ORGINAL ARTICLE

Predictors of Physical Activity in Type 2 Diabetic Patients Based on the Theory of Planned Behavior

Ali Fattahi[1*], Roya Nikanjam[1], Majid Barati Mehr[2], Abbas Moghimbeigi[3]

1. MSc, Department of Public Health, School of Health, Hamadan University of Medical Sciences, Hamadan, Iran.
2. Assistant Professor, Social Determinants of Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.
3. Department of Biostatistics and Epidemiology, School of Health, Alborz University of Medical Sciences, Karaj, Iran.

***Correspondence:**
Ali Fattahi, MSc, Department of Public Health, School of Health, Hamadan University of Medical Sciences, Hamadan, Iran.
Tel: (98) 918 307 0877
Email: alifattahi59@yahoo.com

Received: 20 September 2019

Accepted: 21 January 2020

Published in April 2020

Abstract

Objective: Low physical activity is the fourth risk factor of death worldwide. Approximately 27% risk of diabetes is reduced by 150 minutes of moderate physical activity per week. The present study was designed to determine the predictors of physical activity promotion among type 2 diabetic patients.

Materials and Methods: In this cross sectional study 320 patients with type 2 diabetes were included. The data collection tool was a questionnaire, consisting of three main parts; demographic characteristics, International Physical Activity Questionnaire (IPAQ) and Theory of Planned Behavior (TPB) theoretical constructs. Statistical software package SPSS (SPSS Inc version 20) used for all statistical analyses. To determine physical activity and predictive factors a series of logistic regression and bivariate correlations and descriptive analysis were computed.

Results: About 57.5% of patients had moderate levels of physical activity. Significant positive correlation between subjective norms and attitudes toward behavior (*P*-value= .0001) was seen. Significant positive correlations between behavioral intention and attitude toward the behavior (*P*-value= .0001) and subjective norms (*P*-value= .0001) was observed.

Conclusion: The results of the present study showed TPB based physical activity and demographic variable have key role in diabetic patient physical activity levels. To promote physical activity these findings can be used to design effective interventions.

Keywords: Physical activities, Theory of planned behavior, Diabetes mellitus type 2

Introduction

Physical inactivity is the fourth risk factor of death (1). In the Eastern Mediterranean region, 50% of women and 40% men are insufficiently active. In Iran 27.2% over 15 years old have low physical activity (2). Physical activity programs and support policies to increase physical activity levels among populations, World Health Organization suggests (3). About 27% reduced risk of diabetes by 150 minutes of moderate physical activity each week (2). Physical activity plays a key role in management and

[DOI: 10.18502/ijdo.v11i4.2878]

control of type 2 diabetes. Physical activity reduces insulin resistance. Also, physical activity increases the number of receptors and the sensitivity of cells to insulin concentrations in tissues, fat and weight loss lower blood pressure and increase physical fitness for type 2 diabetics. Especially women did not participate in physical activity, and they activity decreases with age increasing. So only 61-41% of 47-54 years old women have desirable physical activity (4-8).

Theory of Planned Behavior (TPB): One of the most commonly utilized models to predict health behavior is the theory of reasoned action (9). TPB focus on theoretical constructs concerned with individual motivational factors as determinants of specific behavior. TPB assume the best predictor of a behavior is behavioral intention, which in turn is determined by attitude toward the behavior (evaluation associated with performing the behavior) and subjective norm (perceived social pressure to perform or not perform the behavior) regarding it. TPB is an extension of theory of reasoned action (TRA) and includes an additional construct: perceived control over performance of the behavior (10).

The TRA and TPB, which focus on the constructs of attitude, subjective norm, and perceived control, explain most of the variance in behavior. Several meta-analyses and reviews confirm evidence. Meta-analyses support the predictive validity of the TPB model on variety of behavior (11) including physical activity and healthy eating habits (12-18).

The present study was designed to determine the predictors of physical activity promotion among type 2 diabetic patients.

Materials and Methods

This cross-sectional study was conducted on 320 patients with type 2 diabetes who were referred to the diabetes center of Hamadan in 2013. The study subjects were selected among diabetic patients with simple random sampling method. Anonymous self-reported questionnaire was used for data collection. Two trained interviewers complete the questionnaires. They receive instructions for how to complete the same questionnaires. Interviewers introduced themselves to patients and explained the study aim and asked them to avoid writing their names on the questionnaires. All questionnaires preserved confidentially and stored for statistical analysis. Subjects entered the study with a willingness and written consent .

