge of exercise, there were four parts of knowledge of exercise being explored. The first part was the benefits of exercise. There were minimum responses concerning the fact that exercising can increase endorphin release. The second part was how to do aerobic exercise. There were minimum responses stating that the proper frequency of exercise should be 3-5 times per week. The statistically significant factors related to both parts of the knowledge were the perception of exercise benefit and the preference for an exercise type. The third part was how the diabetes type II patients should exercise properly. There were minimum responses stating that patients should consult their doctors for proper exercise programs before first beginning to exercise. The factor related to this part of knowledge was the perception of exercise benefits. The fourth part was the knowledge about abnormal symptoms. There were minimum responses that dizziness was a hypoglycemic symptom and that a severe leg pain symptom signaled the need to terminate the exercise. There was no statistically significant factor related to the fourth part. The diabetes

Table 4. Knowledge of exercise and numbers of the DM patients with correct responses

Items	Number (percent)
Part 1.	
Benefits of exercise	
Increase endorphin release	120 (61.2)
Prevent osteoporosis	131 (66.8)
Enhance lipid control	147 (75.0)
Enhance BP control	149 (76.0)
Enhance DM control	168 (85.7)
Improve GI function	168 (85.7)
Strengthen muscles	180 (91.8)
Reduce stress	183 (93.4)
Increase cardiopulmonary fitness	187 (95.4)
Part 2.	
How to do aerobic exercise	
Proper frequency of exercise	99 (50.5)
Proper intensity of exercise	118 (60.2)
Proper duration of exercise	125 (63.8)
Need to cool down	195 (99.5)
Need to warm up	196 (100)
Part 3.	
How to do exercise in the DM patient	
Should consult their doctors for proper program	96 (49.0)
Should stop exercise when getting a cold	119 (60.7)
Should not do heavy exercise alone	125 (63.8)
Should practice aerobic exercise	139 (70.9)
Should wear proper shoe	170 (86.7)
Should have regular exercise at least 3 times/week	170 (86.7)
Should stop exercise when having abnormal symptom	171 (87.2)
Part 4.	
Hypoglycemic symptoms	
Dizziness	32 (16.3)
Hungry	110 (56.1)
Sweating	130 (66.3)
Syncope	140 (71.4)
Tachycardia	149 (76.0)
Symptom for terminating exercise	
Severe leg pain	138 (70.4)
Dysnea	139 (70.9)
Nausea & vomiting	143 (73.0)
Dizziness	161 (82.1)
Loss of balance	163 (83.2)
Chest discomfort	169 (86.2)
The acquisition of knowledge	
Never	13 (6.6)
Health care provider	114 (58.2)
Mass media	113 (57.7)
Reading	75 (38.3)
Attending the course	48 (24.5)
others	13 (6.6)

Table 5. Factors related to the level of knowledge of exercise

Factors	p-value				
	Benefits of exercise	How to do aerobic exercise	How to do exercise in the DM patient	Hypoglycemic symptoms	When to stop exercise
Acquisition of knowledge (yes-no)	0.8	0.12	0.71	0.41	0.85
Perceived benefits of exercise (VAS >7-<7)	0.009*	<0.001*	0.021*	0.39	0.65
Preference of exercise (VAS >7- <7)	0.005*	0.03*	0.09	0.71	0.18
Frequency of exercise (<3->3 times/week)	0.98	0.75	0.21	0.40	0.17

* Significant at p-value < 0.05

type II patients acquired their exercise knowledge from a health care provider (58.2%) rather than from other channels. There was no statistical difference between the level of knowledge and the method of acquisition of knowledge (Tables 4, 5).

Discussion

Because the present study selected the diabetes type II patients by systematic randomization, the authors should assume that it could represent the average diabetes type II patients that attended the DM clinic at Siriraj Hospital. Moreover, the data was collected by personal interview. No directed questions were used during the interview.

According to the guidelines of American College of Sport Medicine (ACSM)[10] and American Diabetes Association[9], aerobic exercise, or the exercise that the type II diabetes can gain the most benefit from, was an exercise performed for at least 30 minutes per day and 3 to 5 days per week. From the present study, the number of the type II diabetes who exercised at least 30 minutes per session were reported at 65.8%. The percentage of the type II diabetes patients exercising is greater than the percentage of the Bangkok resident exercising[11](57.8%). The practice patterns of exercise showed that they liked to exercise by walking at home, in the morning, and paid no additional expenses. This was similar to the inhabitants of Bangkok. The possible reasons that the number of the type II diabetes who exercised regularly more than the number of the inhabitants of Bangkok were three folds. Firstly, most of the diabetics were old. Secondly, most of them were unemployed and had more than six hours of free time per day to exercise. Lastly, most of the diabetes type II patients received continuous treatment in the hospital, so they had numerous chances to get helpful recommendations from the health care providers.

Nonetheless, there were 13.3% of the diabetes type II patients who did not exercise. The major reason given was not feeling healthy enough. Many studies reported that many older people did not participate in leisure time physical activities[12-14]. Undoubtedly, they basically understood the benefits of exercise but they were worried about their health. In the present study, the high frequency of physical exercise among these patients was related to co-morbid diseases, the acquisition of knowledge, and preference of exercise. Three items can help the diabetes type II patients exercise with more confidence and regularity. Firstly, clear advices from their doctors about their physical abilities. Secondly, advice from their doctors about the proper practice pattern of exercise, suitable for their conditions. Lastly, recommendation from their doctor about the types of exercise that could easily be practiced at no additional expenses, such as walking and bicycling, or the types of exercise that the patients could enjoy such as Thai Traditional Folk Dances or Tai Chi.

