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Uncontrolled type 2 diabetes mellitus in Kandahar, Afghanistan: a cross-sectional analytical study

ABSTRACT

Background. Type 2 diabetes mellitus (T2DM) is one of the leading causes of mortality and morbidity worldwide. Main objective of this study was to determine the factors affecting uncontrolled T2DM.

Methods. This was a cross-sectional analytical study conducted in Kandahar, Afghanistan during July–December, 2018. Data was collected from 748 T2DM patients aged > 20 years. Data was analyzed with SPSS software using descriptive statistics, Chi square test, and binary logistic regression.

Results. Among 748 T2DM patients, 390/748 (52.1%) were females with 246/258 (95.3%) having low or middle socio-economic status. Family history of DM was present in 402/746 (53.9%) patients with 370/740 (50%) patients having uncontrolled DM. Vanaspati or animal fat was used by 728/748 (97.3%) of the patients, with 194/746 (26%) patients doing regular exercise. Oral hypoglycemic drugs were used by 666/720 (92.5%) of the patients. Comorbidities were present in 612/748 (81.8%) of the patients, with 348/748 (46.5%) having hypertension while 566/746 (75.9%) of the patients were either overweight or obese. Binary logistic regression revealed female gender (Adjusted Odds Ratio [AOR] 2.1, 95% CI 1.3–3.5), job without vigorous activity (AOR 2.2, 95% CI 1.3–3.6), and late diagnosis of DM (AOR 9.2, 95% CI 1.2–73.4) as the risk factors for uncontrolled T2DM.

Conclusion. Uncontrolled DM is prevalent in Kandahar. Proper control of the risk factors for uncontrolled DM will help in decreasing the severity and complications of DM. Diabetic services improvement, especially public awareness programs on media, is highly recommended to improve diabetic care in Kandahar. (Clin Diabetol 2020; 9; 6: 416–425)

Key words: diabetes mellitus, DM, Kandahar, Afghanistan, risk factors, determinants

Introduction

Type 2 diabetes mellitus (T2DM) is one of the leading cause of mortality and increases the risks of cardiovascular disease, blindness, kidney failure, and lower limb amputation [1]. In 2014, according to World Health Organization (WHO), approximately 422 million people worldwide had diabetes mellitus (DM) as compared to 108 million in 1980, particularly in low- and middle-income countries [1]. Approximately 90% of diabetes patients have T2DM, which is mostly related to lifestyle [2]. DM can cause many long-term complications in different parts of the body and can increase the overall risk of premature death [3]. Due to the increasing prevalence of obesity, especially among younger adults, T2DM is now more frequently diagnosed in young adults and adolescents, especially in high-income countries [4, 5]. In 2010, prevalence of DM in Afghanistan among the age group of 20–79 years was estimated to be 8.6%, whereas by 2030 it is estimated to reach 9.9% [6]. Moreover, studies reported that the prevalence of DM was 9.9% in Herat [7]

11.8% in Jalalabad [8], 13.2% in Kabul [9], and 22.4% in Kandahar [10]. Main objective of this study was to determine the factors affecting uncontrolled T2DM, as well as the sociodemographic, behavior, physical activity, and nutrition status of patients with T2DM in Kandahar, Afghanistan.

Methods

This was a cross-sectional analytical study. Data was collected during 6-month-period (July–December, 2018) using researcher-made questionnaire with questions regarding general characteristics, socio-economic status, physical activity, and nutrition of the diabetic patients.

The study population was composed of patients with T2DM with age > 20 years who visited public and private health facilities in Kandahar, Afghanistan. All the patients were living in urban area (Kandahar city).

Research question: What are the factors affecting uncontrolled T2DM in Kandahar city, Afghanistan?

Primary objective was to determine the factors affecting uncontrolled T2DM in Kandahar city, Afghanistan.

Secondary objective was to determine the sociodemographic, behavior, physical activity, and nutrition status of patients with T2DM in Kandahar city.

