Identifying employees at high risk of diabetes among the medical staff of Jaber Al-Ahmed Armed Forces Hospital in Kuwait and screening them for diabetes

Muneera AlRandi MBCHB, MRCGP, (INT.), Postgrad. Dip. (diabetes)* Amal HJ Hussain, MBCHB, MSc public health** Yousef Ahmed Al-Nesef, MPA, FFPH*** Wafa Ebrahim Alsharbati, MBCHB, MSc medical statistics**** Alanoud M Alobaidly, BSc nursing* Abdulla Abu Almelh, BSc nursing*

*Jaber Al-Ahmed Armed Forces Hospital, Kuwait

**Occupational Health Department, Ministry of Health, Kuwait

***Ministry for Defense, Kuwait

****Ministry of Health, Kingdom of Bahrain

Correspondence to: doctorwafa@hotmail.com

الملخص

المقدمة: مرض السكري هو احد أهم الأمراض غير المعدية التي تؤدي إلى الاعتلال والوفيات في دولة الكويت. وفي كثير من الاحيان يتأخر اكتشاف النوع الثاني من مرض السكري نظرا لمروره بمرحلة ما قبل سريرية لا تظهر فيها أعراض المرض. و لذلك من الشائع أن تكون مضاعفات السكري موجودة عند تشخيص المريض. و من خلال الفحص الدوري يمكن التعرف على الأفراد الذين يعانون من مرض السكري بصورة مبكرة وبدء العلاج للوقاية من مضاعفات السكر كما يمكن من خلال الفحص التعرف على الافراد في مرحلة ما قبل السكر و الذين قد يستفيدون من التدخلات لمنع أو تأخير ظهور مرض السكري لديهم.

الأهداف: تهدف هذه الدراسة الى تقدير معدل انتشار عوامل الخطورة للإصابة بمرض السكري لدى العاملين في مستشفى جابر الأحمد و فحص الفئات ذات الخطورة العالية لمرض السكري.

الطريقة: دراسة مقطعية شملت الموظفين في مستشفى جابر الأحمد للقوات المسلحة في الفترة من اكتوبر الى نوفمبر ٢٠١٢. حيث أجريت مقابلات شخصية مع الموظفين و سجلت اوزانهم واطوالهم ثم تم تصنيفهم بحسب معدل خطورة الاصابة بمرض السكر عن طريق استخدم استبيان خاص إلى فئات ذات خطورة منخفضة، مرتفعة قليلا، معتدلة ، عالية أو عالية جدا.و تم فحص المشاركين الذين ينتمون إلى فئات عالية الخطورة للإصابة بمرض السكر باستخدام HbA1c.

النتائج: شملت الدراسة ٦٤٧ موظف و موظفة. ٧٠,٦ ٪ من المشاركين في الدراسة كانوا يعانون إما من زيادة في الوزن أو السمنة، وأكثر من نصفهم كان لديهم زيادة في محيط الخصر و ٢٣ ٪ من المشاركين مدخنين . و اشارت الدراسة أن الموظفين الكويتيين لديهم معدلات خطورة للإصابة بمرض السكر أكبر من الغير كويتيين (P < ٠,٠٠١) حيث أن ٢٧,٦ ٪ من الموظفين الكويتيين ينتمون إلى الفئة المنخفضة الخطورة للإصابة بمرض السكري مقارنة ب ٤٢,٤ ٪ من الموظفين غير الكويتيين. كما أظهرت نتائج فحص HbA1c ل ٥١ مشاركا ينتمون للفئة ذات الخطورة العالية للإصابة بمرض السكري أن ٦ (١١,٨ ٪) مشارك مصاب بالسكر و ٢٦ مشارك (٥١,٠ ٪) في مرحلة ما قبل الاصابة بمرض السكري .

الخلاصة: ينبغي تقييم مدى خطورة الاصابة بمرض السكر لدى الموظفين في مستشفى جابر اللأحمد بصورة دورية و فحص السكري للفئات ذات الخطورة العالية و ادراج هذا الفحص ضمن الفحوص الروتينية لبرنامج الصحة المهنية في المستشفى.

ABSTRACT

Background: Diabetes mellitus is one of the top diseases leading to morbidity and mortality in Kuwait. There is often a delay in diagnosing patients with type 2 diabetes due to the long asymptomatic pre-clinical stage and complications are commonly present at diagnosis. Screening can identify diabetics and treatment can be initiated earlier to prevent complications. Screening can detect pre-diabetics who may benefit from interventions to prevent or delay progression to diabetes.

