WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 7.523
Volume 6, Issue 5, 81-91. Research Article ISSN 2277– 7105

AWARENESS AND KNOWLEDGE OF DIABETES MELLITUS AMONG HEALTH CARE PROFESSIONALS, PATIENTS AND PUBLIC OF MUSCAT REGION IN OMAN

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Article Received on
05 March 2017,
Revised on 22 March 2017,
Accepted on 13 April 2017
DOI: 10.20959/wjpr20175-8301

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ABSTRACT

Introduction: Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism. It is the most common endocrine disorder and by the year 2010, it is estimated that more than 200 million people worldwide will have DM and 300 million will subsequently have the disease by 2025. **Aim:** To know the awareness of diabetic mellitus in Oman among healthcare professionals (Pharmacist, Nurses), Patients and public. **Materials and Methods:** Cross-sectional survey was conducted to evaluate the general public's knowledge of diabetes and to assess awareness on healthcare professionals (pharmacists and nurses) and diabetic patients. **Results:** All of the healthcare professionals (100%) correctly answered that there are two types of diabetes as compared to 78% patients and 66% public. Also 95% of the healthcare correctly identified insulin as a hormone, as compared to 62% of patients and 55% of public who answered correct. Also 100% of the patients and 99% of healthcare agreed that diabetics should exercise regularly as compared to 89% of the public. **Conclusion:** Based on survey results, surprisingly 70% of patients and 62% of healthcare mistakenly believe that most diabetics are more than 40 years old. Hence policy makers, educational providers and healthcare agencies should take note that more work needs to be done among public and patients to raise their awareness as that of healthcare professionals.

KEYWORDS: Type 1 diabetes mellitus, Type 2 diabetes mellitus, Awareness, knowledge, Health care professionals.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism. It is the most common endocrine disorder and by the year 2010, it is estimated that more than 200 million people worldwide will have DM and 300 million will subsequently have the disease by 2025. Diet and lifestyle strategies are to reduce weight, improve glycaemic control and reduce the risk of cardiovascular complications, which account for 70% to 80% of deaths among those with diabetes. Diabetes is best controlled either by diet alone and exercise (non-pharmacological), or diet with herbal or oral hypoglycaemic agents or insulin (pharmacological). The main side effects are weight gain and hypoglycaemia with sulfonylureas, gastrointestinal (GI) disturbances with metformin, weight gain, GI disturbances and liver injury with thiazolidinediones, GI disturbances, weight gain and hypersensitivity reactions with meglitinides and flatulence, diarrhoea and abdominal with alpha-glucosidase inhibitors.[1][2][3]

Types of diabetes mellitus

Diabetes mellitus may be categorized into several types but the two major types are type 1 and type 2. On the basis of etiology, the term type 1 and type 2 were widely used to describe IDDM and NIDDM, respectively; other specific types of diabetes and gestational diabetes. The term juvenile -onset diabetes has sometimes been used for IDDM and maturity-onset for NIDDM. On the basis of etiology.[4]

Type 1

There is no known etiological basis for type 1b diabetes mellitus. Some of these patients have permanent insulinopenia and are prone to ketoacidosis, but have no evidence of autoimmunity. This form is more prevalent among individuals of African and Asian Origin.[5]

Type 2 diabetes

In some countries, childhood diabetes type 2 is more common than type 1. The disease is usually controlled through dietary therapy, exercise and hypoglycemic agents.[6] [7]

Gestational Diabetes* (GD) *mellitus

refers to the onset or initial recognition of glucose intolerance during pregnancy, usually in the second or third trimester.[18] It occurs in about 4% of all pregnancies. Patients with GD have a 30% to 50% chance of developing DM, usually type 2 DM.[8]

Other types

Prediabetes indicates a condition that occurs when a person's blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 DM. Many drugs impair insulin secretion and some toxins damage pancreatic beta cells. The ICD-10 (1992) diagnostic entity, malnutrition-related diabetes mellitus (MRDM or MMDM, ICD-10 code E12), was deprecated by the World Health Organization when the current taxonomy was introduced in 1999.[9] [10]

AIM

To know the awareness of diabetic mellitus in Oman among healthcare professionals (Pharmacist, Nurses), Patients and public.