The data collection tool was a questionnaire, consisting of three main parts, which were completed by the self-report method. The first part included the demographic characteristics of the participants such as age, gender, educational level, marital status, occupation, height, weight, and smoking history. The second part is the reliable and valid Persian form of the International Physical Activity Questionnaire (IPAQ). The questionnaire assessed the physical activity and classified it into three categories: low, moderate, and severe.

TPB scale was designed based on a standard questionnaire and included 19 items under four constructs including (a) attitude; (b) subjective norms; (c) perceived behavioral control; (d) behavioral intention.

Attitude include 7 items (3 items affective attitude,4 items instrumental attitude) were designed to measure attitude toward physical activity (e.g., “Doing 30 minutes of moderate physical activity at least 5 days a week would be”). The items were rated on a 5-point scale ranging from 1 (Very worthwhile)to 5 (Very worthless).Higher scores indicate more positive attitude to physical activity. These items were multiplicatively combined and averaged. The 7-items scale had Cronbach’s alphas is 0.82, 0.54.

About 4 items were designed to measure Subjective norms. A sample item is “I am under pressure from my family or friends to do 30 minutes of moderate physical activity at least 5 days a week.” The items were rated on a 5-point scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). The 4-item scale had Cronbach’s alphas of 0.76.

[DOI: 10.18502/ijdo.v11i4.2878]

Perceived behavioral control, a belief-based measure of PBC was employed. Control beliefs were assessed in relation to difficulty of physical activity, physical activity be up to me. The items were rated on a 5-point scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). The 2-item scale had Cronbach's alphas of 0.71.

Intention to use was measured with 2 items. The item "I expect to do 30 minutes of moderate physical activity at least 5 days a week The item rated on a 5-point scale ranging from 1 (Very unlikely) to 5 (Very likely) and how likely is it possible that you would make a decision to do 30 minutes moderate physical activity at least 5 days a week in the next month? Is too scaled. The 2-item scale had Cronbach's alphas of 0.60 (19).

Data analysis

Statistical software package SPSS (SPSS Inc version 20) used for all statistical analyses and an alpha level of .05 for all statistical tests. To determine physical activity and predictive factors a series of logistic regression and bivariate correlations and descriptive analysis computed.

Ethical considerations

This study was approved by the ethics committee of Hamadan University of Medical Sciences IR.UMSHA.REC.1397.930126169.

Results

This cross-sectional study was conducted on 320 patients with type 2 diabetes. The mean and standard deviation of age was 55 years and 11.87. About 61.9% of participants were in the category of 45 to 65 years old and 0.6% was fewer than 25 years old. Merely, 12.2% of participants were college graduates and most of them were illiterate or having only primary school education. Females were 71.6% of patients and 74.1% of them were married. Two hundred and ninety three (91.6%) patients were nonsmokers and 27 (8.4%) were smokers, which 20 of them were men (22% of men's). Self-employed patients, were 231 (72.2%) (Table1).

Means and SD status of constructs; attitude, subjective norm, perceived behavioral control and behavioral intention (Table2). We used logistic regression model to predict physical activity intentions; attitudes and subjective norms were predictors of physical activity intention. (Table3) To predict physical activity using logistic regression model, behavioral intentions predict physical activity.

Table 4 displays the relationship between demographic variables and model structure's (attitude, subjective norm perceived behavioral control and behavioral intention). The gender, age and employment status correlate with the attitude.

Discussion

The current study examined physical activity status based on TPB among diabetic patients as a prelude to the design of effective intervention strategies to promote their physical activity. Based on the findings of this study, most patients participate in the study had a moderate level of physical activity. The statistically significant relationship between attitudes (total) and behavioral intention with physical activity among diabetic patient was seen. Subjective norm, perceived behavioral control and physical activity correlation evaluated with Spearman's test, no significant correlation between these two showed. (17,20-22), other studies have shown that levels of health indicators(body mass index, fasting blood glucose, blood lipids, blood pressure and heart rate) in patients with type 2 diabetes without intervention is usually abnormal. Thus increasing the above mentioned factors necessary to design studies and collect data (23,24).

