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Research Article

ASSESSMENT OF MANAGING PREDIABETES IN PRIMARY HEALTH CARE IN RIYADH REGION

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Abstract:

Aim: To assess the knowledge of PCPs on the current prediabetes guidelines, their evaluation of current lifestyle and pharmacological interventions and identify the gap between recommendations and practices.

Methods: A cross-sectional study was conducted using a survey questionnaire that was distributed to PCPs in primary health care centers in Riyadh, Saudi Arabia. The survey questionnaire included questions on the PCPs knowledge of risk factors warranting screening for prediabetes, required laboratory tests, management practices, attitudes and beliefs regarding prediabetes and its management.

Results: A total of 225 PCPs participated in the survey, 133 (59.1%) males and 92 (40.9%) females, 190 (84.4%) were Saudis. One hundred and fifty-seven (69.8%) of the respondents were family medicine residents. There were only 49 (21.8%) of respondents who identified all 8 possible risk factors. Only 8 of 10 respondents correctly answered the upper and lower limit of FBS and HbA1c. Majority (>95.0%) of the respondents recommended weight loss, diet modification and exercise for prediabetes, but only 182 (80.9%) recommend metformin as part of the management for prediabetes. Eight-one respondents (36.0%) considered aggressive management for prediabetes. Seven in 10 respondents believed that interventions such as more time for doctors to spend counselling patients, provision of more educational resources, improved access to diabetes prevention programs, improved nutrition resources and improved weight loss programs will improve the management and treatment of prediabetic patients. There were no significant differences in the knowledge of risk factors and management across gender, nationality, length of experience, and specialty.

Conclusion: This study shows a substantial gap in the knowledge to practices and attitudes of our PCPs in the screening and management of prediabetes. There is a need for an institutional reform to update and educate PCPs on the screening guidelines set by reputable organizations such as the ADA to translate knowledge into good clinical practice and attitude. There is also a need to address the PCPs concern on the potential interventions and programs that they deemed necessary to improve the management and treatment of prediabetic patients.

Keywords: prediabetes, management, knowledge gap, primary health care, practice guidelines

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INTRODUCTION:

Diabetes Mellitus (DM) is a serious global health problem with increasing health burden on allocating resources and managing patients. In 2013, the estimated worldwide prevalence of DM is 382 million and was projected to rise to 592 million a decade [1]. In Saudi Arabia, the estimated prevalence of DM is 7 million and is still projected to increase [2]. Several reports have been published on DM in Saudi Arabia, and most of them highlighted the increasing incidence and prevalence rates, the higher propensity among females and higher among people in the urban areas [3-5]. With the current alarming 10-fold increase in the prevalence of DM in Saudi Arabia, it has become the 2nd highest in the Middle East and 7th highest in the world with regards to the highest rate of diabetes [2, 6].

Several factors that could explain the increasing prevalence of DM including individual-level risk factors, environmental risk factors, evolution of the disease, detection effect and global changes [7]. Individual risk factors include age, family history of diabetes, obesity, hypertension, dyslipidemia and socio-economic factors [8-11]. Environmental increased levels of noise and air pollution were reported to increase the risk for DM [7,12].

One of the postulated factors for the increased prevalence of DM was the conversion of prediabetic individuals to diabetics [7]. Prediabetes is a state wherein a patient has elevated blood glucose levels but still below the threshold to be considered as full-blown diabetic [13, 14]. An estimated 500 million Chinese may have prediabetes in 2010 [15], and the same projections also with the USA, Canada and the UK [16-18]. Despite rigorous educational and information campaigns towards prevention and early consultation conducted about DM, many prediabetes patients do not receive the evidence-based management recommendations from their doctors [19, 20].

