ORIGINAL ARTICLE

Patient Activation Measures in Type2 DM in Tertiary Care Hospital – Does it Differ between Male and Female

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ABSTRACT

Introduction: Type 2 diabetes is characterised by relative insulin deficiency caused by pancreatic β-cell dysfunction and insulin resistance in target organs. The Patient Activation Measure is a valid, highly reliable, unidimensional, probabilistic Guttman-like scale that reflects a developmental model of activation. The measure has good psychometric properties indicating that it can be used at the individual patient level to tailor intervention and assess changes.

Aim: To investigate whether the level of patient activation differs between men and women with T2DM.

Materials and methods: It is a cross-sectional study involving all the patients with T2DM from a tertiary care hospital. The following data were extracted: age, gender, BMI, smoking status, HbA1c, use of glucose lowering medication, and the presence of complications. In this study the Dutch version of the PAM was used which was validated by NIVEL (Netherlands Institute for Health Services Research). The questionnaire consists of 13 items. The association between gender and patient activation was investigated with multivariate linear regression using the continuous PAM score.

Results: 54.5% of the patients were male and 45.5% were female. Mean age was 61.54 (SD: 12.037) years in men and 57.41 (SD: 12.583) years in women, who were significantly older than women ($p < 0.019$).We have found that there is stastically significant difference between patient activation in men and women (p-0.0006).

Conclusion: Patient activation is more in male compared to female. Hence healthy behaviours should be educated for diabetic patients to reduce complications and improve their quality of life and activation.

Key words: PAM-patient activation measures; Type 2 Diabetes Mellitus, BMI

INTRODUCTION

Type 2 diabetes is characterised by relative insulin deficiency caused by pancreatic β-cell dysfunction and insulin resistance in target organs. Between 1980 and 2004, the global rise in obesity, sedentary lifestyles, and an ageing population have quadrupled the incidence and prevalence of type 2 diabetes[1]. World Health Organization (WHO) estimates that more than 346 million people worldwide have DM. This number is likely to be more than double by 2030 without any intervention. Almost 80% of diabetes deaths occur in low and middle-income countries[2]. According to WHO report, India today heads the world with over 32 million diabetic patients and this number is projected to increase to 79.4 million by the year 2030[3].

Diabetes can cause micro vascular and macro vascular complications. Strict metabolic control can delay or prevent the progression of complications associated with diabetes. The needs of diabetic patients are not only limited to adequate glycaemic control but also correspond with preventing complications; disability limitation and rehabilitation. Various studies done in India revealed very poor adherence to treatment regimens due to poor attitude towards the disease and poor health literacy among the general public[4,5]

There are seven essential self-care behaviours in people with diabetes which predict good outcomes. These are healthy eating, being physically active, monitoring of blood sugar, compliance with medications, good problem-solving skills, healthy coping skills and risk-reduction behaviours[6]. Socio-demographic and cultural barriers such as poor access to drugs, high cost, patient satisfaction with their medical care, patient provider relationship, degree of symptoms, unequal distribution of health providers between urban and rural areas have restricted self-care activities in developing countries.

In a study to identify the barriers from the provider's perspective in regard to diabetes care; factors like affordability by the patient, belief by providers that

medications cannot cure patient condition, no confidence in their own ability to alter patient behaviour were identified[7].Another study stressed on both patient factors (adherence, attitude, beliefs, knowledge about diabetes, culture and language capabilities, health literacy, financial resources, co-morbidities and social support) and clinician related factors[8](attitude, beliefs and knowledge about diabetes, effective communication).

The Patient Activation Measure is a valid, highly reliable, uni-dimensional, probabilistic Guttman-like scale that reflects a developmental model of activation. Activation appears to involve four stages: (1) believing the patient role is important, (2) having the confidence and knowledge necessary to take action, (3) actually taking action to maintain and improve one's health, and (4) staying the course even under stress. The measure has good psychometric properties indicating that it can be used at the individual patient level to tailor intervention and assess changes. Therefore, the aim of this study was to investigate whether the level of patient activation differs between men and women with T2DM.

