The effect of family support, knowledge, and socioeconomic status in controlling diabetes and its complications on the patient

Hisham M. Bakri [1], Faisal M. Alahmadi [1], Ahmad M. Taiyeb [1], Hashim H. Khairallah [1], Anas M. Andijani [1], Khaled A. Yaghmour [2]

(1) Medical intern at King Abdulaziz University Hospital, Jeddah, Saudi Arabia
(2) Assistant Professor, Consultant, Family Medicine Department, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

Corresponding author
Dr. Hisham M. Bakri
Jeddah, Saudi Arabia
Tel.:0543087697
Email: Hishambakri.hb@gmail.com

Received: November 2022 Accepted: December 2022; Published: December 15, 2022.
Citation: Hisham M. Bakri et al. The effect of family support, knowledge, and socioeconomic status in controlling diabetes and its complications on the patient. World Family Medicine. December 2022 - January 2023; 21(1): 89-100
DOI: 10.5742/MEWFM.2023.95251505

Abstract

Background: About 422 million people with diabetes worldwide live in low- and middle-income countries, and the disease directly causes 1.5 million fatalities yearly.

Objectives: to assess the impact of patients' knowledge and family factors in controlling (DM) and its complications.

Methods: a cross-sectional study was done on 137 DM patients. The Diabetes Care Profile (DCP) developed by the Michigan diabetes research and training center was used to measure the social and psychological factors of DM.

Results: 79.6% of the participants were checking their blood sugar and 39.5% were keeping a record of blood sugar test results. Of them, 23.4% had good DM education and 54.7% and 3.6% had fair and good DM understanding respectively. Almost 50% had good social support, 43.8 had good DM control and 56.2% had a good attitude toward DM. Of them, 47.4% had good diet adherence, 46% had long-term care benefit and only 27.7% had good monitoring and understanding management practice. Participants who had good DM understanding had a significantly higher percentage of those who were checking their blood sugar. A significant positive correlation was found between the Control Problems Scale and both the support scale and the Diabetes Attitude Scale (DAS-3). A significant positive correlation was found between the support scale and the health status scale and the Diabetes Attitude Scale (DAS-3).

Conclusion: a relation between family support, knowledge, and socioeconomic status was found to have an effect on diabetes control and complications.

Keywords: support, knowledge, socioeconomic, controlling, diabetes, Saudi Arabia

Introduction

Diabetes mellitus (DM) is a collective name for a variety of metabolic abnormalities, the most common of which is chronic hyperglycemia. Poor insulin secretion, impaired insulin action, or both may be the root of the problem (1). Patients with prediabetes are at a greater risk of developing diabetes mellitus. Prediabetes is commonly described as blood glucose levels that are higher than normal but below diabetes thresholds (1).

The bulk of the approximately 422 million individuals with diabetes globally reside in low- and middle-income nations, and diabetes is directly responsible for 1.5 million fatalities annually (2). The prevalence of DM in Saudi Arabia's population is 8.5%, with men having a slightly higher prevalence than women (8.7% vs. 8.3%) (3). The incidence of DM rises with age, becoming particularly noticeable at 40 and older and peaking at 65, when it is 49.2% in the country. In Saudi Arabia, there are now 2,156,294 diabetic individuals who have been diagnosed and are over the age of 15 (3).

Poor management of DM might lead to problems. DM problems are typically brought on by persistently high blood sugar, which influences the body in two categories, macrovascular and microvascular, the latter of which is more noticeable than the former. Nerve damage, chronic kidney disease, and blindness are examples of microvascular consequences. Macrovascular problems, on the other hand, include primarily heart conditions, strokes, and reduced blood flow to limbs that results in their loss and eventual death (4).

The two main factors contributing to end-stage renal disease are diabetes and hypertension (5). DM doubles to triples the chance of having heart disease and stroke (6). DM can also lead to hypertension and speed up the development of atherosclerosis (7).

