Sociodemographic determinants of management behaviour of diabetic patients Part II. Diabetics' knowledge of the disease and their management behaviour

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المحدّدات الاجتماعية الديمغرافية للسلوك العلاجي لمرضى السكّري المرددين على إحدى عيادات السكّري في الإسكندرية. الجزء الثاني – معلومات مرضى السكّري وسلوكياتهم العلاجية

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خلاصة: كان هدف هذه الدراسة وصف مستوى معارف مرضى السكّري حول هذا المرض، وإظهار الصلة بين المتغيرات الديمغرافية (العمر والجنس والتعليم) وبين مستوى هذه المعارف، وكشف العلاقة بين المعارف وبين سلوكيات المرضى السكّرين تجاه المعالجة. ولقد وجدنا أن أكثرية المرضى السكّرين (90.0 %) كانت لديهم معرفة ضئيلة حول المرض، وأن 83.7 % كانت معلوماتهم ضئيلة حول مضاعفات المرض، وأن 96.3 % لم يكونوا يعرفون إلا القليل عن كيفية السيطرة على المرض. إن المستوى المنخفض لمعارف مرضى السكّري حول مرضهم ليشير إلى أن مقدمي الرعاية الصحية يحتاجون إلى التدريب في مجالات الإعلام والتثقيف والتواصل.

ABSTRACT We aimed to: describe the level of knowledge of diabetic patients about the disease, show the relationship between demographic variables (age, sex and education) and level of knowledge and reveal the relationship between knowledge and management-related behaviour of diabetics. We found that a majority of diabetic patients (90.0%) had poor knowledge about the disease, 83.7% had poor knowledge about the complications associated with diabetes and 96.3% had poor awareness of how to control the disease. The poor level of knowledge that diabetics have about their disease suggests that health care providers need to be trained in the areas of information, education and communication.

Déterminants socio-démographiques du comportement de diabétiques venant en consultation de diabétologie à Alexandrie. Deuxième partie: connaissances des diabétiques sur leur maladie et leur comportement concernant la prise en charge de leur maladie
RESUME Notre but était de décrire le niveau de connaissances des patients diabétiques sur la maladie diabétique, de démontrer la relation entre les variables démographiques (âge, sexe et instruction) et le niveau de connaissances, et mettre en évidence la relation entre les connaissances et le comportement des diabétiques concernant la prise en charge de leur maladie. On a constaté qu'une majorité de diabétiques (90,0%) avaient peu de connaissances sur la maladie, 83,7% connaissaient mal les complications du diabète et 96,3% ne savaient guère comment contrôler cette maladie. Le faible niveau des connaissances qu'ont les diabétiques sur leur maladie donne à penser que les prestateurs de soins de santé nécessitent une formation dans les domaines de l'information, de l'éducation et de la communication.

Introduction

Diabetes mellitus is emerging as a clinical and public health problem in Egypt [1]. According to Arab, its prevalence in the country is estimated at 4.3% of the population, of which 5.7% exists in urban areas, 4.1% in rural areas and 1.5% among desert communities [2]. Serious diabetic complications may affect a considerable proportion of the population if the disease is not properly managed.

The success of diabetes management depends largely upon patient compliance with the prescribed management plan [3,4]. Compliance has been defined as the extent to which a person's behaviour coincides with the medical advice given [5]. Several studies have shown that compliance rates of diabetics to the medical advice they receive is generally low. Therefore, the patient's behaviour is crucial to the successful management of the disease [6–8]. It should be noted that an individual's behaviour occurs against a background of their past experiences, stresses, social relations and knowledge within the cultural, political and economic environmental characteristics of the society concerned [8]. The patient's knowledge about the disease and its management is important. Several studies have concluded that lack of knowledge of self-care skills, and misinformation and or misunderstanding of the therapeutic plan were a major aspect of involuntary noncompliance.

The aims of our study were to:

- describe the level of knowledge of diabetic patients about the disease;
- show the relationship between demographic variables (age, sex and education) and level of knowledge;
- reveal the relationship between knowledge and management-related behaviour of diabetics.

Subjects and methods

To fulfil these aims, the same methodology previously mentioned in Part I of the study was followed [9]. Data were collected using an interview schedule to obtain information about age, sex, educational background of patients, their knowledge of the disease and behaviour. The following five areas of diabetics' knowledge were assessed: complications, how to control them, how to examine urine for sugar, names and types of medications given and administrative procedures of insulin.

