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Original Research Article

A Study on Knowledge, Perceptions and Attitudes about Screening and Diagnosis of Diabetes in Saudi Population

Saeed Muraya Alqahtani[1*], Talal Saeed Muhammed Alqahtani[2], Naif Muytiq Aljahdali[3], Rehab Abdullah Mohammad[1], Ruba Awad Salman Alradadi[1], Wafaa Abdullah Aziz Al.Shehri[1]

[1]Briman Primary Care Center, Jeddah, Saudi Arabia.
[2]Althagar Hospital, Jeddah, Saudi Arabia.
[3]Alnaeem Primary Care Center, Jeddah, Saudi Arabia.

ABSTRACT

Introduction: Timely screening and treatment of diabetes can considerably reduce associated health adverse effects. The purpose of the study was to evaluate the knowledge about diabetes and perceptions and attitude about screening and early diagnosis of diabetes among the population.

Methods: A cross-sectional questionnaire-based study conducted among non-diabetes adult people attending primary health care centers in Jeddah, Saudi Arabia. Participants' knowledge about diabetes risk factors and complications and perceptions and attitude regarding screening and early diagnosis of diabetes was assessed and different scores were calculated.

Results: Total 202 patients were included: mean (SD) age was 38.19 (13.25) years and 55.0% were females. Knowledge about diabetes risk factors and complications was 60.41%-84.77% and 44.67%-67.51%, respectively, depending on the item. Perceptions about screening and early diagnosis showed that 81.19% believed that screening tests exist and 75.14% believed that it is possible to diagnose diabetes before complication stage; while 84.16% believed that early diagnosis increases treatment efficacy, decreases incidence of complications (83.66%), and allows early treatment (83.66%). Regarding attitude, 86.14% agreed to undergo diabetes screening if advised by the physician and 60.40% would do on their own initiative. Linear regression showed a positive correlation of attitude score with knowledge about diabetes risk factors (OR=1.87; p<0.0001) and complications (OR=1.46; p<0.0001); perception about feasibility of screening (OR=1.93; p<0.0001) and benefits of early diagnosis (OR=1.69; p<0.0001).

Conclusions: The improvement of knowledge about diabetes risk factors and complications as well as the perception about feasibility and benefits of screening are prerequisites for the promotion of diabetes screening among the population.

Key Words: Knowledge; Perception; Attitude; Diabetes; Screening.

***Correspondence to:**

Saeed Muraya Alqahtani
MBBS, Briman Primary Care center,
Jeddah, Saudi Arabia.

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INTRODUCTION

Type 2 diabetes mellitus, a complex metabolic disorder constitutes a major health problem, which is being responsible for nearly 5 million deaths annually across the globe.[1] It is a condition associated with irreversible, long-term complications resulting from diabetes-induced micro- and macro-vascular damage leading to multiple organ failure. These include retinopathy, neuropathy, nephropathy, ischemic heart disease and stroke, in addition to high comorbid hypertension and dyslipidemia.[2]

Diabetes diagnosis is based on one of the following criteria: fasting plasma glucose ≥126 mg/dL (7.0 mmol/l), 2-hour 75-g oral glucose tolerance test (OGTT) ≥200 mg/dL (11.1 mmol/l) or hemoglobin A1c level ≥6.5% (48 mmol/mol) recommended by an international expert committee and confirmed by the American Diabetes Association.[2,3] However, approximately one-third of cases are undiagnosed and may remain in this latent phase for many years, a period during which macro- and micro-vascular complications can significantly progress.[2,4]

Early detection and efficient target treatment may represent the effective solution in preventing and limiting diabetes complications.[5] Computer-based simulations from the Anglo-Danish-Dutch Study of Intensive Treatment in People with Screen-Detected Diabetes in Primary Care (ADDITION-Europe) showed that early diagnosis and treatment are effective by 38% relative risk reduction of cardiovascular events.[6] Furthermore, results from

the previous study demonstrated that in a primary care-based screening for type 2 diabetes (T2D) most of the cases have an increased cardiovascular risk profile.[7] Besides of early detection of diabetes cases, pre-diabetes cases such as impaired glucose tolerance can also benefit from screening programs and improve the yield of an early therapeutic intervention.[8,9]

In Saudi Arabia, population-based screening campaigns showed high efficacy in the detection of undiagnosed diabetes cases, especially when these were conducted by primary healthcare centers.[10] Although individuals with high educational levels exhibited good knowledge about diabetes yet, insufficient levels of knowledge and awareness about diabetes risks and preventive measures were reported among the Saudi population.[11]

Knowledge about diabetes risk factors, its complications and awareness about benefits of early diagnosis among the population can be a determinant for successful screening campaigns. Thus, good knowledge and awareness may improve patients' self-initiated screening and/or prevention. On the other hand, assessing community's knowledge and awareness about issues related to diabetes screening constitutes important background data for the design of awareness and screening campaigns.

Therefore the current study assessed the levels of knowledge and awareness about diabetes risk factors and its complications, as well as the perception about the benefits and feasibility of early screening among non-diabetic patients attending primary healthcare centers (PHC) in Jeddah, Saudi Arabia. Further the study also assessed the attitude and readiness of the participants to undergo diabetes screening and to comply with further preventive and therapeutic measures including lifestyle changes, treatments, monitoring and follow-up visits.

