

A review of diabetic patients' knowledge in a high prevalent European country – Malta

Sarah Cuschieri, Daniel Borg, Sean Pace, Francesca Camilleri

Abstract

Education is the first milestone in the care pathway of all diabetic patients. The aim of this study was to assess the educational knowledge and awareness among a diabetic patient cohort and compare this knowledge to a previously conducted study. Acquiring information on diabetes knowledge is essential for both clinicians and policy makers. Interviews using validated questionnaires covering various aspects of diabetes knowledge were conducted among a diabetic cohort between August and September of 2014 at the state hospital in Malta. The majority exhibited correct knowledge on diabetes and related complications. Knowledge levels appeared to have improved and were influenced by gender, type of diabetes and length of diabetes awareness. We conclude that educational approaches should be targeted towards every diabetic individual and should start immediately after diagnosis. This would lead to improved self-care, with a reduction in diabetic complications and a decrease in health-care expenditure.

Keywords

Education, Medical; Diabetes Mellitus; Knowledge; Self Care; Health Expenditures

Introduction

Diabetes mellitus is a growing epidemic that is afflicting every country all over the globe. In 2015, Europe was estimated to have 59.8 million adults diagnosed with diabetes with 193 million having undiagnosed diabetes.¹ Unfortunately diabetes is responsible for a number of general health complications and increases the mortality among those affected. It has been estimated that in Europe, diabetes directly resulted in 627, 000 deaths in 2015.¹

Responsibility for prevention of this disease should assumed upon by society in general, including the policy makers. Diabetes leads to a decrease in quality of life, with an impact on the social wellbeing and drastically increases health services expenditure. In fact diabetes type 2 alone, contributed to 9% of the total health expenditure in the European region in 2015. The diabetic health expenditure included the provision of health services for preventative and curative means, for family planning activities, nutritional activities and for emergency services.¹

Evidence has shown that education alone, apart from the pharmaceutical and surgical interventions, has a positive impact on the quality of life of these patients.² Therefore adequate knowledge about diabetes is the key for better diabetes care.³ Knowledge is a dynamic subject and challenging to assess. Taking a representative sample of diabetic patients and assessing their knowledge using a number of set questions, is a feasible procedure although to our knowledge this has never been undertaken in a European country (please see details of literature search in Section 4.1.2 below).

Malta is a small island in the Mediterranean sea located between the European and African continents which have both registered a high

Sarah Cuschieri MD, MSc*
Faculty of Medicine and Surgery,
University of Malta,
Msida, Malta
sarah.cuschieri@um.edu.mt

Daniel Borg
Faculty of Medicine and Surgery,
University of Malta,
Msida, Malta

Sean Pace
Faculty of Medicine and Surgery,
University of Malta,
Msida, Malta

Francesca Camilleri
Faculty of Medicine and Surgery,
University of Malta,
Msida, Malta

**Corresponding Author*

diabetes prevalence for a long period of time.⁴ The last prevalence study performed in 1981 stated that 7.7% of the total population suffered from diabetes type 2.⁵ According to the last International Diabetes Federation Atlas, in 2015 Malta had an estimated diabetes prevalence of 13.9%.¹ The reason behind this drastic prevalence increase could be multifactorial ranging from genetics to different lifestyle exposures.⁶

The primary aim of this study was to evaluate the general educational awareness and knowledge of diabetes in Maltese diabetic patients. The secondary aims were to: assess the impact of knowledge about the disease on the prevalence of diabetes and/to compare current diabetes awareness with that measured in a study performed in 2007.

Method

A clinical study was performed to assess the educational knowledge of diabetic patients on their condition by using a validated questionnaire. The study cohort included all diabetic patients attending the Diabetes Clinic at Mater Dei Hospital, Malta during the summer months (August – September) of 2014. Mater Dei Hospital is the only state hospital in Malta and the vast majority of diabetic patients in the country attend this clinic. Data collection was performed everyday during different consultant-led clinics, until a convenience sample size was obtained. The sample was of similar size and gender distribution to the study performed in 2007.

The questionnaire contained questions covering demographic data and different aspect of diabetes knowledge including: general diabetes knowledge, knowledge on hypoglycemia and its management, physical activity, diet, complications of diabetes and the appropriate plasma glucose level when fasted and postprandial. The questions were picked from open access validated questionnaires.⁷⁻⁹

The questionnaires were distributed to the diabetic patients while they were waiting for their outpatient appointment. The study was explained to every patient by one of the three medical students researchers who were trained on how to conduct interviews without biases by the main author. Those that agreed to participate were requested to sign a

consent form and then given the questionnaire to fill in with the help of the researcher. The same three researchers were responsible for the data collection in order to standardize the data collected.