One billion people in the world are pre-diabetic, who may eventually end up with full-blown diabetes (8). Taking that into consideration, DM complications could decrease a patient's lifespan and have a detrimental influence on their lifestyle (9).
In Saudi Arabia, DM is linked to contemporary lifestyle practices such as inactivity, unhealthy food choices, obesity ,and genetic factors (10).

The aim of this study was to assess the impact of patients' knowledge and family factors in controlling DM and its complications.

Subjects and Methods

A cross-sectional study was done in Saudi Arabia from May to August 2022. The inclusion criteria were DM patients > 24 years.

Sample size was obtained using a margin of error of 5% and a 95% coincidence interval and with the use of the following formula:
n=(z^2×p(1-p))/ε^2
where z is the z score= 95% confidence level is 1.96, ε is the margin of error = 5%, N is the population size and p is the population proportion=8.5% prevalence of DM in Saudi Arabia population is 8.5% according to general authority for statistics (3). The calculated sample size was 120 participants.

An online pre-designed questionnaire was used; the Diabetes Care Profile (DCP) is a survey method developed by the Michigan diabetes research and training center to measure the social and psychological factors of DM. The project described was supported by Grant Number P30DK020572 (MDRC) from the National Institute of Diabetes and Digestive and Kidney Diseases (11). The first section of the questionnaire included items to assess participants' demographics, DM history and blood sugar checkup. The second section included the following scales: health status scale, the Education / Advice Received scale, understanding scale, Support scale, Control Problems Scale, Diabetes Attitude Scale (DAS-3)., Diet Adherence Scales, Long-term care benefits Scale and Monitoring Barriers and Understanding scale.

Ethical approval for the study was obtained from the research ethics committee of King Abdul-Aziz university hospital Jeddah, Saudi Arabia.

Data were analyzed statistically using (SPSS) version 26. To test the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test (χ^2) was used. Quantitative data was expressed as mean and standard deviation (Mean ± SD), and non-parametric variables were tested using the Mann-Whitney test. Correlation analysis was performed using the Spearman's test, and a p-value of less than 0.05 was considered statistically significant.

Results

(Table 1) shows that the mean age of the participants was 52.18 ± 16.41 years and 55.5% were males. Of the participants, 73% were married, 92% had Saudi nationality and 50.4% had a bachelor's degree of education. More than half (57.7%) were living with ≥5 people; 35.8% had a 100001-15000 SR monthly income and 67.9% were unemployed. The mean DM duration was 12.03 ± 8.34 years; the mean days per week of testing blood sugar was 3.98 ± 2.62 days and the mean times of testing per day was 2.16 ± 1.96 times . Most of the participants (79.6%) were checking their blood sugar and 39.5% were keeping a record of blood sugar test results. The mean DM duration was 12.03 ± 8.34 years, the mean days of testing blood sugar weekly was 3.98 ± 2.62 days.

(Table 2) demonstrates that 38.7% of the participants had a good health status, 23.4% had good DM education and 54.7% and 3.6% had fair and good DM understanding respectively. Almost half of the participants (50.7%) had good social support, 43.8 had good DM control and 56.2% had a good attitude toward DM. Of them, 47.4% had good diet adherence, 46% had long-term care benefit and only 27.7% had monitoring and understanding management practice.

(Table 3 and 4) shows that a non-significant relationship was found between DM control and DM social support and participants' demographics, DM history and blood sugar checkup (p=>0.05). While participants who had a good DM understanding had a significantly higher percentage of those who were checking their blood sugar (p=<0.05) (Table 5).

(Table 6) shows that a non-significant relationship was found between DM control and all other scale results (p=>0.05).

(Table 7) shows that a significant positive correlation was found between the Control Problems Scale and the support scale (r= 0.19, p-value= 0.024), and a significant positive correlation was found between the Control Problems Scale and the Diabetes Attitude Scale (DAS-3). (r= 0.18, p-value= 0.031).

(Table 8) shows that a significant positive correlation was found between the support scale and the health status scale (r= 0.17, p-value= 0.045) and the Diabetes Attitude Scale (DAS-3). (r=0.25, p-value=0.003).