OBJECTIVES

- To assess the knowledge level about diabetes risk factors and complications.
- To assess perception about feasibility and benefits of early screening of diabetes or pre-diabetes status.
- To explore various attitudes of patients regarding diabetes screening and diagnosis including self-initiated screening, self-initiated change in lifestyle (physical activity, diet, etc.) and early treatment initiation.
- To investigate demographic and socioeconomic factors of knowledge, perception and attitude.
- To study the correlation of these attitudes with levels of knowledge.

MATERIALS AND METHODS

This was a cross-sectional study conducted among adult, non-diabetic patients who attended PHCs during the period from 13 to 30 November 2016. A semi-structured questionnaire was designed and used to collect the following data:

A) Demographic, socioeconomic and clinical factors including age, gender, nationality, marital status, accommodation (urban versus rural), educational level, income, and medical history.

B) Assessment of knowledge about diabetes, including risk factors such as obesity, unhealthy eating habits, family history of diabetes, etc. (8 items) and complications such as retinopathy, nephropathy, ischemic heart disease (IHD), etc. (8 items).[2,12-15] Knowledge about risk factors and complications was expressed as two distinct scores (min.=0; max.=8), which were calculated as the sum of items correctly identified within each respective category.

C) Assessment of perception about feasibility of early screening of diabetes (8 items) and about health benefits of early diagnosis of diabetes (8 items). Similarly, perception scores (min. = 0; max. = 8) were calculated for feasibility and benefits as the sum of the items correctly identified within each category, respectively.

D) Assessment of attitude and readiness of the patients regarding both self- and physician-initiated screening, change in lifestyle and treatment (6 items). Participants were questioned as "what is your level of readiness or acceptance to perform the following actions?" and answers were collected as a 4-point likert-type scale (1= I disagree; 2 = I'm not concerned; 3 = I hesitate; 4 = I agree). An attitude score (min. = 6; max. = 24) was calculated as the sum of the item scores.

The questionnaire underwent face and content validity by coauthors and reliability was tested by calculation of the Cronbach's alpha for each relevant part including knowledge about diabetes (Cronbach's alpha = 0.914); perceptions about diabetes screening (Cronbach's alpha = 0.874); and attitude towards screening (Cronbach's alpha = 0.795). The study protocol was revised and approved by the Medical Research and Studies Department, Directorate of Health Affairs, Jeddah, Ministry of Health.

Sampling Method

Sample size (N=188) was calculated to detect ±10% difference from a hypothetic 50% proportion of knowledge rate (percentage of participants who correctly identified a given item), with 0.05 type I error and 0.20 type II error. A convenience sampling method was used to include consenting participants until reaching the target sample size.

Statistical Methods

Statistical analysis was performed with the Statistical Package for Social Sciences version 21.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were applied to analyze demographic and clinical characteristics of the study population, proportion of the participants who correctly identified each of investigated knowledge and perception items, and the patterns of attitude towards diabetes screening.

Knowledge scores (risk factors and complications), perception scores (feasibility and benefits) and attitude score were analyzed as ordinal variables, and factors associated with knowledge, perception and attitude were analyzed using nonparametric tests including Mann Whitney-U test for binomial variables such as gender and nationality and Kruskall-Wallis test for multinomial variables such as marital status, occupation etc. Results were presented as frequency (percentage) or mean ± standard deviation (SD).

Linear regression was carried out to analyze the correlation of positive attitude towards diabetes screening and readiness to operate necessary changes with knowledge about diabetes screening, perceptions and its benefits. The regression models used attitude score as the dependent variable and the other scores including knowledge scores (risk factors and complications of diabetes) and perception scores (feasibility and benefits of screening) as the predictors. Significant results were presented as odds-ratio (OR) [95%CI] and p-value<0.05 was considered for statistical significance.

Table 1: Demographic and clinical characteristics of the study population

Parameter	Category	Frequency	Percentage
Age (years)	**Mean, SD; [range=15; 84]**	38.19	13.25
Gender	**Male**	91	45.0
	Female	111	55.0
Nationality	**Saudi**	191	94.6
	Non-Saudi	11	5.4
Marital Status	**Single**	82	40.6
	Married	101	50.0
	Divorced	11	5.4
	Widowed	8	4.0
Number of children	**Mean, SD; [range=0; 15]**	4.14	3.00
Accommodation	**Urban**	177	87.6
	Rural or Bedouin	7	3.5
Monthly income (SAR)	**<5,000**	58	28.7
	5,000 – 10,000	77	38.1
	10,000 – 15,000	41	20.3
	>15,000	16	7.9
Occupation	**Employed**	118	58.4
	Housewife	43	21.3
	Unemployed	27	13.4
	Retired	8	4.0
Educational level	**Illiterate**	7	3.5
	Primary	21	10.4
	Secondary	67	33.2
	University+	105	52.0
Medical History	**Hypertension**	65	32.2
	Dyslipidemia	47	23.3
	Atherosclerosis	17	8.4
	IHD	11	5.4
	Stroke	7	3.5
	Other medical history	5	2.0
	Surgical history	13	6.4

Some values do not sum up to the total indicated in the column heading because of missing data; IHD: ischemic heart disease.