METHODOLOGY

The study population consisted of patients with T2DM. It is a cross-sectional study involving all the patients with T2DM from a tertiary care hospital. We excluded patients with recent history of severe sepsis requiring hospitalization, severe trauma, recent fracture and malignancy.

The following data were extracted: age, gender, BMI, smoking status, HbA1c, use of glucose lowering medication, and the presence of complications. (The presence of microvascular complications was defined as having microalbuminuria, diabetic retinopathy, and/or diminished sensibility of the feet. The presence of macrovascular complications was defined as (a history of) angina pectoris, myocardial infarction, percutaneous transluminal coronary angioplasty, coronary artery bypass grafting, stroke or transient ischemic attack).

In this study the Dutch version of the PAM was used which was validated by NIVEL (Netherlands Institute for Health Services Research)[9]. The questionnaire consists of 13 items which measure knowledge, skills, confidence, and behaviours needed for self management. Each item has five different response categories: (1) disagree strongly, (2) disagree, (3) agree, (4) agree strongly, and (5) not applicable. In the current study, the same scoring rules as in the Dutch validation study of the PAM were used[9]. Patients who filled out less than 7 items or who answered all items with disagree strongly or agree strongly were excluded. Subsequently, mean scores for the PAM were calculated leaving out items which were responded to with not applicable. The mean scores were transformed into a PAM score ranging from 0 to 100 based on scoring rules of Insignia Health[14]. Based on the same rules, the PAM score was also converted into the four levels of patient activation.

Statistical Analysis. Statistical analyses were performed using SPSS version 22

Multiple imputations were used for missing data on the independent variables, assuming that data was missing at random(MAR) or completely at random(MCAR).

Ten imputed datasets were created and the pooled results are described. The patient characteristics are expressed as mean with standard deviation (SD) or median with interquartile range (IQR) for normally distributed data, respectively. Categorical variables are described in numbers and percentages. Differences were considered to be significant at a p value of <0.05.The association between gender and patient activation was investigated with multivariate linear regression using the continuous PAM score.

Four models were used:1)a crude model,2)model adjusted for drugs,HbA1c,veg/non-veg,3) a model adjusted for drugs, HbA1c, veg/non-veg, complications, 4) a model adjusted for age, smoking, MVC, drugs, HbA1c, veg/non-veg and, 5)an explorative model with all variables in model(3) and BMI also.

These diabetes-related confounders were added to investigate whether the burden of T2DM may confound the relation between gender and PAM. The degree to which the different models determined the PAM score was evaluated by the explained variance, shown as adjusted $R2$.

Ethics**:** All patients gave written informed consent for the use of the survey data and the clinical data.

RESULTS

The patient characteristics are described in Table 1. 54.5% of the patients were male and 45.5% were female. Mean age was 61.54 (SD: 12.037) years in men and 57.41 (SD: 12.583) years in women, who were significantly older than women ($p < 0.019$).Men smoked more frequently and they had also more often complications compared to women. The BMI was slightly higher in women. In this study we have found that there is stastically significant difference between patient activation in men and women(p-0.0006).

The median PAM score and the distribution of the PAM levels are described in Table 1. The median PAM score was 14 (IQR: 9.25-16.00) in men and 12 (IQR: 8.00–15.00) in women. Significant difference between PAM levels in men and women ($p = 0.006$).

Table 1: Patient Characteristics

Characteristics	Men	Women	p-value
Number of Patients (%)	109(54.5)	91(45.5)	
Mean age (years)	61.54(12.037)	57.41(12.583)	0.019 < 0.05
Median BMI	26(23.1-28.0)	27.5(23.1-28.0)	0.081 > 0.05
Smoking, n (%)	56(51.4)	16(17.6)	0.000 < 0.05
Use of glucose lowering drugs, n (%)	67(61.5)	57(62.6)	0.865 > 0.05
Use of insulin, n (%)	42(38.5)	34(37.4)	0.865 > 0.05
Median HbA1c (mmol/mol)	9.2 (7.85-11.4)	9.4 (7.8-11.5)	0.953 > 0.05
Complications, n (%)	60(55)	49(53.8)	0.865 > 0.05
Median PAM score	14(9.25-16.00)	12(8.00-15.00)	0.006 < 0.05
PAM level			
1	4(3.7)	5(5.5)	
2	16(14.7)	23(25.3)	
3	16(14.7)	15(16.5)	
4	73(67)	48(52.7)	

Values are depicted as n (%), mean (SD), or median (IQR).
Continuous data were analysed using independent t-tests or the Mann-Whitney Utest.
Categorical variables were analysed using Chi-square tests

Table 2a: Multivariate Regression Analysis for Patient Activation (Cont..)

