

KNOWLEDGE, ATTITUDES , PRACTICE AND COMPLIANCE OF DIABETIC PATIENTS IN DAKAHLIA, EGYPT

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ABSTRACT

Background: Diabetes education, with improvement in knowledge, attitudes and skills, leads to better control of the disease **The objectives** of the study were to assess knowledge, attitude, practice and compliance of rural diabetic patients, and to identify the predictors of good knowledge and patient's compliance and to determine the impact of diabetes on patients' daily work.

Method: This was a cross sectional descriptive study extended for one year and conducted at out-patient clinics of three family health centers chosen randomly in Dakahlia Governorate. A pre-constructed and pre tested questionnaire was used to assess KAP and compliance of participants.

Results: Among 750 respondents, females constituted 56.1%. 94.8% aged ≥ 30 years. 66.3% of them were rural resident. Nearly one third of patients were illiterates. Non-workers/housewives were 31.1%. More than half of patients reported monthly income of ≥ 1200 Egyptian pounds. About two thirds of the patients have been diabetic since more than 5 years and majority of them 93.1% were of type II. Positive family history of diabetes was reported in 72% of patients. Logistic regression revealed that the significant predictors of good knowledge were urban resident, disease duration, work and positive family history while that of patients' compliance were education, disease duration.

Conclusion: The overall rate of adequate knowledge regarding diabetes was only 52.3% among participants. Insulin-treated patients had lowest knowledge, attitude, and practice toward diabetes. There is a gap between patients' level of knowledge and their practice.

Recommendation: Efforts are required to improve KAP of diabetic patients and their compliance.

Keywords: Diabetes mellitus, KAP, Compliance, Egypt.

INTRODUCTION

Diabetes mellitus is a major emerging clinical and public health problem. According to WHO estimates in 2007, 190 million people suffer from diabetes world-wide and about 330 million are expected to be diabetic by the year 2025 ^[1]. It is the leading cause of blindness, and of lower-limb amputations. Concerning mortality, adults with diabetes have rates of stroke and death from heart disease that are about 2 to 4 times higher than adults without diabetes ^[2].

Diabetes education, with consequent improvement in knowledge, attitudes and skills, leads to better control of the disease, and is widely accepted to be an integral part of **comprehensive** diabetes care ^[3].

Although the prevalence of diabetes mellitus is high among population in Middle East countries, patients often lack the knowledge and skills to self-manage their condition ^[4].

Egypt had been estimated to be the 9th country in the prevalence of diabetes. Recent changes in physical activity and dietary patterns have promoted the development of diabetes and if different preventive and control activities are not adopted, by the year 2025, more than 9 million Egyptians (13% of the population above 20 years old) will have diabetes ^[5]. This percent reduced to 7.2% ^[6].

Studies have shown that increasing patient knowledge regarding disease and its complications has significant benefits with regard to patient compliance to treatment and to decreasing complications associated with the disease ^[7]. To the best of authors' knowledge no studies were done in rural Dakahlia, Egypt, where the situation appears to be different. **The objectives** of the study were to assess knowledge, attitude, practice and compliance of diabetic patients, and to identify the predictors of good level of knowledge and patient's compliance and determine the impact of diabetes on patients' daily work.

SUBJECT AND METHODS

Study design and timing

A cross sectional descriptive study extended for one year from January 2014 to January 2015.

Study Area: It was conducted at out-patient clinics of three family health centers: Shawa, Meniat Al-Nasr and Al-Kebab Al-Soghra which were chosen randomly in Dakahlia Governorate.

Sample Size and procedure: The sample size was calculated online at the following website <https://www.dssresearch.com/KnowledgeCenter/toolkitcalculators/samplesizecalculators.aspx> with alpha error 5% and study power 80%, a test value (%) of 11% and expected sample value (%) of 14% giving sample size of 723 with adding 10% for non response rate a final sample of 795 was calculated. Systematic sampling technique was used to select study participants.

Inclusion criteria: All type I or II diabetic patients, aged ≥ 18 years being diagnosed for at least 6 months.

Exclusion criteria: Those who refused to participate in the study. 750 patients participated in the study giving a 94.3% response rate.

Administrative and ethical consideration: communication with local health authority to obtain an official permission to conduct this study. Patients were interviewed and an oral informed consent was obtained.