Figure 1: Knowledge about diabetes risk factors and complications

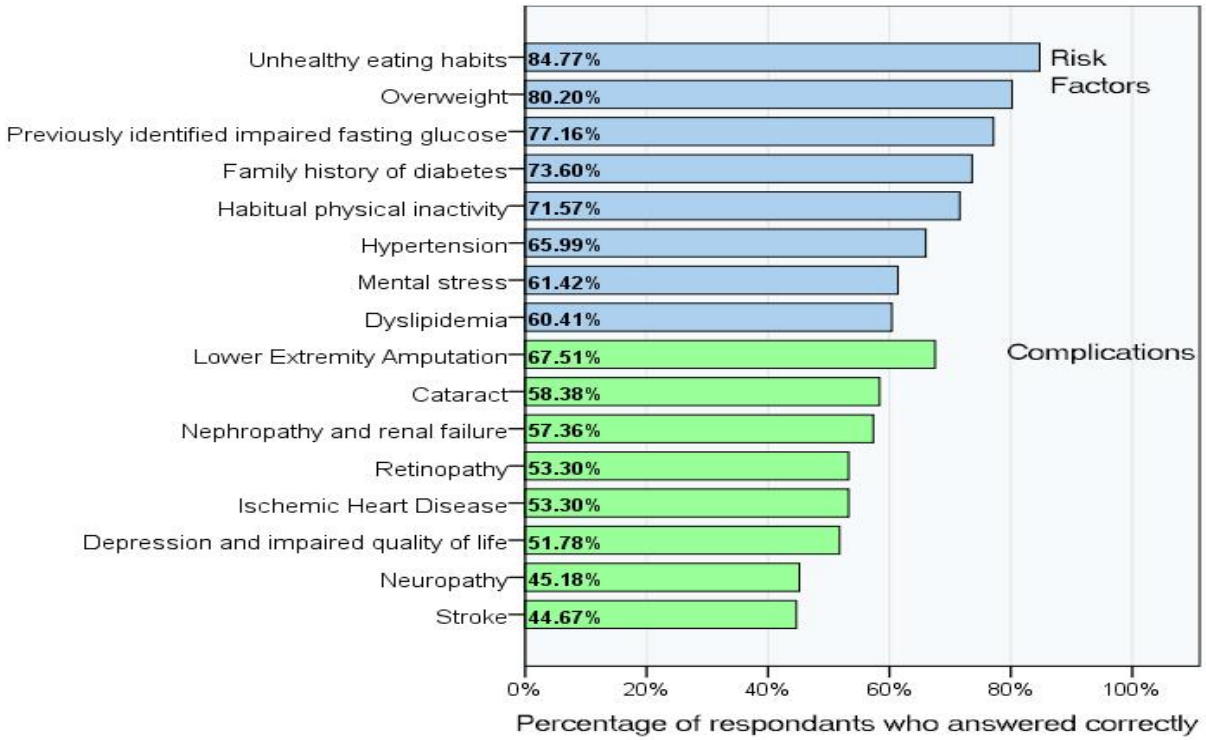


Figure 2: Perception about feasibility of diabetes screening and benefits of early diagnosis

