

**ORIGINAL PAPER**

**Diabetic Patients are often Sub-Optimally Aware about their Disease and its Treatment**

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**Abstract**

**Background:** Diabetes mellitus (DM) represents a continuously growing worldwide threat with major financial impact on the healthcare systems. The importance of tight glycaemic control in patients with DM type II is well established and is most effectively accomplished with the proper cooperation of both the treating physicians as well as the treated subjects.

**Aims:** The aim of our study was to evaluate the level of awareness of patients with DM type II about the various aspects of DM, including the nature of the disease, its precipitating factors and complications, as well as its treatment.

**Methodology:** The patients were asked to complete anonymously a questionnaire concerning their knowledge about diabetes, its basic pathophysiology and complications, the treatment options and possible side-effects.

Data were analyzed using STATA statistical software (Version 9.0).

**Results:** Eighty patients were on oral hypoglycaemic agents (OHA), 34 on insulin while 4 were under a hybrid treatment. Among patients on OHA, 40 patients (50%) were taking a combination of them. 13,4% of the sample was aware of what DM stands for, 84,9% did not know the type of DM they were suffering from, while (85,7%) considered that obesity plays a major role in the pathogenesis of DM. Concerning the therapy of DM, only 54,83% of the patients were aware of the brand names of their antidiabetic medication, 88,2% did not know their way of action, while 60,5% did not know the possible side effects. The majority of the sample, 60,5%, assumed that blood glucose should be measured only before meals.

**Conclusions:** The knowledge of the subjects visiting the center for the first time was found to be inadequate. This is probably due to inadequate information, non-availability of educational material and improper guidance.

**Key Words:** Education and diabetes mellitus, inadequate knowledge, scale awareness program

## Introduction

Diabetes mellitus (DM) represents a continuously growing worldwide threat with major financial impact on the healthcare systems. The importance of tight glycaemic control in patients with DM type II is well established and is most effectively accomplished with the proper cooperation of both the treating physicians as well as the treated subjects (Caballero, 2009). Besides diet, exercise, oral hypoglycemic agents and insulin are the cornerstone of DM treatment and when taken appropriately, seem to be acceptably effective (Pappas and Karaoulli, 2010, Barnes and Hong 2012).

Unfortunately, patient compliance with the prescribed treatment is often sub-optimal, which may have a deleterious effect on glycaemic control. Poor compliance may be attributed to various reasons: incomplete patient understanding of the nature of their disease, of the importance of taking their hypoglycemic agents as prescribed, of their actions or side-effects or finally of the possible complications of DM. In the same lines, the information provided to patients by their physicians may be rather quite obscure or simply not elaborate enough to be satisfactorily understood (Calle-Pascual et al, 2002, Konstantikaki 2008, Cederholm et al, 2009, Krepia et al, 2011).

The aim of our study was to evaluate the level of awareness of patients with DM type II about the various aspects of DM including the nature of the disease, its precipitating factors and complications, as well as its treatment. Moreover, we assessed their knowledge concerning the medication they received, their action, correct dosing, side-effects and proper follow-up.

## Methodology

The study population consisted of 119 consecutive patients (57 male, 62 women, mean age 68+/-13 years old, duration of DM 6.1 years) with DM type II who attended the outpatient diabetic clinic of our institution. All subjects underwent the usual clinical and laboratory evaluation. Diabetes was defined according to ADA criteria. The presence and severity of hypertension were determined according to the JNC VI guidelines. History of CV and other diseases was defined as a self-reported history or written information from the medical records.

Anthropometric determinations such as weight and height were measured by standard techniques, and body mass index (BMI) was calculated as

body weight in kilograms divided by height in meters squared.

Waist circumference was measured at the midpoint between the low rib margin and the iliac bone, and hip circumference was measured at the trochanter level. Both circumferences were measured to the nearest 0.5 cm and ratio between them provided the waist/hip ratio.

The patients were asked to complete anonymously a questionnaire concerning their knowledge about diabetes, its basic pathophysiology and complications, the treatment options and possible side-effects.

## Statistical analysis

Data were analyzed using STATA statistical software (Version 9.0, Stata Corporation, College Station, TX 77845, USA). The normality of the distribution of the continuous variables was tested by using the Shapiro-Wilk statistic. All variables had normal distribution.