Study tool: A structured and pre tested questionnaire was designed to inquire about:

- 1- Socio-demographic data such as age, sex, residence, education, occupation, income ...etc.
- 2- Duration of diabetes, and family history of diabetes.
- 3- Patient's knowledge about (17 questions):
 - a- Causes of diabetes, genetic factor, symptoms, normal level of blood glucose, causes of hypoglycemia and its symptoms.
 - b- Management of diabetes by medications, lifestyle changes as diet plan and exercise. Management of diabetes during illness, effort, or stress. Cardio protective effect of cholesterol limitation, evenly spaced meals.

c- Complications of diabetes, as cardiac, renal, retinal, diabetic stroke, diabetic foot and compromised immunity in diabetes.

4- Attitude of diabetic patients towards diabetes, compliance to prescribed medications, food control when using anti-diabetic drugs, food control without drug use, attitude toward change of diet plan, sport, feet care, control of hypoglycemia and management of diabetes during illness (11 questions).

5- Health care profile practiced by diabetic patients included; source of the provided health care services, frequency of visits to diabetic clinic, periodic examination of feet, heart, eye, kidney and the date of last examination for each (9 questions).

6- Patient's compliance and effect of diabetes on patient activity and ability to work.

Based on the score obtained by each participant, 2 categories were defined: poor (<50% of the total score) and good (\geq 50% of total score).

A pilot study was carried out on 20 diabetic patients (not included in the final analysis) to test our tool and make necessary modifications. An average of 25 minutes was needed for filling each questionnaire. Data were analyzed using SPSS version 16. Chi-squared test /Fisher exact were used for comparison between groups. Significant variables on univariate analysis were entered into multivariate logistic regression analysis.

RESULTS

A total of 750 participants; females constituted 56.1%. Most of the patients (94.8%) aged \geq 30 years. 66.3% of them were rural resident. Nearly one third of patients were illiterates. Non-workers/housewives were 31.1%. More than half of patients reported monthly income of \geq 1200 Egyptian pounds. About two thirds of the patients have been diabetic since more than 5 years and majority of them 93.1% were of type II. Positive family history of diabetes was reported in 72% of patients as shown in table 1.

Table 1: Characteristics of studied Diabetic Egyptian Patients

Variables		No	%
Age	<30 years	39	5.2
	\geq 30 years	711	94.8
Sex	Male	329	43.9
	Female	421	56.1
Residence	Urban	251	33.5
	Rural	499	66.5
Education	>secondary	276	36.8
	\leq Secondary	239	31.9
	Illiterate	235	31.3

Occupation	Professional	171	22.8
	semi-professional/clerk	56	7.5
	manual worker/farmer	206	27.5
	Trades/Business	84	11.2
	Not Working- Housewife	233	31.1
Income	<1200 L.E/Month	355	47.3
	≥1200 L.E/Month*	395	52.7
Duration of diabetes	<1 year	53	7.1
	1-5year	209	27.9
	5-10 year	296	39.5
	>10 year	179	23.8
	Can't recall	13	1.7
Type of diabetes	Type I	52	6.9
	Type II	698	93.1
Family history of diabetes	No	210	28
	1 st degree relatives	333	44.4
	2 nd degree relatives	207	27.6

*1200L.E is the minimum adequate level of monthly income

Table 2 portrayed knowledge of diabetic patients. Three quarters of studied patients know the symptoms of diabetes and two thirds of patients know the genetic factor in diabetes while, 39.3% of patients were knowledgeable about causes of diabetes and only one third of patients were knowledgeable about the normal fasting blood sugar level. 71.3% of studied patients knew that oral pills as a drug for treating diabetes and 38.8% of patients were knowledgeable about the successful management of diabetes by lifestyle changes while, one third of patients knew about insulin therapy. Most patients knew the importance of evenly-spaced meals, 36.4% knew the importance of regular exercise program and one third of patients knew the cardio-protective effect of cholesterol limitation and diet plan during infection while, 30.8% knew the importance of individualized diet plan. 80.5% of studied patients knew about compromised immunity in diabetes and the importance of diabetic foot care and less than two thirds knew diabetes complications while, 40.8% of patients were knowledgeable about psychological changes. Most insulin-treated patients knew when to take insulin and about half of them knew the symptoms of hypoglycemia while, 37.0% of patients knew the fast acting insulin, 24.1% knew the conditions leading to hypoglycemia and only 13.0% knew the proper way of mixing insulin.