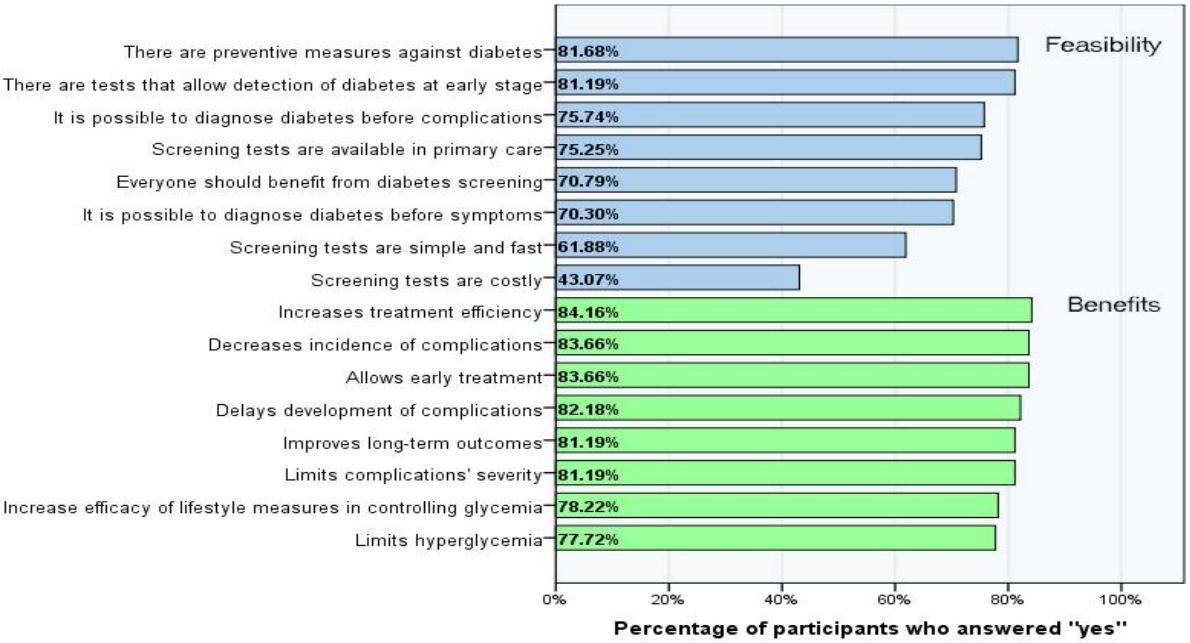
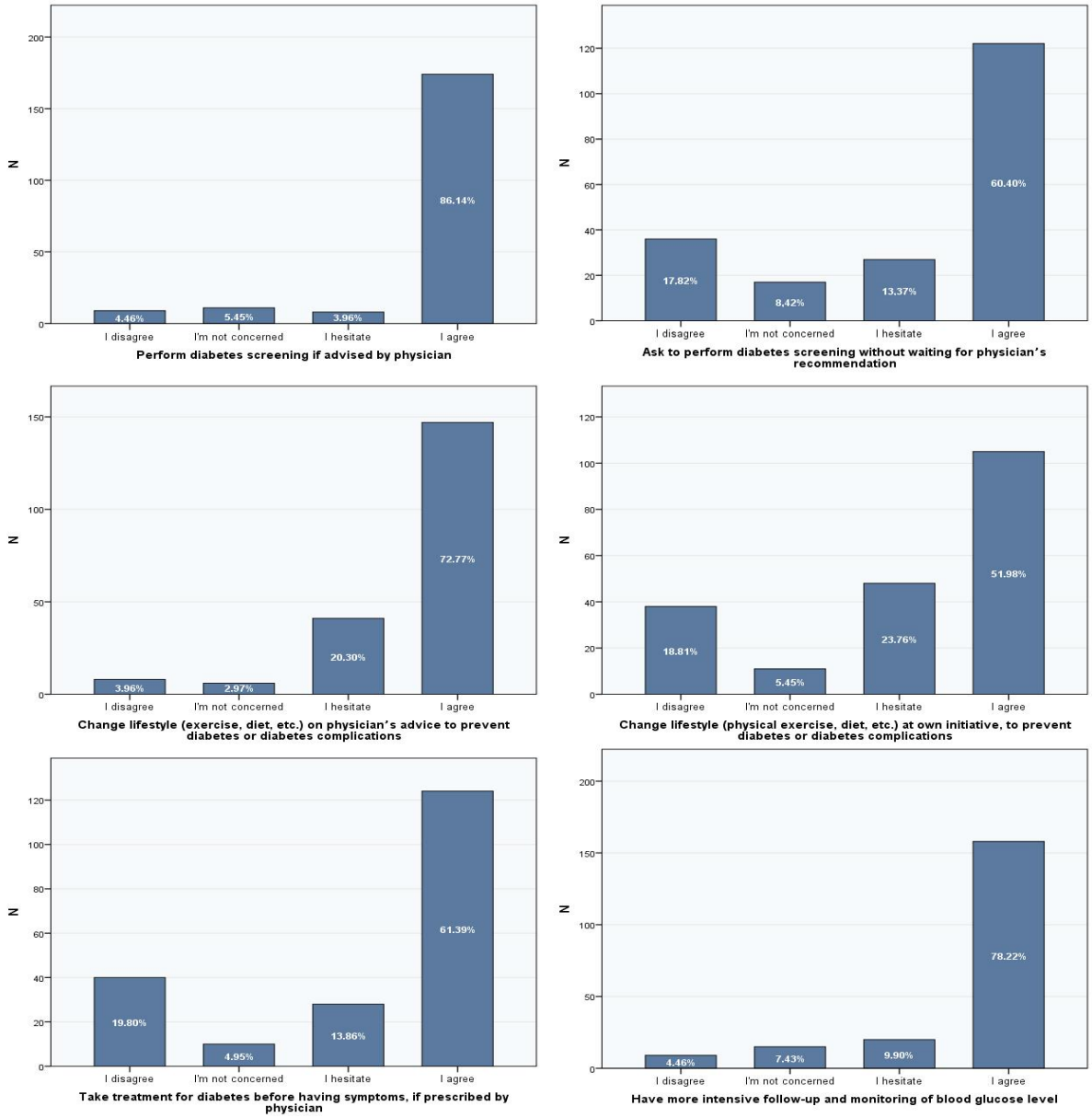


Figure 3: Participants' attitude towards diabetes screening, early diagnosis and treatment.
Participants answered the question: What is your level of readiness or acceptance to perform the following actions?



RESULTS

Population characteristics

A total 202 patients were included in the analysis had mean±SD [range] age 38.19±13.25 [15; 84] years, 55.0% were females, and 50.0% were married. Majority were employed (58.4%), had high educational level (52.0%), originated from urban setting (87.6%), and had relatively high income (5,000 SAR – 15,000 SAR; 58.4%). Clinical data showed 32.2% of participants with hypertension, 23.2% with dyslipidemia, 5.4% with IHD and 6.4% with surgical history. (Table 1)

Assessment of knowledge about diabetes

Among investigated items, unhealthy eating habits was the most frequently identified as a risk factor for diabetes in 84.77% of the participants, followed by overweight and obesity in 80.20%, and previously identified impaired fasting glucose in 77.16%. Hypertension, mental stress and dyslipidemia were the least frequently identified risk factors for diabetes by 65.99%, 61.42% and 60.41% of the participants, respectively.

