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Awareness and Knowledge Towards Type 2 Diabetes Mellitus Risk Factors in Northern Saudi Arabia

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ABSTRACT

Background/Purpose: *Diabetes mellitus (DM) is a major public health problem in Saudi Arabia and it is a risk factor for many comorbid diseases. Therefore, the aim of the present study was to assess the awareness and knowledge towards type 2 Diabetes Mellitus (T2DM) risk factors in Northern Saudi Arabia.* ***Methodology:*** *This is a cross-sectional survey conducted in the city of Hail, Northern Saudi Arabia. Data of T2DM awareness was obtained from 1530 Saudi volunteers living in the city of Hail.* ***Results:*** *Out of the 1530 participants, around 59% were males and 41% were females. Out of 1530 participants 60.8% know nothing about DM and about 48% were not sure whether they know something about symptoms of DM. The lack of knowledge about the relationship between obesity and DM was statistically significant among this study group, $p<0.001$.* ***Conclusion:*** *There is low awareness and knowledge levels toward baseline DM related information among Northern Saudi Arabian population, which necessitates the need for comprehensive awareness program. Women are more in need to be targeted by DM prevention and control programs.*

Keywords: Diabetes, Saudi Arabia, Obesity, Lifestyle, Awareness, Hail

INTRODUCTION

Diabetes mellitus (DM) is a serious and increasing global health burden and estimates of prevalence are essential for appropriate allocation of resources and monitoring of trends [1,2]. Type 2 Diabetes Mellitus (T2DM) is reported to affect one in 11 adults worldwide, with over 80% of T2DM patients residing in low-to-middle-income countries [3]. The new estimates of DM prevalence, deaths attributable to DM and healthcare expenditure due to diabetes present a large social, financial and health system burden across the world. It was estimated that in 2017, there are 451 million (age 18-99 years) people with DM worldwide. These figures are expected to increase to 693 million by 2045. It was estimated that almost half of all people (49.7%) living with diabetes are undiagnosed. Moreover, there is an estimate that 374 million people suffer with impaired glucose tolerance (IGT) and it is projected that almost 21.3 million women following parturition delivering live births are affected by some form of hyperglycemia in pregnancy. In 2017, approximately 5 million deaths worldwide were attributable to diabetes in the 20-99 years age range. The global healthcare expenditure on people with diabetes is estimated to be USD 850 billion in 2017 [4].

However, the roles of overall diet, individual foods and nutrients, physical activity, and other lifestyle factors in the development of T2DM is well established. Excess adiposity is a major risk factor for diabetes, and thus, maintaining a healthy body weight and avoidance of weight gain during adulthood is the cornerstone of diabetes prevention. Taken together, these ongoing large cohort studies have provided convincing epidemiologic evidence that a healthy diet, together with regular physical activity, maintenance of a healthy weight, moderate alcohol consumption, and avoidance of sedentary behaviors and smoking would prevent most of type 2 diabetes cases [5].

The World Health Organization (WHO) has reported that Saudi Arabia ranks the second highest in the Middle East and is seventh in the world for the prevalence rate of diabetes. It is estimated that around 7 million of the population

are diabetic and almost around 3 million have pre-diabetes [6,7]. The prevalence of T2DM in Saudi Arabia is 32.8%. However, the predicted prevalence will be 35.37% in 2020; 40.37% in 2025 and 45.36% in the year 2030. The coeficient of time factor indicated that prevalence rate has increased during 1982-2015. Saudi Arabia has the highest prevalence (32.8%) of type 2 diabetes mellitus [8]. DM has been found to be related to high mortality, morbidity, and vascular complications, accompanied by poor general health and lower quality of life [6]. Saudi Arabia, which has become increasingly westernized over the past few decades now has one of the highest prevalence rates of overweight and obesity, even in children. Adopting modern cultural changes, and economic prosperity has created an obesogenic environment that promotes unhealthy eating, sedentary lifestyles, and weight gain [9].

In Saudi Arabia, promotion of larger health awareness via healthy eating choices and increased physical activity particularly among women can make some difference. Consequently, there is a strong need for the epidemic control program, with emphasis on encouraging a healthy diet, including exercise and active lifestyles, as well as, weight control. Therefore, the aim of the present study was to assess the awareness and knowledge towards T2DM risk factors in Northern Saudi Arabia.

