Compliance and control of diabetes in a family practice setting, Saudi Arabia

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امتثال المرضى لمعالجة السكّري والسيطرة عليه في عيادة لطب الأسرة بالمملكة العربية السعودية

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خلاصة: كان هدف هذه الدراسة استعراف بعض محدِّدات امتثال المرضى للنظام الغذائي وأدوية السكّري ومواعيد الاستشارة بين مرضى السكّري (وعددهم 294) الذين يترددون على إحدى عيادات طب الأسرة. وأظهرت النتائج أن الإمتثال الدقيق للنظام الغذائي كان أعلى بدرجة جوهرية بين الذكور (P = 0.01) وأولئك الذين يتحكمون جيداً في مستوى السكّري (P = 0.01)، بينما كان الامتثال الدقيق لمواعيد الاستشارة مرتبطاً بدرجة جوهرية بالنمط الثاني من السكّري (P<0.01) وبالرعاية الجيدة (P<0.01). أما الامتثال للأدوية فلم يكن له أي ارتباط جوهري بأي عامل من المحدِّدات التي تمت دراستها (P<0.05). ولدى تطبيق تحليل التحوّف (الانحدار) المتعدد، تبيّن أن درجة السيطرة على السكّري ومدة المرض والدرجة الإجمالية للرعاية كانت هي العوامل الوحيدة للتكهن بجوانب الامتثال الثلاثة (P<0.05).

ABSTRACT This study aimed to identify some determinants of compliance with diet, anti-diabetic drugs and the appointment system amongst diabetic patients ($n = 294$) attending a family practice setting. The results showed that good compliance with diet was significantly higher among males ($P = 0.01$) and those with good diabetic control ($P = 0.01$), while good compliance with appointment systems was significantly associated with type II diabetes ($P < 0.01$) and good care ($P < 0.01$). Compliance with drugs showed no significant association with any of the studied determinants ($P > 0.05$). When multiple regression analysis was applied, the degree of control of diabetes, its duration and the total score of care were the only predictors of the three aspects of compliance ($P < 0.05$).

Observance et contrôle du diabète dans un centre médical communautaire en Arabie saoudite
RESUME Le but de cette étude était d'identifier certains déterminants de l'observance concernant le régime alimentaire, les médicaments antidiabétiques et le suivi médical chez des diabétiques (n=294) consultant dans un centre médical communautaire. Les résultats ont montré que l'observance du régime alimentaire était significativement meilleure chez les hommes (p=0,01) et chez les personnes qui avaient un bon contrôle du diabète (p=0,01) tandis qu'une bonne observance du suivi médical était associée de manière significative avec le diabète de type 2 (p<0,01) et une bonne prise en charge (p<0,01). L'observance médicamenteuse n'a montré aucune association significative avec l'un quelconque des déterminants étudiés (p>0,05). A l'analyse par régression multiple, le degré de contrôle du diabète, sa durée et la cote totale de la prise en charge étaient les seuls éléments prédictifs de ces trois aspects de l'observance (p<0,05).

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Introduction

The care of diabetes involves some changes in the lifestyle of diabetic patients, such as a change in dietary habits and regular intake of medications. Compliance of diabetic patients with medical advice is essential for controlling the disease. Compliance is defined as the extent of adherence of patients to medical advice; it is affected by many factors related to the patient, the disease, the physician and the family [*1*].

A study of the determinants of compliance among Saudi diabetic patients is considered a priority need at the moment for three reasons. First, diabetes mellitus is becoming a major health problem within Saudi Arabia as its prevalence has been found to be 11.8% and 12.8% in males and females respectively [*2*]. It thus causes a considerable increase in morbidity, mortality and cost to the society. Secondly, it is a proven fact that long-term complications of diabetes mellitus can be prevented or postponed through good care and control of the disease [*3*]. Thirdly, Saudi society is undergoing such a rapid socioeconomic transition that it is unfair to apply the results of compliance studies from Western countries to the Saudi community. A few researchers in Saudi Arabia have studied the problem of compliance in some chronic diseases such as epilepsy [*4*], but none of them has addressed the problem of compliance in diabetes.