OBJECTIVE

To identify areas of knowledge in public, patients and healthcare (pharmacists and nurses) that might require to design of future educational programme and materials.

METHODOLOGY[11]

A cross-sectional survey was conducted to evaluate the general public's knowledge of diabetes and to assess awareness on healthcare professionals (pharmacists and nurses) and diabetic patients. The respondents were required to answer 25 questions from a pre-tested questionnaire using 'Yes', 'No' or 'Unsure' as the response. To achieve that multiple questionnaires have been developed to evaluate the level of the awareness by randomly selected in different places in the National Diabetes & Endocrine Centre, Royal hospital, in different community pharmacy and health centers. Also some of our relatives and friends who are suffering from this disease and general people who are not suffering from this disease. The questionnaire available in the two official languages of Oman (Arabic and English) was divided into sex main sections with each section focusing on different aspects of diabetes mellitus, namely, general knowledge about diabetes (5 questions), risk factors (4 questions), symptoms and complications (7 questions), treatment and management (4

questions), medications available (2 questions) and monitoring (3 questions). A point was awarded for each correct response and zero for wrong or unsure responses.

Diabetes Awareness Survey

The Oman Medical College student would like you to complete this survey to assess diabetes knowledge among: **Health Care Professionals (Nurses / Pharmacist) or Patients or Public** Please answer the questions (without doing research) to aid the work well program with future programming and outreach.

Gender: Female \ Male

Age: ……..

1) General Knowledge of diabetes

Questions	Yes	No	Unsure
1) Diabetes is a condition of high blood sugar.			
2) There are two major types of diabetes.			
3) Diabetes is contagious disease.			
4) Diabetes is not curable.			
5) Insulin is a hormone.			
2) Knowledge of risk factors of diabetes:			
Questions	Yes	No	Unsure
1) A person with Family history of diabetes more likely to have diabetes.			
2) Most diabetic patients with age above 40 years old.			
3) Obesity is related to diabetes.			
4) Pregnant Female can develop diabetes.			

3) Knowledge on symptoms and complications of diabetes:

Questions	Yes	No	Unsure
1) Diabetic patients always have constant feeling of thirst and frequent urination.			
2) Slow healing of cuts and wounds.			
3) High blood pressure can devolves in diabetic patients.			
4) Loss of sensation in arms and legs are common in diabetic patients.			
5) Decaying limbs that require surgical removal is one of complications of diabetes.			
6) Diabetic patients always have Kidney problems.			
7) Weight loss despite normal appetite in diabetic patients.			

4) Knowledge of treatment and management of diabetes

Questions	Yes	No	Unsure
1) Diabetics should carry sweets and jelly beans when they are out.			
2) Diabetics should go for regular eye check-up.			
3) Diabetics should exercise regularly.			
4) Diabetics should not donate blood.			

5) Medication available for treatment of diabetes

Questions	Yes	No	Unsure
1) Tablets and capsules			
2) Injections			

6) Knowledge of monitoring of diabetic conditions

Questions	Yes	No	Unsure
1) Diabetics should test for sugar in the urine.			
2) Diabetics should make regular visits to the eye doctor.			
3) Diabetics should not smoke.			