Table 1. Distribution of studied participants according to their demographics, DM history and blood sugar checkup (No.:137)

Variable	No. (%)
Age	52.18 ± 16.41
Gender	
Female	61 (44.5)
Male	76 (55.5)
Marital status	
Widow	4 (2.9)
Single	26 (19)
Married	100 (73)
Divorced	7 (5.1)
Nationality	
Saudi	126 (92)
Non-Saudi	11 (8)
Educational level	
Primary	8 (5.5)
Middle	5 (3.6)
Secondary	33 (24.1)
Bachelor's	69 (50.4)
Master	14 (10.2)
PhD	8 (5.8)
How many people live with you?	
One	7 (5.1)
Two	10 (7.3)
Three	13 (9.5)
Four	25 (18.2)
≥5	79 (57.7)
Lives alone	3 (2.2)
Monthly income	
<5000 SR	19 (13.9)
5000-10000 SR	25 (18.2)
100001-15000 SR	49 (35.8)
>15000 SR	44 (32.1)
Employment status	
Employed	44 (32.1)
Unemployed	73 (67.9)
Do you check your blood sugar?	
No	28 (20.4)
Yes	109 (79.6)
Do you keep a record of your blood sugar test results? (No.:109)	
Only unusual results	14 (12.8)
No	52 (47.7)
Yes	43 (39.5)
Diabetes duration	12.03 ± 8.34
How many days a week do you test your blood sugar?	3.98 ± 2.62
On the days you test, how often do you test your blood sugar during the day?	2.16 ± 1.96

Table 2. Distribution of studied participants according to results of used scales (Health status, Education / Advice Received, Understanding, Support, Control Problems Scale, Attitudes Toward Diabetes Scales, Diet Adherence Scales, Long-term care benefits Scale and Monitoring Barriers and Understanding) (No.:137)

Variable	No. (%)
Health Status	
Poor health status	84 (61.3)
Good health status	53 (38.7)
Education / Advice Received	
Poor education	105 (76.6)
Good education	32 (23.4)
Understanding	
Poor understanding	57 (41.6)
Fair understanding	75 (54.7)
Good understanding	5 (3.6)
Support	
Poor social support	68 (49.6)
Good social support	69 (50.4)
Control Problems Scale	
Poor control	77 (56.2)
Good control	60 (43.8)
Attitudes Toward Diabetes Scales	
Negative attitude	60 (43.8)
Positive attitude	77 (56.2)
Diet Adherence Scales	
Poor adherence	72 (52.6)
Good adherence	65 (47.4)
Long-term care benefits Scale	
Poor benefits	74 (54)
Good benefits	63 (46)
Monitoring Barriers and Understanding Management Practice	
Poor monitoring	99 (72.3)
Good monitoring	38 (27.7)

Table 3. Relationship between DM control and participants' demographics, DM history and blood sugar checkup (no.:137)

Variable	Control Problems Scale		χ2	p-value
	Poor control No. (%)	Good control No. (%)		
Age	54.01 ±15.52	49.82 ±17.33	1.38	0.166
Diabetes duration	12.84 ±8.26	10.98 ±8.39	1.49	0.136
How many days a week do you test your blood sugar?	4.14 ±2.82	3.8 ±2.38	0.26	0.794
On the days you test, how often do you test your blood sugar during the day?	2.21± 2.32	2.1 ±1.46	0.81	0.414
Gender				
Female	37 (48.1)	24 (40)	0.88	0.347
Male	40 (51.9)	36 (60)		
Marital status				
Widow	3 (3.9)	1 (1.7)	0.63	0.888
Single	14 (18.2)	12 (20)		
Married	56 (72.7)	44 (73.3)		
Divorced	4 (5.2)	3 (5)		
Nationality				
Saudi	72 (93.5)	54 (90)	0.56	0.454
Non-Saudi	5 (6.5)	6 (10)		
Educational level				
Primary	4 (50)	4 (6.7)	1.62	0.898
Middle	3 (3.9)	2 (3.3)		
Secondary	18 (23.4)	15 (25)		
Bachelor's master	41 (53.2)	28 (46.7)		
Master	8 (10.4)	6 (10)		
PhD	3 (3.9)	5 (8.3)		
How many people live with you?				
<5	31 (40.3)	27 (45)	0.31	0.577
≥5	46 (59.7)	33 (55)		
Monthly income				
<5000 SR	8 (10.4)	11 (18.3)	4.53	0.209
5000-10000 SR	28 (36.4)	16 (26.7)		
100001-15000 SR	30 (39)	19 (31.7)		
>15000 SR	11 (14.3)	14 (23.3)		
Employment status				
Employed	20 (26)	24 (40)	3.04	0.081
Unemployed	57 (74)	36 (60)		
Do you check your blood sugar?				
No	19 (24.7)	9 (15)	1.94	0.164
Yes	58 (75.3)	51 (85)		
Do you keep a record of your blood sugar test results? (No. 109)				
Only unusual results	10 (13)	4 (6.7)	4.19	0.241
No	27 (35.1)	25 (41.7)		
Yes	21 (27.3)	22 (36.7)		