The objectives of the study were:

- to study the demographic features of diabetic patients in terms of patient characteristics, disease characteristics and care characteristics among patients attending a family practice setting;
- to assess the role of the characteristics in the prediction of compliance with diet, medication and the appointment system.

Subjects and methods

The study was carried out for a period of 3 months from 1 October to 31 December 1996 at Al-Manhal primary health care (PHC) centre. It has a catchment area of 50 km^2 and serves about 16 000 inhabitants of Abha, the capital city of Asir Region, Saudi Arabia. The centre is manned by six general practitioners including two females. Care of diabetic patients is provided through an integrated approach within the ordinary morning and afternoon clinics. Female diabetic patients are seen mainly by female doctors and male patients by male doctors.

All the diabetic patients registered with Al-Manhal PHC centre (n = 294) were included in the present study. Special problem-oriented medical files, designed for the diabetic patients are kept separately. A special diabetic follow-up card was designed for the purpose of the present study. It comprised three columns to record the assessment by the doctor of the patient's degree of compliance with diet, drugs and the appointment system. The new diabetic card was introduced in mid-1996. All doctors at Al-Manhal PHC centre were trained in the methods of assessing the three aspects of compliance with the diabetic regimen under study.

Compliance by diabetic patients attending the clinic was judged in accordance with the guidelines laid down by the National Quality Assurance Protocol, Ministry of Health, Saudi Arabia [*5*], which are based on the number of visits by the diabetic patient during a 6-month period. Good compliance was recorded when the diabetic patient attended the clinic on more than two occasions, fair compliance when the patient attended on one occasion and poor compliance when the patient had not attended the clinic during the previous 6 months.

Compliance with dietary regimen was graded as: good, fair and poor depending on the reported adherence to the prescribed dietary regimen by the diabetic patient, which was further evaluated by the extent of weight gain/loss and by metabolic control. Good compliance was recorded when the patient strictly followed the prescribed dietary regimen, fair when he/she sometimes did not follow the regimen, and poor when he/she did not follow the regimen at all.

Compliance with anti-diabetic drugs was assessed by the extent of adherence of the diabetic patients to the prescribed doses of medications, which was double-checked by inspecting the drug container. Good compliance was recorded when the diabetic patient took all his/her medications in accordance with the prescription, fair when he/she missed 1–3 doses per month and poor when he/she missed ≥ 4 doses per month.

During the monthly visit of the patient to the PHC centre the doctor assessed and recorded the degree of compliance with appointment, diet and anti-diabetic drugs and gave specific health education tailored to the needs of each patient. The doctor also recorded such advice briefly in the diabetic follow-up record. The diabetic patients were repeatedly asked to bring with them the drug bottle with their anti-diabetic medications when they came to the PHC centre for the repeat prescription. In assessing the degree of compliance with the appointment system, the PHC doctor looked at the dates of the previous visits by the patient; in assessing the degree of compliance with diet and drugs the doctor asked patients about the extent of their adherence to the specific instructions previously given to them and recorded in their files.

The data collected for our study were based on the assessment by the doctor of the patient's conformity to the three aspects of compliance during the interview of the last visit in late 1996.

We developed a compliance score using a three-point scale for each of the three items (diet, drugs and appointment) as follows: 3 for good compliance, 2 for fair and 1 for poor compliance. The total compliance score for the three items was nine. The process of care was measured by the score system developed by Chesover et al. [*6*], which depends on the extent of fulfilment of 10 items of good diabetic care in the past 10 years. These 10 items are: blood glucose measurements, weight, test for proteinuria, blood pressure, foot examination, peripheral sensation, ophthalmic examination, urea and electrolytes, and glycosylated haemoglobin measurements. Good care was recorded if the total score was ≥ 8 points, fair (5–7 points) and poor (< 4 points). Control of diabetes was defined as good if the last reading of fasting blood sugar was < 140 mg/dL and poor if it was ≥ 140 mg/dL. Diabetic files were reviewed to examine the relationship of degree of compliance with diet, drugs and appointments to variables related to patients' characteristics (age, sex, literacy, employment and marital status), disease characteristics (type of diabetes, family history of diabetes and duration of diabetes) and care characteristics [number of drugs, type of drugs (oral or insulin), degree of diabetic care and control].