It is understood that primary care physicians (PCPs) should have sufficient knowledge on prediabetes screening and management to effectively improve the care of patients with prediabetes. Appropriate management of prediabetes patients is crucial to prevent or delay the progression of the diabetes. Tseng et al in 2017 surveyed PCPs and showed that only 17% of the PCPs knew how to diagnose prediabetes based on fasting blood glucose (FBS) and hemoglobin A1c (HbA1c) and that patient-related factors formed as barriers to management [21]. Only 3-4 PCPs refer patients to lifestyle modification as

their initial approach in management [22]. Much more, a study showed that less than half of surveyed PCPs in the USA were familiar with the National Diabetes Prevention Program (DPP) which may have affected their diagnostic and management interventions [23].

In Saudi Arabia, there is estimated 3 million prediabetics or around 27.6%, with a higher propensity for the male population [2, 24]. A study conducted in Saudi Arabia with regards to the knowledge and practices related to DM among PCPs showed that only 32.7% of the PCPs had excellent knowledge of DM, and 8.5% had unsatisfactory knowledge [25]. Apart from this, many PCPs reported that they have no experience with the initiation of management and have little knowledge of the algorithms of management of prediabetes and diabetes [26].

A scarcity of studies conducted on the PCPs knowledge, attitudes and practices towards screening and management of prediabetic patients prompted us to conduct this study. We aimed to assess the knowledge of PCPs on the current prediabetes guidelines, their evaluation of current lifestyle and pharmacological interventions and identify the gap between recommendations and practices.

METHODS:

A cross-sectional study was conducted using a survey questionnaire that was distributed to PCPs in primary health care centers in Riyadh, Saudi Arabia. All PCPs that were involved in the screening and management of patients with prediabetes and diabetes were included in the study. PCPs that were not involved in the screening and management of prediabetic patients were excluded from the study.

Sample size was calculated using the formula ($N=4pq/l^2$) where p is the anticipated proportion, $q=1-p$, and l is the allowable precision. Taking 95% confidence interval, 5% precision, applying total population of the PHCC physicians in Riyadh region to be 1608, and $p=45\%$ (based on the study in which 45% primary health care physicians were found to be having correct knowledge about the risk factors that should prompt the pre-diabetes screening) [27], the calculated sample size was 269.

The survey tool was adapted from a validated questionnaire from the Johns Hopkins School of Medicine for Primary Care Providers' Screening and Treatment Practices for Prediabetes used by Tseng et al in 2017 [28]. The survey tool consisted of

questions on the PCPs knowledge of risk factors warranting screening for prediabetes, required laboratory tests, management practices, attitudes and beliefs regarding prediabetes and its management. Participants were asked to select from a list of potential risk factors for prediabetes. They were also asked on the upper and lower limits of FBS and HbA1c, the ADA recommendations for minimum weight loss (% of body weight), minimum physical activity (minutes per week) and questions on best initial management approach for prediabetic patients. For attitudes and beliefs regarding prediabetes, we asked the participants to respond to 5-point Likert type of questions regarding interventions which they believe can reduce the risk for diabetes.

Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., IBM, Armonk, New York, USA). Descriptive statistics will be expressed as frequencies and

percentages (categorical variables) and as mean and standard deviation for continuous variables. Chi-square test was used to determine significant differences in between categorical groups. Correlational analysis was done using the Pearson correlation test. A p value of <0.05 was considered statistically significant.

The study was approved by the Institutional Review Board of Ministry of health, Riyadh, Saudi Arabia.

RESULTS:

A total of 225 PCPs participated in the survey, 133 (59.1%) males and 92 (40.9%) females, 190 (84.4%) were Saudis. One hundred and fifty-seven (69.8%) of the respondents were family medicine residents. Majority of the respondents were Family Medicine residents (n=157, 69.8%). Table 1 shows the demographic profile of all 225 respondents.