The inclusion criteria were all patients attending the diabetes clinic at Mater Dei Hospital during the study period. All patients who did not attend the outpatient clinic appointment at Mater Dei Hospital or attended a primary health or private clinic were excluded from this exercise.

All the data was transferred onto a spreadsheet and double-checked by all the researchers in order to minimize human errors. Statistical analyses were performed by BMI SPSS v. 21 for Mac and Excel 2011 for Mac. A diabetic score was elaborated for the questions regarding general diabetes knowledge, symptoms of hypoglycemia, management of hypoglycemia and physical activity. For every correct response, a nominal value of 1 was assigned, the sum of which was calculated. The scores of the different questions were analyzed as follows; a student t-test for gender, ANOVA for education and the different types of diabetes, Kruskal-Wallis for location they live in and Pearson's correlation for the length of diabetes awareness in relation to the diabetic scores obtained for each question. All tests were conducted with a confidence interval of 95%. p-values of less than 0.05 were considered as statistically significant associations.

The questions on physical activity and complications of diabetes were compared to a study by Cutajar⁷ which had assessed these factors among the Maltese diabetic population in 2007.

Ethical permission was obtained from the University of Malta Ethics Research Committee. Authorization to distribute the questionnaires was obtained from the diabetes clinic consultants and nursing officer along with the Mater Dei Hospital administration and data protection office.

Results

The study was based on a cohort of 130 patients (62 male, 68 female) with a mean age of 60.42 (SD: 12.7) years. Table 1 illustrates the demographic data of the population under study.

Table 1: Demographic data of the sample population

Variable	No. of patients (n=130)	%		
Sex				
Male	62	48%		
Female	68	52%		
			Gender	
			Male	Female
Age (years)				
≤30	3	2.3%	1	2
31 – 40	6	4.6%	2	4
41 – 50	15	11.5%	8	7
51 – 60	30	23.1%	16	14
61 – 70	55	42.3%	25	30
≥71	21	16.2%	10	11
Educational Level				
Illiterate	1	1%	0	1
Primary	28	22%	11	16
Did not finish Secondary	16	12%	6	10
Finished Secondary	51	39%	25	26
Sixth form	17	13%	11	6
Undergraduate Courses (University, MCAST)	5	4%	4	1
Postgraduate	12	9%	4	8

The majority of the patients suffered from type 2 diabetes, although 41% of the study population did not know what type of diabetes they suffered from. Table 2 illustrates the different diabetes types as perceived by the patients and interviewed during the study period. The patients had been aware of their condition for a mean of 9.94 years (SD: 8.9) and the majority of them had good knowledge on diabetes. Table 3 shows the general diabetes knowledge among the study population. Diabetes knowledge was rated as into a score and was found to be statistically significantly related to gender ($p=0.002$), duration of diabetes awareness ($p=0.02$) and to the type of diabetes the patients suffered from ($p=0.02$) but not statistically significant related to the location the patient lived in, nor to their educational level ($p=0.723$; $p=0.427$ respectively). Table 4 illustrates the different patients' habitual localities. There was an excellent level of knowledge when it came to the desired fasting plasma glucose level and 2-hour postprandial glucose level a patient should aim for, with 73% and 48% demonstrating a correct response respectively.

When questioned about hypoglycaemia symptoms, 67% responded that feeling thirsty is a relevant symptom and 44% thought that polyuria is also a relevant symptom. It was clear that respondents often confused the significance of hyperglycaemic and hypoglycaemic symptoms. Whether this was due to lack of educational knowledge or to misunderstanding of the question is not clear. There was also a misconception by 83% of the population that the immediate treatment of hypoglycemia is to eat a bar of chocolate or biscuits, when in actual fact this is not correct (Table 5).

A list of different common conditions was provided to assess whether the diabetic patients

knew which of the complications might arise if diabetes is uncontrolled. Interestingly, for every condition the majority of the patients answered correctly especially for the diabetic microvascular and macrovascular complications. Table 6 shows the different complications and the answers provided by the study population.

The majority of the diabetic patients knew about the importance of physical exercise and 58% were aware that at least 30 minutes of daily physical activity is required. A statistically significant relation was observed between physical activity knowledge and the type of diabetes the patients suffered from ($p=0.021$).

By providing a list of different dietary foods we evaluated the educational knowledge of how healthy each item was deemed by the patients. Table 7 lists the different food items and whether the patients knew correctly the health benefits of each item. It was noted that 65% thought incorrectly that cereals were healthier than other type of food; same with chicken (95%) and light yogurt (70%), where in actual fact these items fall under moderate food items category, meaning they should be consumed in moderation.