Statistical analysis was done using *SPSS*. Univariate relationships between the dependent variables (degree of compliance with diet, drugs and appointment) and independent variables related to patients, disease and care characteristics were examined using the chi-squared test and Fisher exact test. The total compliance score as dependent variable was compared with the patient, disease and care character-

Table 1 **Characteristics of diabetic patients (n = 294) at Al-Manhal PHC centre, 1996**

Characteristic	Value
Mean age ± *s*	54 ± 12.8 years
Sex	
Females	121 (41.2%)
Males	173 (58.8%)
Marital status	
Single	23/260 (8.2%)
Married	257/280 (91.8%)
Missing	14 (4.8%)
Education	
Illiterate	125/225 (55.6%)
Literate	100/225 (44.4%)
Missing	69 (23.5%)
Employment	
Unemployed	106/194 (54.6%)
Employed	88/194 (45.4%)
Missing	100 (34.0%)
Type of diabetes	
Type I	36 (12.2%)
Type II	258 (87.8%)
Type of treatment	
Diet only	22/248 (8.9%)
Diet and drugs	226/248 (91.1%)
Missing	46 (15.5%)
Family history of diabetes	
Positive	97/260 (37.3%)
Negative	163/260 (62.7%)
Missing	34 (11.6%)
Smoking	
Smokers	22/270 (8.1%)
Non-smokers	248/270 (91.9%)
Missing	24 (8.2%)
Mean duration of diabetes ± *s*	6.4 ± 5 years
Mean fasting blood sugar ± *s*	189.1 ± 63.6 mg/dL
Mean systolic blood pressure ± *s*	121 ± 18 mmHg
Mean total cholesterol ± *s*	215.5 ± 47.1 mg/dL

s = standard deviation

istics as independent variables using linear regression analysis. Using stepwise multiple regression analysis, the compliance of patients with diet as a dependent variable was compared with their compliance with other aspects of the diabetic regimen (appointments and drugs).

Results

The total number of diabetic patients registered with Al-Manhal PHC centre during the study period was 294. Table 1 shows the characteristics of diabetic patients under study. We found that > 50% of the diabetic patients were illiterate and unemployed. Their mean age ± standard deviation was 54.2 ± 12.8 years, they mostly had type II diabetes and they had a relatively high mean fasting blood sugar level at 189.1 ± 63.6 mg/dL.

Table 2 shows the pattern of compliance by diabetic patients at Al-Manhal PHC centre. For about two-thirds of the diabetic pa-

Table 2 **Patterns of compliance by diabetic patients at Al-Manhal PHC centre**

Compliance pattern	No.	%
Compliance with appointments (n = 294[a])		
Good	180	61.2
Fair	23	7.8
Poor	91	31.0
Compliance with drugs (n = 222[a])		
Good	187	84.2
Fair	31	14.0
Poor	3	1.4
Compliance with diet (n = 238[a])		
Good	97	40.8
Fair	113	47.5
Poor	28	11.8

[a]Results are presented for patients whose data are available.

tients their compliance rating for appointments was good and for > 80% their compliance rating for drugs was good. However, only 40% had a good compliance rating for diet.

Table 3 shows univariate analysis of the effect of patient characteristics, disease and care characteristics on the degree of compliance with diet by diabetic patients. None of the sociodemographic characteristics had a significant relationship to compliance with diet ($P > 0.05$) except for sex ($P = 0.01$). None of the disease characteristics under study had any significant association with the degree of compliance with diet ($P > 0.05$ for all the variables). Neither the number of drugs nor the type of drugs was found to have any significant relationship with the degree of compliance with diet ($P > 0.05$ for both). The degree of diabetic care did not have any significant relationship with the degree of compliance with diet ($P > 0.05$), but the degree of control was found to have a significant relationship with the degree of compliance with diet ($P = 0.010$).

