

Factors Affecting Awareness of Medical Practitioners Regarding Type 2 Diabetes Mellitus and its Management

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ABSTRACT

Background: Diabetes mellitus is one of the most common public health issues globally whose incidence is on the rise, particularly in middle-income and low-income countries. Primary care physicians are the first line of defense in treating and directing diabetics and their families. Despite this, available literature points out a lack of awareness among them regarding type 2 diabetes mellitus and its management.

Objective: To determine the awareness and its associated factors regarding type 2 diabetes mellitus and its management among medical practitioners working in different health facilities of Karachi.

Method: A cross-sectional study was conducted from June 2016 to November 2017 on medical practitioners working at different public and private health establishments of Districts Malir and Korangi, Karachi. Data from 208 conveniently sampled medical practitioners from the randomly selected union councils of these two districts were collected through the study questionnaire after taking their verbal informed consent. Data were analyzed on SPSS version 21. Crude and adjusted odds ratio with 95% confidence interval were computed using binary logistic regression to determine the association of study variables with adequate awareness.

Results: A total of 328 medical practitioners were approached out of which only 208 returned the questionnaire yielding a response rate of 63.4%. The median age of study participants was 38 (IQR=47-30) years. 148 (71.2%) of them were males whereas 168 (80.8%) of them were privately employed. It was found that 146 (70.2%) participants had adequate awareness whereas 62 (29.8%) had inadequate awareness regarding type 2 diabetes mellitus and its management. Univariate and multivariable analysis showed that none of the demographic characteristics of the practitioners were significantly associated with awareness.

Conclusion: Medical practitioners were found to be adequately aware of many aspects of diabetes mellitus type 2 and its management. Their awareness, however, was not associated with their demographic characteristics.

Keywords: Awareness, diabetes mellitus, physicians, demographic factors, private and public health sector.

INTRODUCTION

Diabetes mellitus is one of the most common public health issues globally whose incidence is on the rise, particularly in middle-income and low-income countries [1]. Primarily there are two forms of diabetes, insulin-dependent or type 1 diabetes mellitus and non-insulin-dependent or type 2 diabetes mellitus. Non-insulin-dependent or type 2 diabetes mellitus is the most common form of diabetes mellitus, which accounts for 90% to 95% of all diabetic patients [2, 3].

Diabetes mellitus can result in multisystem micro-vascular complications, such as retinopathy, nephropathy and neuropathy, and macro-vascular complications, such as ischemic heart disease, stroke and peripheral vascular disease [4]. Chronic complications of diabetes are mainly due to hyperglycemia-induced impairment of neural and vascular structure at a cellular and molecular level [5].

According to the International Diabetic Federation, one out of every eleven adults aged 20 to 79 years has diabetes mellitus, and one out of every two of them is unaware of it; 79% of people with diabetes live in low and middle income countries; moreover, 10% of total global health expenditure is spent on diabetes [6]. Literature reports that Asia is rapidly becoming a hub of the emerging type 2 diabetes mellitus global epidemic [3]. A systematic review in 2016 reported the current prevalence of type 2 diabetes mellitus in Pakistan to be 11.7% [7], though the second National Diabetes Survey of Pakistan in 2018 reported the overall weighted prevalence of diabetes to be 26.3%, of which 19.2% were known diabetics whereas 7.1% were newly diagnosed diabetics [8].

Pakistan is the world's sixth most populous country [9]. It has gone through major economic and epidemiologic shifts. Growing urbanization has resulted in a more sedentary lifestyle, higher-calorie food consumption, eating more and drinking less, as well as stressful conditions, all of which have contributed to the rising prevalence of diabetes [10]. In the light of the high prevalence of diabetes in Pakistan, it is important that effective prevention and control strategies are in place to

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effectively deal with its increasing public health burden. Due to a lack of endocrinologists, physicians play an important role in diabetes management [11].

Primary care physicians are the first line of defense in treating and directing diabetics and their families. Despite this, available literature points out a lack of awareness among them regarding type 2 diabetes mellitus and its management [12]. Literature also shows that continuing professional education improves the competency of the healthcare providers for diabetes management [13]. In the absence of such education, physicians may not possess sufficient knowledge to provide initial and continuous treatment and therapy for diabetes mellitus.