Table 2: The different types of diabetes as perceives by the patient

Type of Diabetes	No. of patients (n=130)	%	Gender	
			Male	Female
Diabetes type 1	11	8%	5	6
Diabetes type 2	62	48%	29	33
Do not know	53	41%	28	25
Others	4	3%	0	4

Table 3: Questions on diabetes knowledge distributed among the study population (n=130) and their corresponding answers

Item	Correct (%)	Incorrect (%)	Do not know (%)
Diabetes can be controlled with treatment	127 (98)	3 (2)	0 (0)
A little glucose in the urine is a good thing	77 (59)	19 (15)	34 (26)
Diabetes is likely to go away after a while	109 (84)	20 (15)	1 (1)
Stressful experiences can affect blood glucose levels	122 (94)	3 (2)	5 (4)
Blood glucose levels do not affect your chances of developing complications	111 (85)	13 (10)	6 (5)

Table 4: Illustrates the locality distribution of the participating diabetic patients

Locality	Number	%
Attard	3	2.31
Balzan	2	1.54
B'Kara	6	4.62
Bormla	1	0.77
Bugibba	2	1.54
Dingli	2	1.54
Fgura	2	1.54
Fleur De Lyns	1	0.77
Floriana	2	1.54
Ghaxaq	1	0.77
G'mangia	1	0.77
Gzira	4	3.08
Dingli	2	1.54
Hal Safi	2	1.54
Hamrun	7	5.38
Ibragg	2	1.54
Kappara	2	1.54
Luqa	1	0.77
Marsa	1	0.77
Marsascala	2	1.54
Marsaxlokk	1	0.77
Mellieha	3	2.31
Mosta	3	2.31
Msida	3	2.31
Mtarfa	1	0.77

Cont. **Table 4:** Illustrates the locality distribution of the participating diabetic patients

Locality	Number	%
Nazzar	2	1.54
Poala	1	0.77
Pembroke	2	1.54
Pieta'	1	0.77
Qawra	1	0.77
Qormi	5	3.85
Qrendi	1	0.77
Rabat	3	2.31
Rahal gdid	4	3.08
Salina	2	1.54
San Giljan	4	3.08
San Gwann	4	3.08
San Pawl	1	0.77
St Lucia	1	0.77
Santa Venera	3	2.31
Senglea	2	1.54
Siggiewi	4	3.08
Sliema	4	3.08
St Andrew's	1	0.77
Ta Xbiex	2	1.54
Tarxien	3	2.31
Xghajra	1	0.77
Zabbar	8	6.15
Zebbug	3	2.31
Zejtun	6	4.62
Zurrieq	4	3.08
Total	130	100

Table 5: Questions on knowledge about hypoglycaemia which were distributed among the study population (n=130) and their corresponding replies

Symptoms of Hypoglycemia	Correct (%)	Incorrect (%)	Do not know (%)
Slurred speech	75 (85)	17 (13)	38 (29)
Feeling very thirsty	27 (21)	87 (67)	16 (12)
Sweating	97 (75)	11 (8)	22 (17)
Dizziness	107 (82)	14 (11)	9 (7)
Confused thinking	87 (67)	19 (15)	24 (18)
Passing more urine than usual (Polyuria)	39 (30)	57 (44)	34 (26)
Immediate management of Hypoglycemia	Correct (%)	Incorrect (%)	Do not know (%)
Have a sugary drink immediately	127 (98)	2 (2)	1 (1)
Eat a bar of chocolate or some biscuits immediately	20 (15)	108 (83)	2 (2)
Treat hypo and rest for 15 minutes	109 (84)	7 (5)	14 (11)

Table 6: Questions about diabetes complications knowledge which were distributed among the study population (n=130) and their corresponding answers

Diabetes Complications	Correct (%)	Incorrect (%)	Do not know (%)
Asthma	72 (55)	16 (12)	42 (32)
Poor circulation of the feet and hands	124 (95)	1 (1)	5 (4)
Heart attack	124 (95)	3 (2)	3 (2)
Back pain	55 (42)	27 (21)	48 (37)
Eye problems	126 (97)	1 (1)	3 (2)
Bronchitis	72 (55)	13 (10)	45 (35)
Kidney problems	111 (85)	9 (7)	10 (8)
Arthritis	69 (53)	35 (27)	26 (20)

Table 7: Correct answers on dietary products health value

Food Item	% Correct
Rice	28
Chocolate	96
Cheesecake	99
Fish	93
Cereal	35
Fresh grapes / figs	18
Oranges and apples	43
Pasta	56
Fruit Juice	19
Light yogurt	30
Bread	67
Soft cheese	65
Chicken	5
Potatoes	35
Vegetables	97

Discussions and Conclusion

Discussion

Education is key to the successful management and prevention of complications that may arise from diabetes mellitus. Knowledge is also important for sufficient self-care by patients.^{9,10} The objectives of the study were to evaluate different aspects of educational diabetes knowledge among Maltese diabetic patients and to assess whether there have been any improvements over the years.