Table 4 shows that none of the variables related to patient characteristics, disease and care were found to have any significant relationship with the degree of compliance with drugs ($P > 0.05$ for these variables). Table 5 shows that the only variables that had a significant relationship with the degree of compliance with appointments through univariate analysis were the type of diabetes ($P = 0.007$) and the degree of care ($P < 0.001$). Patients with type II diabetes tended to comply more with the primary care diabetic clinic. The rest of the variables related to patients, disease and care characteristics did not have significant relationships ($P > 0.05$ for such variables).

Table 6 shows multivariate analysis for the effect of patients, disease and care characteristics on the total compliance score for diet, drugs and appointments. None of the sociodemographic characteristics of the patients were significantly predictive of the total compliance score ($P > 0.05$ for such variables). Scores for care ($P = 0.01$) and control of diabetes ($P = 0.02$) were found to be significant predictors of compliance. On the other hand, the duration of diabetes was observed to have a significant negative relationship with the total compliance score ($P = 0.01$).

Table 7 shows the effect of compliance with drugs and appointments as independent variables and compliance with diet as a dependent variable using stepwise logistic regression analysis. It was observed that both compliance with appointments ($P = 0.01$; odds ratio = 3.16; 95% confidence interval = 1.41 to 0.80) and compliance with drugs ($P = 0.03$; odds ratio = 14.93; 95% confidence interval = 2.862 to 2.516) significantly predicted compliance with diet.

Discussion

Measuring the compliance of diabetic patients is a complex issue because it includes several important aspects of diabetic self-care activities, such as the extent of adherence to dietary regimen, drugs, appointment systems, exercise and foot care. In addition to these limitations, cost and feasibility of the different means of assessing compliance are also important when deciding whether to use self-reported methods, observational or biochemical methods.

Patient characteristics

We found no significant relationship between the various aspects of compliance as regards diet, drugs and appointments and the sociodemographic characteristics of the patients, i.e. age, sex, literacy, employment

Table 3 **Univariate analysis of the effect of patient, disease and care characteristics on degree of compliance with diet**

Variable	Compliance with diet				*P*-value[a]
	Poor		Good/fair		
	No.	%	No.	%	
Patient characteristics					
Age (years)					
< 45 (*n* = 48)	3	6.3	45	93.7	0.20
≥ 45 (*n* = 187)	24	12.8	163	87.2	
Sex					
Female (*n* = 135)	22	16.3	113	83.7	0.01*
Male (*n* = 103)	6	5.8	97	94.2	
Literacy					
Illiterate (*n* = 88)	15	17.0	73	83.0	0.09
Literate (*n* = 110)	10	9.1	100	90.9	
Employment					
Unemployed (*n* = 78)	10	12.8	68	87.2	0.31
Employed (*n* = 98)	8	8.2	90	91.8	
Marital status					
Unmarried (*n* = 19)	3	15.8	16	84.2	0.57
Married (*n* = 210)	24	11.4	186	88.6	
Disease characteristics					
Type of diabetes					
Type I (*n* = 28)	4	14.3	24	85.7	0.66
Type II (*n* = 210)	24	11.4	186	88.6	
Family history of diabetes					
Negative (*n* = 135)	15	11.1	117	86.7	0.85
Positive (*n* = 85)	9	10.6	76	89.4	
Duration of diabetes (years)					
< 7 (*n* = 112)	12	10.7	100	89.3	0.69
≥ 7 (*n* = 22)	3	13.6	19	86.4	
Care characteristics					
Number of drugs					
1 (*n* = 205)	24	11.7	181	88.3	0.79
≥ 2 (*n* = 11)	1	9.1	10	90.9	
Type of drugs					
Oral (*n* = 173)	20	11.6	153	88.4	0.99
Injection (insulin) (*n* = 43)	5	11.6	38	88.4	
Degree of diabetic care					
Poor (*n* = 2)	0	0.0	2	100.0	0.78[b]
Good/fair (*n* = 236)	29	11.9	208	88.1	
Degree of control					
Poor (*n* = 122)	20	16.4	102	83.6	0.010*
Good/fair (*n* = 108)	6	5.6	102	94.4	