Table 4. Relationship between social support and participants' demographics, DM history and blood sugar checkup (no.:137)

Variable	Support		χ^2	p-value
	Poor social support No. (%)	Good social support No. (%)		
Age	51.49 ±16.6	52.86 ±16.31	0.7	0.478
Diabetes duration	11.55± 8.89	12.49 ±7.79	1.15	0.247
How many days a week do you test your blood sugar?	4.41± 2.85	3.6 ±2.36	1.27	0.201
On the days you test, how often do you test your blood sugar during the day?	2.37 ±2.46	1.96 ±1.36	0.09	0.922
Gender				
Female	34 (50)	27 (39.1)	1.63	0.201
Male	34 (50)	42 (60.9)		
Marital status				
Widow	1 (1.5)	3 (4.3)	1.32	0.722
Single	12 (17.6)	14 (20.3)		
Married	51 (75)	49 (71)		
Divorced	4 (5.9)	3 (4.3)		
Nationality				
Saudi	63 (92.6)	63 (91.3)	0.08	0.772
Non-Saudi	5 (7.4)	6 (8.7)		
Educational level				
Primary	4 (5.9)	4 (5.8)		
Middle	2 (2.9)	3 (4.3)	0.98	0.964
Secondary	18 (26.5)	15 (21.7)		
Bachelor's master	34 (50)	35 (50.7)		
Master	7 (10.3)	7 (50)		
PhD	3 (4.4)	5 (7.2)		
How many people live with you?				
<5	31 (45.6)	27 (39.1)	0.58	0.444
≥5	37 (54.4)	42 (60.9)		
Monthly income				
<5000 SR	7 (10.3)	12 (17.4)		
5000-10000 SR	20 (29.4)	24 (34.8)	2.71	0.438
100001-15000 SR	28 (41.2)	21 (30.4)		
>15000 SR	13 (19.1)	12 (17.4)		
Employment status				
Employed	20 (49.4)	24 (34.8)	0.45	0.501
Unemployed	48 (70.6)	45 (65.2)		
Do you check your blood sugar?				
No	17 (25)	11 (15.9)	1.72	0.189
Yes	51 (75)	58 (84.1)		
Do you keep a record of your blood sugar test results? (No. :109)				
Only unusual results	2 (2.9)	12 (17.4)	1.08	0.28
No	25 (36.8)	27 (39.1)		
Yes	24 (35.3)	17 (27.5)		

Table 5. Relationship between DM understanding and participants' demographics, DM history and blood sugar checkup (no.:137)