Table2: Knowledge of studied patients about diabetes, its management & its complications

Knowledge Items	Total	No. with correct answers	%
Disease			
Causes of diabetes	750	295	39.3
Genetic factor in diabetes	750	502	66.9
Symptoms of diabetes	750	574	76.5

Normal fasting blood sugar level	750	261	34.8
Symptoms of hypoglycemia *	54	26	48.1
Conditions leading to hypoglycemia*	54	13	24.1
Management			
Management of diabetes by lifestyle changes	750	291	38.8
Oral hypoglycemic pills	750	535	71.3
Insulin therapy	750	257	34.3
Fast acting insulin *	54	20	37.0
The proper way of mixing insulin *	54	7	13.0
Right time to take insulin injection *	54	52	96.3
Life style			
Diet plan	750	231	30.8
Diet plan during infection	750	261	34.8
Cardio-protective effect of cholesterol limitation	750	242	32.3
Evenly spaced meals	750	706	94.1
Regular exercise program	750	273	36.4
Complications			
Importance of diabetic foot protection & care	750	581	77.5
Stroke, cardiac, renal & retinal complications	750	461	61.5
Compromised immunity in diabetics	750	604	80.5
Psychological changes			
fear, frustration, anger and anxiety	750	306	40.8

*insulin treated patients

Positive **attitude** of diabetics was detected among 60.1% of studied patients for compliance to prescribed medications, among 93.2% for controlling food when using antidiabetes drug, among 40.1% for diet plan change with lifestyle changes .About three quarters of diabetics had positive attitude of controlling diabetes by sport & exercise.77.5% showed positive attitude towards feet care & protection. More than three quarters of insulin-treated patients had positive attitude of treating themselves when feeling hypoglycemic. Minority of insulin-treated patients had positive attitude for dealing properly with minor infection or disease (data not shown in table).

Table 3 illustrated a profile of the quality of health care **practiced** by the studied diabetic patients. 61.1% of patients are treated by specialists.60.0% of them had at least 3 annual clinic visits. More than three quarters of studied patients had periodic feet examination. About half of them had periodic retinal or cardiac examinations. Nearly one quarter of patients did their last retinal or cardiac examinations within a year. Less than three quarters (72.3 %) of studied patients practiced periodic renal examination and only 38.3 % of them did their last renal examination within a year. **Regarding effect of diabetes on patient work**, 73.4 % mentioned that their work is affected in form of more absenteeism, decreased ability or total inability to work.

Table 3: Quality of health care practiced by the studied diabetic patients

Quality Variable	Variable Items	No.	%
Treating doctor	General practitioner	292	38.9
	Specialist	458	61.1
Frequency of Clinic Visits	≥ 3 / year	450	60.0
	≤ 2 / year	300	40.0
*Periodic Feet Examination	Yes	584	77.9
	no / can't recall	166	22.1
Periodic Retina Examination	Yes	382	50.9
	no / can't recall	368	49.1
Last Retina Examination	\leq a year	205	27.3
	$> 1 - 2$ years	188	25.1
	> 2 years / can't recall	357	47.6
Periodic Heart Examination	Yes	378	50.4
	no / can't recall	372	49.6
Last Heart Examination	\leq a year	172	22.9
	$> 1 - 2$ years	191	25.5
	> 2 years / can't recall	387	51.6
Periodic Kidney Examination	Yes	542	72.3
	no / can't recall	208	27.7
Last Kidney Examination	\leq a year	287	38.3
	$> 1 - 2$ years	258	34.4
	> 2 years / can't recall	205	27.3
Effect of diabetes on work	no effect at all	200	26.7
	Absenteeism / decreased ability	547	73.0
	Total inability to work	3	0.4

*Periodic Feet Examination is recommended every 3 months, periodic retinal, renal and heart examination is recommended every year according to Egyptian national guidelines.