Objectives: The aim of this study is to estimate the prevalence of risk factors for diabetes in healthy employees and screen those with high risk for diabetes.

Method: A cross-sectional study conducted in Jaber Al-Ahmed Hospital from October to November 2012. The Finnish questionnaire for diabetes risk assessment was used to categorize participants into different risk categories for diabetes. Participants considered to be at high risk were screened for diabetes using HbA1c.

Results: 647 employees participated in the study. 70.6% of the participants were overweight or obese; more than half had a high waist circumference and 23% were smokers. Kuwaiti employees tended to have more risk compared to non-Kuwaitis (P<0.001) with 27.6% of Kuwaitis belonging to the low risk group compared to 42.4% of the non-Kuwaitis. HbA1c testing showed that out of the 51 participants with high/very high risk, 6 (11.8%) were diabetics and 26 (51.0%) were pre-diabetics.

Conclusion: Screening and a diabetic risk assessment for those at high risk should be part of the routine occupational health check program in the hospital.

Keywords: diabetes; occupation; health; screening; Kuwait; risk

INTRODUCTION

Diabetes mellitus is one of the leading non-communicable diseases accounting for significant morbidity and mortality in Kuwait and globally. According to the World Health Organization (WHO), it is one of the top ten causes of death in the world.[1] Moreover, diabetic retinopathy is a leading cause of new onset blindness in many industrialized countries and is an increasingly frequent cause of blindness elsewhere.[2] According to the Canadian Diabetes Association, about one-third of people who have had diabetes for more than 15 years will develop kidney disease.[3]

There are two main types of diabetes: Type 1 diabetes which usually develops in childhood and adolescence and Type 2 diabetes which occurs in adulthood and is related to obesity, lack of physical activity, and unhealthy diet. Type 2 is more common representing 90% of diabetic cases worldwide.[4]

According to the International Diabetes Federation (IDF), a rising trend of incidence and prevalence of diabetes is seen in every country around the world. 1 in 9 adults in the Middle East and North Africa has diabetes and more than half of the people with diabetes in this region are unaware that they have it.[5] Three of the top 10 countries with the highest prevalence of diabetes in 2013 (in adults aged 20 to 79 years) were in the Middle East, i.e. Saudi Arabia (24.0%), Kuwait (23.1%) and Qatar (22.9%).[6] In 2013, Kuwait also had the highest prevalence of impaired glucose tolerance worldwide (17.9%).[6] In developed countries most people with diabetes are above the age of retirement, whilst in the Arab region nearly three quarters (73.4%) of diabetics are under 60 years of age.[7] The mean onset age for type II diabetes in Kuwait is 48.63±12.12 years.[8]

Type 2 diabetes has a long asymptomatic pre-clinical phase which frequently goes undetected. Complications are commonly present at the time of diagnosis although the reported rates vary between studies.[5] Screening can identify individuals with diabetes and treatment can be initiated earlier in the course of the disease to prevent cardiovascular disease (CVD) and other complications. Screening can also detect pre-diabetics who may benefit from interventions to prevent or delay progression to diabetes.

The main objective of this study was to identify staff members who are at high risk of developing diabetes and to screen them for diabetes. The screening project might also help in raising awareness of the risk factors for diabetes and the importance of periodic checking of staff members.

METHOD

This cross-sectional study was carried out among all staff working at the Jaber Al-Ahmed Armed Forces Hospital in the period from 14th October to 18th November, 2012.

Exclusion criteria were established diabetes and pregnancy at the time of the project. Written informed consent was obtained from each participant.

The Finnish questionnaire which is the recommended tool for diabetes risk assessment by IDF, WHO and American Diabetic Association (ADA) was used in the study to assess the risk for diabetes. It has eight scored questions with the total test score providing a measure of the probability of developing Type 2 diabetes over the following 10 years.[9] Information regarding risk factors and socio-demographic variables was collected in face-to-face interviews conducted by a team of 2 doctors and 4 nurses who received special training in order to collect uniform information from the participants. Weight was measured with light clothing and without shoes. Height was measured without shoes, with the participants standing fully erect on a flat surface and looking straight ahead. Body mass index (BMI) was calculated and evaluated as defined by WHO.[10] Participants were divided into low, slightly elevated, moderate, high or very high risk categories. Staff members belonging to the high or very high risk categories were screened for diabetes using HbA1c as recommended in the updated IDF Guidelines.[10] Based on IDF categorization, participants with an HbA1c of more than 6.5 were considered diabetics and those with HbA1c between 5.7 and 6.5 were considered pre-diabetics.[11] Analysis of data was performed using STATA (Version 12). Categorical variables were compared using chi-squared tests and a p-value of less than 0.05 was considered statistically significant.