In order to assess any differences between the groups for various categories, the Student's t-test was used for the continuous variables after controlling for equality of variances. The frequencies of the categorical variables are shown in contingency tables, while the Pearson's chi-square statistic was used in order to assess for any correlation. All categorical variables are presented as absolute frequencies and percentages, while the continuous variables are shown as means and standard deviations. The potential effect of the independent variables on the outcome (dependent variable) was tested using univariate and multiple logistic regression models. In addition, log-binomial models were calculated in order to produce relative risks rather than odds ratios, making the results of this study comparable with modern literature. All reported *p*-values are based on two-sided tests and compared to a significance level of 5%.

## Results

The study population consisted of 119 consecutive patients (57 male, 62 women, mean age 68+/- 13.1 years old), 115 with DMII and 4 with DMI. Demographic, anthropometric, clinical and metabolic determinations, as well as echocardiographic examination data of the baseline examination of the whole population are presented in Table 1.

Eighty patients were on oral hypoglycaemic agents (OHA), 34 on insulin while 4 were under a hybridic treatment. Among patients on OHA, 40 patients (50%) were taking a combination of them.

**Table 1. Base-line demographic, clinical and laboratory data of the study population.**  
Data presented as mean ± standard deviation (SD)

Characteristic/Parameters	Data
Age (years)	68,2 ± 13,1
Male (%)	57 (47,9%)
Type of DM (I/II)	4 (3,4%) / 115 (94,6%)
BMI (kg/m <sup>2</sup> )	28.53±4.66
Waist circum ference (cm)	96.65±22.73
Duration of hypertension (years)	6.06±7.38
Smoking currently (%)	29.4
Previous treatment (%)	65.0
DM (%)	9.1
Office SBP (mmHg)	147.25±20.20
Office DBP (mmHg)	93.38±11.87
Office PP (mmHg)	53.87±16.98
Heart rate (bpm)	72.69±10.23
Previous CAD (%)	4.8
Previous stroke (%)	2.3
Serum glucose (mg/dl)	100.38±28.08
Serum creatinine (mg/dl)	0.98±0.59
Total cholesterol (mg/dl)	228.05±66.31
LDL cholesterol (mg/dl)	129.78±87.33
HDL cholesterol (mg/dl)	52.23±18.77
Serum triglycerides (mg/dl)	148.40±39.83
SUA (mg/dl)	5.50±5.75

BMI: body mass index, CAD: coronary artery disease, DM: diabetes mellitus

In details, 69 took sulphonylureas, 48 metformin, 9 thiazolidinediones, while among the patients taking more than one OHA, the most common combination was sulphonylurea plus metformin (35 patients, 87%) (Table 2).

It is worth-noting that only 56.8% of the whole population was taking their medication in a correct way (Table 3).

Concerning the questions about DM, only 16 patients (13.4%) were aware of what DM is, 101 (84,9%) did not know the type of DM they were suffering from, while 102 (85,7%) considered that obesity plays a major role in the pathogenesis of DM. To the question which organ affect DMII, 91,6% responded the eyes, 55,5% the heart, 47,9%

the lower extremities, 37% the kidneys, 23,5% the arteries and 10,1% all the body tissues. Concerning the therapy of DM, only 57 patients (48,3%) were aware of the brand names of their antidiabetic medication, 105 (88,2%) did not know their way of action, while 72 patients (60,5%) did not know the possible side effects.

**Table 2. Antidiabetic treatment of our study population**

Type of treatment	Patients (n=119)
OHA (n,%)	80 (67,8%)
Insulin	34 (28,8%)
Insulin + OHA	4 (3,4%)
Monotherapy	75 (63%)
Drug combination	44 (37%)
Sulphonylureas	69
Metformin	48
Thiazolidinediones	9
Sulphonylureas + Metformin	35

OHA: oral hypoglycaemic agents

**Table 3. Percentage of patients with correct use of their medication**

Antidiabetic agent	Correct use of medication
Insulin	92,1%
Sulphonylureas	61%
Metformin	58,3%
Thiazolidinediones	33,3%
Sulphonylureas + Metformin	54,2%

Concerning the question about the self-control of DM, 17 patients (14, 3%) were aware of the importance of the HbA1c. 77, 3% (92 patients) had blood glucose testing meter and 89, 1% (106 patients) did not know the importance of the daily blood glucose measurement.

The majority (72 patients, 60,5%) assumed that blood glucose should be measured only before meals while 46 patients (38,7%) did measure blood glucose before and after meals. 15% of the patients measured blood glucose only once per week or less, 33% daily, 30% 2-3 times per day 16,8% more than 3 per day (Table 4).

Concerning the questions about the follow up of DM, 22% of the patients responded that only once or twice per year should visit the physician, 37% monthly while 17, 6% was not aware of the follow up. 47, 5% of the patients did not know about the ophthalmological follow up, while 35, 3% had never a test-eye examination (Table 5).

