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Prevalence, Knowledge, Attitude and Practices of Diabetes Mellitus among Jazan Population, Kingdom of Saudi Arabia (KSA)

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Abstract

Background: Diabetes mellitus (DM) prevalence is increasing in Arabian Gulf countries and Saudi Arabia is ranked as the 7th country world widely estimated to have the highest numbers of people with diabetes in 2000 and 2030. Objectives: This study intended to estimate the prevalence, risk factors of diabetes among adult population of Jazan region, Saudi Arabia. Methods: Observational cross sectional survey conducted among adult Saudi population aged 15 years of age and over who attended eight Primary Health Care Centers (PHCCs) in Jazan region. Standardized questionnaire as well as diabetic registry was utilized for this research. The questionnaire involved risk factors of DM and socio-demographic variables. Statistical analysis involved: chi-square test (or Fisher exact test where applicable) was used to evaluate the prevalence of DM among different subgroups. The crude odds ratios (OR) were estimated by univariate analysis to observe the association of each variable with DM. Results: The overall prevalence of DM among study participants was found to be 12.3% (95% CI: 10.9 - 13.8). The prevalence of DM according to gender showed that women are of significantly higher prevalence 19.0% with confidence interval (95% C.I. 15.9 - 22.6), compared with only 9.8% for male (95% CI. 8.4 - 11.4). Participant's body mass index, age, family history of diabetes and daily exercise and work involved physical activities that showed a significant association with DM. Conclusion: Increased prevalence of diabetes calls for urgent steps towards prevention and health promotion, programs designed to reduce its burden.

1. Introduction

Diabetes mellitus (DM) is considered as one of the most chronic diseases that faced humankind. It affected human

kind and continued to do so, but in steady increasing rate. Globally the burden of Diabetes mellitus is overwhelming. It is estimated that the total number of people with diabetes is to reach 221 million in 2010 and this number will increase to 366 million in 2030 [1] [2].

Kingdom of Saudi Arabia had achieved a notable economic growth and improvement in life quality. The country enjoys high level of economic growth and development during the past three decades. The population of country had experienced remarkable change in life styles and hence increasing rate of non-communicable disease [3]-[6]. Saudi Arabia is considered as the seventh highest rate in the world in terms of diabetes incidence, with about 3.4 million people having been diagnosed with diabetes. The recent estimate of the disease showed that 24.4% of the adult population is suffering from DM.

A review of literature indicates that proper education and awareness program can improve the knowledge of patients and change their attitude as a large gap was found between knowledge and attitude [2] [4].

Obtaining information about the prevalence, risk factors of DM is the first step in formulating a preventive program for the disease. Also there is increasing need to investigate KAP among diabetic patients to help in future development of programs and techniques for effective health education [7].

The objectives of this study were to determine the prevalence of diabetes mellitus and its associated factors among population of Jazan region south west of KSA and to investigate their knowledge attitude and practices towards this disease.

2. Material and Methods

2.1. Study Design and Population

Observational cross sectional survey conducted among adult Saudi population aged 15 years of age and over who attended eight Primary Health Care Centers (PHCCs) in Jazan region, Saudi Arabia during November, 2006. The sample size was calculated depending on the prevalence of DM in KSA, giving a sample of 2200 participants. The sample design was cluster random sampling based on primary health centers covering Jazan region. Eight PHCCs were selected at random and subjects were selected using systemic random sample from each PHCC attendance list.

2.2. Data Collection

The data was collected by 4th Year Medical Students during their field training course. The students used a questionnaire that included demographic data, smoking and Qat consumption, blood pressure measurement, anthropometric data, physical activity, dietary habits and knowledge attitude and practice towards DM. Each subject was interviewed for 20 - 30 minutes. Students were trained for data collection before commencement of the survey.

Height and weight were measured using standardized methods and Body Mass Index (BMI) calculated using chart of the National Heart, Lung, and Blood Institute (NIH) USA. Blood pressure measurement was carried out by trained medical students according to World Health Organization (WHO) standardized criteria. DM data were checked using the DM registry at the Non-communicable disease (NCD) clinic of the PHCC. The collected data was cleaned and entered over a week, and potential errors were identified and corrective actions taken.