RESULTS

The total number of staff registered in Jaber Al-Ahmed Armed Forces Hospital was 1,031 and of those 851 were accessible. Out of these, 50 were diabetics, 15 were pregnant, 169 were on leave, 11 were commissioned and 21 refused to participate in the study.

Among the 647 staff members who participated in the study, 308 (48%) were Kuwaiti. 513 (79.3%) of the participants were under 45 years of age and the male to female ratio was 1:1.2. The vast majority of Kuwaiti participants (90.9%) were under 45 years of age compared to 68.7% of the non-Kuwaiti ($p<0.001$). 23% of the participants were smokers. Only 28.6% of the participants had normal weight and 70.6% were either overweight or obese. More than half the participants had a high waist circumference (Table 1).

Risk assessment showed that 228 participants (35.3%) had a low risk, 274 (42.3%) had a slightly elevated risk, 93 (14.4%) had a moderate risk and 52 (8%) had a high to very high risk.

The prevalence of smoking was higher among Kuwaiti participants (27.6%) compared to non-Kuwaiti (18.9%) (p-value=0.01). 27.6% of Kuwaiti participants had low risk compared to 42.2% of non-Kuwaiti and 9.7% of Kuwaitis belonged to the high risk category compared to 6.5% of non-Kuwaitis (p -value=0.001).

Out of the 52 participants in the high and very high risk categories, one staff member refused blood collection for HbA1c testing. HbA1c testing showed that out of the 51

participants with high or very high risk 6 (11.8%) were diabetics, 26 (51.0%) were pre-diabetics and 19 (37.2%) were normal.

DISCUSSION

The prevalence of diabetes is rapidly increasing globally at an alarming rate.[12] Diabetes has changed from being a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting youth and middle age people.[13]

Type 2 diabetes has a long asymptomatic pre-clinical phase which frequently goes undetected and complications frequently present at the time of diagnosis.[11] Chronic hyperglycemia is associated with long-term complications in various organs, especially the eyes, kidneys, nerves, heart, and blood vessels.[14] Individuals with undiagnosed Type 2 diabetes are also at significantly higher risk for stroke, coronary heart disease, and peripheral vascular disease than non-diabetics.[14] Early detection of pre-diabetes and diabetes would be appropriate because the duration of hyperglycemia is a predictor of adverse outcomes, and there are effective interventions to prevent disease progression and to reduce complications.[15]

The IDF recommends that each health service should decide whether to have a program to detect people with undiagnosed diabetes based on the prevalence of undiagnosed diabetes. The decision to conduct such a program should also take into consideration the availability of resources to run the program and to provide the necessary treatment for newly diagnosed patients.[11] The IDF also recommends that detection programs start with identifying high-risk individuals using a risk assessment questionnaire to be followed by checking fasting blood glucose or HbA1c in high-risk individuals.[11]

Our study showed that risk factors for diabetes e.g. overweight and obesity, high waist circumference and smoking, are common among staff members in Jaber Al-Ahmed Armed Forces Hospital.