Behaviours assessed were those related to: seeking medical attention, medication adherence, dietary compliance, exercise compliance, smoking and self-care practices.

Patients' knowledge and behaviours were scored (one score was given for each correct answer and zero for wrong or no answers), and were graded as poor, satisfactory or very good. A maximum total score of 9 was given for a response related to all diabetic complications' statements. The level of knowledge was graded as poor with a score of 0–4, satisfactory with a score of 5–6 and very good with a score of 7–9. A maximum total score of 5 was given to the response related to how to control diabetes. The level of knowledge was graded as poor with a score of 0–2, satisfactory with a score of 3 and very good with a score of 4–5. Procedures for managing the disease were assessed by three questions that covered sugar urine analysis, name of medications and administration of insulin. The scores for answers to the five questions about knowledge were summed and a total percentage score was calculated and graded so that a poor level of overall knowledge was < 50%, satisfactory level of overall knowledge 50%–75% and very good level of overall knowledge > 75%.

The data were analysed using *SPSS* as well as descriptive and analytic statistics. The chi-squared Mantel–Haenzel test for linear association was used for ordinal values. The Wilcoxon signed ranks test for pairs was used when the observations were described in terms of rank. A 5% level was taken as the level of significance.

Results

Overall level of knowledge

The majority of diabetic patients (90.0%) had a poor overall knowledge level about the disease, while the rest had only a satisfactory level. A significant linear association was observed between the overall knowledge level of diabetics and their age ($\chi^2_{MH} = 12.51$). The older the patient, the more likely the poor overall level of knowl-

edge. Also, a significant linear association was observed between educational level and overall knowledge level ($\chi^2_{MH} = 21.16$). The lower the patient level of education, the poorer their overall knowledge. No significant difference was observed between males and females with regard to their overall level of knowledge ($\chi^2_{MH} = 0.25$). Also, no significant difference was observed among patients who owned a television or radio and overall knowledge level. The outcome of a Fisher exact test was $P = 0.503$ as shown in Table 1.

Level of knowledge of key issues of diabetes

Most of the patients had poor knowledge about the complications of diabetes (83.7%) (Table 2); less than one-fifth (14.7%) had a satisfactory level. Over two-

Table 1 Distribution of diabetic patients by age, sex and education against their overall level of knowledge

Demographic variable	Overall level of knowledge				χ^2 (P-value)
	Poor		Satisfactory		
	No.	%	No.	%	
Age (years)					$\chi^2_{MH} = 12.51$
≤ 50	51	77.3	15	22.7	(0.000)[a]
50–60	122	92.4	10	7.6	
≥ 60	97	95.1	5	4.9	
Sex					$\chi^2 = 0.25$
Males	140	89.2	17	10.8	(0.616)
Females	130	90.9	13	9.1	
Education					$\chi^2_{MH} = 21.16$
No formal education	158	95.8	7	4.2	(0.000)[a]
Primary/secondary	82	88.2	11	11.8	
University	30	71.4	12	28.6	
Own television/radio					(0.503)[b]
No	24	85.7	4	14.3	
Yes	245	90.4	26	9.6	

[a]*Significant at 5% level*   [b]*Fisher exact test*

thirds (77.7%) of the patients were able to name one or more complications of diabetes. Of those who named at least one, 69.3% stated coma, 51.0% retinopathy, 34.3% peripheral neuritis and 28.3% hypertension. Very few stated pregnancy or fetal complications.

Only 17.7% of the patients were able to state how a person could control the disease (Table 2). However, 66.0% were aware of dietary regimen and 38.3% stated their compliance with taking medications. Very few were aware that exercise (2.7%) is a means of controlling the disease. Un-

dergoing laboratory tests was mentioned by 8.7% of the patients.

Less than one-third (31.7%) were able to state correctly how to screen for sugar in urine. However, the majority (96.3%) were able to name their medicine correctly. Only 17.7% knew how an insulin injection is given.