Inclusion criteria:
— patient with laboratory confirmed T2DM;
— both male and female patients with age > 20 years;
— permanent residents of Kandahar city.

Exclusion criteria:
— type 1 DM;
— patients who refused to consent for interview.

Sample size was calculated using the following formula:

Where n is the sample size, p is the prevalence of outcome expressed as a proportion, E is the margin of error which is 0.05 in this case, 1.96 is the standard normal z-value corresponding to the 95% confidence interval.

The sample size and power calculations have been performed in Stata 15 (College Station, Texas, USA). Our sample size was 748 patients.

Written informed consents were taken from all the participants prior to the study. Information of the participants will not be disclosed. Ethical approval was taken from Kandahar University Ethics Committee with code number of KDRU-EC-2019.329.

Data was analyzed with SPSS version 22 (Chicago, IL, USA). Descriptive statistics, such as percentages and proportions, were used to describe the sociodemographic and other variables of the study participants. Chi square test (using crude odd ratio [COR]) was used to study the association of different factors in uncontrolled diabetic patients. All variables that showed statistically significant association were put in binary logistic regression (using adjusted odd ratio [AOR]) to determine the factors affecting uncontrolled T2DM. P value of < 0.05 was considered statistically significant.

Definitions

Diabetes: A patient with fasting blood glucose of ≥ 126 mg/dL.

Fasting: Not having anything to eat or drink (except water) for at least 8 hours before the test.

Late diagnosis of T2DM: A diabetes patient with at least one diabetes related comorbidities or complications within 6 months before diagnosis.

Uncontrolled diabetes: Fasting blood glucose level of ≥ 126 mg/dL and random blood glucose of ≥ 200 mg/dL on previous three continuous occasions of the patient's visit to hospital.

Results

This was a cross-sectional study with data collected from 748 T2DM patients who visited the public and private health facilities of Kandahar city during a period of 6 months. Mean (SD) age of all patients, males, and females were 57.3 (12.6) years, 58.0 (13.3) years, and 56.6 (11.8) years, respectively (Table 1). Approximately half (360/736 [48.9%]) of the patients were in the age group of 40–59 years. Females (390/748 [52.1%]) were more than males (358/748 [47.9%]), with almost all (386/390 [99.0%]) of the female patients being housewives. Socio-economic status of most (246/258 [95.3%]) of the patients was low or middle income. More than half (402/746 [53.9%]) of the patients had a family history of DM (Table 2).

Uncontrolled DM was observed in 370/740 (50%) of the patients. Overall, 94/746 (12.6%) of the patients were smoking, with 74/358 (20.7%) males and 20/388 (5.2%) females. Mouth sniff (locally called Naswar) was being used by 266/746 (35.7%) of the patients, with 184/356 (51.7%) in males. Fruits and vegetables were used daily by 62/620 (10%) and 96/674 (14.2%) of the patients. Nearly all (728/748 [97.3%]) of the patients were using Vanaspati or animal fat, with 194/746 (26%) of the patients doing regular exercise. For treatment, 666/720 (92.5%) of the patients were treated with oral hypoglycemic drugs, 34/720 (4.7%) with insulin, while 20 (2.8%) of the patients did not use any drugs for treatment. Comorbidities were present in 612/748 (81.8%) of the patients. Hypertension was present in 348/748 (46.5%) of the patient, while 566/746 (75.9%) of the patients were either overweight or obese (Table 3).