Variable	Understanding			χ^2	p-value
	Poor understanding No. (%)	Fair understanding No. (%)	Good understanding No. (%)		
Age	51.33 ±16.47	52.71 ±16.33	53.8 ±20.2	2	0.584
Diabetes duration	12.06 ±8.14	11.99 ±8.33	12.2 ±5.25	2	0.949
How many days a week do you test your blood sugar?	4.08 ±2.56	3.94 ±2.71	3.8 ±2.16	2.3	0.905
On the days you test, how often do you test your blood sugar during the day?	2.39 ±2.41	2.03 ±1.71	2 ±1.22	2.1	0.976
Gender					
Female	27 (47.4)	31 (41.3)	3 (60)	0.98	0.612
Male	30 (52.6)	44 (58.7)	2 (40)		
Marital status					
Widow	2 (3.5)	1 (1.3)	1 (20)		
Single	12 (21.1)	13 (17.3)	1 (20)	7.26	0.297
Married	39 (68.4)	58 (77.3)	3 (60)		
Divorced	4 (7)	3 (4)	0 (0.0)		
Nationality					
Saudi	50 (87.7)	71 (94.7)	5 (100)	2.57	0.277
Non-Saudi	7 (12.3)	4 (5.3)	0 (0.0)		
Educational level					
Primary	3 (5.3)	4 (5.3)	1 (20)		
Middle	3 (5.3)	2 (2.7)	0 (0.0)	5.95	0.819
Secondary	16 (28.1)	15 (20)	2 (40)		
Bachelor's master	26 (45.6)	41 (54.7)	2 (40)		
Master	5 (8.8)	9 (12)	0 (0.0)		
PhD	4 (7)	4 (5.3)	0 (0.0)		
How many people live with you?					
<5	27 (47.4)	29 (38.7)	2 (40)		
≥5	30 (52.6)	46 (61.3)	3 (60)	1.01	0.602
Monthly income					
<5000 SR	9 (15.8)	8 (10.7)	2 (40)		
5000-10000 SR	9 (15.8)	15 (20)	1 (20)	5.63	0.566
100001-15000 SR	22 (38.6)	27 (36)	0 (0.0)		
>15000 SR	17 (29.8)	25 (33.3)	2 (40)		
Employment status					
Employed	19 (33.3)	25 (33.3)	0 (0.0)	2.45	0.293
Unemployed	38 (66.7)	50 (67.7)	5 (100)		
Do you check your blood sugar?					
No	18 (31.6)	10 (13.3)	0 (0.0)		
Yes	39 (68.4)	65 (86.7)	5 (100)	7.96	**0.019**
Do you keep a record of your blood sugar test results? (No. 109)					
Only unusual results	2 (3.5)	10 (13.3)	2 (40)	1.54	0.11
No	20 (35.1)	29 (38.7)	3 (60)		
Yes	17 (29.8)	26 (34.7)	0 (0.0)		

Table 6. Relationship between DM control and health status, education / advice received, understanding, support, attitudes toward diabetes scales, diet adherence scales, long-term care benefits scale and monitoring barriers and understanding (No.:137)

Variable	Control Problems Scale		χ2	p-value
	Poor control No. (%)	Good control No. (%)		
Health Status				
Poor health status	41 (53.2)	43 (71.7)	4.82	0.128
Good health status	36 (46.8)	17 (28.3)		
Education / Advice Received				
Poor education	59 (76.6)	46 (76.7)	0.001	0.995
Good education	18 (23.4)	14 (23.3)		
Understanding				
Poor understanding	34 (44.2)	23 (38.3)	1.96	0.375
Fair understanding	39 (50.6)	36 (60)		
Good understanding	4 (5.2)	1 (1.7)		
Support				
Poor social support	42 (54.5)	26 (43.3)	1.69	0.193
Good social support	35 (45.5)	34 (56.7)		
Attitudes Toward Diabetes Scales				
Negative attitude	37 (48.1)	23 (38.3)	1.29	0.255
Positive attitude	40 (51.9)	37 (61.7)		
Diet Adherence Scales				
Poor adherence	43 (55.8)	29 (48.3)	0.76	0.382
Good adherence	34 (44.2)	31 (51.7)		
Long-term care benefits Scale				
Poor benefits	41 (53.2)	33 (55)	0.04	0.838
Good benefits	36 (46.8)	27 (45)		
Monitoring Barriers and Understanding Management Practice				
Poor monitoring	56 (72.7)	43 (71.7)	0.01	0.891
Good monitoring	21 (27.3)	17 (28.3)		