2.3. Data Management Analysis

The data entry and analysis were performed using Statistical Package for the Social Sciences Program (SPSS) 17th Edition. The overall prevalence of DM among patients was calculated with a 95% confidence interval (CI). The chi-square test (or Fisher exact test where applicable) was used to evaluate the prevalence of DM among different sub-groups. The crude odds ratios (OR) were estimated by univariate analysis to observe the association of each variable with DM. All statistical tests were two-sided; and a level of $P < 0.05$ was used to indicate statistical significance.

2.4. Ethical Consideration

Ethical approval was obtained from the Medical Research Ethics Committee of Faculty of Medicine. Participation was voluntary and verbal consent was acquired from all participants. Confidentiality of all participants was

maintained as no names were mentioned in the questionnaires, participant were told that they have the complete free dome to quit the study at any time.

3. Results

Two thousands and twenty three (2023) persons were met the inclusion criteria and participated in the study (586 women and 1487 men) the response rate was estimated at 92%. Males constituted a large number of the sample 73.5% in comparison to 26.4% for females participants (**Table 1**). The distribution of study subjects according to age shows that 65.9% are in the age group (15 - 39) years, 69.7%, 55.4% for male and female respectively.

Table 1. Some selected characteristics of Study participants.

Characteristics	Male N%	Female N%	Total N%
Age Groups			
15 - 39	1036 (69.7)	297 (55.4)	1333 (65.9)
40 - 49	188 (12.6)	107 (20.0)	295 (14.6)
50 - 59	148 (10.0)	67 (12.5)	215 (10.6)
60+	115 (7.7)	65 (12.1)	180 (8.9)
Education			
Illiterate	155 (10.4)	233 (43.5)	388 (19.2)
Incomplete schooling	81 (5.4)	34 (6.3)	115 (5.7)
Completed Primary School	157 (10.6)	42 (7.8)	199 (9.8)
Completed Intermediate School	324 (21.8)	43 (8.0)	367 (18.1)
Completed secondary School	400 (26.9)	91 (17.0)	491 (24.2)
University and above	360 (24.8)	93 (17.6)	463 (22.9)
Marital Status			
Single	708 (47.6)	102 (19.0)	810 (40.0)
Married	731 (49.2)	370 (69.0)	1101 (54.4)
Married in Polygamy Relations	44 (3.0)	5 (.9)	49 (2.4)
Divorced	2 (0.1)	17 (3.2)	19 (.9)
Widowed	2 (0.1)	42 (7.8)	44 (2.2)
Occupation			
Government Employee	599 (40.3)	89 (16.6)	688 (34.0)
Private Sector Employee	131 (8.8)	8 (1.5)	139 (6.9)
Student	487 (32.8)	54 (10.1)	541 (26.7)
House Wife	-	327 (61.0)	336 (16.6)
Retired	117 (7.9)	5 (.9)	122 (6.0)
Unemployed	153 (8.5)	53 (9.9)	197 (9.7)
Family Income (n = 1362)			
Less than 3000 SR	252 (25.2)	174 (48.1)	426 (31.3)
3000 - 4999 SR	215 (21.5)	43 (11.9)	258 (18.9)
5000 - 6999 SR	166 (16.6)	74 (20.4)	240 (17.6)
7000 - 9999 SR	163 (16.3)	37 (10.2)	200 (14.7)
10000 and More SR	204 (20.4)	34 (9.4)	238 (17.5)

Illiterate people were 19.2%, while those who completed secondary education were 24.2% participants. About 54.4% of study participants were married in single union compared with only 2.4% who were also married but in polygamy relation, while single participants were 40%. 34.0% are working in government institutions, compared with 18.9% in private sector. Regarding the income distribution almost 50% of respondents are with monthly family income less than 5000 SR.

The prevalence of DM according to some demographic and socio-economic characteristics is shown in **Table 2**. The prevalence of DM according to gender showed that women are of higher prevalence 19.0% with confidence interval (95% C.I. 15.9 - 22.6), compared with only 9.8% for male (95% CI. 8.4 - 11.4). The age specific prevalence rate showed a general increase of DM with age with significant difference between the different age groups. The lowest prevalence were found among age group (15 - 39) years 3.6% (95% CI. 1.9 - 4.2), while the highest prevalence reported for the age group 60+ 40.6% (95% CI. 33.6 - 47.9). The prevalence of DM according to marital status 50% of widowed respondents were diabetic patients (95% CI 35.8 - 64.2), followed by divorced participants 31.6% and married 17.1%. According to the occupational status, 25% house wife and retired

Table 2. Prevalence of diabetic mellitus according to some selected characteristics.