Table 1. Characteristics of the continuous variables

Variable	Total			Males			Females		
	n	Mean ± SD	Range	n	Mean ± SD	Range	n	Mean ± SD	Range
Age	736	57.3 ± 12.6	20–103	358	58.0 ± 13.3	28 – 103	378	56.6 ± 11.8	20–85
Number of family members	736	16.1 ± 6.9	2–40	358	17.4 ± 7.3	3 – 40	378	14.8 ± 6.3	2–35
Number of years smoking in the past	182	13.4 ± 10.3	1–45	118	15.5 ± 9.8	1–45	64	9.6 ± 10.2	1–40
Packs of cigarettes smoked per week	80	2.6 ± 1.6	1–7	70	2.5 ± 1.3	1 – 6	10	3.8 ± 2.9	1–7
Number of days eating fruit in a week	620	3.6 ± 1.7	0–7	306	4.0 ± 1.6	0–7	314	3.3 ± 1.8	0–7
Number of days eating vegetables in a week	674	4.1 ± 1.6	0–7	330	3.9 ± 1.4	2–7	344	4.2 ± 1.7	0–7
Number of days doing exercise in a week	190	6.0 ± 1.1	3–7	150	5.8 ± 1.0	3–7	40	6.9 ± 0.2	6–7
Blood sugar [mg/dL]	744	227.8 ± 81.2	71–580	356	214.5 ± 70.6	71–461	388	240.0 ± 88.2	72–580
Systolic BP [mm Hg]	748	135.9 ± 24.4	70–190	358	136.9 ± 24.4	70–190	390	135.1 ± 24.5	80–190
Diastolic BP [mm Hg]	748	83.8 ± 12.2	35–120	358	84.2 ± 12.3	35–120	390	83.3 ± 12.2	55–110
Pulse rate (/minute)	748	86.1 ± 12.3	23–131	358	84.6 ± 12.1	23–112	390	87.5 ± 12.2	61–131
Weight [kg]	748	73.2 ± 13.2	48–130	358	75.2 ± 11.7	52 – 107	390	71.5 ± 14.3	48–130
Height [cm]	746	164.9 ± 8.5	105–191	358	168.7 ± 6.8	150–191	388	161.5 ± 8.4	105–181
Waist circumference	726	85.9 ± 17.5	55–168	354	82.8 ± 11.7	59–120	372	88.9 ± 21.2	55–168
BMI	746	27.1 ± 5.6	18–57	358	26.6 ± 4.7	18–39	388	27.6 ± 6.3	18–57
For how long are you taking anti- diabetic medication (years)?	668	6.9 ± 5.0	0–25	312	6.9 ± 4.8	0–25	356	7.0 ± 5.3	0–25