Table 1. Demographic profile of 225 survey respondents

Demographic characteristics	n	%
Gender		
Male	133	59.1
Female	92	40.9
Nationality		
Saudi	190	84.4
Non-Saudi	35	15.6
Length of clinical experience		
< 5 years	163	72.4
5-10 years	39	17.3
>10 years	23	10.2
Specialty		
Family Medicine residents	157	69.8
Family Medicine consultants / specialists	41	18.2
General practitioner	21	9.3
Internal Medicine	6	2.7
Half-day clinic sessions per week		
1-2 sessions	45	20.0
3-4 sessions	27	12.0
5-6 sessions	67	29.8
7-8 sessions	58	25.8
9-10 sessions	28	12.4

Table 2 shows the percentage of yes responses to questions on risk factors for prediabetes. Over 90% of the respondents believed that age ≥ 45 years old, heart disease, sedentary lifestyle, and gestational diabetes were considered as risk factors for prediabetes. However, 77 (34.2%) of respondents thought that smoking was a risk factor. Only 176 (78.2%) and 179 (79.6%) of respondents considered hypertension and dyslipidemia as risk factors for prediabetes. Of the 8 listed risk factors based on the American Diabetes Association, there were only 49 (21.8%) of respondents who identified all 8 possible risk factors, 101 (44.9%) identified 7 risk factors and 26 (11.6%) identified 6 risk factors. There were 49 respondents (21.8%) who identified 5 risk factors and below.

Table 2. Percentage of respondents on risk factors and management of prediabetic patients.

Variables	n of yes responses	%
Risk factors		
Age of ≥ 45 years old	214	95.1
BMI of >25 kg/m ²	184	81.8
Hypertension	176	78.2
Dyslipidemia	179	79.6
Heart disease	218	96.9
Sedentary lifestyle	221	98.2
Gestational diabetes	208	92.4
Smoking	77	34.2
Recommended management, yes		
Weight loss	225	100.0
Diet modification	223	99.1
Exercise	217	96.4
Metformin	182	80.9
Prediabetes as a medical condition that needs intervention		
Needs mild intervention	38	16.9
Needs moderate intervention	77	34.2
Needs aggressive intervention	81	36.0
Prediabetes don't require specific management	10	4.4
Don't know	19	8.4
Minimum weight loss (% of body weight)		
3%	2	0.9
5%	77	34.2
7%	46	20.4
10%	59	26.2
Don't know	41	18.2
Minimum physical activity (min/week)		
At least 100 min/week	3	1.3
At least 120 min/week	19	8.4
At least 150 min/week	189	84.0
At least 200 min/week	10	4.4
Don't know	4	1.8
Follow-up of prediabetic patients		
3 months	74	32.9
6 months	51	22.7
One year	80	35.6
Two years	2	0.9
No specific recommendation	5	2.2
Don't know	13	5.8

Figure 1 shows the responses to the questions pertaining to the laboratory value limits, of FBS and HbA1c. There were 187 respondents (83.1%) who correctly answered the upper and lower limit of FBS, and 176 (78.2%) correctly answered the upper and lower limit for HbA1c. Majority (>95.0%) of the respondents recommended weight loss, diet modification and exercise for prediabetes. However, only 182 (80.9%) recommend metformin as part of the management for prediabetes. There were only 81 respondents (36.0%) who considered aggressive management for prediabetes. Only 46 (20.4%) of the respondents correctly answered the 7% minimum weight loss for prediabetics. One hundred and eighty-nine respondents (84.0%) correctly answered the minimum physical activity of at least 150 minutes per week. One in three respondents (n= 80, 35.6%) follow-up their prediabetic patients after one year. (Table 2)

Figure 1. Figure 1 shows the responses to the questions pertaining to the laboratory value (upper and lower limits) of FBS and HbA1c.