RESULTS

Results of the Diabetes Awareness Survey

Table 1: General Knowledge by Category

		Category					
		Patients		Healthcare		Public	
		Count	Column N %	Count	Column N %	Count	Column N %
Diabetes is a condition of high blood sugar	No	3_a	3.0%	5_a	5.0%	8_a	8.1%
	Yes	96_a	97.0%	95_a	95.0%	91_a	91.9%
There are two major types of diabetes	No	22_a	22.2%	0^1	.0%	34_a	34.3%
	Yes	77_a	77.8%	100^1	100.0%	65_a	65.7%
Diabetes is a contagious disease	No	99^1	100.0%	94_a	94.9%	96_a	97.0%
	Yes	0^1	.0%	5_a	5.1%	3_a	3.0%
Diabetes is not curable	No	43_a	43.4%	36_a	36.0%	49_a	49.5%
	Yes	56_a	56.6%	64_a	64.0%	50_a	50.5%
Insulin is a hormone	No	38_a	38.4%	5_b	5.0%	45_a	45.5%
	Yes	61_a	61.6%	95_b	95.0%	54_a	54.5%

Note: Values in the same row and subtable not sharing the same subscript are significantly different at $p < 0.05$ in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.[2]

1. This category is not used in comparisons because its column proportion is equal to zero or one.
2. Tests are adjusted for all pairwise comparisons within a row of each innermost sub table using the Bonferroni correction.

Table 2: Knowledge of risk factors by Category

		Category					
		Patients		Healthcare		Public	
		Count	Column N %	Count	Column N %	Count	Column N %
A person with a family history of diabetes is more likely to have diabetes	No	18_a	18.2%	5_b	5.0%	$9_{a,b}$	9.1%
	Yes	81_a	81.8%	95_b	95.0%	$90_{a,b}$	90.9%
Most diabetic patients are above 40 years old	No	30_a	30.3%	$38_{a,b}$	38.0%	50_b	50.5%
	Yes	69_a	69.7%	$62_{a,b}$	62.0%	49_b	49.5%
Obesity is related to diabetes	No	6_a	6.1%	7_a	7.0%	21_b	21.2%
	Yes	93_a	93.9%	93_a	93.0%	78_b	78.8%
Pregnant females can develop diabetes	No	1_a	1.0%	3_a	3.0%	20_b	20.2%
	Yes	98_a	99.0%	97_a	97.0%	79_b	79.8%

Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< 0.05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.[1]

1. Tests are adjusted for all pair wise comparisons within a row of each innermost sub table using the Bonferroni correction.

Table 3: Knowledge of symptoms & complications by Category

		Category					
		Patients		Healthcare		Public	
		Count	Column N %	Count	Column N %	Count	Column N %
Diabetic patients always have constant feeling of thirst and frequent urination	No	0^1	.0%	5_a	5.0%	7_a	7.1%
	Yes	99^1	100.0%	95_a	95.0%	92_a	92.9%
Slow healing of cuts and wounds	No	2_a	2.0%	2_a	2.0%	9_a	9.1%
	Yes	97_a	98.0%	98_a	98.0%	90_a	90.9%
High blood pressure can evolve in diabetic patients	No	45_a	45.5%	10_b	10.0%	45_a	45.5%
	Yes	54_a	54.5%	90_b	90.0%	54_a	54.5%
Loss of sensation of arms an legs are common in diabetic patients	No	26_a	26.3%	9_b	9.0%	50_c	50.5%
	Yes	73_a	73.7%	91_b	91.0%	49_c	49.5%
Decaying limbs that require surgical removal is one of the compplications of diabetes	No	9_a	9.1%	4_a	4.0%	35_b	35.4%
	Yes	90_a	90.9%	96_a	96.0%	64_b	64.6%
Diabetic patients always have kidney problems	No	56_a	56.6%	26_b	26.0%	50_a	50.5%
	Yes	43_a	43.4%	74_b	74.0%	49_a	49.5%
Weight loss despite normal appetite in diabetic patients	No	6_a	6.1%	11_a	11.0%	31_b	31.3%
	Yes	93_a	93.9%	89_a	89.0%	68_b	68.7%

Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< 0.05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.[2]

1. This category is not used in comparisons because its column proportion is equal to zero or one.
2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