Variable	Model(1) Adjusted R^2(%)= 0.040%		Model(2) Adjusted R^2(%)=0.038%		Model(3) Adjusted R^2(%)=0.034%	
	b (95%CI)	p value	b (95%CI)	p value	b (95%CI)	p value
Gender	-1.675 (-3.039,-0.311)	0.016	-1.838 (-3.235, -0.441)	0.010	-1.832 (-3.233, -0.431)	0.011
Age						
BMI						
Smoking						
Complications					-0.251 (-1.641, 1.139)	0.722
Drugs	-1.466 (-2.866, -0.67)	0.040	-1.824 (-3.617, -0.031)	0.046	-1.872 (-3.69,-0.055)	0.044
HbA1c			-0.145 (-0.532, 0.243)	0.463	-0.153 (-0.545 ,0.238)	0.441
Veg/Non Veg			0.829 (-0.625, 2.283)	0.262	0.806 (-0.656, 2.269)	0.278

Table 2b: Multivariate Regression Analysis for Patient Activation

Variable	Model(4) Adjusted R^2(%)=0.026%		Model(5) Adjusted R^2(%)=0.021%	
	b (95%CI)	p value	b (95%CI)	p value
Gender	-2.028 (-3.559, -0.497)	0.010	-2.034 (-3.570, -0.498)	0.010
Age	-0.021 (-0.090, 0.049)	0.562	-0.021 (-0.091, 0.049)	0.555
BMI			0.031 (-0.132, 0.158)	0.855
Smoking	0.308 (-1.252, 1.867)	0.698	0.312 (-1.252, 1.877)	0.694
Complications	-0.589 (-2.301, 1.122)	0.498	-0.606 (-2.331, 1.119)	0.489
Drugs	-1.938 (-3.771, -0.104)	0.038	-1.931 (-3.770, -0.092)	0.040
HbA1c	-0.147 (-0.541, 0.246)	0.461	-0.15 (-0.547, 0.246)	0.455
Veg/Non Veg	0.85 (-0.625, 2.325)	0.257	0.805 (-0.751, 2.361)	0.309

Table 3: Stratified Analysis for Men and Women

Variables	Men				Women			
	Model(4) aR^2(%)=0.030%*		Model(5) aR^2(%)=0.023%*		Model(4) aR^2(%)=0.013%*		Model(5) aR^2(%)=0.014%*	
	b(95%CI)	p#	b(95%CI)	p#	b(95%CI)	p#	b(95%CI)	p#
Age	-0.04 (-0.12, 0.03)	0.252	-0.05 (-0.14, 0.03)	0.22	-0.04 (-0.16, 0.09)	0.56	-0.04 (-0.17, 0.09)	0.572
BMI	-0.07 (-0.27, 0.12)	0.451	-0.07 (-0.27, 0.12)	0.467	0.12 (-0.11, 0.32)	0.341	0.11 (-0.11, 0.33)	0.344
Smoking	1.36 (-0.45, 3.17)	0.138	1.46 (-0.40, 3.32)	0.123	-1.81 (-4.83, 1.20)	0.235	-1.81 (-4.87, 1.25)	0.242
Complications			-0.52 (-2.68, 1.64)	0.633	-1.61 (-4.62, 1.39)	0.289	-1.62 (-4.66, 1.43)	0.294
Drugs	-2.63 (-4.82, -0.45)	**0.019**	-2.75 (-4.99, -0.50)	**0.017**	-0.84 (-3.11, 1.43)	0.465	-0.82 (-4.11, 2.47)	0.621
HbA1c	-0.29 (-0.77, 0.19)	0.24	-0.31 (-0.80, 0.18)	0.216			0.006 (-0.72, 0.73)	0.572
Veg/Non Veg	1.06 (-0.90, 3.02)	0.287	1.02 (-0.95, 2.99)	0.307	1.01 (-1.51, 3.54)	0.427	1.01 (-1.56, 3.58)	0.436