* *Statistically significant at 95% confidence level*
[a] *Using chi-squared test*
[b] *Using Fisher exact test*

Table 4 **Univariate analysis of the effect of patient, disease and care characteristics on degree of compliance with drugs**

Variable	Compliance with drugs				P-value[a]
	Poor		Good/fair		
	No.	%	No.	%	
Patient characteristics					
Age (years)					
< 45 (*n* = 43)	1	2.3	42	97.7	0.48
≥ 45 (*n* = 175)	2	1.1	173	98.9	
Sex					
Females (*n* = 99)	1	1.0	98	99.0	0.58
Males (*n* = 122)	2	1.6	120	98.4	
Literacy					
Illiterate (*n* = 78)	2	2.6	76	97.4	0.37
Literate (*n* = 110)	1	0.9	109	99.1	
Employment					
Unemployed (*n* = 67)	2	3.0	65	97	0.37
Employed (*n* = 94)	1	1.1	93	98.9	
Marital status					
Unmarried (*n* = 19)	1	5.3	18	94.7	0.14
Married (*n* = 194)	2	1.0	192	99	
Disease characteristics					
Type of diabetes					
Type I (*n* = 29)	2	6.9	27	93.1	0.056
Type II (*n* = 192)	1	0.5	191	99.5	
Family history of diabetes					
Negative (*n* = 126)	1	0.8	125	99.2	0.29
Positive (*n* = 76)	2	2.6	74	97.4	
Duration of diabetes (years)					
< 7 (*n* = 107)	1	0.9	106	99.1	0.84
≥ 7 (*n* = 21)	0	0.0	21	100	
Care characteristics					
Number of drugs					
1 (*n* = 206)	3	1.5	203	98.5	0.69
≥ 2 (*n* = 11)	0	0.0	11	5.1	
Type of drugs					
Oral (*n* = 174)	1	0.8	173	99.4	0.10
Injection (insulin) (*n* = 43)	2	4.6	41	95.4	
Degree of diabetic care					
Poor (*n* = 217)	3	1.4	214	98.6	0.94
Good/fair (*n* = 4)	0	0.0	4	100	
Degree of control					
Poor (*n* = 120)	1	0.8	119	99.2	0.41
Good/fair (*n* = 22)	2	9.1	20	90.1	

[a] *Using Fisher exact test*

Table 5 **Univariate analysis of the effect of patient, disease and care characteristics on degree of compliance with appointments**

Variable	Compliance with appointments				*P*-value[a]
	Poor		Good/fair		
	No.	%	No.	%	
Patient characteristics					
Age (years)					
< 45 (*n* = 62)	20	32.3	42	67.7	0.70
≥ 45 (*n* = 225)	67	29.8	158	70.2	
Sex					
Females (*n* = 120)	32	26.7	88	73.3	0.24
Males (*n* = 172)	57	33.1	115	66.9	
Literacy					
Illiterate (*n* = 125)	31	24.8	94	56.0	0.84
Literate (*n* = 100)	26	26.0	74	74.0	
Employment					
Unemployed (*n* = 106)	24	22.6	82	77.4	0.86
Employed (*n* = 88)	19	21.6	69	78.4	
Marital status					
Unmarried (*n* = 23)	6	26.1	17	73.9	0.69
Married (*n* = 257)	77	30.0	180	70.0	
Disease characteristics					
Type of diabetes					
Type I (*n* = 36)	17	47.2	19	52.8	0.007*
Type II (*n* = 246)	63	25.6	183	74.4	
Family history of diabetes					
Negative (*n* = 162)	51	31.5	111	68.5	0.42
Positive (*n* = 97)	26	26.8	71	73.2	
Duration of diabetes (years)					
< 7 (*n* = 131)	31	23.7	100	76.3	0.29
≥ 7 (*n* = 27)	9	33.3	18	66.7	
Care characteristics					
Number of drugs					
1 (*n* = 217)	44	20.3	173	79.7	0.31[b]
≥ 2 (*n* = 12)	1	8.3	11	91.7	
Types of drugs					
Oral (*n* = 185)	32	17.3	153	82.7	0.066
Injection (insulin) (*n* = 44)	13	29.5	31	70.5	
Degree of diabetic care					
Poor (*n* = 50)	47	94.0	3	6.0	0.00*
Good/fair (*n* = 242)	42	17.4	200	82.6	
Control of diabetes					
Poor (*n* = 133)	22	16.5	111	83.5	0.53
Good/fair (*n* = 112)	22	19.6	90	80.4	