Table 4: Knowledge of treatment & management by Category

		Category					
		Patients		Healthcare		Public	
		Count	Column N %	Count	Column N %	Count	Column N %
Diabetics should carry sweets and jelly beans when they are out	No	23_a	23.2%	21_a	21.0%	26_a	26.3%
	Yes	76_a	76.8%	79_a	79.0%	73_a	73.7%
Diabetics should go for regular eye check ups	No	2_a	2.0%	14_b	14.0%	18_b	18.2%
	Yes	97_a	98.0%	86_b	86.0%	81_b	81.8%
Diabetics should exercise regularly	No	0^1	.0%	1_a	1.0%	11_b	11.1%
	Yes	99^1	100.0%	99_a	99.0%	88_b	88.9%
Diabetics should not donate blood	No	12_a	12.1%	31_b	31.0%	41_b	41.4%
	Yes	87_a	87.9%	69_b	69.0%	58_b	58.6%

Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< 0.05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.[2]

1. This category is not used in comparisons because its column proportion is equal to zero or one.
2. Tests are adjusted for all pair wise comparisons within a row of each innermost sub table using the Bonferroni correction.

Table 5: Medication available for Treatment by Category

		Category					
		Patients		Healthcare		Public	
		Count	Column N %	Count	Column N %	Count	Column N %
Tablets and capsules	No	1_a	1.0%	5_a	5.0%	20_b	20.2%
	Yes	98_a	99.0%	95_a	95.0%	79_b	79.8%
Injections	No	0^1	.0%	0^1	.0%	6_a	6.1%
	Yes	99^1	100.0%	100^1	100.0%	93_a	93.9%

Note: Values in the same row and sub table not sharing the same subscript are significantly different at p< 0.05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.[2]

1. This category is not used in comparisons because its column proportion is equal to zero or one.
2. Tests are adjusted for all pair wise comparisons within a row of each innermost sub table using the Bonferroni correction.

Table 6: Knowledge of monitoring of diabetes by Category

		Category					
		Patients		Healthcare		Public	
		Count	Column N %	Count	Column N %	Count	Column N %
Diabetics should test for sugar in the urine	No	6_a	6.1%	23_b	23.0%	17_b	17.2%
	Yes	93_a	93.9%	77_b	77.0%	82_b	82.8%
Diabetics should make regular visits to the eye doctor	No	0^1	.0%	12_a	12.0%	21_a	21.2%
	Yes	99^1	100.0%	88_a	88.0%	78_a	78.8%
Diabetics should not smoke	No	3_a	3.0%	18_b	18.0%	29_b	29.3%
	Yes	96_a	97.0%	82_b	82.0%	70_b	70.7%

Note: Values in the same row and sub table not sharing the same subscript are significantly different at p< 0.05 in the two-sided test of equality for column proportions. Cells with no subscript are not included in the test. Tests assume equal variances.[2]
1. This category is not used in comparisons because its column proportion is equal to zero or one. 2. Tests are adjusted for all pair wise comparisons within a row of each innermost sub table using the Bonferroni correction.