Comparing the general knowledge of DM between the two sexes, we found out that men were better informed about DM (21,1% vs 6,5%,  $p < 0,05$ ), the OHA (57,1% vs 40,3% ,  $p < 0,05$ ) and the importance of HbA1c (21,1% vs 8,1%,  $p < 0,05$ ) than women.

Insulin treated patients with DM type II were better informed about the correct use of their antidiabetic medication (84,2% vs 43,8%,  $p < 0,0001$ ), their way of action (28,9% vs 3,8%,  $p < 0,001$ ) and their possible side effects (60,5% vs 28,8%,  $p < 0,001$ ) than tablets treated patients.

Finally, the age of the diabetic patients was inversely correlated to the knowledge of DM and each medication (Table 6).

**Table 4. Patient knowledge about the control of DM**

		Patients (n=119)	
		YES	NO
Do you know HbA1c is?		14,3%	85,7%
Do you have blood glucose testing meter at home?		77,3%	22,7%
Do you need to measure blood glucose at home?		89,1%	10,9%
When should you measure blood glucose?	Before meals	60,5%	
	Before and after meals	39,5%	
How often should you measure blood glucose at home?	Never	5,2%	
	1 or less / per week	15%	
	1 / per day	33%	
	2-3 / per day	30%	
	>3 / per day	16,8%	

**Discussion**

The management of Diabetes Mellitus not only requires the prescription of the appropriate nutritional and pharmacological regimen by the physician but also intensive education and counseling of the patient (Cederholm et al,2005, Derson et al,1994).

The control of obesity and the ideal body weight is important for better glycemic control and prevention of complications but the characteristics of our patients were not according to this norm as more than half of the patients were overweight or obese (Gikas et al,2008) . The majority of the patients had a wrong assessment of their own weight and most overweight patients did not consider themselves to be overweight, thus a problem with their attitudes (Rekleiti et al,2008).

**Table 5. Patient knowledge about the follow up of DM**

		Patients(n=119)	
How often should you visit your diabetologist?	Never	1,7%	
	1-2 / per year	22,7%	
	3-6 per year	21%	
	Monthly	37%	
	Don't know	17,6%	
How often should you visit your ophthalmologist?	Never	1,7%	
	1-2 / per year	43,6%	
	3-6 per year	5,9%	
	Monthly	1,7%	
	Don't know	47,1%	
When did you have your last test-eye examination?	Never	35,4%	
	Last year	21,8%	
	2-3 years ago	33,6%	
	> 3 years ago	9,2%	

The results of this study highlights the need to educate the patients about their body weight as well as assessment of obesity (Chao et al, 2008, Charpentier et al, 2003).

**Table 6. Age and Self evaluation of DM**

	AGE		p value
	YES	NO	
Do you know what DM is?	59,2 ± 8,7	69,6 ± 9,2	<0,05
What type of DM do you have?	58 ± 10,2	69,9 ± 8,4	<0,01
Do you know the brand names of your DM medication?	63,9 ± 9,4	72,1 ± 7,8	<0,01
Do you know their way of action?	59 ± 10,4	69,4 ± 9,5	<0,05
Do you know what HbA1c is?	61,5 ± 11,4	69,3 ± 10,3	<0,05
Correct use of medication	61,5 ± 9,9	72,1 ± 9,1	<0,05

Greater BMI with co-relation to poor glycemic control was comparative in females only. It was not easy for everyone to understand the concept of Body Mass Index and it was suggested that waist circumference may be used as a crude parameter instead as it is easier and more understandable (Rekliti , et al, 2010) . Glycemic control could be improved by a weight loss of only 10% of the initial weight and thus public education and awareness about the beneficial effects of consuming a healthy diet is required. Self-monitoring of blood glucose is a simple and practical procedure acceptable for those patients who can afford it and facilitates the attainment of good glycemic control but unfortunately in our local population the practice of using glucometers was not good, as although 77,3% of the patients had their own glucometers, only 33% measured blood glucose once per day (Culhane-Pera et al, 2005). The overall awareness about the risk of complications was satisfactory but the misconceptions regarding glucose control, insulin

and diabetes were quite common (Kyriazis et al, 2010, Mytas et al, 2009).

The knowledge of the subjects visiting the center for the first time was found to be inadequate. This probably is due to inadequate information, non-availability of educational material and improper guidance. The reasons of the poor knowledge need to be further studied in detail in our population. There is need for arranging large scale awareness programs for the general public and also to identify and use media to spread the message which could change the attitude of our public in the future (Dinsmoor,2006).

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