Level of knowledge and age

Table 2 also indicates that there was a significant linear association between age and level of knowledge concerning diabetic complications ($\chi^2_{MH} = 9.14$). Older patients

Table 2 Distribution of diabetic patients by age and knowledge level of key issues related to diabetes

Knowledge level	Age (years)						Total		χ^2_{MH} (P value)
	< 50 (n = 66)		50–60 (n = 132)		> 60 (n = 102)		(n = 300)		
	No.	%	No.	%	No.	%	No.	%	
Diabetic complications									
Poor	47	7.1	113	85.6	91	89.2	251	83.7	9.14
Satisfactory	16	2.4	18	13.6	10	9.8	44	14.7	(0.002)a
Very good	3	4.6	1	0.8	1	1	5	1.7	
How to control diabetes									
Poor	65	98.5	123	93.2	101	99.0	289	96.3	0.26
Satisfactory	1	1.5	5	3.8	1	1	7	2.3	(0.606)
Very good	0	0.0	4	3.0	0	0.0	4	1.3	
Procedure of screening sugar in urine									1.54
Correct	30	45.5	31	23.5	34	33.3	95	31.7	(0.214)
Incorrect	36	54.5	101	76.5	68	66.7	205	68.3	
Names of medication used									0.48
Correct	64	97.0	128	97.0	97	95.1	289	96.3	(0.214)
Incorrect	2	3.0	4	3.0	5	4.9	11	3.7	
Method of giving insulin injection									11.20
Correct	22	33.3	19	14.4	12	11.8	53	17.7	(0.000)a
Incorrect	44	66.7	113	85.6	90	88.3	247	82.3	

aSignificant at 5% level

(> 60 years) tended to be less knowledgeable than younger ones. Also, a significant linear association was observed between age and knowledge about how to give an insulin injection. More younger patients knew the correct procedure than older ones (χ^2_{MH} = 11.20). No significant linear association was observed between age and level of knowledge as regards to how to control diabetes (χ^2_{MH} = 0.26), screening sugar in urine (χ^2_{MH} = 1.54) or naming medications used (χ^2_{MH} = 0.48).

Level of knowledge and sex

Table 3 shows the association between sex and level of knowledge with regard to the key issues related to diabetes. Gender differences were found in the area of how to control the disease. Females had a slightly poorer level of knowledge than males (99.3% compared to 93.6%). Males were more likely to have a satisfactory and very good level (6.4% compared to 0.7%).

Level of knowledge and education

The results in Table 4 show a significant linear association when educational level and knowledge about complications of the disease was considered (χ^2_{MH} = 31.96). More university graduates had satisfactory level (28.6%) or very good level (9.5%) as compared to those without any education (6.1% and 0.6% respectively).

A significant linear association was observed between level of education and knowledge about the procedure of screen-

Table 3 Distribution of diabetic patients by sex and knowledge level of key issues related to diabetes

Knowledge level	Sex				Total		χ^2 (P-value)
	Males (n = 157)		Females (n = 143)		(n = 300)		
	No.	%	No.	%	No.	%	
Diabetic complications							
Poor	131	83.4	120	83.9	251	83.7	0.01
Satisfactory and very good	26	16.6	23	16.1	49	16.3	(0.911)
How to control diabetes							
Poor	147	93.6	142	99.3	289	96.3	6.81
Satisfactory and very good	10	6.4	1	0.7	11	3.7	(0.009)[a]
Procedure of screening of sugar in urine							
Correct	57	36.3	38	26.6	95	31.7	3.28
Incorrect	100	63.7	105	73.4	205	68.3	(0.070)
Name of medications used							
Correct	151	96.2	138	96.5	289	96.3	0.02
Incorrect	6	3.8	5	3.5	11	3.7	(0.881)
Method of giving insulin injection							
Correct	25	15.9	28	19.6	53	17.7	0.69
Incorrect	132	84.1	115	80.4	247	82.3	(0.486)

[a]Significant at 5% level

Table 4 Distribution of diabetic patients by their level of education and knowledge level of key issues related to diabetes