Table 7. Spearman's correlation analysis between Control Problems Scale scores and other scales scores (health status, education / advice received, understanding, support, attitudes toward diabetes scales, diet adherence scales, long-term care benefits scale and monitoring barriers and understanding)

Variable	Control Problems Scale	
	r	p-value
HealthStatus	-0.05	0.541
Education / Advice Received	0.01	0.91
Understanding	0.02	0.8
Support	0.19	**0.024**
AttitudesToward DiabetesScales	0.18	**0.031**
Diet AdherenceScales	-0.02	0.747
Long-term care benefitsScale	-0.01	0.844
Monitoring Barriers and Understanding Management	0.07	0.532

Table 8. Spearman's correlation analysis between support scale scores and other scales scores (health status, education / advice received, understanding, control problems scale, attitudes toward diabetes scales, diet adherence scales, long-term care benefits scale and monitoring barriers and understanding)

Variable	Support Scale	
	r	p-value
HealthStatus	0.17	**0.045**
Education / Advice Received	-0.17	0.079
Understanding	0.16	0.063
AttitudesToward DiabetesScales	0.25	**0.003**
Diet AdherenceScales	0.06	0.449
Long-term care benefitsScale	-0.13	0.123
Monitoring Barriers and Understanding Management	0.08	0.446

Discussion

The aim of this cross-sectional study was to identify the effectiveness of family support, knowledge, and socioeconomic status in controlling diabetes and its complications on the patient. In this part of the study, we will discuss the following measures: DM control, social support, and understanding level among multiple variables including age, gender, marital status, education level, number of people living with the patient, monthly income, employment status and the frequency of measuring blood glucose level.

The mean age of our patients was 52.18 ± 16.41 years, and this usually related to the fact that the patients who contributed to our research were 24 years old and above, so, most likely diagnosed with type 2 DM which affects older rather than younger age groups. The mean age of our patients is similar to that in other studies (12,13,14). Older aged patients had poorer control than younger aged patients, even though, the association isn't statistically significant as consistent with another study (15). Social support and understanding levels have not been significantly related to specific aged patients, as agreed with by this study (16). In fact, another study reached the conclusion that education programs about DM and its management should be started as young as possible in order to reflect good health outcomes for diabetic patients (17).

The majority of our patients were males (55%), moreover, the highest percentage of DM control was among males rather than females and this could be related to the fact that females have much less daily activity compared to males in Saudi Arabia, which has been denoted in studies done in Saudi Arabia (18,19). Another factor that helps males to have better control, is males are found to have more social support (60%) compared to female patients (40%). However, there is no significant relation between DM control and gender.
Social support and attitudes toward diabetes scales were significantly associated with the control scale, respectively. A cross-sectional study showed that social support reflected better self-management practices (17). The relation between education and understanding levels with DM control were similarly insignificant. Interestingly our analysis showed that Bachelor degree patients have more social support compared to lower and higher education levels in DM patients and this may be related to the fact that bachelor degree patients are in middle ages and mainly newly married so they have better social status and support which has been demonstrated by another study in which they found college degree patients had more social support compared to other levels (16). A cross-sectional study found that education levels with a college degree or more have superior glycosylated hemoglobin levels (7.0%) compared to those lower than college degree levels who had (7.3%) glycosylated hemoglobin level (20).

The number of people living with DM patients has been found to be associated with better social support, and patients who live with more than 5 people have better DM control and understanding levels. A cross-sectional study among 405 adults attending diabetic outpatient clinics between May 2021 and June 2021 has implicated that the higher the number of family members, the more optimal self-management and control (21). Monthly income, employment status and frequency of measuring blood glucose level have not been found to be significantly associated with DM control.

Conclusion

This study has demonstrated the relation between family support, knowledge, and socioeconomic status and showed its effect on diabetes control and complications on the patient. Moreover, patients with diabetes should be evaluated in multiple social, educational, and economical aspects in order to preserve good diabetes control, decrease complications and reduce overall diabetes incidence and mortality.

Acknowledgment: The authors gratefully acknowledge the cooperation of all participants.

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