Characteristics	N%	95% C.I.	P Value
Gender			
Male	146 (9.8)	8.4 - 11.4	0.000
Female	102 (19.0)	15.9 - 22.6	
Age Groups			
15 - 39	48 (3.6)	2.7 - 4.7	
40 - 49	67 (22.7)	18.3 - 27.8	0.000
50 - 59	60 (27.9)	22.3 - 34.3	
60+	73 (40.6)	33.6 - 47.9	
Marital Status			
Single	23 (2.8)	1.9 - 4.2	
Married	188 (17.1)	15 - 19.4	
Married in Polygamy Relations	9 (18.4)	10.0 - 31.4	0.000
Divorced	6 (31.6)	15.4 - 5.42	
Widowed	22 (50.0)	35.8 - 64.2	
Occupation			
Government Employee	89 (12.9)	10.6 - 15.6	
Private Sector Employee	20 (14.4)	10.5 - 21.2	
Student	10 (1.8)	1.0 - 3.3	
House Wife	84 (25.0)	20.5 - 29.7	0.000
Retired	31 (25.4)	18.5 - 33.8	
Unemployed	14 (7.1)	4.3 - 11.6	
Family income (n = 1362)			
Less than 3000 SR	64 (15.0)	11.9 - 18.7	
3000 - 4999 SR	26 (10.1)	7.0 - 14.4	
5000 - 6999 SR	13 (5.4)	3.2 - 9.0	0.005
7000 - 9999 SR	24 (12.0)	8.2 - 17.2	
10000 and More SR	31 (13.0)	9.3 - 17.9	
Overall Prevalence	248 (12.3)	10.9 - 13.8	

population were diabetic patient. 15% of people with monthly income less than 3000 SR were diabetic patients (95% CI. 11.9 - 18.7). The overall prevalence of DM among study participants was found to be 12.3% (95% CI: 10.9 - 13.8). The table further suggested there is a significant difference between DM prevalence according to gender, marital status and between patients according to occupation and monthly family income.

Table 3 shows the prevalence of DM and its association with some selected risk factors. According to the table participant's body mass index, age, family history of diabetes and daily exercise and work involved physical activities showed a significant association with DM. Age greater than 40 years increases the risk of DM ten times while family history of DM increase the risk three times. Obesity increases the risk DM twice while doing daily exercise decreases the risk twice.

Majority of the DM patients in our study (96.0%), 97.3% male and 93.1% females were aware about important of monitoring DM, with no significant difference between males and females (Table 4). About half of the DM patients are using oral hypoglycemic, while one quarter of them are using insulin with no significant difference between males and females. Dietary regimen, weight reduction and practice of exercise were accepted by less than half of studied patients (35.1%, 34.7%, 39.4% respectively). Only 18.5% of DM patients opted to alternative medicine like plans and weeds to as a choice to treat DM (Table 4).

Table 3. Prevalence of DM and its association with some selected risk factor (OR and 95% confidence intervals) among study participants.

Characteristics	Diabetic	Non-Diabetic	OR (95% CI)	P Value
General Obesity				
BMI < 30	156 (10.1)	1391 (89.9)	1	0.000
BMI > 30	86 (18.9)	368 (81.1)	2.08 (1.5 - 2.7)	
Age				
Less than 40	48 (3.6)	1285 (96.4)	1	0.000
Greater Than 40	200 (29.0)	490 (71.0)	10.9 (7.8 - 15.2)	
Family History of Diabetic				
No	86 (7.1)	1126 (92.9)	1	0.000
Yes	162 (20.0)	649 (80.0)	3.2 (2.4 - 4.3)	
Addiction to Khat				
No	180 (13.0)	1206 (87.0)	1	0.141
Yes	68 (10.7)	569 (89.3)	0.8 (.50 - 1.1)	
Addiction to Tobacco				
No	198 (13.3)	1291 (86.7)	1	0.017
Yes	50 (9.4)	484 (90.6)	0.6 (0.4 - 0.9)	
Hypertension				
Absent	151 (9.8)	1392 (90.2)	1	0.000
Present	65 (35.7)	117 (64.3)	5.1 (3.6 - 7.2)	
Doing Exercise Daily				
Yes	63 (15.6)	341 (84.4)	1	0.000
No	47 (7.4)	586 (92.6)	2.3 (1.5 - 3.4)	
Work involve Physical Activity				
Yes	92 (15.0)	523 (85.0)	1	0.016
No	156 (11.1)	1246 (88.9)	1.4 (1.1 - 1.8)	

Table 4. Knowledge, attitude & practice of diabetic mellitus among patients about their disease.