PATIENTS AND METHODS

This is a cross-sectional survey conducted in the city of Hail, Northern Saudi Arabia. Data of T2DM awareness was obtained from 1530 Saudi volunteers living in the city of Hail. Participants were randomly selected by Simple random sampling regardless of age, gender and education or occupation.

A purposeful questionnaire was designed and used for obtaining the necessary data. The following information was obtained from each participant: age, sex, and education level. Questions regarding awareness about blood donation were also included, which comprised:

1. Do you have information on how one gets DM?
2. Do you know the symptoms of DM?
3. Do you think regular physical activity can decrease the risk of DM?
4. Do you think uncontrolled nutritional habits can increase the risk of DM?
5. Do you practice regular physical activity?

Data Analysis

Statistical Package for Social Sciences (SPSS version 16) was used for analysis and to perform Pearson Chi-square test for statistical signiicance (p-value). The 95% conidence level and conidence intervals were used. A p-value less than 0.05 was considered statistically significant.

Ethical Consent

Each participant was asked to sign a written ethical consent during the questionnaire's interview. Informed ethical consent form was designed and approved by the ethical committee of the College of Medicine (University of Hail, Saudi Arabia) Research Board.

RESULTS

In this study, awareness, and knowledge towards T2DM risk factors was assessed in 1530 volunteers, their ages ranging from 15 to 70 years. Out of the 1530 participants, 901/1530 (59%) were males and 629/1530 (41%) were females, giving male to female ratio of 1.00: 1.43. Most of the study subjects were within the age group 40-60 years followed by age group 60+ years representing 1015/1530 (66.3%) and 217/1530 (14.2%), in this order. The male to female distribution was relatively similar among different age groups as indicated in Table 1 and Figure 1.

Table 1 Socio-demographic data of the participants

Variables	Category	Males	Females	Total
Age in years	<25	62	66	128
	25-40	101	69	170
	40-60	683	332	1015
	>60	55	162	217
	Total	901	629	1530
Educational status	Illiterate	78	252	330
	Basic education	619	197	816
	University level	120	72	192
	Post-university	84	108	192
	Total	901	629	1530

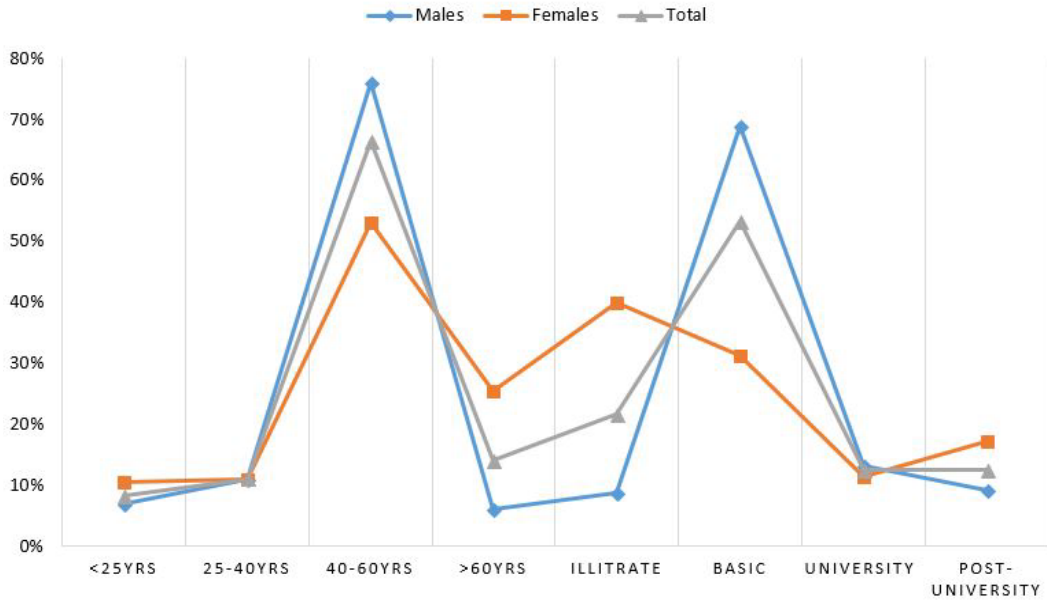

Figure 1 Description of the study population by age, education status and sex

The distribution of the study subjects by sex and knowledge on risk factors expected to increase the risk of DM was described in Table 2. When the participants were asked the question "Do you have information on how one gets DM?" the majority of participants answered "No" representing 930/1530 (60.8%), of whom, 553/901 (61.4%) were males and 377/629 (60%) were females. Out of 312/1530 (20.4%) answered "Yes", 186/901 (20.6%) were males and 126/629 (20%) were females, the ignorance of information about DM was statistically significant $p<0.05$. When the participants were asked the question "Do you know the symptoms of DM" the majority of participants answered "May be" representing 738/1530 (48.2%), of whom, 529/901 (58.7%) were males and 209/629 (33.2%) were females. Out of 396/1530 (26%) answered "Yes", 240/901 (26.6%) were males and 156/629 (24.8%) were females, as indicated in Table 2 and Figure 2.