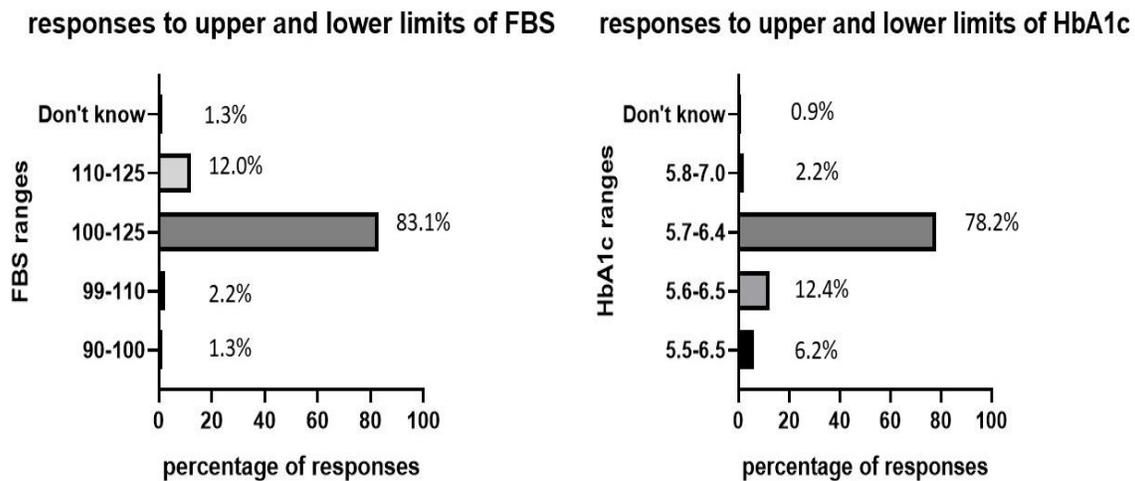


Table 3 shows the attitudes towards management and interventions for prediabetic patients. One hundred and sixty-eight respondents (74.7%) believed that more time for doctors to spend counselling patients will improve management for prediabetics. More educational resources, improved access to diabetes prevention programs, improved nutrition resources and improved weight loss programs were also thought to improve the management and treatment of prediabetic patients in more than 80% of the respondents. On the other hand, only 97 (43.1%) of the respondents believed that an improved access to bariatric surgery will improve the management and treatment of prediabetics.

Table 3. Attitudes towards management and interventions for prediabetic patients

Interventions that will improve the management and treatment of prediabetes	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
More time for doctors to counsel patients	83 (36.9%)	85 (37.8%)	34 (15.1%)	6 (2.7%)	17 (7.6%)
More educational resources for patients	98 (43.6%)	84 (37.3%)	22 (9.8%)	2 (0.9%)	19 (8.4%)
Improved access to diabetes prevention programs	124 (55.1%)	63 (28.0%)	18 (8.0%)	1 (0.4%)	19 (8.4%)
Improved nutrition resources for patients	122 (54.2%)	61 (27.1%)	22 (9.8%)	-	20 (8.9%)
Improved access to weight loss programs	119 (52.9%)	66 (29.3%)	21 (9.3%)	1 (0.4%)	18 (8.0%)
Improved access to bariatric surgery	43 (19.1%)	54 (24.0%)	79 (35.1%)	26 (11.6%)	23 (10.2%)

There were no significant differences in the knowledge of risk factors across gender ($p=0.228$), nationality ($p=0.643$), length of experience ($p=0.771$), and specialty ($p=0.863$). There were also no significant differences with regards to the management (diet modification, exercising, and prescription of metformin) across gender, nationality, length of experience and specialty ($p>0.05$). However, more family medicine residents responded correctly on the minimum weight loss required for prediabetic patients than other specialties (61.6% vs 38.4%, $p=0.003$). Knowledge was not significantly correlated with gender ($r=0.073$, $p=0.277$), nationality ($r=0.007$, $p=0.919$), number of half-day clinic sessions ($r=0.031$, $p=0.640$), years of experience ($r=0.006$, $p=0.928$), and specialty ($r=0.030$, $p=0.654$). Other comparisons did not yield any statistical significance.

DISCUSSION:

In this study, we found that only 21.8% of our PCPs were able to identify the potential risk factors for prediabetes as set by the ADA. Much more, the same proportion of our respondents (21.8%) failed to identify several risk factors (correctly identifying only 1 to 5 of 8 risk factors). This is incongruent with the ADA recommendations that has to be looked into. Similar studies by Tseng et al also found gaps in the PCPs knowledge of risk factors, and believed that these knowledge gaps in the ADA guidelines and recommendations for prediabetes may serve as a barrier towards implementation of proper management of such patients to reduce the risk for progression to full-blown diabetes [21,28].