Regarding complications, lower extremity amputation was the most frequently identified complication of diabetes in 67.51% of the participants, followed by cataract in 58.38% and nephropathy in 57.36%. Neuropathy and stroke were the least frequently identified complications of diabetes reported by 45.18% and 44.67% of the participants, respectively. (Figure 1)

Assessment of perceptions about diabetes screening

Assessment of perception about feasibility of diabetes screening showed that 81.68% of the participants believed that there are preventive measures against diabetes, 81.19% believed that there are tests that allow detection of diabetes at early stage and 75.74% believed that it is possible to diagnose diabetes before the development of complications. Assessment of perception about the benefits of early diagnosis of diabetes showed that 84.16% of the participants believed that early diagnosis increases treatment efficacy, 83.66% believed that it decreases incidence of complications, and 83.66% believed that it allows early treatment**.** (Figure 2)

Attitude towards diabetes screening, early diagnosis and treatment

Assessment of attitude showed that 86.14% of the participants agree to perform diabetes screening if advised by physician, while 60.40% would perform it on their own initiative; 72.77% would agree to improve their lifestyle on physician's advice to prevent diabetes or diabetes complications, while 51.98% would do on their own initiative; 61.39% would agree to take treatment for diabetes before having symptoms and 78.22% would agree to undergo intensive follow-up and monitoring of blood glucose level. (Figure 3)

Table 2: Factors of knowledge about diabetes risk factors and complications

Parameter	Category	Risk factors (score)			Complications (score)		
		Mean	SD	p-value	Mean	SD	p-value
Gender	**Male**	5.81	2.50	.399	4.79	3.01	.036*
	Female	5.56	2.59		3.87	3.42	
Nationality	**Saudi**	5.62	2.56	.246	4.30	3.26	.808
	Non-Saudi	6.55	2.21		4.00	3.49	
Marital Status	**Single**	5.93	2.38	.288	4.15	3.40	.902
	Married	5.68	2.58		4.46	3.23	
	Divorced	4.45	2.62		4.18	3.03	
	Widowed	4.63	3.38		3.75	3.15	
Accommodation	**Urban**	5.69	2.52	.006*	4.16	3.26	.009*
	Rural or Bedouin	2.71	2.56		1.00	1.91	
Monthly income (SAR)	**<5,000**	5.67	2.59	.585	3.07	3.46	.004*
	5,000 – 10,000	5.97	2.48		5.06	3.10	
	10,000 – 15,000	5.80	2.52		4.93	3.11	
	>15,000	5.06	2.74		4.50	2.85	
Occupation	**Employed**	5.80	2.46	.425	4.05	3.30	.450
	Housewife	5.19	2.57		4.98	2.94	
	Unemployed	6.04	2.68		4.37	3.58	
	Retired	5.63	3.46		4.50	3.38	
Educational level	**Illiterate**	3.86	3.08	.089	4.86	2.41	.419
	Primary	5.19	2.34		3.19	3.09	
	Secondary	5.52	2.74		4.30	3.40	
	University+	5.94	2.39		4.39	3.25	

Scores (min.=0, max=8) are calculated as the number of risk factors and complications correctly identified by the participant, respectively; * statistically significant result ($p<0.05$);
Statistical tests used=Mann Whitney-U test and Kruskall Wallis test

Table 3: Factors associated with perception about feasibility of diabetes screening and benefits of early diagnosis

Parameter	Category	Feasibility (score)			Benefits (score)		
		Mean	SD	p-value	Mean	SD	p-value
Gender	**Male**	5.66	2.20	.825	6.12	2.21	.002*
	Female	5.55	2.39		6.85	2.28	
Nationality	**Saudi**	5.59	2.29	.543	6.62	2.20	.016*
	Non-Saudi	5.82	2.60		4.82	2.93	
Marital Status	**Single**	5.49	2.20	.427	6.54	2.36	.877
	Married	5.80	2.28		6.46	2.29	
	Divorced	5.27	1.90		7.09	1.30	
	Widowed	4.63	3.81		6.38	2.45	
Accommodation	**Urban**	5.61	2.32	.302	6.53	2.30	.438
	Rural or Bedouin	6.00	3.06		7.14	1.86	
Monthly income (SAR)	**<5,000**	5.79	2.39	.203	6.84	2.35	.016*
	5,000 – 10,000	5.25	2.48		6.19	2.31	
	10,000 – 15,000	6.02	1.98		6.20	2.43	
	>15,000	6.50	1.71		7.25	1.69	
Occupation	**Employed**	5.84	2.02	.684	6.30	2.33	.033*
	Housewife	5.16	2.57		6.74	2.13	
	Unemployed	5.70	2.48		7.44	1.69	
	Retired	4.88	3.40		6.25	2.92	
Educational level	**Illiterate**	1.71	1.38	.001*	6.14	2.27	.509
	Primary	5.57	2.31		6.38	1.83	
	Secondary	5.43	2.44		6.43	2.56	
	University+	5.97	2.01		6.61	2.19	

Scores are calculated as the number (0 to 8) of items answered positively regarding feasibility and benefits of diabetes screening, with higher scores indicating more positive perception;* statistically significant result (p<0.05); statistical tests used: Mann Whitney-U test and Kruskall Wallis test, as appropriate.