About 294/1530 (19%) of the participants believe that obesity can increase the risk of DM, hence, the remaining 1236/1530 (81%) don't think that obesity has a role in DM. The lack of knowledge about the relationship between obesity and DM was statistically significant among this study group, $p<0.001$. Out of 1236 participants who don't believe in the link between obesity and DM, 703 (78.7%) were males and 527 (83.8%) were females, as shown in Table 2 and Figure 2.

About 720/1530 (47%) of the participants believe that physical activity can decrease the risk of DM, whereas remaining 810 (53%) think that physical activity has no role in DM. Out of 810 participants who don't believe in the link between physical activity and DM, 390/901 (43.3%) were males and 420/629 (66.8%) were females, as shown in Table 2 and Figure 2. On asking the participants about their own physical activities, only 192/1530 (12.5%) were

found to have regular physical activity. These results indicate the deep sedentary lifestyle, which was found to be statistically significant p<0.0001.

About 516/1530 (33.7%) of the participants believe that uncontrolled dietary habits can increase the risk of DM, hence, the remaining 1014/1530 (66.3%) don't think that uncontrolled dietary habits have a role in DM. Out of 1014 participants who don't believe in the link between uncontrolled dietary habits and DM, 703/901 (78%) were males and 311/629 (49.4%) were females, as shown in Table 2 and Figure 2.

Table 2 Distribution of the study subjects by sex and knowledge on factors expected to increase the risk of DM

Questions	Answers	Males	Females	Total
Do you have information on how one' gets DM?	Yes	186	126	312
	May be	162	126	288
	No	553	377	930
	Total	901	629	1530
Do you know the symptoms of DM?	Yes	240	156	396
	May be	529	209	738
	No	132	264	396
Do you think Obesity can increase the risk of DM?	Yes	192	102	294
	No	709	527	1236
Do you think regular physical activity can decrease the risk of DM?	Yes	511	209	720
	No	390	420	810
Do you think uncontrolled nutritional habits can increase the risk of DM?	Yes	198	318	516
	No	703	311	1014
Do you practice regular physical activity?	Yes	126	66	192
	Sometimes	114	60	174
	Rarely	294	180	474
	No	367	323	690

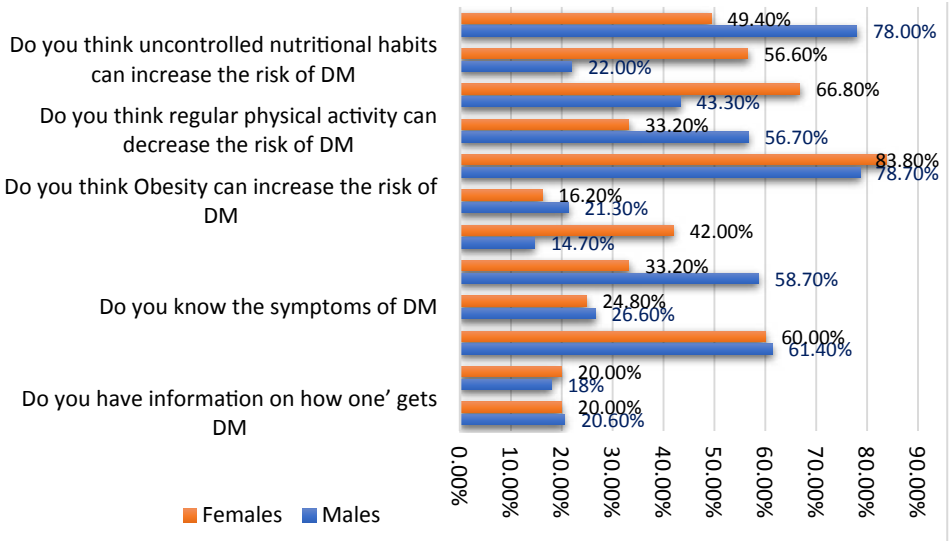

Figure 2 Description of the study subjects by sex and knowledge on factors expected to increase the risk of DM