BMI — body mass index; mm Hg — millimeter of mercury; SD — standard deviation

Table 2. Socio-demographic characteristics

Variable	Total, n (%)	Males, n (%)	Females, n (%)
Age (years)			
20–39	58 (7.9)	32 (8.9)	26 (6.9)
40–59	360 (48.9)	178 (49.7)	182 (48.1)
60–79	284 (38.6)	122 (34.1)	162 (42.9)
>80	34 (4.6)	26 (7.3)	8 (2.1)
Total	736 (100)	358 (100)	378 (100)
Gender			
Male	358 (47.9)	358 (100)	0 (0)
Female	390 (52.1)	0 (0)	390 (100)
Total	748 (100)	358 (100)	390 (100)
Literacy			
Literate	362 (48.4)	280 (78.2)	82 (21.0)
Illiterate	386 (51.6)	78 (21.8)	308 (78.0)
Total	748 (100)	358 (100)	390 (100)
Marital status			
Currently married	486 (65.0)	278 (77.6)	208 (53.3)
Widowed	242 (32.4)	70 (19.6)	172 (44.1)
Never married	16 (2.1)	10 (2.8)	6 (1.6)
Divorced	4 (0.5)	0 (0)	4 (1.0)
Total	748 (100)	358 (100)	390 (100)
Occupation			
Government employee	16 (2.1)	16 (4.5)	0 (0.0)
Non-government employee	62 (8.3)	60 (16.8)	2 (0.5)
Self-employed	160 (21.4)	158 (44.1)	2 (0.5)
Unemployed/Housewife	510 (68.2)	124 (34.6)	386 (99.0)
Total	748 (100)	358 (100)	390 (100)
Number of family members			
< 5	28 (3.8)	12 (3.3)	16 (4.2)
5–9	110 (14.9)	48 (13.4)	62 (16.4)
10–19	408 (55.4)	176 (49.2)	232 (61.4)
20–30	160 (21.7)	102 (28.5)	58 (15.3)
> 30	30 (4.1)	20 (5.6)	10 (2.7)
Total	637 (100)	358 (100)	378 (100)
Socio-economic status			
Low income	148 (57.4)	144 (62.1)	4 (15.4)
Middle income	98 (37.9)	76 (32.7)	22 (84.6)
High income	12 (4.7)	12 (5.2)	0 (0.0)
Total	258 (100)	232 (100)	26 (100)
Family history of DM			
Yes	402 (53.9)	172 (48.3)	230 (59.0)
No	344 (46.1)	184 (51.7)	160 (41.0)
Total	746 (100)	356 (100)	390 (100)
Relative with history of DM			
Brother	124 (30.8)	62 (35.6)	62 (27.2)
Mother	108 (26.9)	34 (19.5)	74 (32.5)
Father	80 (19.9)	54 (31.0)	26 (11.4)
Sister	60 (14.9)	12 (6.9)	48 (21.0)
Son	14 (3.5)	8 (4.6)	6 (2.6)
Others*	16 (4.0)	4 (2.4)	12 (5.3)
Total	402 (100)	174 (100)	228 (100)

*Other relatives: uncle, cousin, daughter, grandfather

Table 3. Behavioral characteristics, DM-related characteristics, and physical measurements

Variable	Total, n (%)	Males, n (%)	Females, n (%)
Current smoker			
Yes	94 (12.6)	74 (20.7)	20 (5.2)
No	652 (87.4)	284 (79.3)	368 (94.8)
Total	746 (100)	358 (100)	388 (100)
Has the doctor advised to stop smoking during last 12 months?			
Yes	84 (91.3)	70 (97.2)	14 (70)
No	8 (8.7)	2 (2.8)	6 (30)
Total	92 (100)	72 (100)	20 (100)
Currently using mouth sniff			
Yes	266 (35.7)	184 (51.7)	82 (21.0)
No	480 (64.3)	172 (48.3)	308 (78.0)
Total	746 (100)	356 (100)	390 (100)
Ex-smoker			
Yes	192 (25.7)	126 (35.4)	66 (16.9)
No	554 (74.3)	230 (64.6)	324 (83.1)
Total	746 (100)	356 (100)	390 (100)
Eating fruit			
Every day in a week	62 (10.0)	26 (8.5)	36 (11.5)
3–6 days in a week	436 (70.3)	234 (76.5)	202 (64.3)
< 3 days in a week	122 (19.7)	46 (15.0)	76 (24.2)
Total	620 (100)	306 (100)	314 (100)
Eating vegetables			
Every day	96 (14.2)	32 (9.7)	64 (18.6)
3–6 days in a week	508 (75.4)	280 (84.8)	228 (66.3)
< 3 days in a week	70 (10.4)	18 (5.5)	52 (15.1)
Total	674 (100)	330 (100)	344 (100)
Type of oil used for cooking			
Vanaspati/animal fat	728 (97.3)	342 (95.5)	386 (99.0)
Vegetable oil	20 (2.7)	16 (4.5)	4 (1.0)
Total	748 (100)	358 (100)	390 (100)
Job with vigorous activity			
Yes	270 (36.1)	192 (53.6)	78 (20.0)
No	478 (63.9)	166 (46.4)	312 (80.0)
Total	748 (100)	358 (100)	390 (100)
Exercise regularly			
Yes	194 (26.0)	156 (43.8)	38 (9.7)
No	552 (74.0)	200 (56.2)	352 (90.3)
Total	746 (100)	356 (100)	390 (100)
Type of exercise			
Walking	178 (23.9)	138 (38.8)	38 (9.7)
Running	10 (1.3)	12 (3.4)	0 (0.0)
Body building	6 (0.8)	6 (1.7)	0 (0.0)
No exercise	552 (74.0)	200 (56.2)	352 (90.3)
Total	746 (100)	356 (100)	390 (100)
Late diagnosis of DM			
Yes	732 (98.1)	346 (97.2)	386 (99.0)
No	14 (1.9)	10 (2.8)	4 (1.0)
Total	746 (100)	356 (100)	390 (100)
Taking antidiabetic medicine			
Yes	700 (95.6)	332 (99.0)	368 (95.3)
No	32 (4.4)	14 (4.0)	18 (4.7)
Total	732 (100)	346 (100)	386 (100)