Though at a national level some literature is available on awareness of type 2 diabetes mellitus and its management among medical professionals, to the best of authors' knowledge, such studies are at least a decade or older [14-16]. In the given context, this study was conducted to evaluate the awareness and its associated factors regarding type 2 diabetes mellitus and its management among medical practitioners working in different health facilities of Karachi.

METHODS

A cross-sectional study was conducted from June 2016 to November 2017 in different private and public health facilities in Karachi. Medical graduates, post-graduate trainees and post-graduates were included in the study while house officers, doctors with administrative jobs and doctors with no clinical experience were excluded from this study.

Keeping the percentage frequency of the study outcome at 89% [17], with a 95% confidence level and 5% precision, the required sample size was calculated to be 151 by using the following formula: $n = z^2(p)(1-p) / c^2$.

First, two rural districts were randomly selected; Korangi and Malir. There were 82 union councils in total; 45 in District Malir and 37 in District Korangi. From these, 52 union councils were randomly selected through computer-generated numbers; 32 union councils from District Malir and 20 union councils from District Korangi, with the intention to cover more than 50% of the total union councils present in both of these districts. The principal investigator visited 280 health facilities in total from the selected union councils of these two districts and after checking eligibility he could distribute a total of only 328 survey questionnaires as many of the medical practitioners were either not registered or not available at the time of data collection.

Ideas were taken from different sources to develop the study's questionnaire. It was then piloted on 9% of the sample size to check for reliability and the Cronbach's alpha value was calculated to be 0.702, indicating an acceptable level of internal consistency. The questionnaire was developed in English and was divided into two sections. The first section included six questions

on demographic characteristics of general practitioners while the second section included nineteen questions on their awareness regarding type 2 diabetes mellitus. Some questions had multiple options while others had dichotomous options, the correct answer in each case was given a score of 1 while the incorrect ones were given a score of 0. Practitioners who correctly answered 70% of the awareness questions were considered as having adequate awareness. The study questionnaire is provided in a supplementary file.

Data were entered and analyzed in a statistical package for social sciences version 21. Descriptive statistics for categorical variables like gender, years of practice, employment, education level, geographical area, health facilities and awareness were presented as frequency and percentage while continuous variables like age, median and interquartile range (IQR) were computed after checking the assumption of normality using Shapiro-Wilk test. Binary logistic regression was applied to compute the univariate odds ratio with a 95% confidence interval for determining the association of study variables with the awareness of medical practitioners. Variables with $p < 0.25$ and other important variables irrespective of $p < 0.25$ in univariate analysis were used to build a multivariable regression model to compute an adjusted odds ratio with a 95% confidence interval. A two-tailed p -value of ≤ 0.05 was considered statistically significant on the final regression model.

RESULTS

A total of 328 medical practitioners were approached out of which only 208 returned the questionnaire

Table 1: Demographic characteristics of medical practitioners employment type.

Variables	Frequency(%)
Age Group	
Up to 40 years	126(60.6)
More than 40 years	82(39.4)
Gender	
Male	148(71.2)
Female	60(28.8)
Education Level	
Graduation	176(84.6)
Diploma/2 Years Post-Graduation	20(9.6)
4 Years Post-Graduation	12(5.8)
Practice Duration	
1-5 Years	59(28.4)
6-10 Years	39(18.8)
11-15 Years	41(19.6)
16 Years or More	69(33.2)
Employment Type	
Public	40(19.2)
Private	168(80.8)
Type of Health Facility	
Private clinics	136(65.4)
Dispensary	13(6.2)
Secondary/Tertiary Care hospital	59(28.4)

Table 2: Univariate analysis of the association between demographic characteristics with awareness.

Participants' Features	Awareness		OR (95% CI)	p-value
	Adequate n(%)	Inadequate n(%)		
Age				
Up to 40 years	94 (74.6)	32(25.4)	Ref	0.085
More than 40 Years	52(63.4)	30(36.6)	1.69 (0.92-3.09)	
Gender				
Male	106(71.6)	42(28.4)	Ref	0.479
Female	40 (66.7)	20 (33.3)	1.26 (0.66-2.40)	
Education Level				
Graduation/Diploma/2 Years Post-Graduation	137(69.9)	59 (30.1)	Ref	0.708
4 Years Post-Graduation	9 (75.0)	3 (25.0)	0.77 (0.20-2.96)	
Practice Duration				
1-10 years	73(74.5)	25(25.5)	Ref	0.201
11 years or more	73(66.4)	37(33.6)	1.48 (0.81-2.70)	
Employment Type				
Public	23(57.5)	17(42.5)	Ref	0.051
Private	123(73.2)	45(26.8)	0.49 (0.24-1.01)	
Health facility				
Clinic/Dispensary	103 (69.1)	46(30.9)	Ref	0.594
Secondary/tertiary care hospital	43(72.9)	16(27.1)	0.83 (0.42-1.63)	