Knowledge level	Illiterate/ read and write (n = 165)		Primary/ preparatory /secondary (n = 93)		University (n = 42)		Total (n = 300)		χ^2_{MH} (P-value)
	No.	%	No.	%	No.	%	No.	%	
Diabetic complications									
Poor	154	93.3	71	76.3	26	61.9	251	83.7	31.96
Satisfactory	10	6.1	22	23.7	12	28.6	44	14.7	(0.000)[a]
Very good	1	0.6	0	0.0	4	9.5	5	1.7	
How to control diabetes									
Poor	162	98.2	85	91.4	42	100.0	289	96.3	0.39
Satisfactory	2	1.2	5	5.4	0	0.0	7	2.3	(0.529)
Very good	1	0.6	3	3.2	0	0.0	4	1.3	
Procedure of screening of sugar in urine									19.80
Correct	37	22.4	34	36.6	24	57.1	995	31.7	(0.000)[a]
Incorrect	128	77.6	59	63.4	18	42.9	205	68.3	
Name of medications used									5.43
Correct	155	93.9	92	98.9	42	100.0	289	96.3	(0.019)[a]
Incorrect	10	6.1	1	10.1	0	0.0	11	3.7	
Method of giving insulin injection									12.24
Correct	19	11.5	20	21.5	14	33.3	53	17.7	(0.000)[a]
Incorrect	146	88.5	73	78.5	28	66.7	247	82.3	

[a]Significant at 5% level

ing for sugar in urine; university graduates (57.1%) were more likely to correctly state the procedure (χ^2_{MH} = 19.80). A significant linear association was also observed between knowledge about the name of medications used and level of education (χ^2_{MH} = 5.43). A significant linear association was also observed between knowledge of the method of giving an insulin injection and educational level (χ^2_{MH} = 12.24). More university graduates (33.3%) than those with primary to secondary education (21.5%) and with no education (11.5%) correctly stated the procedure. However, no significant linear association was observed be-

tween level of education and level of knowledge associated with controlling the disease (χ^2_{MH} = 0.39).

Levels of knowledge and ownership of a radio or television

Table 5 indicates that owning a radio or a television set did not significantly affect the patients' level of knowledge of diabetic complications, how to control diabetes, and the procedure for screening sugar in urine. It also did not affect their ability to name the medications used, or the method of giving insulin injections.

Table 5 **Distribution of diabetic patients by ownership of radio and television and knowledge of key issues related to diabetes**

Knowledge level	Ownership of:				Total		P-value
	Radio or television ($n = 28$)		Radio and television ($n = 271$)		($n = 299$)		
	No.	%	No.	%	No.	%	
Diabetic complications							1.0[a]
Poor	24	85.7	226	83.4	250	83.6	
Satisfactory and very good	4	14.3	45	16.6	49	16.4	
How to control diabetes							0.275[a]
Poor	26	92.9	262	96.7	288	96.3	
Satisfactory and very good	2	7.1	9	3.3	11	3.7	
Procedure of screening of sugar in urine							$\chi^2 = 1.52$ $P = 0.217$
Correct	6	21.4	89	32.8	95	31.8	
Incorrect	22	78.9	182	67.2	204	68.2	
Name of medications used							0.275[a]
Correct	26	92.9	262	96.7	288	96.3	
Incorrect	2	7.1	9	3.3	11	3.7	
Method of giving insulin injection							0.604[a]
Correct	6	21.4	47	17.3	53	17.7	
Incorrect	22	78.6	224	82.7	246	82.3	

[a]*Calculated by Fisher exact test*

Relationship between knowledge and patient behaviour related to management

No significant linear association was observed between the overall knowledge level and the behaviour related to diabetes management ($\chi^2_{MH} = 0.93$). However, a statistical linear association was observed between the patient's knowledge about hypertension as a diabetic complication and having their blood pressure checked ($\chi^2_{MH} = 11.88$). Those who knew about hypertension tended to have very good behaviour, while those lacking knowledge were more likely to be categorized as having poor or satisfactory behaviour.

A significant linear association was observed between knowledge about diabetic retinopathy and patient's attendance at eye screenings ($\chi^2_{MH} = 11.11$). Those who lacked knowledge tended to behave poorly while those who were aware of the disorder were more likely to be classified as having very good or satisfactory behaviour.

No statistical linear association was observed in the following areas: between knowledge of diabetic foot problems and foot self-care, knowledge of dietary regimen compliance to control diabetes and patient compliance with the required regimen, and knowledge of medications and compliance with the prescribed medicines.

Discussion

Health education is a process that bridges the gap between health information and health practices [10]. One step in planning health education intervention is to identify predisposing factors. Among the factors that could be directly influenced by education intervention is knowledge.