*aR^2(%)=Adjusted R^2(%); #p= p value

The results of the regression analyses are described in Table 2. In all models gender was has significant association with the PAM score. In the explorative model (model (5)), all diabetes-related factors (HbA1c, diabetes duration, use of oral glucose lowering drugs, and the presence of complications)were not associated with the PAM score.

Stratified analyses according to gender are described in Table 3. In men, lower age ($b = -0.044$; $p = 0.252$), and a lower BMI ($b = -0.074$; $p = 0.451$) were associated with a higher PAM score in models (R 2 0.023%). In women, the absence of complications ($b = -1.614$; $p < 0.0289$) are associated with a higher PAM score in models (R 2 0.013%). In the explorative model (model (5)), no associations were found between HbA1c, diabetes duration, use of oral glucose lowering drugs, the presence of complications, and the PAM score in men or women.

DISCUSSION

The study was conducted in south India in a tertiary care centre which constitutes mostly rural population. Diabetic care and PAM are mostly related to gender specific risk factors. In this study we have found that there is stastically significant difference between patient activation in men and women (p-0.0006) Since, India is a developing country there is a wide disparity in literacy rate. Men have higher literacy rate compared to women. So, PAM in men are slightly higher than women.

Women have slightly higher BMI compared to men since women in this study are mostly home makers with a sedentary life style. Women with T2DM have a lower degree of well-being, a lower health-related quality of life, and a higher BMI compared to men with T2DM[16,17]. Use of drugs is slightly higher in men than women because educational status of men is higher compared to women in India. There is no much disparity of HbA1c levels in men and women.

Complications are higher in men compared to women even though women have higher BMI and low usage of insulin because of life style, nutritional and genetic factors. On account of the social stigma against females, which is prevalent in the Indian sub continent and per se, in rural India, females have a lack of awareness on their disease and its complications, and are non adherent to their medication and other self care activities. These factors contribute to a poor patient activation among females.

Healthy behaviours are higher in women compared to men since number of smokers are higher in men compared to women. A dutch study revealed that there is a slight degree of patient activation in men and diabetes[9].

Some limitations need to be mentioned. Due to the cross-sectional design, causal conclusions could not be drawn. Although we have investigated important confounders, still some potentially important factors were not taken into account. We were not able to adjust for educational level, socioeconomic status, and marital status. Inclusion of those variables might increase the explained variance. Educational status and financial distress, which could be use as markers for socioeconomic status, were associated with patient activation in a previous Dutch study[10]

As noted by another study good glycaemic control was significantly associated with older age, higher education, higher patient activation, lower diabetes-related emotional distress, better diet and exercise behaviours, lower body mass index, shorter duration of disease and knowledge of HbA1c targets[11]. Women may need additional support and specialized programs for encouragement and of self-management behaviours, problem solving, and addressing gender-specific barriers to self[12]. Two studies found a higher level of patient activation in men[9,10], whereas three other studies did not find a difference between men and women in the level of patient activation[13, 14, 15].

A study revealed that there is no difference in the degree of patient activation of men and women with T2DM. Furthermore, no significant influence was found for well-being, quality of life, BMI, and smoking on the relationship between gender and patient activation[13]

Future studies should evaluate the importance of other factors, such as cognitive impairment, health literacy, motivation and self-efficacy with regard to self-management activation. Additionally, scientific efforts are needed to investigate causal pathways between these determinants and activation. This knowledge might help healthcare professionals to identify patients at risk of inadequate self-management behaviours, which is essential for the development of more individually targeted and tailored interventions.

CONCLUSION

Patient activation is more in males compared to females. Hence healthy behaviours should be educated for diabetic patients to reduce complications and improve their quality of life and activation.

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