Table 4: Factors associated with positive attitude about screening and early diagnosis of diabetes

Parameter	Category	Attitude (score)		
		Mean	SD	p-value
Gender	**Male**	20.16	4.49	.828
	Female	20.55	3.94	
Nationality	**Saudi**	20.58	3.96	.030*
	Non-Saudi	16.91	6.38	
Marital Status	**Single**	20.59	4.31	.552
	Married	20.18	4.24	
	Divorced	19.73	3.69	
	Widowed	21.63	2.88	
Accommodation	**Urban**	20.17	4.26	.444
	Rural or Bedouin	19.00	4.55	
Monthly income (SAR)	**<5,000**	20.81	4.46	.713
	5,000 – 10,000	20.57	4.18	
	10,000 – 15,000	20.05	3.97	
	>15,000	20.31	4.06	
Occupation	**Employed**	20.25	4.40	.232
	Housewife	20.07	3.69	
	Unemployed	21.59	3.50	
	Retired	19.63	6.25	
Educational level	**Illiterate**	19.29	3.40	.574
	Primary	21.48	3.16	
	Secondary	20.12	4.70	
	University+	20.37	4.10	

Scores (6-24) are calculated as the sum of attitude item scores (1=I disagree; to 4=I agree), with higher scores indicating more positive attitude towards and readiness to undergo diabetes screening and assume related consequences; * statistically significant result (p<0.05); statistical tests used: Mann Whitney-U test and Kruskall Wallis test, as appropriate.

Table 5: Linear correlation of attitude towards diabetes screening with knowledge about diabetes and perception about feasibility and benefits of screening

Predictors (scores)	OR	95%CI		p-value
		Min.	Max.	
Knowledge about diabetes risk factors	**1.87**	1.51	2.31	<.0001*
Knowledge about diabetes complications	**1.46**	1.23	1.74	<.0001*
Perception about feasibility of diabetes screening	**1.93**	1.52	2.44	<.0001*
Perception about benefits of early diagnosis	**1.69**	1.32	2.17	<.0001*

Factors associated with knowledge about diabetes and perception about diabetes screening

Participants living in urban setting had better knowledge about risk factors (mean±SD score=5.69±2.52 versus 2.71±2.56; p=0.006) and complications (4.16±3.26 versus 1.00 versus 1.91; p=0.009) as compared to those living in rural settings, respectively. Gender comparison showed better knowledge about diabetes complications among males versus females (mean±SD score=4.79±3.01 versus 3.87±3.42; p=0.036). (Table 2)

Regarding perception about feasibility of diabetes screening, participants with low educational level had lower score (1.71±1.38) as compared to those with higher educational levels (p=0.001). Regarding benefits of early diagnosis of diabetes, perception differed across participant's gender, nationality, income and occupation, with perception score being higher in females versus males (p=0.002), Saudis versus non-Saudis (p=0.016), high income (>15,000 SAR) versus counterparts (p=0.016) and unemployed v/s other occupation categories (p=0.033). (Table 3)

Factors associated with attitude towards screening and early diagnosis of diabetes

Participants with Saudi nationality had more positive attitude towards screening and early diagnosis of diabetes and readiness to comply with related preventive and therapeutic measures as compared to non-Saudi participants (mean±SD score=20.58±3.96 versus 16.91±6.38; p=0.030). No other factors showed statistically significant difference. (Table 4)

Correlation of attitude with knowledge and perception

Linear regression analysis showed a positive correlation of attitude with all other scores including knowledge about diabetes risk factors (OR [95%CI]=1.87 [1.51; 2.31]; p<0.0001); knowledge about diabetes complications (OR [95%CI]=1.46 [1.23; 1.74]; p<0.0001); perception about feasibility of diabetes screening (OR [95%CI]=1.93 [1.52; 2.44]; p<0.0001); and perception about benefits of early diagnosis (OR [95%CI]=1.69 [1.32; 2.17]; p<0.0001). (Table 5)

DISCUSSION

The current study demonstrates the positive relationship of the attitude of the non-diabetes individuals towards diabetes screening with their level of knowledge about the risk factors and complications associated with diabetes and the perceptions they have about the feasibility and benefits of diabetes screening and early diagnosis. The regression analyses showed that the more people know about diabetes and the more positive is their perception about diabetes screening; the more they exhibit readiness to comply with preventive and therapeutic measures. These results indicate that raising awareness among the individuals about the diabetes risk factors and complications, as well as the importance and benefits of early screening of diabetes would be an efficient way to improve preventive and therapeutic measures for diabetes at the population scale. This would suggest the policy makers and the health care providers in consensus should act proactively to increase knowledge about diabetes and to promote diabetes screening and early diagnosis. This is even crucial in a country like Saudi Arabia that is recognized to be the 7th highest in terms of diabetes incidence, where a recent estimate showed 24.4% of the adult population suffering from DM.[12]

In the current study, almost 60% to 85% of the participants have the knowledge in identifying different diabetes risk factors, which was generally adequate. However, the factors that were relatively less identified were hypertension, mental stress and dyslipidemia. According to previous literature, hypertension and diabetes co-exist often, as they have close metabolic pathways. Furthermore, people with diabetes associated with hypertension have significantly higher risk for cardiovascular diseases.[12-15] A clinical study had reported that psychological stress has adverse effects on glucose control in diabetes patients, which may lead to more severe complications; although the study had not confirmed a causal relationship between stress and diabetes. Other literature supports that psychological stress impairs glucose metabolism in the non-symptomatic patient, which may develop to diabetes.[16,17] Many studies have reported dyslipidemia as a major risk factor in causing diabetes.[18,19] Despite the multitude of studies that are conducted to bring awareness about the diabetes, many regions still have very poor knowledge about the condition and its complications.[20-23] Similar to the current study, previous studies in Saudi population have reported poor knowledge about the risk factors associated with diabetes, however the knowledge about the obesity and diabetes was very high.[11,24]