Table 4 showed knowledge, attitude, practice and compliance of studied patients according to their socio-demographic characteristics. Higher levels of knowledge with highly statistically significant differences was reported among patients >30 years (73.6 %), males (74.5%), urban patients (90.8%), literates (71.8 %), working patients (58.6%), patients with relatively higher incomes (69.1%), disease duration ≤ 5 years and patients with positive family history (73.3%). Nearly similar statistically significant findings were also reported regarding positive attitude except patients <30 and females showed more positive attitudes, however, good practice was statistically significant among urban patients (89.6%), literate patients (83.3%), working patients (78.9%), high income >1200 LE. (91.1%) and patient with disease duration of 1-5 years. Patient's compliance was significantly high among patients <30 years (79.5%), urban patients (71.3%), literates (75.7%), working patients (64.4%), high income patient (83.5%) and recently diagnosed diabetic patients <1 year (79.2%).

Table 4: Knowledge, attitude, practice and compliance of studied patients according to their Socio-demographic characteristics

Variables	Correct No.	Positive attitude No. (%)	Good No. practice (%)	Compliance No. (%)
Knowledge (%)				
Age	12 (30.8)	38 (97.4)	28 (71.8)	31 (79.5%)
<30 years				
>30years	523 (73.6)	552 (77.6)	548 (77.1)	420 (59.1%)
P value	0.001	0.001	0.4	0.01
Sex	245 (74.5)	306 (72.7)	261 (79.3)	209 (63.5)
Male				
Female	290 (68.9)	284 (86.3)	315 (74.8)	242 (57.5)
P value	0.093	0.001	0.16	0.09
Residence	228 (90.3)	229 (91.2)	225 (89.6)	179 (71.3)
Urban				
Rural	307 (61.5)	361 (72.3)	351 (70.3)	272 (54.5)
P value	0.001	0.001	0.001	0.001
Education	473 (91.8)	466 (90.5)	429 (83.3)	390 (75.7)
Literate*				
Illiterate	62 (26.4)	124 (52.8)	147 (62.6)	61 (26.0)
P value	0.001	0.001	0.001	0.001
Work	406 (78.5)	432 (83.6)	408 (78.9)	333 (64.4)
Workers**				
Non-Workers	129 (55.4)	158 (67.8)	168 (72.1)	118 (50.6)
P value	0.001	0.001	0.001	0.001
Income	465 (69.3)	511 (76.2)	504 (75.1)	385 (57.4)
<1200 LE				
≥1200LE	70 (88.6)	79 (100)	72 (91.1)	66 (83.5)
P value	0.001	0.001	0.001	0.001

Duration of disease				
<1 year	40	51	(45
1-5 year	(75.5)	96.2)		(84.9)
>5year/can't recall	165	176		191
P value	(78.9)	(84.2)		(91.4)
	330	363		340
	(67.6)	(74.4)		(69.7)
	0.008	0.001		0.001
Family history				
Positive	396	448		408
Negative	(73.3)	(83.0)		(75.6)
P value	139	142		168
	(66.2)	(67.6)		(80.0)
	0.001	0.001		0.228
				0.2

* Literate: includes (High Education, Mid-Education & Read/Write groups).

** Working: includes (Professional, semi-professional, manual worker & trades/business groups).

Logistic regression analysis revealed that the significant independent predictor of good knowledge regarding diabetes are, in order; urban resident (OR=5.7), disease duration of 1-5 years (OR= 2.2), work (OR= 1.95), positive family history (OR= 1.7) as shown in table 5.

Table (5): Logistic regression analysis of significant independent predictors of good knowledge

	B	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
				Lower	Upper
Age(1)	-2.488	.000	.083	.037	.189
Residence(1)	1.733	.000	5.658	3.389	9.447
work (1)	.670	.000	1.954	1.354	2.819
Duration		.003			
duration (1)	.388	.332	1.475	.673	3.231
duration(2)	.779	.001	2.179	1.389	3.418
Family history (1)	.502	.010	1.652	1.128	2.420
Constant	-0.34				
Model χ^2	146.38	&P			
	<0.000				
% correctly predicted	72.8%				

Logistic regression analysis revealed that the significant independent predictor of patient's compliance regarding diabetes is education (OR=7.7), disease duration < 1year and of 1-5 years (OR= 2.5 and 1.7 respectively).while low income patients were less likely to be compliant as portrayed in table 6.