Comparison between our study and Cutajar study⁷

In 2007, a study ($n=110$) was performed to assess a number of factors, one of which was the knowledge about the disease among diabetics attending the Diabetes Clinic in two different health centers in Malta. There are significant methodological differences between the two studies. Ours was carried out in a centralized hospital setting whereas the previous study had been carried out in the primary health care setting. A different population group was studied and percentage comparisons were made between both studies. Unfortunately the samples could not be matched in terms of age and gender due to lack of such information present in the 2007 study.

Our findings show that the general awareness of the majority of participants in the current study population was good, with 73% aware of the correct fasting plasma glucose value unlike in the 2007 study group where 55% were unable to give an approximate value. In our study population it was found that there was better awareness of diabetes-related complications than the other study. 95% of our participants knew that cardiac circulatory pathology could be directly attributable to diabetes whereas in the other study only 74.5% responded correctly. In the 2007 study, arthritis and asthma were incorrectly linked with diabetes (83.6% and 66% respectively), while in our study only 12% and 27% respectively answered incorrectly. Regarding the recommended level of physical activity there was a striking difference. In 2007, 54% of patients were unaware of the basic requirements, whereas only 2% in our population sample were not updated with the current exercise regimes advised.

It is encouraging to note that on the whole, Maltese diabetic patients are well educated on the general aspects of this common disease. There is still some confusion regarding the different

symptoms attributable to hypoglycaemic versus hyperglycaemic episodes. These should be common knowledge to all diabetics, as they should be trained how to spot and manage these symptoms in an acute scenario.

Diabetes knowledge and the way forward

The type of diabetes a patient suffers from, the gender and the length of time the patients were aware of their condition appear to be predictors of diabetes knowledge in Malta. This suggests that education should be readily available to each diabetic patient irrelevant of the type of diabetes they suffer from. All efforts should be taken to educate these patients about their disease and on how to look out for any possible complications related to the disease. Also, improving knowledge among diabetic patients will improve self-care. Achieving a good self-care level implies that, patients need to gain knowledge on all aspects of their condition ranging from risk factors to complications and management.¹¹ Complications development would decrease if patients were capable of taking care of their condition sufficiently. This is not only beneficial for the patient's quality of life but it would also have a positive economic impact on the health care system and a decrease in the productivity loss to society, brought about by associated complications and ill health.¹² Therefore it is encouraged that investing in educational sessions for diabetic patients would lead to long-term benefits from a psychosocial and likely to lead to reductions in health care expenditure. It is important to keep an open eye for knowledge barriers that sometimes arise from health care professions¹³⁻¹⁴, for organizational interventions¹⁵ as well as from patients themselves.¹⁶ It is the duty of all health professions (doctors, nurses, pharmacists, podiatrists, dietitians) that at every encounter with diabetic patients, they should counsel and educate individual patients. Also regular educational updates should be organized at different localities, making educational sessions more accessible to all patients as well as reducing the stigma associated with hospital-based care.¹⁷

This study, to the best of our knowledge, is the first to discuss diabetes knowledge and awareness in a European country after a Google Scholar search was performed in the end of

December 2014. It has shown that diabetes knowledge may have actually improved even though the prevalence of diabetes along with complications within the country has increased. The reason behind the improved diabetes knowledge could be from the frequent occurrence of this disease within families, which may influence diabetes knowledge. This is consistent with Foma et al.¹⁸ who found a correlation between diabetes knowledge and having a family member with diabetes. Another reason could be the increased coverage of aspects of diabetes care and prevention by the social media and in televised diabetic educational programs and in the national newspapers are likely to have increased public awareness. Such initiatives should be developed further. In Malta, the information and aids give to our diabetic patients by the local diabetes association helped in the level of knowledge achieved by participants. It is also suggested that from a small age, children should be made aware of this chronic disease, its symptoms, its complications and most importantly the measures that prevent developing this disease.