Table 3 describes the distribution of the study subjects by education and knowledge on factors expected to increase the risk of DM. On asking the participants "Do you have information on how one gets DM?" the majority of participants answered "NO" representing 930/1530 (60.8%) participants of whom 204/330 (61.8%), 534/816 (65.4%), and 192/384

(50%) were among illiterate, basic education and higher education levels respectively. On asking the participants "Do you know the symptoms of DM" the majority of participants answered "MAY BE" representing 738/1530 (48.2%) participants of whom 66/330 (20%), 600/816 (73.5%), and 72/384 (18.8%) were among illiterate, basic education and higher education levels respectively. On asking the participants "Do you think obesity can increase the risk of DM" the majority of participants answered "NO" representing 1092/1530 (71.4%) participants of whom 270/330 (81.8%), 702/816 (86%), and 120/384 (31.3%) were among illiterate, basic education and higher education levels respectively. On asking the participants "Do you think regular physical activity can decrease the risk of DM" the majority of participants answered "NO" representing 834/1530 (54.5%) participants of whom 318/330 (96.4%), 516/816 (63.2%), and 0.00% were among illiterate, basic education and higher education levels respectively. On asking the participants "Do you think uncontrolled nutritional habits can increase the risk of DM" the majority of participants answered "NO" representing 1080/1530 (70.6%) participants of whom 258/330 (78%), 360/816 (44%), and 192/384 (50%) were among illiterate, basic education and higher education levels respectively. On asking the participants "Do you practice regular physical activity" the majority of participants answered "NO" representing 690/1530 (45%) participants of whom 264/330 (80%), 294/816 (36%), and 132/384 (34.4%) were among illiterate, basic education and higher education levels respectively, as indicated in Table 3 and Figure 3.

Table 3 Distribution of the study subjects by education and knowledge on factors expected to increase the risk of DM

Variables	Category	Illiterate	Basic education	Higher education	Total
Do you have information on how one gets DM?	Yes	60	60	192	312
	May be	66	222	0	288
	No	204	534	192	930
	Total	330	816	384	1530
Do you know the symptoms of DM?	Yes	60	156	180	396
	May be	66	600	72	738
	No	204	60	132	396
Do you think Obesity can increase the risk of DM?	Yes	60	114	264	438
	No	270	702	120	1092
Do you think regular physical activity can decrease the risk of DM?	Yes	12	300	384	696
	No	318	516	0	834
Do you think uncontrolled nutritional habits can increase the risk of DM?	Yes	72	186	192	450
	No	258	630	192	1080
Do you practice regular physical activity?	Yes	0	60	132	192
	Sometimes	0	174	0	174
	Rarely	66	288	120	474
	No	264	294	132	690

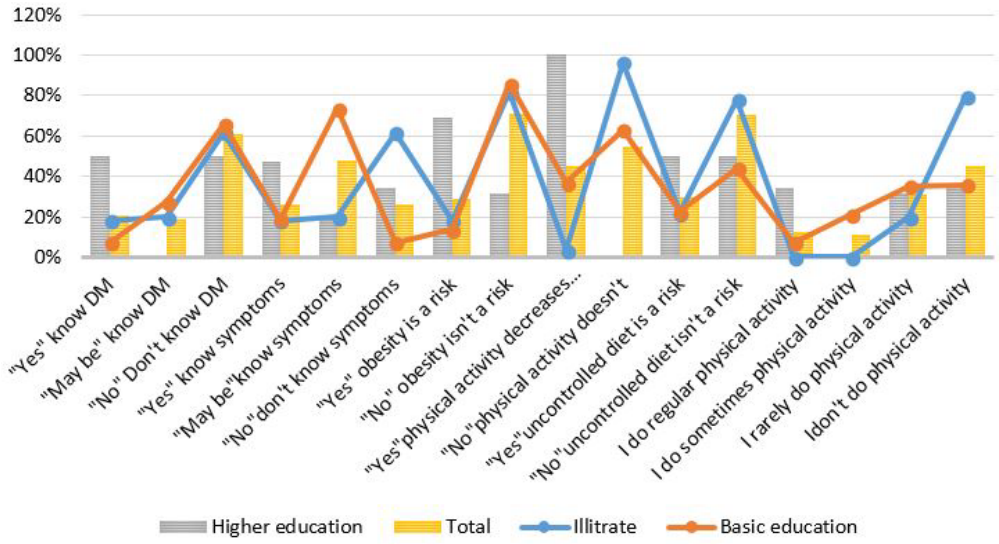

Figure 3 Description of the study subjects by education and knowledge on factors expected to increase the risk of DM