Category	Characteristics	Male N%	Female N%	Total N%	P Value
	Awareness				
Knowledge	Aware	143 (97.9)	95 (93.1)	238 (96.0)	0.056
	Not Aware	3 (2.1)	7 (6.9)	10 (4.0)	
	Oral Hypoglycemic				
	Yes	95 (51.1)	64 (55.7)	159 (52.8)	0.440
	No	91 (48.9)	51 (44.3)	142 (47.2)	
	Dietary regimen				
	Yes	90 (27.7)	84 (49.1)	174 (35.1)	0.040
	No	235 (72.3)	87 (50.9)	322 (64.9)	
	Insulin Treatment				
Management	Yes	37 (20.3)	42 (36.5)	79 (26.6)	0.003
	No	145 (79.7)	73 (63.5)	218 (73.4)	
	Weight reduction				
	Yes	90 (31.5)	58 (41.1)	148 (34.7)	0.048
	No	196 (68.5)	83 (58.9)	279 (65.3)	
	Practicing exercise				
	Yes	108 (37.9)	61 (42.4)	169 (39.4)	0.371
	No	177 (62.1)	83 (57.6)	260 (60.6)	
	Alternative medicine (e.g. Medicinal plants) to treat DM				
Attitude	Yes	26 (11.9)	37 (30.3)	63 (18.5)	0.000
	No	193 (88.1)	85 (69.7)	278 (81.5)	

4. Discussion

The data obtained from this cross sectional study revealed an overall prevalence of DM of 12.3% in Jazan Region. This estimate is far less than what has been reported by previous studies in KSA [8] [9] which produced prevalence rate of 23.7% and 23.1% respectively. This is may be attributed to the size of the study. Also the study showed that the prevalence of DM in female is higher than male, along the lines of some international studies [10] [11], only justification may be the unequal sex ratio of male in female participated in the survey. The study further showed increase of prevalence of DM with age. The increase in the prevalence of diabetes mellitus with age is expected and has been observed in all studies reported elsewhere. However, the increase in prevalence in those above aged 60 years and above was very significant. This trend is noticed in other studies in other parts of KSA and other countries characterized by high prevalence of DM [8]-[12].

The univariate analyses showed a significant association between BMI and DM, BMI greater than 30 increases the risk of DM twice. The relationship between diabetes mellitus and obesity is well established and has been documented in many other surveys, nationally and internationally [9]-[13]. International study involved 49 developing countries documented that overweight (BMI) and obese (BMI > 30 kg/m^2) were significantly associated with odds of having diabetes as compared with those who were of normal weight [14].

The study did not find an independent relationship between diabetes and Khat chewing, the habit is highly prevalent among Jazan population. In fact no previous studies in KSA investigated the relationship between Khat chewing and DM. DM is associated with family history of diabetes. The DM prevalence is higher and related independently (OR = 3.2) among people with diabetes history in their families. This association is found to

be higher in surveys conducted elsewhere [11] [15] [16].

The study further documented an association between diabetes and physical activity. The group with physical activity had the lowest prevalence of DM. Physical activity level might affect prevalence through its relationship with other factors such as obesity and hypertension [17].

The study revealed high level of knowledge about important of monitoring DM among studied population, with no significant difference between males and females. These findings may be along the same line of other studies in KSA which produced good level of Knowledge about DM [18].

Several limitations should be taken into consideration when interpreting the results of the present study. (1) The present analysis is based on cross sectional data therefore; the associations of diabetes with other independent variables should be interpreted with causation. (2) The distribution of study participants according to gender was biased towards male and this may affected the estimated prevalence of DM for this study and this may explain the that why prevalence of the DM among male was far less than the national level.

5. Conclusion

In conclusion, this cross sectional study showed that the prevalence of DM in Jazan region is 12.3%. Increased prevalence of diabetes calls for urgent steps towards prevention and health promotion, programs designed to reduce its burden. Knowledge of the patients regarding complications of DM is necessary and important for management of the disease.

Acknowledgements

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