Prevalence and Predictors of Diabetes Mellitus in Jalalabad City, Afghanistan-2013

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Abstract

Objective: Diabetes mellitus (DM) is a global health problem with significant impact on health and quality of life. There is no national statistics about this disease in Afghanistan. The aim of this study is to evaluate the prevalence of DM and associated factors in adults lived in Jalalabad city, Afghanistan.

Materials and Methods: A cross-sectional study was conducted in Jalalabad city in May to June 2013. Multistage random sampling technique was used to choice 1200 adults aged 25-70 years. WHO STEPS approach was used to collect data on demographic and behavioral factors. Physical measurements including height, weight, blood pressure and biochemical blood analysis were done. Bivariate and multivariate analysis was performed using SPSS version.20.

Results: The prevalence of diabetes was 11.8%. There was significant difference of diabetes prevalence between female and male (13.4 % vs. 9.4 %). The mean age of diabetic patients was 38.8 ±11 years. The factors such as vegetables consumption (OR:0.48, 95%CI: 0.31 – 0.75), obesity (OR:1.83, 95%CI: 1.11 – 3.03), hypertension (OR:1.99, 95%CI:1.33 – 2.97), total cholesterol (OR:1.64, 95%CI:1.07 – 2.51), and total triglycerides(OR:1.91, 95%CI: 1.16 – 3.16) independently are associated with diseases.

Conclusions: The high prevalence of diabetes in working-age is cause of concern. Measures such as raising awareness and changing of lifestyle may help to reduce the burden of DM among Jalalabad adults.

Keywords: Diabetes mellitus, WHO STEPwise, Prevalence, Risk factors, Afghanistan

Introduction

Diabetes mellitus (DM) is a public health problem worldwide (1). The global number of people with diabetes rises from 171 million in 2000 to 366 million in 2030 (2), while the global prevalence of this disease is increasing from 8% in 2011 to 10% in 2030. Nearly 80% of people with diabetes live in low- and middle-income countries (3). Morbidity and mortality due to diabetes are increasing which is largely contributed by changes in behavior towards unhealthy diet, physical inactivity, overweight and obesity, tobacco and alcohol consumption as well as demographic changes such as age, sex, ethnicity, residential area and other factors (4-9).

In Afghanistan, due to years of fighting and competing priorities, few studies have been conducted to estimate the prevalence of diabetes in this country. Based on World Health Organization (WHO), the number of diabetic patients will be tripled in 2030 as compared to 2000 in Afghanistan (10). The prevalence of diabetes in adult population has been estimated 8.6% and 9.9 % in 2010 and 2030 respectively (11). The prevalence of diabetes among men and women ≥ 40 years was 16.1% and 12% respectively in Kabul, with an overall prevalence of 13.3% (12).

The national prevalence of diabetes among aged 25–64 year was 7.7%, but this prevalence was 8.3% among females and 7.1% among males in our neighboring, Iran in 2005 (13). Also, the prevalence of diabetes was 12.14% in males and 9.83% in females in Punjab Province in Pakistan. Risk factors such as central obesity, hypertension and family history of the disease were strongly associated with diabetes (14).

The aim of this study was estimating the prevalence of diabetes and its associated risk factors among adult population in Jalalabad city, urban area of eastern Afghanistan.

The results of this study will encourage the authorities for designing and implementing a national study, formulating policies and strategies for preventing and control of this disease.

Materials and Methods

In this cross-sectional study, WHO STEPwise approach (15) was conducted to evaluate the prevalence and associated factors of non-communicable diseases including diabetes, hypertension and obesity, in Jalalabad city Afghanistan. The target population of this study was adults between 25 to 70 years old who live in Jalalabad city. Inclusion criteria: In each household interviewer, all persons who were between 25 to 70 years old were selected. Exclusion Criteria: temporary residents (less than six months of stay in the city) and living in insecure areas.

In this study, after sample size calculation and consideration the proportion of main risk factors of diabetes, the sample size was 600 individuals. Due to cluster sampling, the sample size was doubled to reach 1200, which was reasonable for achieving the study objectives given the limited resources.

The data were collected from May to June 2013. Then Expanded Program on Immunization (EPI) used to select samples (an updated and reliable source of data for the study). We approached all four clusters (A – D) and 20 sub-clusters of EPI including five districts in the city to capture the target population.