The results of our study indicate that the majority of diabetic patients (90.0%) had a poor overall knowledge level about the disease and the rest had only a satisfactory level. El-Zeiny et al. also reported poor levels of knowledge of diabetic patients [8]. More seriously, our study indicates that the majority of the patients (83.7%) had little knowledge about diabetic complications. It has been pointed out that informing patients about the complications of diabetes might be a way to motivate health behaviour [11,12]. Key demographic factors have been used to explain the differences in predisposition to acquire and process information. Our study showed that sex was not related to level of knowledge except in how to control diabetes. Females tended to have a poorer level of knowledge, where males had either a satisfactory or very good level. This is expected, as males are more likely to be better educated or employed outside the home than females. This may expose them more to knowledge than females.

Our study also indicated a significant linear association between the overall knowledge level of patients and their educational level. Patients holding no educational certificates were more likely to have a poor level of knowledge and to a lesser extent those with primary to secondary education, as compared with university graduates. The same trend was observed as regards knowledge about the names of medications used, the method of giving insulin injections and diabetic complications. Kasl and Cobb stated that knowledge related to disease improves with a corresponding increase in the level of education and socioeconomic status [13]. Those of a higher academic level and of a better socioeconomic standard have a greater chance of obtaining knowledge from the press, books and other mass media sources. They have no barriers in communicating with the health care team, and they may grasp knowledge correctly. However, no significant linear association was observed between the level of knowledge about how to control diabetes and the level of education. This suggests that even for educated people, sources of knowledge about controlling diabetes are lacking. However, owning a radio or television had no significant relationship with the patients' overall knowledge or with any specific knowledge related to diabetes.

Age also played a significant role. It was found to be linearly associated with the overall level of knowledge. The older the patient was, the more likely that he/she had a poorer level of knowledge. The same trend was observed when knowledge levels related to diabetic complications and method of giving insulin injections were considered. However, knowledge was not linearly associated with age with respect to how to control diabetes, procedures of screening sugar in urine or in naming medications.

The role of information is accepted as being important to health-related behaviour. Indeed, a positive association between behaviour and knowledge was demonstrated in the early work of Cartwright [14]. Moreover, several studies have concluded that lack of knowledge of self-care skills, misinformation and misunderstanding of the therapeutic plan are major aspects of involuntary noncompliance [1].

El-Zeiny et al. concluded from their study that diabetic patients lacked knowledge and consequently had low levels of

self-care practices [8]. This is expected, as health information of some kind may be necessary before a personal health action will occur.

Our study indicated that an association between knowledge of medications and adherence to the prescribed medicines existed. Marks and Clark made the same observation [15]. They reported that patients generally had little knowledge about the medications they were receiving. It should be pointed out that basic knowledge of one's medications should include a general understanding of the purpose, timing and scheduling of the medications being taken. This knowledge, as stated by Levine et al., may help to facilitate the patient's adherence to taking medications [16]. No significant linear association was observed between knowledge about dietary regimen and compliance to the required regimen. However, Lenner found that patient understanding of what to eat and why is a prerequisite for a dietary change [17].

Rankins et al. drew attention to the fact that patients may not recall verbal advice or may misinterpret such advice [18]. Health cards with figures and pictures may help people who are illiterate, while written messages are useful for educated patients and illiterates if they have an educated family member. Similar results were reported by Shama [19].

Our study indicated a significant linear association between the level of knowledge about hypertension and level of compliance with regard to blood pressure measurement. Also, the same linear association was found between the level of knowledge and level of compliance as regards eye screening. This indicates that in some respects, information can be positive to consumer decision-making. However, both these practices are related to screening for complications. Patients' perceptions may have a significant role in their practices, not only their knowledge.

Conclusions

From the present research it was concluded that the knowledge level of diabetic patients is poor, particularly with those who are not educated and are elderly. The overall level of knowledge of patients was not linearly associated to their management behaviour. However, a significant linear association was observed between behaviour and specific knowledge related to blood pressure and eye screening. The poor level of knowledge of diabetic patients suggests that health care providers need to be trained in the area of information, education and communication. Mass media should also play a more significant role in educating the public and diabetic patients about actions to be carried out in managing the disease. It is also, important to study the amount, type and channels of information that will have an impact on the diabetics and their families.

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