* *Statistically significant at 95% confidence level*
[a] *Using chi-squared test*
[b] *Using Fisher exact test*

Table 6 **Multivariate analysis of the effect of patient, disease and care characteristics on the total compliance score to diet, drugs and appointments**

Variables	Partial regression coefficient (β)	95% confidence interval	*t*	*P*-value
Patient characteristics				
Age	0.0041	−0.0176 to 0.0259	0.38	0.70
Sex	0.4467	−0.2154 to 1.1089	1.34	0.18
Employment	−0.4822	−1.1137 to 0.1493	−1.51	0.133
Literacy	−0.1939	−0.8172 to 0.4294	−0.62	0.54
Marital status	0.6274	−0.1737 to 1.4285	1.55	0.12
Constant	6.9938	5.6912 to 8.2962	10.63	0.00
Disease characteristics				
Type of disease	0.1817	−0.3615 to 0.7251	0.66	0.51
Family history of disease	−0.3565	−0.7249 to 0.0120	−1.91	0.06
Duration of disease	−0.0478	−0.0839 to 0.1179	−2.62	0.01*
Constant	7.9517	7.3166 to 8.5867	24.70	0.00
Care characteristics				
Number of drugs	0.1830	−0.5899 to 0.9560	0.47	0.64
Type of drugs	0.2132	−0.6313 to 0.2049	−1.01	0.32
Total score of care	0.2546	0.0783 to 0.4310	2.85	0.01*
Control of diabetes	0.4141	0.0812 to 0.7471	2.45	0.02*
Constant	5.9202	4.7448 to 7.0955	9.93	0.00

** Statistically significance at 95% confidence level*

Table 7 **Effect of compliance with drugs and appointments on compliance with diet (dependent variable) using stepwise logistic regression of significant variables**

Significant variable	Coefficient	*P*-value	Odds ratio	95% confidence interval
Compliance with appointments	1.152	0.01	3.165	1.25 to 7.99
Compliance with drugs	2.701	0.03	14.934	1.22 to 182.80
Constant	−1.156			

and marital status. This is comparable with other Western studies which have found that sociodemographic characteristics had no consistent relationship with compliance in general [7].

Disease characteristics

Our results showed that type II diabetes was significantly associated with good/fair compliance with appointments. This could be explained by the fact that most type II

diabetics receive their care and medications from the PHC centre, while type I diabetics receive their care and medications mostly from the hospital. In the multivariate analysis model, increasing duration of diabetes was found to be predictive of decreasing total compliance score. This observation is consistent with other studies comparing acute and chronic forms of diseases in which chronicity was associated with poor compliance [*1*].

Care characteristics

Neither the number of drugs nor the type of drugs (oral or injectable) was found to have any significant association with or prediction of the various aspects of compliance under study. However, good care was found to predict a better compliance score. This might be explained by the increasing satisfaction of the diabetic patients with the improving quality of care and their relationship with the PHC centre team, which are important determinants of good compliance [*3,7*].

Control of diabetes was found to be associated with better compliance with diet and with a total compliance score. Greenfield et al. found that compliance was causally related to improvement in diabetic control [*8*]. Some reports have found that the relationship between control and compliance is reciprocal [*9*], i.e. improvement in glycaemic control may reinforce compliance efforts and poor diabetic control discourages further efforts to comply. Other reports have found that there is no consistent relationship between diabetic compliance and glycaemic control [*10,11*].