The results of the present study suggested that attitude toward physical activity between

[DOI: 10.18502/ijdo.v11i4.2878]

Table 1. Frequency and percent of demographic variables among diabetic patients

Demographic variables& Physical activity level		Frequency (Percent)
Marital status	Married	237 (74.1)
	Single	14 (4.4)
	Widow	63 (19.7)
	Other	5 (1.6)
Occupation	Unemployed	7 (2.2)
	Self-employee	231 (72.2)
	Decrepit	24 (7.5)
	Employee	20 (6.2)
	Retired	38 (6.9)
Gender	Male	91 (28.4)
	Female	229 (71.6)
Age	<25	2 (6)
	25-45	59 (18.4)
	45-65	198 (61.9)
	>65	61 (19.1)
Smoking	Yes	27 (8.4)
	No	293 (91.6)
Body mass index*	Underweight	11 (3.4)
	Normal	77 (24.1)
	Overweight	123 (34.8)
	Obese	61 (19.1)
	Obesity	26 (8.2)
Education	Illiterate	100 (31.2)
	Primary	99 (30.9)
	Guidance	41 (12.8)
	High School	41 (12.8)
	College	39 (12.2)
Physical activity level	High	53 (16.5)
	Moderate	184 (57.5)
	Low	83 (25.9)

* Body mass index have 22 missed people.

Table 2. Means and standard divisions of TPB variables among diabetic patients

TPB variables	Mean (± SD)
Attitude	82.34 (± 19.84)
Subject norms	87.53 (± 20.18)
Perceived behavioral control	64.06 (± 21.49)
Intention	91.28 (± 21.52)

Table 3. logistic regression of predicting physical activity intention with TPB variable and logistic regression of predicting physical activity with TPB variable among diabetic patients

Step	Variables	Odd's Ratio	Beta	S. E	*P*-value	95% Confidence Interval for B	
						Lower Bound	Upper Bound
Step1	Attitude	0.341	0.314	0.058	0.000	0.227	0.454
Step2	Attitude	0.266	0.245	0.060	0.000	0.149	0.383
Step2	SN	0.232	0.217	0.058	0.000	0.117	0.347
Step1	Intention	0.007	0.223	0.002	0.000	0.003	0.010

patients with type 2 diabetes intended meaning is strongly positive. The findings of this study is consistent by Boudreau et al (25) findings between patients with type II diabetes is (*P*-value< 0.01). Also in the study by Ghahremani et al. (22) physical activity is effective by 32.8% variance.

The findings showed that patient with a positive attitude to physical activity only have moderate activity this suggests that other factors play important role in behavior. In this study attitudes and demographic variables, gender, age and occupation were a statistically significant relationship.

[DOI: 10.18502/ijdo.v11i4.2878]

Table4. The relationship between demographic variables and mode structure's among diabetic patients

Demographic variables		Attitude	SN	PBC	Intention
		Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)
Sex	Male	86.81 (16.97)	89.14 (17.5)	62.08 (19.93)	91.20 (21.44)
	Female	80.56 (20.63)	86.89 (21.1)	64.84 (22.07)	91.32 (21.59)
(ANOVA)	*P*-value	0.011	0.370	0.301	0.967
Age	0-30	81.25 (21.57)	76.56 (23.5)	46.87 (8.83)	93.75 (17.67)
	31-60	84.92(17.28)	88.87 (18.1)	64.61 (21.47)	93.25 (18.27)
	61≤	76.87(23.59)	85.54 (23.5)	64.26 (21.79)	86.86 (27.10)
(ONE WAY ANOVA)	*P*-value	0.004	0.118	0.072	0.048
	Yes	85.58 (19.82)	87.50 (20.0)	59.25 (23.40)	89.81 (27.95)
Smoking	No	82.04 (19.85)	87.54 (20.2)	64.50 (21.29)	91.42 (20.88)
(ANOVA)	*P*-value	0.367	0.992	0.225	0.711
Education	Illiterate	78.53 (21.17)	85.81 (21.1)	65.75 (21.87)	89 (23.65)
	Primary	82.57 (20.32)	86.80 (24.0)	64.89 (22.20)	90.53 (23.22)
	Guidance	82.31 (18.2)	91.76 (12.2)	62.19 (20.82)	96.64 (12.19)
	High School	84.49 (19.30)	88.87 (16.5)	64.02 (22.21)	90.24 (23.63)
	Collegiate	89.28 (15.41)	87.98 (16.8)	59.61 (18.68)	94.55 (15.38)
(ANOVA)	*P*-value	0.061	0.584	0.604	0.311
Body mass index	Underweight	72.72 (23.54)	94.31 (15.1)	59.09 (22.42)	95.45 (15.07)
	Normal	85.57 (18.94)	86.52 (18.4)	63.47 (20.85)	93.18 (16.16)
	Overweight	82.78 (19.15)	89.17 (20.0)	64.93 (20.41)	90.14 (21.78)
	Obese	80.03 (20.39)	85.04 (21.5)	63.11 (24.09)	90.16 (26.33)
	Obesity type 1	84.18 (16.54)	85.41 (24.7)	64.28 (24.77)	94.04 (15.62)
	Obesity type 2	88.57 (11.95)	92.50 (11.1)	77.50 (18.54)	95 (11.18)
(ONE WAY ANOVA)	*P*-value	0.272	0.588	0.720	0.832
Occupation	No work	91.32 (15.68)	92.85 (12.1)	92.85 (12.19)	89.28 (28.34)
	Self-employ	81.10 (20.37)	88.66 (19.4)	88.66 (19.48)	92.15 (20.05)
	Sear	73.51 (22.18)	72.39 (32.8)	72.39 (32.86)	73.95 (36.47)
	Employee	92.85 (9.76)	92.81 (10.5)	92.81 (10.59)	93.12 (17.89)
	Retired	88.25 (15.73)	86.51 (14.9)	86.51 (14.92)	96.38 (11.95)
(ANOVA)	*P*-value	0.003	0.002	0.348	0.001
Marital status	Married	82.36 (19.98)	87.52 (20.2)	64.34 (21.34)	91.61 (20.58)
	Single	81.37 (20.54)	86.60 (21.0)	52.67 (15.64)	81.25 (34.23)
	Died	81.74 (20.09)	87.30 (20.6)	63.69 (22.19)	91.86 (22.12)
	Divorced	92.85 (.)	1 (.)	1 (.)	75 (.)
	Other	89.2 (10.10)	91.25 (12.1)	80 (20.91)	1 (0.0)
(ANOVA)	*P*-value	0.913	0.965	0.48	0.339