This is the first study to our belief that examined the knowledge, attitude and practices of PCPs in screening, diagnosis and management of prediabetic patients in Saudi Arabia. There were some studies that were directed towards the patients' knowledge, attitude and practices, however most of these studies were done on full-blown diabetic patients [29, 30]. Surprisingly, less than 80% of our respondents identified hypertension and dyslipidemia as potential risk factors for prediabetes, and there were 34.2% of our PCP's that identified smoking as a risk factor, which is not currently listed as a risk factor in the updated ADA standard of care [31, 32]. In this regard, we deemed to highlight the importance of the PCP's knowledge about potential risk factors and the diagnostic criteria to screen and identify patients for prediabetes since these knowledge, attitudes and practices greatly contribute to the appropriate management to delay the progression of these patients to full-blown diabetes.

Another highlight of this study is that nearly all of our respondents (>96%) would recommend weight loss, diet modification and exercise to reduce progression to diabetes. However, only 20.4% of our respondents know the 7% minimum weight loss, 84% know the 150 minutes per week exercise, and only 35.6% will correctly follow-up the patient in one year. Much more, there were respondents who "do not know" of these guidelines on lifestyle modifications. These are solid evidences of our PCP's incomplete knowledge of evidence-based ADA recommendations for lifestyle changes [32].

In 2007, the ADA added the use of metformin as part of the recommendation and guidelines for the management of prediabetic patients [33]. In this study, only 80.9% of our respondents would recommend the use of metformin to prediabetic patients. Studies have shown that the use of metformin (at 850 mg twice a day dose) significantly delay the progression of prediabetes to diabetes [34, 35]. However, the use of metformin among prediabetics was found to be significantly low (<1%) of the US adults with prediabetes particularly among those who do not have additional risk factors for diabetes [36]. In contrast to previous studies, a report showed negative attitudes of family physicians towards recommendation of giving metformin to prediabetic patients [37].

Majority of our respondents (>80%) believed that interventions including more time for patient-doctor interaction, provision of educational resources to patients, improved access to diabetes prevention programs, nutrition resources and weight loss programs will improve the management and treatment of prediabetic patients. Computer-based management and including those mobile applications to track lifestyle modifications may help but were found to have limited effectiveness [38]. Our PCPs know the importance of these interventions and have shown good attitude towards the implementation of lifestyle modification and provision of resources to aid and complement patients' good quality of life. However, all these interventions should be cohesive both for the patient and the doctor; the patient's willingness and motivation to undergo such intervention and the doctor's patience, support and understanding of patients' perspective and preferences.

Similar to other previous studies, we also have limitations which include the survey being conducted in a single region and respondents from various specialties. For this reason, we can not generalize our findings to represent the whole of PCPs involved in

the screening and management of prediabetes. Furthermore, the nature of the study was a survey in which respondents may have misreport their responses leading to several biases. However, despite these limitations, we were able to provide important highlights on what is the current situation of our PCPs knowledge, attitude and practices towards prediabetes. This study may serve as a prelude to other future studies that will delve into the practices and outcomes of intervention on delaying the progression of prediabetes to diabetes, and much more for the institutional reforms to improve the knowledge, attitudes and practices of PCPs in accordance with established guidelines set by reputable organizations.

CONCLUSION:

This study shows a substantial gap in the knowledge to practices and attitudes of our PCPs in the screening and management of prediabetes. There is a need for an institutional reform to update and educate PCPs on the screening guidelines set by reputable organizations such as the ADA to translate knowledge into good clinical practice and attitude. There is also a need to address the PCPs concern on the potential interventions and programs that they deemed necessary to improve the management and treatment of prediabetic patients.

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