As such, our primary sampling unit (PSU) was sub-clusters, the secondary sampling units (SSU) were streets/areas, and tertiary sampling unites (TSU) were households and ultimate sampling units (USU) were respondents of 25 years and above in the households. The boundaries of some areas and streets was not clear and we could not find how many households were there in a center leading to periphery in each street, which ended up selecting each 2nd household until the sample size is completed. The interviewer was instructed to find a highly visible religious physical point known as Masjid to be used as a fixed landmark or a very populated street within the boundaries of the selected location following applying the bottle rotating rule to proceed to series of households.

The households with only one person meeting the eligibility criteria were the designated respondents. For households' more than one person, the name of each person was written on a piece of paper. Like the lottery fashion, a child was asked to pick up a paper to select the designated respondent. The method provided equal chance of being selected for each member of the households that is the requirements for carrying out the survey.

A structured and coded questioner was used to collect demographic, socio-economic, clinical, and behavioral information during face-to-face interview. All risk factors were included in the questionnaire based on WHO STEP approach. A non-flexible measurement tape was used to measure height of participants. Measurements of height and weight were also used to calculate and categorize body mass index (BMI) (16). A tension measurement tape was used to measure the waist circumference in order to identify central obesity (17). Sphygmomanometers were used to determine systolic and diastolic blood pressure (18). The instruments were compared with each other to determine their validity. Fasting blood sugar more than 126 mg/dl was considered as diabetes (4). The next day, following interview and measurement of anthropological parameters blood samples were obtained from patients and were processed by a lab technician. Then samples sent to the Central Public Health Laboratory (CPHL) in Kabul, the samples were stored at -80°C until biochemical measurements were completed. Fasting blood sugar, triglycerides, cholesterols, blood lipoproteins were measured. It should be noted that the informed consent was obtained from all participants and a research protocol was approved by institutional review board in the Ministry of Public Health in Afghanistan. The data were managed and analysed using SPSS version 20 (19).

Results

Descriptive Analysis

Blood samples were obtained from 1200 patients. 24 patients were excluded from main analysis due to damage of samples. A total of, 731 were females (60.9%) and 469 (39.1%) were males. The result showed that 13.4 percent of women and 9.4 percent of men had Diabetes Mellitus. Therefore the prevalence of this disease is 11.8%.

The mean age (± SD) of subjects was 38.8 ±11.06 years. The mean (± SD) of weight and height of participants were 68.6±15 Kg and 155.5±13.8 centimeter respectively. The mean (± SD) of body mass index was 27.2±6.8Kg/m2 which was slightly higher than normal value. The BMI categories showed that 27.3% of participants were obese, 32.2% overweight, 34.4% normal and just around 6.1 percent were underweight (table 1). The prevalence of cigarette smoking was lower (6.2 %) than the prevalence of snuff (10.7%). Also, one thirds of the subjects had consumed fruit three days per week while two thirds of patients had used vegetables three days per week.

Also 35% of patients have vigorous physical activity and 59% of patients have moderate physical activities (table 2). The mean (± SD) systolic and diastolic blood pressure was 122.2±20.8 mmHg and 79±13.1mmHg respectively.

Bivariate Analysis

The prevalence of diabetes increases with age. The prevalence of diabetes in females was 1.5 times more than males. There was reverse association between the level of income and diabetes, the risk of diabetes in people with low income was more than people with high income.

The risk of diabetes in patients who had consumed vegetables more than 3 times per week was lower than others. Also, there was significant association between vigorous and moderate physical activity with diabetes (OR: 1.97, 95% CI: 1.26 – 3.1), (OR: 2.32, 95%CI: 1.56 – 3.48) respectively.

There was no significant association between diabetes with smoking, servings of fruits, consuming of kitchen oil and sedentary lifestyle. Besides, there was significant association between obesity and diabetes (OR: 2.03, 95% CI: 1.26 - 3.29) as compared to underweight groups.

Also, higher blood pressure was more common among diabetes (OR: 2.42, 95%CI: 1.70 - 3.44).

Higher total cholesterol and triglycerides were more common among diabetic patients (OR: 1.75, 95%CI: 1.20 - 2.53) and (OR: 1.98, 95%CI: 1.28-3.06) respectively. Multivariate analysis of the risk factors associated with Diabetes is explained in table 4.