CI: Confidence interval, **OR:** Odd ratio, **Ref:** Reference category

yielding a response rate of 63.4%. Data of 208 medical practitioners were therefore analyzed for the study. The median age of study participants was 38 (IQR=47-30) years, further detail of their demographic characteristics is provided in Table 1.

The study results further showed that 164 (78.8%) of the medical practitioners were aware of the diagnostic criteria of pre-diabetes whereas 168 (80.8%) of them were aware of the diagnostic criteria of diabetes mellitus type 2. For clinical features of hypoglycemia and hyperglycemia among patients of type 2 diabetes mellitus, 187 (90%) and 188 (90.4%) respectively showed awareness. Moreover, 119 (57.2%) practitioners were aware that hypoglycemia is more dangerous for a diabetic patient than hyperglycemia, 203 (97.6%) of them were aware of the risk factors of diabetes mellitus type 2 whereas 181 (87.0%) of them were aware that stress is an important factor that can lead to diabetes mellitus. Moreover, 121 (58.2%) of the practitioners were aware that blood glucose level is maintained normally by liver glycogen, 148 (71.2%) of them were aware that a newly diagnosed diabetic patient must be referred to a diabetologist whereas 126 (60.6%) of them were aware that the treatment of a newly diagnosed diabetes type 2 patient should be started immediately. Furthermore, 177 (85.1%) of the practitioners were aware that lifestyle modification accompanied by metformin use are the first steps for its control whereas 178 (85.6%) of them knew about drug alteration as the next step in the control of diabetes. Moreover, 183 (88.0%) of the practitioners were aware that twice insulin therapy should be started in case of the failure of oral hypoglycemic drugs, 157 (75.5%) were aware that bedtime long-acting insulin should be added in case of uncontrolled diabetes mellitus

whereas 132 (63.5%) were aware that sulphonylureas should be omitted from therapy after starting insulin to prevent hypoglycemia. Furthermore, 194 (93.2%) of the practitioners were aware that diabetes self-management education is an essential part of diabetic care, 188 (90.4%) were aware that self-monitoring of blood glucose helps in diabetes control, 124 (59.6%) were aware that dietary modification and regular exercise helps in the control of diabetes mellitus whereas 122 (58.7%) participants were aware that a non-drug treatment can help control diabetes mellitus.

It was further seen that 146 (70.2%) participants had adequate awareness whereas 62 (29.8%) had inadequate awareness regarding type 2 diabetes mellitus and its management. Table 2 represents an association of participants' characteristics with awareness. It shows that none of the demographic characteristics studied were significantly associated with the awareness of the participants.

Fig. (1) shows details of the multivariable model of factors affecting awareness. The likelihood of adequate awareness was higher in practitioners aged >40 as compared to those aged <40 years but statistically, it was not significant (aOR=1.50, 95% CI: 0.70-3.20). The odds of adequate awareness were higher in females than male practitioners but statistically, significance was not observed (aOR=1.30, 95% CI: 0.65-2.58). The odds of adequate awareness among practitioners with graduation, diploma, or 2 years post-graduation were 1.29 times higher in contrast to practitioners with four years post-graduation without statistical significance (aOR=1.29, 95% CI: 0.32-5.14). No statistically significant higher likelihood of awareness was seen among practitioners with work experience of more than