Further, the knowledge about diabetes complications was less satisfactory; with correct answers ranging from 45% to 68% approximately depending on the item. The items that were more frequently identified as risk factors were lower extremity amputation, followed by cataract and nephropathy, while those that were less frequently identified were depression and impaired quality of life, neuropathy and stroke. A study by Mohieldein et al (2011) have reported diabetes knowledge score of 67.4% among study population, while the knowledge regarding the disease, associated risk factors, symptoms and complications were reported in 71.1, 63.4, 80.8 and 47.7%, respectively.[25] The knowledge about diabetes complications reported in the above study is similar to the current study observation. Generally, diabetes complications are categorized into macrovascular (coronary artery disease, peripheral arterial disease, and stroke) and microvascular (nephropathy, neuropathy, and retinopathy) complications.[26] However, previous study by De Groot et al. (2001) had reported significant association of depression with a variety of vascular complications such as diabetic retinopathy, nephropathy, neuropathy and sexual dysfunction.[23] In the current study the knowledge score of the participants about complications

is highest for lower extremity amputation and least for stroke. Comparably, participants from an Irish study reported retinopathy, stroke, peripheral vascular disease and amputation as complications for diabetes in 61.2, 17.1, 16.3 and 12%, respectively.[27,28] This indicates that there are some population variations in awareness about diabetes complications, which advocates for systematic global diabetes education programs to bring awareness in the population and act early to tackle severe complications such as stroke and amputations.

The study also observed that male participants and individuals living in urban areas had significantly more knowledge about the risk factors and complications; while participants in high income group and high educational levels had not significantly more knowledge about risk factors and complications. Urban areas, by comparison to rural areas, are often privileged with education and social level which are important factors of health education. A study called the Bangladesh Population-Based Diabetes and Eye Study (BPDES) reported that in rural people there is a limited knowledge about the diabetes and the risk factors associated with diabetes, this was observed even in people with diabetes.[29]

In the current study, assessment of participants' knowledge about the benefits of early diabetes diagnosis showed that "increase in treatment efficacy" followed by "decrease in incidence of diabetes complications" were the two most frequently cited benefits. Similar to our study, participant's perception about the benefits of early diagnoses and treatment was reported in ADDITION-Europe study.[6] Further, factors that were significantly associated with the perceptions on benefits of early diagnosis were male participants, Saudi nationality, high income (>15000SAR [US$5000]) and unemployed group. However, there is a lack of literature support to confirm or contradict the perceptions on feasibility and benefits of early diagnosis and treatment across the globe. This shows that the current study was the first to attempt to study extensively knowledge and perceptions of general population on the early diagnosis and treatment of diabetes.

Attitude towards diabetes screening and early diagnosis and readiness to comply with related preventive and therapeutic measures was positively associated with Saudi nationality as compared to non-Saudi participants. Moreover, there is a significant correlation of attitude with both knowledge about risk factors and complications and perceptions on feasibility with screening and benefits of early diagnosis. This provides evidence that the promotion of diabetes screening requires improving knowledge about diabetes risks and perception about screening.

This study provides an extensive analysis of knowledge and perception parameters associated with diabetes and diabetes screening and correlates them to the attitude trend towards screening. This model along with study results can be the stepping-stone for public health education and awareness campaigns, or for large-scale studies for creating national and regional data.

CONCLUSIONS

There is still insufficient knowledge about diabetes risk factors and complications among the Saudi population, which constitutes an obstacle to screening and early diagnosis of several cases. Perception about diabetes screening should be improved as well, by both physicians and authorities, to promote a positive attitude towards screening and prevent delayed diagnoses which associate severe complications. To best of our knowledge, the current study is the first to provide extensive analysis of knowledge and perceptions about diabetes and diabetes screening and their impact on individual's attitude towards screening and compliance with preventive and therapeutic measures. The descriptive and analytic model of this study could be used to design targeted awareness campaigns and health education programs.

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REFERENCES

1. da Rocha Fernandes J, Ogurtsova K, Linnenkamp U, Guariguata L, Seuring T, Zhang P, Cavan D, Makaroff LE. IDF Diabetes Atlas estimates of 2014 global health expenditures on diabetes. Diabetes Res Clin Pract. 2016; 117: 48-54. doi:10.1016/j.diabres.2016.04.016.

2. American Diabetes Association. Standards of medical care in diabetes-2016. Diabetes Care. 2016;29(suppl 1):s1–112.

3. Association AD, others. Standards of medical care in diabetes--2010. Diabetes Care. Am Diabetes Assoc; 2010;33(Supplement 1):S11--S61.

4. Harris MI, Eastman RC. Early detection of undiagnosed diabetes mellitus: a US perspective. Diabetes Metab Res Rev. Wiley Online Library; 2000;16(4):230–6.

5. Colagiuri S, Davies D. The value of early detection of type 2 diabetes. Curr Opin Endocrinol Diabetes Obes [Internet]. 2009 Apr; 16(2):95-9. http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=01266029-200904000-00002.

6. Herman WH, Ye W, Griffin SJ, et al. Early detection and treatment of type 2 diabetes reduce cardiovascular morbidity and mortality: a simulation of the results of the Anglo-Danish-Dutch Study of Intensive Treatment in People With Screen-Detected Diabetes in Primary Care (ADDITION-Europe). Diabetes Care. Am Diabetes Assoc; 2015;38:1449–55.