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Table 3 (cont.). Behavioral characteristics, DM-related characteristics, and physical measurements

Variable	Total, n (%)	Males, n (%)	Females, n (%)
Yes	700 (95.6)	332 (99.0)	368 (95.3)
No	32 (4.4)	14 (4.0)	18 (4.7)
Total	732 (100)	346 (100)	386 (100)
Type of DM medication			
Oral hypoglycemic	666 (92.5)	314 (92.4)	352 (92.6)
Insulin	34 (4.7)	18 (5.3)	16 (4.2)
Non	20 (2.8)	8 (2.3)	12 (3.2)
Total	720 (100)	340 (100)	380 (100)
DM now under control			
Yes	370 (50)	208 (59.1)	162 (41.8)
No	370 (50)	144 (40.9)	226 (58.2)
Total	740 (100)	352 (100)	388 (100)
Co-morbidities present			
Yes	612 (81.8)	272 (76.0)	340 (87.2)
No	136 (18.2)	86 (24.0)	50 (12.8)
Total	748 (100)	358 (100)	390 (100)
Co-morbid diseases			
HTN	329 (53.8)	109 (40.0)	220 (64.7)
MI	68 (11.1)	10 (3.6)	58 (17.1)
COPD	60 (9.8)	49 (18.2)	11 (3.2)
Anxiety	47 (7.7)	35 (12.9)	12 (3.5)
IHD	47 (7.7)	30 (11.0)	17 (5.0)
Others*	61 (9.9)	39 (14.3)	22 (6.5)
Total	612 (100)	272 (100)	340 (100)
Blood pressure			
Normal	400 (53.5)	198 (55.3)	202 (51.8)
Stage 1 (mild) hypertension	154 (20.6)	70 (19.6)	84 (21.5)
Stage 2 (moderate) hypertension	144 (19.2)	58 (16.2)	86 (22.1)
Stage 3 (severe) hypertension	50 (6.7)	32 (8.9)	18 (4.6)
Total	748 (100)	358 (100)	390 (100)
BMI			
Normal	180 (24.1)	94 (26.2)	86 (22.2)
Overweight	160 (21.4)	74 (20.7)	86 (22.2)
Obese	406 (54.5)	190 (53.1)	216 (55.6)
Total	746 (100)	358 (100)	388 (100)

DM — diabetes mellitus; COPD — chronic obstructive pulmonary disease; HTN — hypertension; IHD — ischemic heart disease; MI — myocardial infarction
*Other comorbid diseases: stroke, chronic kidney injury, dyslipidemia