The subjective norm and intention to perform physical activity between patients with type 2 diabetes is a significant and positive. Our Findings, approved by study conducted in patients with type 2 diabetes by Boudreau et al. (25) (*P*-value< 0.0001). In Hossaini et al. study 74.4% of participants have moderate level of subjective norm about physical activity (26).

In this study, subjective norm, with demographic variable, job, were significantly related.

Positive significant relation showed between Intention statuses toward physical activity in diabetic patients. Plotnikoff has not approved our finding (16) but Moeini et al. in their study showed that intention is the strongest predictor of physical activity (27). Cultural differences in Canadian society can be effective in

[DOI: 10.18502/ijdo.v11i4.2878]

explaining these differences. In this study, there were significant relation between behavioral intention and demographic variables such as age and occupation.
No significant correlation reported between perceived behavioral control with intention and physical activity. Significant relation saw among perceived behavioral control and age. Ghahremani et al reported 8.32 variance of physical activity explained by PBC (22) .Fortier et al. reported that PBC significantly correlated with intention (28).

Conclusions

The results of the present study showed TPB based physical activity and demographic variable have key role in diabetic patient well-being. The relation of these variables with physical activity is important. To design effective intervention to promote physical activity these findings can used.

Acknowledgements

We would like to thank the Vice-chancellor of Research and Technology, Hamadan University of Medical Sciences for the approval of this study. We announced our gratitude from diabetic patients who took part in the interviews. In addition, the authors thank the staff of Diabetes Center for their cooperation in research.

Funding

This study was supported by the Vice-chancellor of Research and Technology (Social Determinants of Health Research Center), Hamadan University of Medical Sciences.

Conflict of Interest

The authors reported no conflict of interest.