Table 1. Frequency distribution of demographic characteristics of participants

Variables	Categories	Female (%)	Male (%)	Total (%)
Age (missing values =97)				
	25 - 34	264 (58)	191 (42)	455 (41.3)
	35 - 44	237 (76.2)	74 (23.8)	311 (28.2)
	45 - 54	119 (56.9)	90 (43.1)	209 (18.9)
	55 and over	44 (34.4)	84 (65.6)	128 (11.6)
Level of education (missing values = 11)				
	Illiterate	643 (75.2)	212 (24.8)	851 (71.9)
	Literate	85 (25.4)	249 (76.6)	334 (28.1)
Monthly income (Afghanis)				
	≤ 10000	350 (49.4)	358 (50.6)	708 (59)
	10000 - 20000	23 (54.8)	19 (45.2)	42 (3.5)
	≥ 20000	42 (97.7)	1 (2.3)	43 (3.6)
	Refused	316 (77.6)	91 (22.4)	407 (33.9)
Work Status (missing values = 05)				
	Official Employee	23 (20.9)	87 (79.1)	110 (9.2)
	Business	1 (1.3)	78 (98.7)	79 (6.6)
	Farmer/worker	4 (1.8)	220 (98.2)	224 (18.7)
	Housewife	646 (100)	0 (0)	646 (54.1)
	Unable to work/retired	3 (3.7)	78 (96.3)	81 (6.8)
	Refused	51 (92.7)	4 (7.3)	55 (4.6)
Marital Status				
	Single	40 (44)	51 (56)	91 (7.6)
	Married	643 (61)	411 (39)	1054 (87.8)
	Widows	40 (87)	6 (13)	46 (3.8)
	Refused	8 (88.9)	1 (11.1)	9 (0.8)

Table 2. Frequency distribution of risk factors

Variables	Categories	Female (%)	Male (%)	Total (%)
Cigarettes Smoking (missing=57)				
	No	676 (63.1)	396 (36.9)	1072 (93.8)
	Yes	1 (1.4)	70 (98.6)	71 (6.2)
snuff using by mouth no smoking (missing =50)				
	No	677 (65.9)	350 (34.1)	1027 (89.3)
	Yes	4 (3.3)	119 (96.7)	123 (10.7)
Fruits intake in week (missing =88)				
	< 3 days	501 (63.8)	284 (36.2)	785 (70.6)
	≥ 3 days	183 (56)	144 (44)	327 (29.4)
Vegetables consumption in week (missing values = 17)				
	< 3 days	189 (75.3)	62 (24.7)	251 (21.2)
	≥ 3 days	527 (56.5)	405 (43.5)	932 (78.8)
Vigorous Physical Activity (missing values=68)				
	No	383 (52.4)	348 (47.6)	731 (64.6)
	Yes	282 (70.3)	119 (29.7)	401 (35.5)
Moderate Physical Activity (missing values=159)				
	No	240 (56.3)	186 (43.7)	426 (40.8)
	Yes	412 (67)	203 (33)	615 (59.2)
Pedal or bicycle for 20 minutes daily per week (missing values =70)				
	No	628 (76.9)	189 (23.1)	817 (72.9)
	Yes	28 (9.2)	276 (90.8)	304 (27.1)
Sedentary lifestyle(The numbers of hours daily)				
	< 3 hours	370 (57.3)	276 (42.7)	646 (65.2)
	≥ 3 hours	185 (53.6)	160 (46.4)	345 (34.9)

Table 3. Bivariate analysis of studied risk/protective factors and Diabetes Mellitus

Variables		Diabetic	Non diabetic	OR*	CI**95%
Age (years) (missing values =117)					
	25 - 34	36 (8)	412 (92)	1	Reference
	35 - 44	42 (13.7)	264 (86.3)	1.82	1.14 – 2.92
	45 - 54	31 (15.1)	174 (84.9)	2.04	1.22 – 3.40
	55 and over	21 (16.9)	103 (83.1)	2.33	1.31 – 4.16
Sex					
	Female	96 (13.4)	621 (86.6)	1	Reference
	Male	43 (9.4)	416 (90.6)	1.5	1.02 – 2.18
Monthly income (Afghanis)					
	≤ 10000 Afghanis	89 (12.9)	602 (87.1)	1	Reference
	≥ 10000 Afghanis	19 (22.6)	65 (77.4)	1.97	1.13 – 3.45
Vegetables consumption in week (missing values = 41)					
	< 3 days	47 (19)	201 (81)	2.1	1.43 - 3.10
	≥ 3 days	91 (10)	820 (90)	1	Reference
Vigorous Physical Activity (missing values=91)					
	No	91 (12.7)	625 (87.3)	1.97	1.26 - 3.10
	Yes	27 (6.9)	366 (93.1)	1	Reference
Moderate Physical Activity (missing values=159)					
	No	65 (15.7)	349 (84.3)	2.32	1.56 - 3.48
	Yes	45 (7.4)	562 (92.6)	1	Reference
Basic Mass index (kg/m square) (missing values=129)					
	Underweight	5 (7.7)	60 (92.3)	1	Reference
	Normal weight	39 (10.6)	329 (89.4)	2.41	0.92 - 6.31
	Overweight	31 (9)	314 (91)	1.7	1.08 - 2.67
	Obese	49 (16.7)	244 (83.3)	2.03	1.26 - 3.29
Blood Pressure (missing values=24)					
	Normotensive	70 (8.7)	737 (91.3)	1	Reference
	Hypertensive	69 (18.7)	300 (81.3)	2.42	1.70 - 3.44
Total Cholesterol (missing values =25)					
	<190 mg/dL	48 (8.8)	500 (91.2)		
	≥ 190 mg/dL	90 (14.4)	537 (85.6)	1.75	1.20 - 2.53
Triglycerides (missing values =25)					
	<150 mg/dL	28 (7.4)	348 (92.6)	1	Reference
	≥150 mg/dL	110 (13.8)	689 (86.2)	1.98	1.28 - 3.06