Chi-square test of the variables was done to determine the factors associated with uncontrolled T2DM. Statistically significant factors associated with uncontrolled T2DM were age ≥ 60 years (COR 1.6, 95% CI 1.2–2.1; P = 0.002), female gender (COR 2.0, 95% CI 1.5–2.7; P < 0.001), unemployed/housewife (COR 2.0, 95% CI 1.4–2.7; P < 0.001), eating fruit < 3 days in a week (COR 1.7, 95% CI 1.2–2.6; P = 0.006), job without vigorous activity (COR 2.7, 95% CI 2.0–3.7; P < 0.001), not doing regular exercise (COR 1.7, 95% CI 1.2–2.4; P = 0.001), late diagnosis of DM (COR 9.2, 95% CI 1.2–73.4; P = 0.011), not taking antidiabetic drugs (COR 2.3, 95% CI 1.1–5.0; P = 0.025), taking insulin (COR 2.0, 95% CI 1.0–4.1; P = 0.049), and DM that has affected routine of the patient (COR 1.6, 95% CI 1.1–2.3; P = 0.016) (Table 4).

Binary logistic regression of the above-mentioned statistically significant variables revealed female gender (AOR 2.1, 95% CI 1.3–3.5; P = 0.004), job without vigorous activity (AOR 2.2, 95% CI 1.3–3.6; P = 0.003), and late diagnosis of DM (AOR 9.2, 95% CI 1.2–73.4; P = 0.035) as the risk factors for uncontrolled T2DM (Table 5).

Table 4. Chi-square test of the factors affecting uncontrolled T2DM

Variable	Total, n (%)	Controlled T2DM, n (%)	Uncontrolled T2DM, n (%)	COR	95% CI	P value
Age (years)						
< 60	418 (55.9)	224 (62.2)	188 (51.1)			
≥ 60	318 (42.5)	136 (37.8)	180 (48.9)	1.6	1.2–2.1	0.002
Total	736 (100)	360 (100)	368 (100)			
Gender						
Male	358 (47.9)	208 (56.2)	144 (38.9)			
Female	390 (52.1)	162 (43.8)	226 (61.1)	2.0	1.5–2.7	< 0.001
Total	748 (100)	370 (100)	370 (100)			
Literacy						
Literate	362 (48.4)	170 (45.9)	212 (57.3)			
Illiterate	386 (51.6)	200 (54.1)	158 (42.7)	0.6	0.5–0.8	0.002
Total	748 (100)	370 (100)	370 (100)			
Marital status						
Single	262 (35.0)	112 (30.3)	150 (40.5)			
Married	486 (65.0)	258 (69.7)	220 (59.5)	0.6	0.5–0.9	0.003
Total	748 (100)	370 (100)	370 (100)			
Occupation						
Employed	238 (31.8)	144 (38.9)	90 (24.3)			
Unemployed/Housewife	510 (68.2)	226 (61.1)	280 (75.7)	2.0	1.4–2.7	< 0.001
Total	748 (100)	370 (100)	370 (100)			
Number of family members						
< 5	28 (3.8)	8 (2.2)	20 (5.6)			
≥ 5	708 (96.2)	360 (97.8)	340 (94.4)	0.4	0.2–0.9	0.018
Total	637 (100)	368 (100)	360 (100)			
Socio-economic status						
Low/Middle income	246 (95.3)	154 (96.3)	90 (93.8)			
High income	12 (4.7)	6 (3.7)	6 (6.2)	1.7	0.5–5.5	0.360
Total	258 (100)	160 (100)	96 (100)			
Family history of DM						
Yes	402 (53.9)	178 (48.1)	222 (60.0)			
No	344 (46.1)	192 (51.9)	148 (40.0)	0.6	0.5–0.8	0.001
Total	746 (100)	370 (100)	370 (100)			
Current smoker						
Yes	94 (12.6)	44 (12.0)	48 (13.0)			
No	652 (87.4)	324 (88.0)	322 (87.0)	0.9	0.6–1.4	0.676
Total	746 (100)	368 (100)	370 (100)			
Has the doctor advised to stop smoking during last 12 months?						
Yes	84 (91.3)	40 (90.9)	44 (91.7)			
No	8 (8.7)	4 (9.1)	4 (8.3)	0.9	0.2–3.9	0.898
Total	92 (100)	44 (100)	48 (100)			
Currently using mouth sniff						
Yes	266 (35.7)	128 (34.8)	138 (37.3)			
No	480 (64.3)	240 (65.2)	232 (62.7)	0.9	0.7–1.2	0.477
Total	746 (100)	368 (100)	370 (100)			
Eating fruit						
3–7 days in a week	498 (80.3)	270 (84.4)	222 (75.5)			
< 3 days in a week	122 (19.7)	50 (15.6)	72 (24.5)	1.7	1.2–2.6	0.006
Total	620 (100)	320 (100)	294 (100)			
Eating vegetables						
3–7 days in a week	604 (89.6)	314 (89.7)	284 (89.9)			
< 3 days in a week	70 (10.4)	36 (10.3)	32 (10.1)	1.0	0.6–1.6	0.946
Total	674 (100)	350 (100)	316 (100)			