Table (6): Logistic regression analysis of significant independent predictors of patient's compliance

	B	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
				Lower	Upper
income (1)	-.749	.026	.473	.245	.913
education(1)	2.037	.000	7.668	5.342	11.006
Duration		.003			
duration(1)	.907	.019	2.478	1.161	5.288
duration(2)	.547	.006	1.728	1.170	2.553
Constant	-0.46				
Model χ^2	187.2	&P <0.000			
% correctly predicted	75.2				
%					

A Significant positive correlation between patient's scores of knowledge and attitude was reported ($r= 0.6$ and $p < 0.01$).In contrast to a negative significant correlation between knowledge and practice ($r= -0.45$ and $p<0.001$) data not shown in table.

DISCUSSION

This study revealed that only one third of the diabetic patients had correct knowledge about causes of diabetes and in spite of 66.9% of participants knew about genetic factor of diabetes, we found 72% of them had a diabetic family member. That is due to relatives' marriage which is common in rural Egypt. In Gambia, West Africa, Foma et al.,^[8] found that 80% of diabetics had a diabetic family member but only one third of them knew that diabetes could be a hereditary disease. While Hashmi et al.^[9] reported that most patients in India were unaware that diabetes runs in families.

In present study about three quarters of studied patients had correct knowledge about symptoms of diabetes. Perez and Cha^[10] and Upadhyay et al.,^[11] in Nepal , also Naglaa and Mohamed.,^[12] in their study in Zagazig, Egypt found about only one third were knowledgeable. The relatively higher rate of knowledgeable diabetics in the present work could be explained by higher percentage of educated participants and high rate of positive family history.

Though hypoglycemia is a serious complication, yet in the current study only one third of the participants knew the normal fasting blood glucose level and 48.1% of them were aware about symptoms of hypoglycemia and about one quarter of them were knowledgeable about causes of hypoglycemia. That agreed with Rafique et al.,^[13] in Pakistan and Bahgat et al.,^[14].

Correct management of DM is crucial for prevention of its complications. The current study revealed that only 38.8% of studied patients were knowledgeable about management of diabetes by lifestyle changes. Whereas 71.3% knew orally taken tablets and 34.3% knew insulin. This agreed with Solomon et al.,^[15] in Ethiopia.

On the opposite side to what was reported in Gambia where most of studied patients in had correct knowledge about management of diabetes by lifestyle changes and medications^[8]. 66% of patients in India were aware about the dietary factor in managing DM^[16].

About one third of the insulin treated diabetic patients had correct knowledge about insulin therapy, and most of them knew the right time to take insulin injection. This agreed with Kamel et al.,^[17] but disagreed with Naglaa and Mohamed,^[12] who stated higher proportions. This discrepancy can be explained by tools' variability used for assessing patient's knowledge.

In our work only one third of diabetic patients were aware about diet plan during health, illness and cardio protective effect of limiting cholesterol also the importance of regular exercise. However most of patients in the study (94.1%) knew the importance of evenly-spaced meals. Similar findings detected in Gambia^[8]. This poor level of knowledge about healthy lifestyle may be attributed to negligence of the health care providers in delivering a proper health message to target patients. Also mass media as T.V has a great role in this concern.

Regarding knowledge about diabetic complications, this study revealed that more than three quarters of the participants had correct knowledge about importance of foot protection and care. About two thirds of them were knowledgeable about stroke, cardiac, renal and retinal complications. This was similar to Roaeid and Kablan^[18].

In current study 40% of the participants were knowledgeable about psychological changes that may associate with diabetes. This result is lower than that reported by Muninarayana et al.,^[19] where two thirds of his studied patients reported so.

This study showed that patients < 30 years were significantly less knowledgeable. The opposite was reported in Ethiopia^[15]. Males were significantly knowledgeable. This result is expected in developing countries like Egypt where males are more likely to be more educated and working outside home. This finding was in accordance with Al-Maskari et.al.,^[20] in UAE.

The rate of knowledgeable diabetic urban residents was significantly higher. The same reported in Pakistan^[13]. It is mostly attributed to better access to information among urban residents. Significant positive relationships between knowledge level and education, working status and the income were noticed. Similar findings reported in UAE where knowledge improved with increase in the level of education and socioeconomic status^[20].