References

1. Mathers C, Stevens G, Mascarenhas M. Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization; 2009.
2. World Health Organization. Chapter 1: Burden: mortality, morbidity and risk factors (Internet). Global Status Report on Non-Communicable Diseases. 2010.
3. World Health Organization. Global strategy on diet, physical activity and health. 2004:17–22.
4. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes research and clinical practice. 2010;87(1):4-14.
5. King H. WHO and the International Diabetes Federation: regional partners. Bulletin of the world Health organization. 1999;77(12):954.
6. Ory MG, Conkling M, Bolin JN, Prochaska JD, Zhan D, Burdine JN, et al. Sociodemographic and healthcare characteristics of Colonia residents: The role of life stage in predicting health risks and diabetes status in a disadvantaged Hispanic population. Ethnicity & disease. 2009;19(3):280.
7. http://www.who.int/mediacentre/factsheets/fs312/en/index.html Reviewed October 2013
8. Alwan A. Global status report on noncommunicable diseases 2010. World Health Organization; 2011.
9. Douglass RB. Belief, attitude, intention, and behavior: An introduction to theory and research. 1977;130-2.
10. Ajzen I. The theory of planned behavior. Organizational behavior and human decision processes. 1991;50(2):179-211.
11. Armitage CJ, Conner M. Efficacy of the theory of planned behaviour: A meta-analytic review. British journal of social psychology. 2001;40(4):471-99.
12. Godin G, Kok G. The theory of planned behavior: a review of its applications to health-related behaviors. American journal of health promotion. 1996;11(2):87-98.
13. Hardeman W, Johnston M, Johnston D, Bonetti D, Wareham N, Kinmonth AL. Application of the theory of planned behaviour in behaviour change interventions: A systematic review. Psychology and health. 2002;17(2):123-58.
14. Ghahremani L, Niknami S, Nazari M. The prediction of physical activity intention and behavior in elderly male residents of a nursing home: a comparison of two behavioral theories. Iranian journal of medical sciences. 2012;37(1):23.(in Persian)
15. . Armitage CJ, Conner M. Efficacy of the theory of planned behaviour: A meta-analytic review. British journal of social psychology. 2001;40(4):471-99.
16. Sheeran P, Taylor S. Predicting Intentions to Use Condoms: A Meta-Analysis and Comparison of the Theories of Reasoned Action and Planned Behavior

[DOI: 10.18502/ijdo.v11i4.2878]

1. Journal of Applied Social Psychology. 1999;29(8):1624-75.
17. Plotnikoff RC, Lubans DR, Costigan SA, McCargar L. A test of the theory of planned behavior to predict physical activity in an overweight/obese population sample of adolescents from Alberta, Canada. Health Education & Behavior. 2013;40(4):415-25.
18. Fortier MS, Kowal J, Lemyre L, Orpana HM. Intentions and actual physical activity behavior change in a community-based sample of middle-aged women: Contributions from the theory of planned behavior and self-determination theory. International Journal of Sport and Exercise Psychology. 2009;7(1):46-67.
19. Ghazanfari Z, Niknami S, Ghofranipour F, Larijani B. Regular physical activity from perspective of females with diabetes: A qualitative study. The Horizon of Medical Sciences. 2009;15(1):5-14.
20. Vaidya A, Krettek A. Physical activity level and its sociodemographic correlates in a peri-urban Nepalese population: a cross-sectional study from the Jhaukhel-Duwakot health demographic surveillance site. International journal of behavioral nutrition and physical activity. 2014;11(1):39.
21. Moeini B, Hazavehei SM, Jalilian M, Moghimbeigi A, Tarigh Seresht N. Factors affecting physical activity and metabolic control in type 2 diabetic women referred to the diabetes research center of Hamadan: Applying trans-theoretical model. Avicenna Journal of Clinical Medicine. 2011;18(2):31-7.
22. Ghahremani L, Niknami S, Nazari M. The prediction of physical activity intention and behavior in elderly male residents of a nursing home: a comparison of two behavioral theories. Iranian journal of medical sciences. 2012;37(1):23.
23. Resnick B, Nigg C. Testing a theoretical model of exercise behavior for older adults. Nursing research. 2003;52(2):80-8.
24. Rajab A, Mahmoodi M, Adili F. Assessment of effect of applying the transtheoretical model to physical activity on health indexes of diabetic type 2 patients. Medical Science Journal of Islamic Azad Univesity-Tehran Medical Branch. 2008;18(1):21-7.
25. Boudreau F, Godin G. Understanding physical activity intentions among French Canadians with type 2 diabetes: an extension of Ajzen's theory of planned behaviour. International Journal of Behavioral Nutrition and Physical Activity. 2009;6(1):35.
26. Hosseini M, Yaghmaei F, Alavi Majd H, Jahanfar M, Heidari P. Correlation between attitude, subjective norm, self-efficacy, intention to physical activity in Female students. Journal of Health Promotion Management. 2014;3(1):52-61.
27. . Moeini B, Jalilian F, Jalilian M, Barati M. Predicting factors associated with regular physical activity among college students applying basnef model. Avicenna Journal of Clinical Medicine. 2011;18(3):70-6.
28. Fortier MS, Kowal J, Lemyre L, Orpana HM. Intentions and actual physical activity behavior change in a community-based sample of middle-aged women: Contributions from the theory of planned behavior and self-determination theory. International Journal of Sport and Exercise Psychology. 2009;7(1):46-67.

[DOI: 10.18502/ijdo.v11i4.2878]