Analysis of Variance of Diabetes Awareness Scores by Category

Figure 1: Mean scores by Category

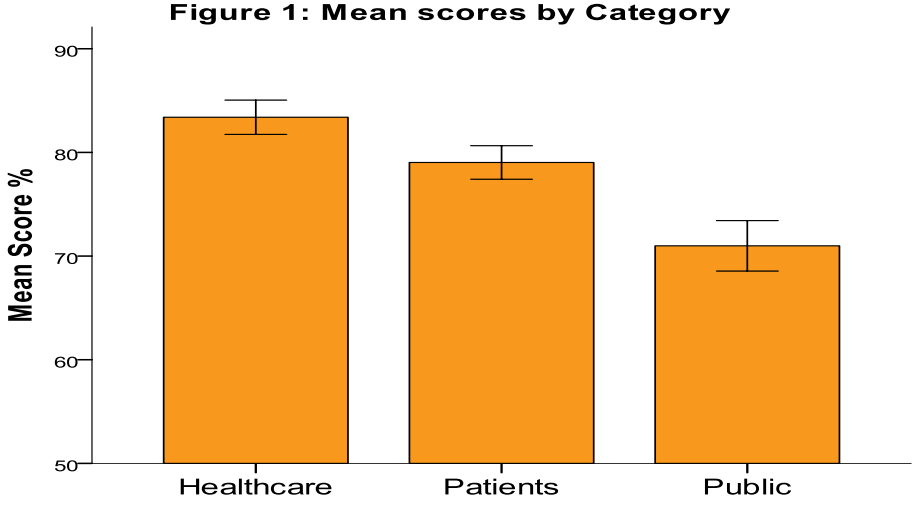

Table 7: Diabetes Awareness Scores(%) by Category

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Patients	99	79.0303	8.10323	.81441	77.4141	80.6465	56.00	92.00
Healthcare	99	83.3939	8.30763	.83495	81.7370	85.0509	60.00	100.00
Public	99	70.9899	12.19359	1.22550	68.5579	73.4219	32.00	92.00
Total	297	77.8047	10.96812	.63643	76.5522	79.0572	32.00	100.00

Table 8: ANOVA

Diabetes Awareness Scores(%)					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7839.138	2	3919.569	41.497	.000
Within Groups	27769.535	294	94.454		
Total	35608.673	296			

Table 9: Multiple Comparisons

Diabetes Awareness Scores (%)
LSD

(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Patients	Healthcare	-4.36364*	1.38136	.002	-7.0823	-1.6450

	Public	8.04040*	1.38136	.000	5.3218	10.7590
Healthcare	Patients	4.36364*	1.38136	.002	1.6450	7.0823
	Public	12.40404*	1.38136	.000	9.6854	15.1227
Public	Patients	-8.04040*	1.38136	.000	-10.7590	-5.3218
	Healthcare	-12.40404*	1.38136	.000	-15.1227	-9.6854
*. The mean difference is significant at the 0.05 level.						

DISCUSSION

The total sample size was 298, with almost equal proportions of patients, healthcare professionals and public. In the area of General Knowledge of diabetes, (Table 1), healthcare showed better knowledge in at least two questions. All of the healthcare professionals (100%) correctly answered that there are two types of diabetes as compared to 78% patients and 66% public. Also 95% of the healthcare correctly identified insulin as a hormone, as compared to 62% of patients and 55% of public who answered correct.

In the area of knowledge of risk factors of diabetes (Table 2), healthcare and public showed better knowledge as compared to patients regarding the influence of family history and age. 95% of healthcare and 92% of public answered correctly that a person with a family history of diabetes is more likely to have diabetes as compared to 82% of patients (*P*-value < 0.05). Again 38%of healthcare and 51% of public correctly answered that Most diabetics are Not above 40 years old as compared to 30% of the patients (*P*-value < 0.05). But surprisingly 70% of patients and 62% of healthcare mistakenly believe that most diabetics are more than 40 years old. The Public showed better understanding concerning this with equal proportions of correct and incorrect answers. Regarding the relationship of obesity vs. diabetes and pregnancy vs. diabetes, healthcare professionals and patients seemed better informed as compared to public (Table 2).

Concerning knowledge of symptoms & complications (Table 3), again healthcare showed better understanding than patients and public in many areas. 90% of healthcare correctly identified that high blood pressure can evolve in diabetic patients as compared 55% of patients and 55% of public (*P*-value < 0.05). Also significant differences were found between healthcare, patients and public regarding the awareness that loss of sensations of arms and legs are common in diabetic patients. Healthcare was most aware (91%), followed by patients (74%) and followed by public (50%). The public also showed least awareness concerning amputation of limbs as one of the complications of diabetes. Higher proportion of healthcare was aware that diabetics always have kidney problems as compared to public and patients

(74% vs. 49.5%, *P*-value < 0.05). Again 89% of healthcare and 94% of patients agreed that weight loss was common in diabetics in spite of normal diet, as compare to 69% of public (*P*-value < 0.05).