DISCUSSION

DM is a major public health problem in Saudi Arabia, and it is a risk factor for many comorbid diseases. The alarming increase in the burden of DM in Saudi Arabia requires the assembly of various efforts including raising of community awareness towards this serious concern. Although, the prevalence of DM is higher all over the country, but there might be some variations amongst different Saudi territory regions [10]. Therefore, the aim of the present study was to assess the awareness and knowledge towards T2DM risk factors in Northern Saudi Arabia.

In the present study, some DM associated risk factors were addressed in this survey in order to make available some facts regarding the knowledge and awareness in this issue in northern Saudi Arabia. The focus was mainly addressed some DM risk factors and its association with sex and education level and/or status.

On asking the participant "Do you have information on how one' gets DM" about 60.8% were found to know nothing about DM and this was found to be statistically significant ($p<0.05$). This ignorance about DM is relatively equal among males and females. Although most reports in this context were addressing Diabetic patients, but these findings were relatively similar to some reports from Saudi Arabia in this regard. In a previous study performed in a primary care center in eastern Saudi Arabia, only 50% of participants knew about DM risk factors and preventive measures [11].

When the participants were asked the question "Do you know the symptoms of DM" the majority of participants answered "May be" indicating that they were not sure about their information regarding this issue. Males were more reluctant than females. Symptoms associated with hyperglycemia such as polyuria, polydipsia, weight loss, polyphagia [12] were the most frequently mentioned symptoms by participants.

In the current study, the lack of knowledge about the relationship between obesity and DM was statistically significant among this study group, $p<0.001$. It was well established that obesity is a risk factor for T2DM [13,14]. In Saudi Arabia, sedentary habits, low physical activity levels in younger populations, and unhealthy dietary habits are major factors causing obesity in the public as well as in children and adolescents attending school and university [15]. The intake frequency of fast food/week is growing higher among large sections of Saudi community [16]. Consequently, implementation of sustainable intermediations to condense fast-food consumption particularly among Saudi children necessitates more research-based evidence of fast-food consumption habits and practices related to growing childhood obesity. Thoughtful acumen into this problem at the governmental level is required to improve the general activity level and evasion of a sedentary lifestyle by exploring the importance of a healthy lifestyle.

In the current study, about 47% of the participants believe that physical activity can decrease the risk of DM, hence, the remaining 53% don't think that physical activity has a role in DM. Two weeks of exercise training improves beta cell function in pre-diabetic or type 2 diabetic individuals and decreases pancreatic fat regardless of baseline glucose tolerance [17]. Sufficient baseline physical activity level and its temporal increase were associated with a lower risk of incident diabetes mellitus in a large, relatively healthy, cohort [18]. Exercise training, in particular aerobic and combined exercise, improves endothelial function in type 2 diabetes patients, but such an improvement appears to be weakened compared with non-diabetics [19].

On the other hand, on asking the participants about their own physical activities, only 12.5% were found to have regular physical activity. These results indicate the deep sedentary lifestyle, which was found to be statistically significant $p<0.0001$. Sedentary lifestyle was more common among females. Several reports from Saudi Arabia have evidenced the low rate of physical activity among people living in Saudi Arabia in general and Saudi community in particular [20-22].

Nevertheless, on assessing the above studied variable in respect to sex, males have more positive awareness towards DM control than females, which might be attributed to the better of publicity of males compared to females, most probably keeping sedentary lifestyle [23,24].

Furthermore, in the present study the awareness and knowledge toward DM were positively correlated with the level of education, more educated people restoring better awareness and knowledge. Such findings were previously reported from Saudi Arabia [25,26]. Consequently, there should be more stress among less educated people to improve their attitude and knowledge toward DM overall control in Saudi Arabia.

CONCLUSION

There is low awareness and knowledge levels toward baseline DM related information among Northern Saudi Arabian population, which necessitate the need for comprehensive awareness program. Women were more in need to be targeted by DM prevention and control programs. Thoughtful acumen into this issue at the health policy level is prerequisite towards better healthy lifestyle leading to ultimate shrinkage in the burden of DM in Saudi Arabia.

DECLARATIONS

Conflict of Interest

The authors have disclosed no potential conflicts of interest, financial or otherwise.

Acknowledgment

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