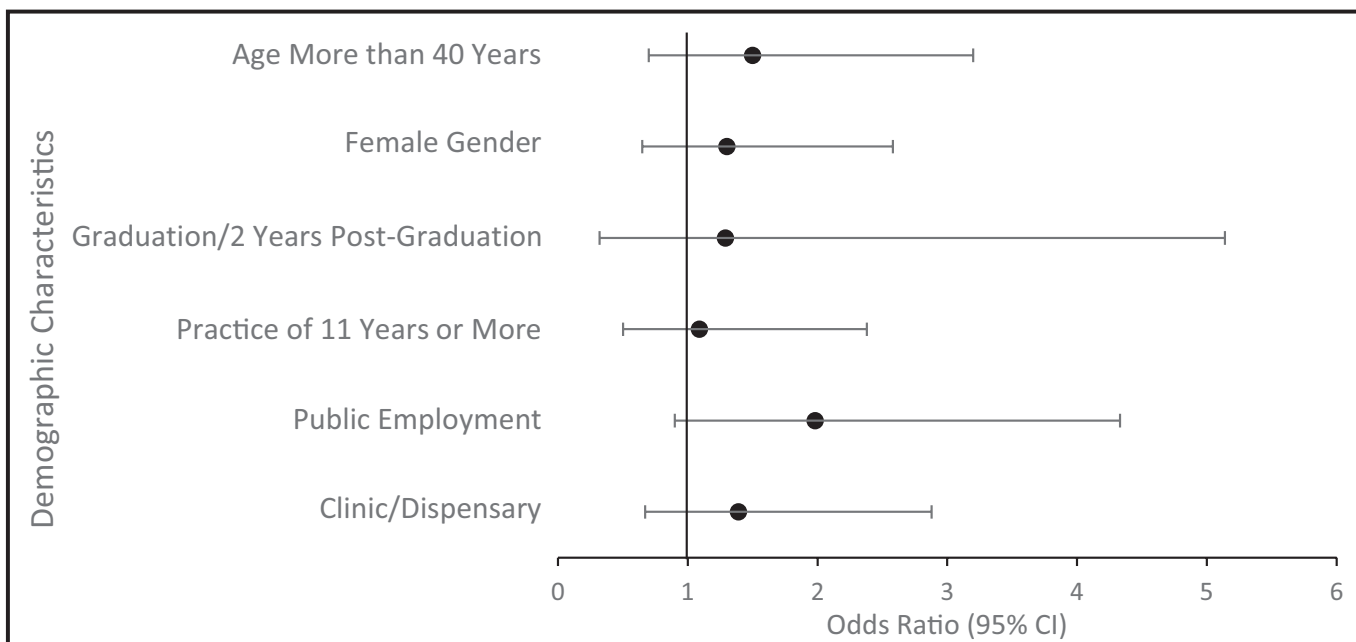


Fig. (1): Multivariable association of study factors with awareness in medical practitioners.

10 years than those with ≤ 10 years (aOR=1.09, 95% CI: 0.50-2.38). The chances of adequate awareness were nearly two-fold higher in those working in the public sector than in the private sector but no statistical significance was seen (aOR=1.98, 95% CI: 0.90-4.33). The likelihood of adequate awareness was higher in practitioners who practiced at a clinic or dispensary but statistically, it was not significant (aOR=1.39, 95% CI: 0.67-2.88).

DISCUSSION

Diabetes mellitus is a metabolic disease characterized by chronic hyperglycemia, which can lead to many complications for the human body. The key aim of diabetes care is to keep blood glucose levels under control; failure to do so can be attributed to several factors, such as patient noncompliance with medication regimens or physician malpractice [18].

Our study results showed that 70.2% of the medical practitioners had adequate awareness whereas 29.8% had inadequate awareness regarding type 2 diabetes mellitus and its management. Moreover, none of the demographic characteristics studied were significantly associated with their awareness.

The study results revealed that 78.8% of the medical practitioners were aware of the impaired fasting and random blood glucose criteria for pre-diabetes. Similarly, Saeed N *et al.* in 2019 reported that 71.8% of the physicians are aware of the impaired fasting blood glucose criteria for pre-diabetes [19]. Kocic V *et al.* in 2017 though reported that 46.3% of the physicians correctly know the impaired fasting glucose criteria for pre-diabetes [20]. This difference in findings could be attributed to different characteristics of the study populations.

Our study results found that 85.1% of the participants were aware that lifestyle modification accompanied by metformin use is the first step for the control of type 2 diabetes mellitus. Similarly, Fogelman Y *et al.* in 2015 revealed 97% of the respondents have such awareness [11]. Proper counseling of diabetic patients by the physicians regarding lifestyle modification, and prompt treatment with oral antihyperglycaemic drugs may be crucial in preventing the complications of diabetes in such patients.