7. Sandbaek A, Griffin SJ, Rutten G, et al. Stepwise screening for diabetes identifies people with high but modifiable coronary heart disease risk. The ADDITION study. Diabetologia. Springer 2008;51:1127–34.

8. Engelgau MM, Narayan KM, Herman WH. Screening for type 2 diabetes. Diabetes Care. American Diabetes Association 2000; 23: 1563-1580.

9. Leiter LA, Barr A, Bélanger A, et al. Diabetes Screening in Canada (DIASCAN) Study Prevalence of undiagnosed diabetes and glucose intolerance in family physician offices. Diabetes Care. Am Diabetes Assoc 2001;24:1038–43.

10. Al-Ghamdi AJ, Al-Turki KA, Al-Baghli NA, et al. A community-based screening campaign for the detection of diabetes mellitus and hypertension in the Eastern province, Saudi Arabia: Methods and participation rates. J Fam community Med. Medknow Publications 2007;14:91-7.

11. Aljoudi A, Taha A. Knowledge of diabetes risk factors and preventive measures among attendees of a primary care center in eastern Saudi Arabia. Ann Saudi Med. 2009;29:15-19.

12. Bani IA. Prevalence, Knowledge, Attitude and Practices of Diabetes Mellitus among Jazan Population, Kingdom of Saudi Arabia (KSA). Journal of Diabetes Mellitus 2015;5:115-122.

13. Cheung BMY, Li C. Diabetes and Hypertension: Is There a Common Metabolic Pathway? Current Atherosclerosis Reports. 2012;14(2):160-166. doi:10.1007/s11883-012-0227-2.
14. Riyahi-Alam S, Derakhshan A, Mansournia MA, et al. Blood pressure and cardiovascular morbidity risk in type 2 diabetes with hypertension over a decade of follow-up: evidence for J-shaped phenomenon. J Hum Hypertens. 2017. doi: 10.1038/jhh.2016.94.
15. Tripathy JP, Thakur JS, Jeet G, et al. Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. Diabetol Metab Syndr. 2017;9:8. doi: 10.1186/s13098-017-0207-3.
16. Faulenbach M, Uthoff H, Schwegler K, et al. Effect of psychological stress on glucose control in patients with Type 2 diabetes. Diabet Med. 2012;29:128-31.
17. Wales JK. Does psychological stress cause diabetes? Diabet Med. 1995;12:109-12.
18. Mooradian AD. Dyslipidemia in type 2 diabetes mellitus. Nat Clin Pract Endocrinol Metab. 2009;5:150-9. doi: 10.1038/ncpendmet1066.
19. Fukui M, Tanaka M, Toda H, et al. Risk factors for development of diabetes mellitus, hypertension and dyslipidemia. Diabetes Res Clin Pract. 2011; 94: e15-8. doi: 10.1016/j.diabres.2011.07.006.
20. Lanting LC, Joung IMA, Mackenbach JP, et al. Ethnic differences in mortality, End-stage complications, and quality of care among diabetic patients a review. Diabetes Care. Am Diabetes Assoc; 2005;28:2280–8.
21. Muninarayana C, Balachandra G, Hiremath S, et al. Prevalence and awareness regarding diabetes mellitus in rural Tamaka, Kolar. Int J Diabetes Dev Ctries. Springer Science & Business Media; 2010;30:18.
22. Deepa M, Bhansali A, Anjana RM, et al. Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. Indian J Endocr Metab. 2014;18:379-85.
23. De Groot M, Anderson R, Freedland KE, Clouse RE, Lustman PJ. Association of depression and diabetes complications: a meta-analysis. Psychosom Med. LWW; 2001;63(4):619–30.
24. Al-Dahan SM, Albaik M, Alomran Y, et al. Awareness and Knowledge of Diabetes among Al-Wazarat Family Medicine Health Center Attendants. American Journal of Research Communication 2013;1:104-30.
25. Mohieldein AS, Alzohairy MA and Hasan M. Awareness of diabetes mellitus among Saudi nondiabetic population in Al-Qassim region, Saudi Arabia. Journal of Diabetes and Endocrinology 2011;2:14-19.
26. Fowler MJ. Microvascular and Macrovascular Complications of Diabetes. Clinical Diabetes 2008; 26 (2): 77- 82. https://doi.org/10.2337/diaclin.26.2.77.
27. O'Sullivan EP, Bhargava A, O'Callaghan M, et al. Awareness of diabetes complications in an Irish population. Ir J Med Sci. 2009;178(4):401-6. doi: 10.1007/s11845-009-0301-0.
28. Menezes SA, Bava MM, Roshan M. A study on awareness of diabetic complications among type 2 diabetes patients. IOSR-JDMS. 2015;14:13-16.
29. Islam FMA, Chakrabarti R, Dirani M, et al. Knowledge, Attitudes and Practice of Diabetes in Rural Bangladesh: The Bangladesh Population Based Diabetes and Eye Study (BPDES). PLoS ONE 2014;9:e110368. doi:10.1371/journal.pone.0110368.
30. Mumu SJ, Saleh F, Ara F, et al. Awareness regarding risk factors of type 2 diabetes among individuals attending a tertiary-care hospital in Bangladesh: a cross-sectional study. BMC Research Notes. 2014;7:599. doi:10.1186/1756-0500-7-599.

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