Compliance with the different aspects of diabetic regimen

Because of the lack of standard methods for assessing various aspects of compliance and the problem of comparing such methods and measurements, diabetic research investigators have had difficulty in making conclusive statements about compliance with various diabetic regimens [*7*]. In our study, compliance with appointments and drugs was much better than compliance with diet. This concurs with other studies where it has been observed that compliance is better with medical aspects of a regimen (e.g. medication) than with lifestyle aspects of a regimen (e.g. diet and exercise) [*12,13*]. Also, it has been observed that compliance with some aspects of diabetic regimen, such as appointments and drugs, could predict compliance with other aspects of the regimen, such as diet. This could be explained by the impact of better care and health education on the various aspects of diabetic regimen given to patients regularly complying with clinic visits. Other reports have found that compliance with one aspect of a diabetic regimen is not highly correlated with compliance with other aspects of the regimen [*10,12*]. The difference between such reports and our findings could be explained by the difference in the methods used to measure compliance and the type of the diabetic programme implemented.

Conclusion

Our study highlights some determinants of compliance with some aspects of the diabetic regimen in the Saudi community. The degree of care and duration of the disease were the most common variables found to predict compliance. Family physicians could make use of the information on patients' compliance with the various aspects

of the prescribed regimen to predict compliance with other aspects of the regimen. Further studies are needed to explore the impact on compliance of social factors, such as family cohesion and support, psychological factors and quality of life.

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References

1. Evans CE, Haynes RB. Patient compliance. In: Rakel RE, ed. *Essentials of family practice.* Philadelphia, WB Saunders Company, 1993:103–18.
2. Al-Nuaim AR et al. *National chronic metabolic disease survey. Part I. Prevalence of diabetes mellitus, obesity and hypercholesterolaemia in Saudi Arabia.* Riyadh, Saudi Arabia, Ministry of Health and King Saud University, 1995.
3. Clark Jr CM, Lee DA. Prevention and treatment of complications of diabetes. *New England journal of medicine*, 1995, 332:1210 7.
4. Abdul Jabber M, Al-Shammari SA. Compliance in Saudi epileptic patients: determinants of compliance in Saudi epileptic patients. *Annals of Saudi medicine*, 1993, 13(1):60–3.
5. The Scientific Committee of Quality Assurance in Primary Health Care. *Quality assurance in primary health care manual.* Riyadh, Saudi Arabia, Ministry of Health and World Health Organization Regional Office for the Eastern Mediterranean, 1994 (WHO-EM/PHC/81-A/G/93).
6. Chesover D, Tudor-Miles P, Hilton S. Survey and audit of diabetes care in general practice in South London. *British journal of general practice*, 1991, 41(348):282–5.
7. Glasgow RE. Compliance to diabetes regimens conceptualization, complexity, and determinants. In: Camer AJ, Spilker B, eds. *Patient compliance in medical practice and clinical trials.* New York, Raven Press Limited, 1991:209–24.
8. Greenfield S et al. Patients' participation in medical care: effects on blood sugar control and quality of life in diabetes. *Journal of general internal medicine*, 1988. 3(5):448–57.
9. Mazzuca SA et al. Clinician communication associated with diabetic patients' comprehension of their therapeutic regimen. *Diabetes care*, 1983, 6(4):347–50.
10. Glasgow RE, McCaul KD, Shafer LC. Self-care behaviors and glycemic control in type I diabetes. *Journal of chronic diseases*, 1987, 40(5):399–412.
11. Wilson W et al. Psychosocial predictors of self-care behaviors (compliance) and glycemic control in non-insulin-dependent diabetes mellitus. *Diabetes care*, 1986, 9(6):614–22.
12. Orme CM, Binik YM. Consistency of adherence across regimen demands. *Health psychology*, 1989, 8(1):27–43.
13. Irvine A. Self-care behaviours in a rural population with diabetes. *Patient education counselling*, 1989, 13:3–13.