Study Limitation

Only patients attending during the months of August and September of 2014 at Mater Dei Hospital were studied. Patients attending health centers or private diabetic clinics were excluded. The study was performed during the summer; during which period the patient's attendance rate decreases due to the hot weather. Also many of the consultants take their annual leave during this period. This may have affected the number of daily patient encounters as well as the demographic and diabetes status of the patients attending. The population under study was different from the population under study by Cutajar's study in 2007, so results and comparisons may not be totally representative. Since this is a study on knowledge, one needs to keep in mind that patients may have answered randomly without really understanding the question or because of lack of knowledge. Although the researchers were constantly present during the interview and enquired whether any clarifications were required, patients may still have not understood the question.

Conclusion

The level of knowledge and awareness about diabetes mellitus in Malta is fairly good considering that the majority of the participants answered correctly. Comparison with a similar study performed in the same country shows knowledge may have improved over time. This is an encouraging finding especially when one considers that the prevalence of diabetes has increased over the years, further research is therefore required to find the etiology behind this epidemic within the Maltese islands⁴.

Knowledge levels appear to be influenced by gender, the type of diabetes that participants suffer from and the length of diabetes awareness. This implies that it is essential that educational approach is targeted to every diabetic and that they should start immediately following diagnoses. This would lead to a better self-care, with a reduction in diabetic complications and to a decrease in health care expenditure.

Reference

1. International Diabetes Federation. IDF Diabetes Atlas 7th edn. Brussels, Belgium : International Diabetes Federation. 2015.
2. Tamayo T, Rosenbauer J, Wild SH, Spijkerman Am, Baan C, Forouhi NG et al Diabetes in Europe: an Update. *Diabetes Res Clin Pract.*, 2014; 103(2), 206 – 217.
3. Baser RS, Richardson DL, Hollerworth HJ. Education in the treatment of diabetes. In: Joslin P, Kahn CR, Weir GC editors. *Joslin's diabetes mellitus* 13th ed. Philadelphia: Lea and Febiger. 1994; 404 - 414.
4. Cuschieri S, Mamo J. Malta: Mediterranean Diabetes hub - a journey through the years. *Malta Medical Journal*, 2014; 26 (03): 27 - 31.
5. Katona G, Aganovic I, Vuskan V, Skrabalo Z. National Diabetes Programme in Malta: Phase 1 and II Final Report. World Health Organization 1983.
6. Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *The New England Journal of Medicine* 2001; 344(18): 1343 - 1350.
7. Cutajar, J. An evaluation of type 2 diabetes care in the primary care setting *Malta Medical Journal*, 2008; 20(03): 21 - 31.
8. HIS: Health Interview Survey. Department of Health Information and Research Strategy and Sustainability Division Ministry for Health Elderly and Community Care. Malta 2008
9. Speight J, Bradley C. The ADKnowl: identifying knowledge deficits in diabetes care. *Diabetic Medicine* 2001; 18: 626 - 633.
10. Caliskan D, Ozdemir O, Ocaktan E, Idil A. Evaluation of awareness of Diabetes Mellitus and associated factors in four health center areas. *Patient Education and Counseling*. 2006; 62: 142 - 147.

11. Piette, J. The Effectiveness of Diabetes Self-Management Education; An overview of published studies. . Retrieved from Centre for Practice Management and Outcomes Research, VA Ann Arbor Health Care System and the Department of Internal Medicine, University of Michigan, 2006
12. World Health Organisation. Prevention of diabetes mellitus. WHO Technical Report Series, 844, Geneva. 1994
13. Pill R, Scott NCH, Rollnick SR, Rees M. A randomised controlled trial of an intervention designed to improve the care given in general practice to type 2 diabetes patients: patient outcomes and professional ability to change behaviour. . *Family Practice* 1998; 15: 229 - 235
14. Wylie G, Hungin APS, Neely J. Impaired glucose tolerance: qualitative and quantitative study of general practitioners' knowledge and perceptions. . *British Medical Journal*, 2002; 324: 11909.
15. Renders CM, Griffin S, Valk GD, Wagner EH, Eijk JTHM, van, Assendelft WJJ. Interventions to improve the management of diabetes mellitus in primary care, outpatient and community settings. *The Cochrane Database of Systemic Reviews*, Issue 4. art. No. : CD001481. 2000
16. Marrero DG, Kakos Kraft S, Mayfield J, Wheeler ML, Fineberg N. Nutrition management of type 2 diabetes by primary care physicians. *J Gen Intern Med*, 2000; 15: 818 - 821.
17. Ministry for Health the Elderly and Community Care. Diabetes: A National Public Health Priority 2015 - 2020. Proposal for a National Strategy for Diabetes. 2015
18. Foma MA, Saidu Y, Omoleke SA, Jafali J. Awareness of diabetes mellitus among diabetic patients in the Gambia: a strong case for health education and promotion. *BMC Public Health* 2013; 13, 1124.