Patients showed better awareness regarding knowledge of treatment and management as compared to healthcare and public (Table 4). 98% of Patients agreed that that diabetic patients need to go for eye check-ups regularly, as compared to 86% of healthcare and 82% of public (*P*-value < 0.05). Also 100% of the patients and 99% of healthcare agreed that diabetics should exercise regularly as compared to 89% of the public. Surprisingly in the area of blood donation, 88% of patients mistakenly felt that diabetics should not donate blood, as compared to 31% of healthcare and 41% of public.

Regarding medications available for treatment again patients and healthcare showed higher level of awareness regarding tablets, capsules and injections as compared to public (Table 5).

Regarding knowledge of monitoring of diabetes (Table 6), surprisingly patients showed better knowledge than the healthcare professionals regarding testing for sugar in the urine (94% vs. 77%, *P*-value < 0.05) and that diabetics should not smoke (97% vs. 82%, *P*-value < 0.05).

CONCLUSION

A one-way analysis of variance (ANOVA) was conducted to assess the difference in the mean scores (%) between the three categories. As can be seen from Figure 1 and Table 7, Healthcare showed the highest mean awareness score of 83.4% followed by Patients with 79.0% followed by Public with 71.0%. As can be seen from Tables 8 & 9, all these differences are statistically significant (*P*-value<0.05). However 38%of healthcare and 51% of public correctly answered that Most diabetics are Not above 40 years old as compared to 30% of the patients (*P*-value < 0.05). But surprisingly 70% of patients and 62% of healthcare mistakenly believe that most diabetics are more than 40 years old. Hence policy makers, educational providers and healthcare agencies should take note that more work needs to be done among public and patients to raise their awareness as that of healthcare professionals.

REFERENCES

1. Klein R, Klein BEK, Moss SE, Cruickshanks KJ. The Wisconsin epidemiological study of diabetic retinopathy, Ophthalmology. 1998 Oct; 105(10): 1801-15.

2. DCCT Research Group, The effect of intensive treatment of diabetes onthe development and progression of long-term complications in insulin-dependent diabetes mellitus, N Engl J Med 1993; 329: 977-986.
3. The HOPE Study Investigators. Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: Results of the HOPE and MICROHOPE Study. Lancet 2000; 355: 253-9.
4. Zimmet P. Globalization, coca-colonization and the chronic disease epidemic: can the Doomsday scenario be averted? J Med 2000; 247: 301-310.
5. Huang C, Kim Y, Caramori ML, et al. Cellular basis of diabetic nephropathy: II. The transforming growth factor-beta system and diabetic nephropathy lesions in type 1 diabetes. Diabetes, 2002.
6. Saely CH, Aczel S, Marte T, et al. Cardiovascular complications in type 2 diabetes mellitus depend on the coronary angiographic state rather than on the diabetes state. Diabetologia. 2004 Jan; 47(1): 145-6.
7. Ahrén B, Corrigan CB. Intermittent need for insulin in a subgroup of diabetic patients in Tanzania. 24-function in type 2 (non-insulin-dependent) diabetes mellitus.
8. American Diabetes Association. Gestational diabetes mellitus. Diabetes Care.
9. Raffel LJ, Scheuner MT, Rotter JI. Genetics diabetes. In: Porte D Jr, Sherwin RS, eds. Ellenberg & Rifkin's Diabetes Mellitus. 5th ed. Stamford, CT.
10. Brodsky IG, Robbins DC, Hiser E, et al. Effect of lowprotein diets on protein metabolis insulin dependent diabetes mellitus patients with early nephropathy, J Clin Endocrinol Metab. 1992 Aug; 75(2): 351-7.