Our study results showed 56.9% of the respondents to be aware that type 2 diabetes mellitus can be controlled with the help of diet and exercise. Fogelman Y *et al.* in 2015 found that 95% of the participants agree that type 2 diabetes mellitus can be controlled with increased physical activity [11]. This finding is especially important because if a majority of medical practitioners have this awareness, they can counsel their diabetic patients to balance their diet and increase their physical activity which can play a very positive role in the overall control of diabetes mellitus.

Our study results showed that 58.7% of the participants were aware that a non-drug treatment can help control type 2 diabetes mellitus. Like our study findings, Mumtaz S *et al.* in 2009 found a majority of clinical students to be aware that diabetes should not always be treated with drugs alone [16]. Lately, the role of non-drug therapy in treating diabetes mellitus type 2 has been much explored, such as exercise therapy, dietary therapy, psychotherapy, and acupuncture, but further research is recommended for confirmation of current conclusions [21, 22].

Our study results further showed that overall 70.2% of the medical practitioners had adequate awareness

regarding type 2 diabetes mellitus and its management. Widyahening IS *et al.* in 2014 found 89% of the general practitioners to be aware of the management of type 2 diabetes [17]. The use of different questions for the assessment of awareness may result in these variations among the estimates.

The study results showed that the age of the practitioners was not significantly associated with their awareness regarding type 2 diabetes mellitus. Unlike the study results, Alsaleem MA *et al.* in 2018 reported the age of the physicians to be significantly associated with their knowledge about diabetes mellitus [23]. Further exploration of these results is therefore suggested to reach a conclusion.

Furthermore, it was seen that practitioners with higher post-graduate qualifications were more likely to have adequate knowledge about type 2 diabetes mellitus and its management, though not significantly. Similarly, Alsaleem MA in 2017 also reported higher qualified physicians to have better knowledge of type 2 diabetes mellitus [24]. This finding was not unexpected, as a higher qualification in any field usually translates into better knowledge and awareness of that discipline.

The study results did not show the practice duration of the practitioners to be significantly associated with their awareness regarding type 2 diabetes mellitus. Similar findings were reported by Alsaleem MA *et al.* in 2018 [23]. Unlike the study results though, Alsaleem MA in 2017 reported physicians with more post-graduate practice experience have better knowledge of type 2 diabetes mellitus [24]. Likewise, Onyiriuka AN *et al.* in 2016 also reported practice experience to be significantly associated with diabetes-related knowledge of physicians [25]. Different levels of exposure to knowledge-enhancing opportunities related to diabetes mellitus during clinical practice may account for the observed differences in the study findings.

The study results showed that a higher proportion of private practitioners had adequate awareness as compared to public practitioners, though this difference did not reach the level of statistical significance. Even though a thorough literature search did not reveal any previous study to have explored the association of type of employment with the awareness of medical practitioners regarding diabetes mellitus, the authors wanted to explore this potential association in order to add to the uniqueness of the study and also to present a venue for future exploration.

It is acknowledged that moderate sample size may limit the generalizability of the study findings. Moreover, a piloted questionnaire with an acceptable level of internal consistency can be considered a strength of the study. Awareness campaigns and educational programs for medical professionals are recommended to continuously

apprise them of recent updates regarding early detection and proper management of diabetes mellitus type 2 to avoid its serious complications.

CONCLUSION

It was concluded from the present study that the medical practitioners were adequately aware of many aspects of diabetes mellitus type 2 and its management. Their awareness, however, was not associated with their demographic characteristics.

ETHICS APPROVAL

To the best of the authors' knowledge, the study procedures were in line with the institutional ethical standards for human experiments and the Helsinki Declaration, including taking verbal informed consent from all the participants. The ethical approval from Baqai Institute of Health Sciences was also duly taken.

CONSENT FOR PUBLICATION

Before data collection, verbal informed consent was taken from each participant of the study.

AVAILABILITY OF DATA

Data cannot be shared publicly because it is the intellectual property of Baqai Institute of Health Sciences. Data are available from the Baqai Institute of Health Sciences upon request (contact via manager.mph@baqai.edu.pk).

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHOR'S CONTRIBUTION

Kishwar Jehandad: Substantially contributed to the design of the work and acquisition of data for the work, and Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Syed Imtiaz Ahmed Jafry: Contributed to the conception of the work and final approval of the version to be published.

Syeda Nadia Firdous: Substantially contributed to interpretation of data for the work, and drafting the work.

Syed Muhammad Zulfiqar Hyder Naqvi: Contributed to the analysis of data for the work, and revising the work critically for important intellectual content.

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