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Table 4 (cont.). Chi-square test of the factors affecting uncontrolled T2DM

Variable	Total, n (%)	Controlled T2DM, n (%)	Uncontrolled T2DM, n (%)	COR	95% CI	P value
Type of oil used for cooking						
Vanaspati/animal fat	728 (97.3)	364 (98.4)	356 (96.2)			
Vegetable oil	20 (2.7)	6 (1.6)	14 (3.8)	2.4	0.9–6.3	0.070
Total	748 (100)	370 (100)	370 (100)			
Job with vigorous activity						
Yes	270 (36.1)	174 (47.0)	92 (24.9)			
No	478 (63.9)	196 (53.0)	278 (75.1)	2.7	2.0–3.7	< 0.001
Total	748 (100)	370 (100)	370 (100)			
Exercise regularly						
Yes	194 (26.0)	114 (31.0)	76 (20.5)			
No	552 (74.0)	254 (69.0)	294 (79.5)	1.7	1.2–2.4	0.001
Total	746 (100)	368 (100)	370 (100)			
Late diagnosis of DM						
Yes	732 (98.1)	369 (99.7)	361 (97.6)			
No	14 (1.9)	1 (0.3)	9 (2.4)	9.2	1.2–73.4	0.011
Total	746 (100)	370 (100)	370 (100)			
Taking antidiabetic medicine						
Yes	700 (95.6)	360 (97.3)	338(93.9)			
No	32 (4.4)	10 (2.7)	22 (6.1)	2.3	1.1–5.0	0.025
Total	732 (100)	370 (100)	360 (100)			
Type of antidiabetic medicine						
Oral antidiabetic	666 (95.1)	348 (96.7)	316 (93.5)			
Insulin	34 (4.9)	12 (3.3)	22 (6.5)	2.0	1.0–4.1	0.051
Total	700 (100)	360 (100)	338 (100)			
Co-morbidities present						
Yes	612 (81.8)	304 (82.2)	300 (81.1)			
No	136 (18.2)	66 (17.8)	70 (18.9)	1.1	0.7–1.6	0.704
Total	748 (100)	370 (100)	370 (100)			
Blood pressure						
Normal	400 (53.5)	198 (53.5)	196 (53.0)			
Hypertension	348 (46.5)	172 (46.5)	174 (47.0)	1.0	0.8–1.4	0.883
Total	748 (100)	370 (100)	370 (100)			
BMI						
Normal	180 (24.1)	80 (21.6)	98 (26.6)			
Overweight/Obese	566 (75.9)	290 (78.4)	270 (73.4)	0.8	0.5–1.1	0.112
Total	746 (100)	370 (100)	368 (100)			

BMI — body mass index; DM — diabetes mellitus; T2DM — type 2 diabetes mellitus

Discussion

In this cross-sectional study, we studied 748 T2DM patients to determine the factors in uncontrolled T2DM in Kandahar, Afghanistan. Although DM is prevalent in Afghanistan, until now very few studies have been conducted on this devastating disease [7–9]. To our knowledge, there has never been any study in Afghanistan to find out the factors affecting uncontrolled DM.