Newly diagnosed patients were significantly more knowledgeable. The reverse was mentioned in Ethiopia^[15]. This study found that patients with positive family history were more knowledgeable. This familial experience could have increased participants' awareness of diabetes. About two thirds of studied patients had positive attitude for compliance to prescribed medications. This was in consistent with Shokair^[21]. But higher than Michel et al.^[22]. This may be attributed to different socio demographic and economic conditions.

93.2% of participants had positive attitude toward food control in addition to drugs use, while only 40.1% of them had same attitude toward change of diet plan with lifestyle changes. This was lower than reported by Kumar ^[23].

Three quarters of the participants had positive attitude toward sport which was relatively high if compared to a study in Zagazig, Egypt ^[12]. This could be explained by sampling variability. Positive attitude toward feet care was noticed among 77.5% of participants which is higher than Kumar ^[23]. Meanwhile, majority of participants had positive attitude toward interaction with hypoglycemia. Similar finding was reported by Naheed Gul ^[24]. In contrast to Nikhil et al., ^[25] who reported that about one third of studied patients had positive attitude during stress or minor illness, minority of our study participants showed such attitude.

Overall compliance rate to prescribed medications was noticed among two thirds of participants but this rate varied according to socio demographic conditions where, patients <30 years, urban residents, educated and working patients with higher income were significantly more compliant. Same results were stated by Shokair ^[21], however such association wasn't detected by Mahfouz and Awadalla ^[26].

Significant positive correlation between patient's scores of knowledge and attitude was reported ($r=0.6$ and $p < 0.01$). Similar finding was detected in UAE ^[20]. On the other hand, this study revealed a negative weak significant correlation between patients' knowledge and practice ($r= -0.45$ and $p < 0.001$). This could be explained on basis of knowledge practice gap as adequate knowledge didn't necessarily determine good practice especially in developing communities where many cultural factors play a role.

Specialists managed two thirds of participants. Also 60% of them had 3 or more clinic visits annually. In contrary to Lafta et al., ^[27] who reported only one third of studied patients did that. Periodic feet examination was done by three quarters of participants, this was higher than that reported in Nigeria ^[28]. Periodic ophthalmology check and heart check were practiced by about one half of patients which agreed with Khandekar et al., ^[29]. While, in Pakistan only 11% thought that yearly visits to ophthalmologist is important ^[24]. Also in Ethiopia, 43.4% had eye check within one year ^[15]. Periodic renal check up was practiced by about three quarters of participants which is higher than reported in India ^[30].

73.4% of patients mentioned that their capacity to work had been affected. Same results were reported by Lopez et al. ^[31] which could be explained by psychological factors rather than actual complications. Logistic regression analysis revealed that the significant independent predictor of good knowledge regarding diabetes are, in order; urban resident, disease duration of 1-5 years, work and positive family history. On the other hand, the independent predictors of good knowledge in Ethiopia were education, age < 30 years old, and duration of diabetes for more than 5 years ^[15]. This discrepancy may be attributed to different socioeconomic factors.

Also, the significant independent predictor of patient's compliance were education, disease duration. In contrast to Khattab et al., ^[32] who mentioned none of socio-demographic factors were significantly predictive to patients' compliance and only the duration of diabetes had a negative significant relation to patients' compliance.

CONCLUSION

The overall rate of adequate knowledge regarding diabetes was only 52.3% among participants. Insulin-treated patients had lowest knowledge, attitude, and practice. Only one third of participants managed their disease at primary health care clinic and 73.4% of patient's work was affected by diabetes which may be the cause of the gap between patients' level of knowledge and their practice.

RECOMMENDATION

Efforts to increase knowledge of diabetics about the disease, and the importance of changing their life style. Closing the gap between knowledge and practice among diabetics is needed. Family physicians should provide proper health education to their patients and enforce their attitude, practice and compliance. Training and empowering of health care providers for delivering adequate health message. Media and nongovernmental organizations should play a role in raising the awareness of diabetics in a simplified way.

Study limitation: The study was outpatient clinics based one; it may not truly represent all diabetics. A nationwide survey is needed for further in depth research on diabetics' knowledge, attitude, practice and compliance and how they interrelate.

Competing interests: Authors have declared that no competing interests exist.

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