*odd's ratio
** Confidence interval

Table 4 shows the results of multivariate analysis test with adjusted OR and 95% Confidence Intervals. According to above table, the main variables involving; high frequency of vegetables intake (OR:0.48, 95%CI: 0.31 –0.75), obesity (OR:1.84,95%CI: 1.11 – 3.03), hypertension, (OR: 1.99, 95%CI: 1.33 – 2.97), high blood cholesterol (OR: 1.64, 95%CI:1.07–2.5), and high blood triglycerides (OR:1.91, 95%CI: 1.16-3.16) had a statistically significant relationship with diabetes.

Discussion

Non-communicable diseases have high prevalence in Afghanistane. More than one-tenth of the adult population in Jalalabad city have diabetes and need serious attention. Therefore, identification of diabetes among adult population and its associated factors could be a base of further provincial and/or national studies.

The high prevalence of DM (11.8%) in this city is comparable with findings of the neighboring countries, such as; India, Pakistan, and Iran (20-22). Factors such as age, sex, diet (vegetables), physical activity, obesity, blood pressure, total blood cholesterol, HDL and total blood triglycerides were significantly associated with diabetes. These findings are similar with other studies in India, china and Bangladesh (23-26). It is estimated that the number of people with diabetes over age 64 years will be 82 million in developing countries in 2030 (2).

Finally, the results of multivariate analysis showed that diet rich in vegetables have a protective role against diabetes.

Table 4. Multivariate analysis of the risk factors associated with Diabetes

Variables		Adjusted OR*	CI** 95%	*P*- Value
Weekly Consumption Vegetables				
	< 3 times	1	Reference	-
	> 3 times	0.48	0.31 – 0.75	<0.01
General Obesity				
	Underweight	1	References	-
	Normal	1.98	0.74 - 5.35	0.17
	Overweight	1.24	0.76 -1.99	0.37
	Obese	1.84	1.11 - 3.03	<0.05
Hypertension				
	No	1	References	-
	Yes	1.99	1.33 – 2.97	<0.05
Total Cholestrol (mg)				
	< 190	1	References	-
	> 190	1.64	1.07 – 2.51	<0.05
Triglyceride (mg)				
	<150	1	References	-
	>150	1.91	1.16 - 3.16	<0.05

*odd's ratio
** Confidence interval

In addition, the incidence of hypertension significantly is associated with diabetes, which is supported by other studies (27-28).
High BMI was also another independent risk factor for diabetes in the study, which is supported by many other studies (29-30). Also there is a strong association between diabetes, hypertension and BMI; this result is in consistent with another study done in Saudi Arabia (31).
Another study in Pakistan showed that obesity was a relative risk for diabetes (28,31). Also high levels of cholesterol and triglyceride in plasma were considered as significant risk factor for diabetes (32). Reducing of blood lipids will have a positive impact on lowering diabetes. In addition, the risk factors like hypertension, hyperlipidemia, and diabetes are prevalent in elderly patients (33).
In our study, the socio-economic, education, income and job status did not show significant impact on prevalence of DM, which likely to be explained by similarity of variables in both genders. Another reason could be that people are reluctant to disclose their real monthly income.
The limitations of our study are inadequate financial recourses for covering area. The second one was Poor security that prevents access to samples in target city.
Given all above, the results of this study have the potential to prevent of diabetes which is a major public health concern in Afghanistan.

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