In our study, DM was uncontrolled in half (50%) of the patients. This higher prevalence of uncontrolled DM is of great concern, and is also broadly in line with studies from Ethiopia (50%) [11] and Pakistan (38.9%) [12]. Contrary, even higher prevalence of uncontrolled DM have been reported from Ghana (86.4%) [3] and Saudi Arabia (74%) [13]. This differences in prevalence of DM may be due to the differences in care, attitude, and practices among DM patients; different methods of health education, treatment, and counselling or variances in geographical regions [3].

Table 5. Binary logistic regression for estimating the factors affecting uncontrolled T2DM

Variable	AOR	95%CI	P value
Job with vigorous activity	2.2	1.3–3.6	0.003
Gender	2.1	1.3–3.5	0.004
Late diagnosis of DM	9.2	1.2–73.4	0.035
Taking antidiabetic medicine	0.1	0.0–1.1	0.055
Type of antidiabetic medicine	2.2	0.9–5.0	0.067
Age	1.4	0.9–2.2	0.106
Eating fruit	1.4	0.9–2.2	0.173
Occupation	0.7	0.3–1.4	0.279
Exercise regularly	0.9	0.5–1.5	0.683

DM — diabetes mellitus; T2DM — type 2 diabetes mellitus

In our study, uncontrolled DM was more prevalent (61.1%) among females. Similar results have been reported from Jordan (51.9%) [14], Ghana (76.8%) [3] and Pakistan (77.3%) [12].

Sedentary lifestyle and lack of regular exercise increases the risk of T2DM. In our study only 26% of the patients were doing regular exercise. Similarly, studies Saudi Arabia [15], Jordan [14], and USA [16] have also revealed that physical inactivity is the predictor of poor glycemic control. Physical exercise not only improves glycemic control, but also boosts patient's insulin sensitivity and repairs some of the damage due by DM associated complications, for instance impaired cardiovascular health [17].

Comorbidities were present in majority (81.8%) of our patients. Similarly, most of the patients had comorbidities in Ghana (86,4%) [3], Jordan (65.1%) [14], and Saudi Arabia (65.0%) [18]. In our study, main factors associated with uncontrolled T2DM were female gender, job without vigorous activity, and late diagnosis of DM. A study in Jordan revealed that statistically significant factors associated with uncontrolled DM were increased duration of DM, not following dietitians-recommended eating plan, negative attitude towards DM, and increased barriers to adherence scale scores [14]. A study conducted in Pakistan showed that patients aged < 50 years, being diagnosed in a hospital rather than a clinic, diabetes information from a doctor or nurse only rather than multiple sources, higher monthly treatment cost, and higher consumption of tea as the main factors for uncontrolled DM. On the other hand, a study in Saudi Arabia concluded that a family history of DM, having longer diabetic durations, not doing sufficient physical exercise, and being overweight were the statistically significant risk factors [18]. These findings emphasize on the importance of patients at risk of developing complication due to DM and implementation of more effective preventive measure [19, 20].

Main limitations of our study were cross-sectional nature of the study (all risk factors of uncontrolled T2DM could not be studied, especially HbA_{1c}), patients were mostly from urban area (we cannot generalize the results to the entire population), and inability to follow up the patients longitudinally.

Conclusion

Diabetes mellitus is prevalent in Kandahar, affecting females more than males. Half of the T2DM patients had uncontrolled DM. Main risk factors for uncontrolled DM were female gender, job without vigorous activity, and late diagnosis of DM. Proper control of these risk factors will help in decreasing the severity and complications of DM. Diabetic services improvement, especially public awareness programs on media, is highly recommended to improve diabetic care in Kandahar. Future studies (especially prospective studies) are needed in Kandahar to find out the different aspects of DM prevalence, clinical features, complications, diagnosis, management, and prognosis.

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Conflict of interests

The authors report no conflicts of interest in this study.

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