Although Kuwaiti employees were younger than non-

		Kuwaiti (%) n=308	Non-Kuwaiti (%) n=339	p-value*	Total (%) n=647
Gender	Male	156 (50.6)	138 (40.7)	0.01	294 (45.4)
	Female	152 (49.4)	201 (59.3)		353 (54.6)
Age (years)	< 45	280 (90.9)	233 (68.7)	<0.001	513 (79.3)
	45-54	26 (8.4)	83 (24.5)		109 (16.8)
	≥55	2 (0.7)	23(6.8)		25 (3.9)
Smoke	Smokers	85 (27.6)	64 (18.9)	0.01	149 (23.0)
	Non smokers	223 (72.4)	275 (81.1)		498 (77.0)
BMI categories (Kg/m^2)	Under weight (BMI<18.5)	3 (1.0)	2 (0.6)	0.15	5 (0.8)
	Normal (BMI 18.5-24.9)	84 (27.3)	101 (29.8)		185 (28.6)
	Overweight (BMI 25-29.9)	112 (36.4)	149 (44.0)		261 (40.3)
	Obesity I (BMI 30-34.9)	78 (25.3)	63 (18.6)		141 (21.8)
	Obesity II (BMI 35-39.9)	21 (6.8)	17 (5.0)		38 (5.9)
	Morbid (BMI ≥40)	10 (3.2)	7 (2.0)		17 (2.6)
Waist	<80 in females <94 in males	143 (46.4)	132 (38.9)	0.11	275 (42.5)
	80-88 in females 94-102 in males	79 (25.7)	108 (31.9)		187 (28.9)
	>88 in females >102 in males	86 (27.9)	99 (29.2)		185 (28.6)
Risk	Low	85 (27.6)	143 (42.2)	<0.001	228 (35.2)
	Mild-moderate	193 (62.7)	174 (51.3)		367 (56.8)
	High-very high	30 (9.7)	22 (6.5)		52 (8.0)

Table 1. Distribution of risk factors among Kuwaiti and non-Kuwaiti employees. *chi-squared test

Kuwaiti, they tended to have a higher risk ($p<0.001$). This is expected with the high prevalence of diabetes among Kuwaitis but can also reflect the fact that immigrant workers especially those working in demanding, non-administrative jobs such as nursing, which is the case in our hospital, are healthier and pass through pre-employment checkup to assess their fitness.

CONCLUSION

Due to the high prevalence of risk factors in our employees and the high prevalence of undiagnosed diabetes and pre-diabetes among those in the high and very high risk categories, we recommend that assessment of these risk factors and screening for diabetes and pre-diabetes should be employed as part of the routine occupational health check-up program in Jaber Al-Ahmed Armed Forces Hospital. This should be followed by planning an intervention program to address these risk factors and help prevent or delay the onset of diabetes among staff members at high risk of diabetes.

ACKNOWLEDGEMENT

Special thanks go to nurses who assisted in data collection and entry: Abdulla Yaqoob Abdulla, Mohamed Jawad Abu Taleb, Alanoud M Alobaidly, Mariam Sadiq Hasan and Jawaher Mohamed Alsabte.

REFERENCES

1. World Health Organization. The top 10 causes of death 2013. Available from: http://who.int/mediacentre/factsheets/fs310/en/index.html.
2. World Health Organization. Prevention of blindness from diabetes mellitus. 2005.
3. Canadian Diabetes Association. 2014. Available from: http://www.diabetes.ca/research/research-funding complications-research.
4. World Health Organization. Available from: http://www.who.int/diabetes/action_online/basics/en index.html.
5. International Diabetes Federation. IDF DIABETES A LAS. 2012.
6. International Diabetes Federation. IDF DIABETES ATLAS. 2013.
7. International Diabetes Federation. IDF Diabetes Atlas. Brussels: 2011.
8. Channanath AM, Farran B, Behbehani K, Thanaraj TA. State of diabetes, hypertension, and comorbidity in Kuwait: showcasing the trends as seen in native versus expatriate populations. Diabetes Care. 2013 Jun;36(6):e75.
9. International Diabetes Federation. Diabetes Prevention. Available from: http://www.idf.org/diabetes-prevention/questionnaire.
10. World Health Organization. BMI classification 2013. Available from: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html.
11. Clinical Guidelines Task Force. Global Guideline for Type 2 Diabetes International Diabetes Federation, 2012.
12. Huizinga MM, Rothman RL. Addressing the diabetes pandemic: a comprehensive approach. Indian J Med Res. 2006 Nov;124(5):481-4.
13. Sayyed AK, Chavan VU, Attar NR, Kakade S, Patil SR, Sontakke AV. Prevalence of Diabetes and Pre-diabetes in Class III and Class IV Healthy Obese Employees of KIMS University, Maharashtra. NJIRM. 2011;2(4):39-44.
14. American Diabetes Association. Screening for Diabetes1998 - present. Available from: http://care.diabetesjournals.org/content/25/suppl_1/s21.
15. Charfen MA, Ipp E, Kaji AH, Saleh T, Qazi MF, Lewis RJ. Detection of undiagnosed diabetes and prediabetic states in high-risk emergency department patients. Acad Emerg Med. 2009 May;16(5):394-402.