In the present study, the frequency of performing exercise and the acquisition of knowledge in exercise were not factors related to the level of exercising knowledge. Most of the diabetes type II patients practiced exercise regularly at least three times a week (65.8%). Moreover, most of them reported that they have already acquired the exercise knowledge (93.4%). Furthermore, most of the patients knew that they should have stopped doing exercise when abnormal symptoms occurred (87.2%). Additionally, more than 70% of patients knew that syncope and tachycardia were symptoms of hypoglycemia, one of the serious complications from doing exercise in the

DM patients. However, only half of them (56%) knew that hunger could have been a symptom of hypoglycemia. Yet, only 16% realized that dizziness could have been a warning symptom of hypoglycemia. The present study revealed that although the patients exercised regularly, they might have done it improperly. Furthermore, it showed that the health care providers, such as doctors and nurses, should be aware of when they recommend their patients to practice exercise. They should advise them more clearly and emphasize the critical parts, such as the hypoglycemic symptoms and the symptoms that the patients should promptly terminate the exercise as well.

According to the present study, although the diabetes type II patients acquire the exercise knowledge from a health care provider rather than from other channels (58.2%), nearly half of them did not acquired that knowledge from doctors and nurses. This data reflected the information that the health care providers may have missed some patients or they had insufficient time for their patients. Due to a huge number of patients that the health care providers had to serve each day, they may not have been able to provide each patient enough time. The data from the present study can help them so that they can give the exercise knowledge to the patients via brochures, video CDs, or other media. In addition, they should emphasize only the items of exercise knowledge that is the least known in each part of knowledge. For the benefit of exercise, patients are not aware that exercise can increase endorphin release. For the aerobic exercise principle, they are not aware of the proper frequency of exercise. Finally, for the exercise principle in DM patients, they are not aware that they should consult their doctors for proper exercise programs before first beginning to exercise. The information received should not only include the benefits and the ways to practice exercise, but also the symptoms of exercise complication that the diabetes type II patients may experience.

Conclusion

Most of the diabetes type II patients practiced exercise regularly at least three times a week (65.8%), by walking (67%), and in-house exercise (48.7%) and most of them practiced exercise in the morning (41.8%). The knowledge about exercise was provided from a health care provider (58.2%). The benefit of exercise known the least was that exercise could increase endorphin release (61.2%). The exercise principle in DM known the least was that the DM patients should consult their doctors before starting an exercise program (49%).

The researchers will take these results and provide the correct knowledge to the diabetes type II patients by emphasizing the items that are the least known and the warning symptoms of exercise complications in the future.

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พฤติกรรมและความรู้เกี่ยวกับการออกกำลังกายของผู้เป็นเบาหวาน

นวพร ชัชวาลพาณิชย์, นวลพิศ อินทรเทพ

วัตถุประสงค์: *เพื่อศึกษาพฤติกรรม และความรู้เกี่ยวกับการออกกำลังกายของผู้เป็นเบาหวานรวมทั้งปัจจัยที่เกี่ยวข้อง*
วัสดุและวิธีการ: *สุ่มสัมภาษณ์โดยใช้แบบสอบถามสำรวจพฤติกรรม และความรู้เรื่องการออกกำลังกายในผู้เป็นเบาหวานชนิดที่ 2 ที่มีอายุตั้งแต่ 18 ปีขึ้นไป และมารับบริการที่คลินิกเบาหวาน โรงพยาบาลศิริราช ตั้งแต่เดือน เมษายน ถึง สิงหาคม พ.ศ. 2550 ระหว่างรอพบแพทย์ที่คลินิกเบาหวาน โรงพยาบาลศิริราช*
ผลการศึกษา: *ผู้เข้าร่วมศึกษาจำนวน 196 คน เป็นชาย 62 คน หญิง 134 คน อายุเฉลี่ย 60.5 ปี พบว่า ส่วนใหญ่ออกกำลังกายสม่ำเสมออย่างน้อย 3 ครั้ง ต่อสัปดาห์ (ร้อยละ 65.8) ผู้เป็นเบาหวานนิยมออกกำลังกาย ด้วยการเดิน (ร้อยละ 67) สถานที่ที่นิยมออกกำลังกายคือในบ้าน(ร้อยละ 48.7) และช่วงเวลาที่ชอบมากที่สุดคือหลังตื่นนอนในช่วงเช้า (ร้อยละ 41.8) ผู้เป็นเบาหวานส่วนใหญ่ได้รับความรู้เรื่องการออกกำลังกายจากบุคลากรทางการแพทย์ (ร้อยละ 58.2) ประโยชน์ของการออกกำลังกายที่ผู้เป็นเบาหวานทราบน้อยที่สุด คือ การออกกำลังกายทำให้สารความสุขหลั่งเพิ่มขึ้น (ร้อยละ 61.2) หลักการออกกำลังกายแบบแอโรบิกที่ผู้เข้าร่วมศึกษาทราบน้อยที่สุด คือ ความถี่ที่เหมาะสมในการออกกำลังกาย (ร้อยละ 50.5) และหลักการออกกำลังกายในผู้เป็นเบาหวานที่ผู้เข้าร่วมศึกษาทราบน้อยที่สุด คือควรปรึกษาแพทย์ก่อนเริ่มออกกำลังกาย (ร้อยละ 49)*
สรุป: *ผู้เป็นเบาหวานส่วนใหญ่มีการออกกำลังกายอย่างสม่ำเสมอ แต่ยังมีข้อที่ไม่รู้เกี่ยวกับการออกกำลังกายอย่างถูกวิธี ซึ่งทางผู้นิพนธ์จะนำข้อมูลที่ได้มาสอนเน้นย้ำข้อที่ผู้เป็นเบาหวานยังไม่ทราบต่อไป*