

## Research Article

# Prevalence of Cardiovascular Disease Risk Factors among Qatari Patients with Type 2 Diabetes Mellitus, Attending Primary Health Care Centres, 2014

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### Abstract

**Background:** Patients with Type 2 diabetes mellitus experience a substantial risk of cardiovascular disease owing to modifiable risk factors.

**Objective:** To estimate the prevalence of cardiovascular disease risk factors among Qatari patients with Type 2 diabetes mellitus attending primary health care centres 2014.

**Method:** Cross sectional design was used. Total of 532 Qatari diabetic patients attending primary healthcare were enrolled. Data was collected using interview administered questionnaire, anthropometric & blood pressure measurement and medical records. Cardiovascular risk was assessed by using General Framingham Risk Prediction Score (GFRP).

**Results:** GFRP score categorized (12.2%) of participants as low risk and (57.6%) as in high and very high risk for cardiovascular disease in 10-years. Lifestyle-related risk factors were dominant among participants. The majority of patients did not consume recommended daily fruit and vegetables (94.2%) and (91.2%) respectively. Additionally, they did not practice recommended frequency of physical activity and were currently smoking in (71.4%) and (4.1%) respectively. Metabolic factors were second common risk factors. The combined overweight and obesity were leading metabolic factors as calculated in (94%) of them. More than two thirds showed uncontrolled diabetes status and (27.6%) were within undesirable range for HDL. The third common cardiovascular disease risk factors were medical and family history. Three quarters of them found to have hyperlipidaemia and (72.7%) were with history of hypertension. The family history of premature cardiovascular disease occurrence in father and/or brother was reported in (16.9% and 13%) of participants respectively.

**Conclusion:** Reduction of cardiovascular disease burden necessitate further focus on preventive interventions especially the lifestyle related risk factors.

**Keywords:** Cardiovascular disease; Lifestyle-related risk factors; Metabolic factors; Prevalence; Qatar; Type 2 diabetes mellitus

**Abbreviations:** BMI: Body Mass Index; CVD: Cardiovascular Disease; GFRP: General Framingham Risk Prediction; HbA1C: Glycated Hemoglobin A1; HDL: High Density Lipoproteins; IRB: Institutional Research Board; LDL: Low Density Lipoproteins;

NCD: Non-Communicable Disease; PHC: Primary Health Care; PHCC: Primary Health Care Corporation; SD: Standard Deviation; SPSS®: Statistical Package of Social Science; Type 2 DM: Type 2 Diabetes Mellitus; WHO: World Health Organization

### Introduction

Patients with Type 2 Diabetes Mellitus (DM) are always at advanced risk of Cardiovascular Disease (CVD), where coronary

heart disease is the leading mortality cause among them owing to the fast growth of multiple modifiable and metabolic cardiac risk factors worldwide [1]. Both CVD and Type 2 DM are significant causes of premature death as well as long-term disability. They contribute substantially to the escalating costs of health care globally, overwhelming health budgets everywhere.

The cardiovascular disease, mainly coronary heart disease and stroke, is the number one cause of mortality worldwide. The WHO reported 17.3 million deaths in 2008 due to CVD. This represented 30% of all global mortality. It is expected to increase up to 23.3 million deaths by the year 2030 and to remain the single leading cause of death globally unless effective preventive interventions are implemented [2].

The State of Qatar has undergone significant social and economic changes over the last two decades, resulting in rapid urbanization with a consequent increase in the burden of Non-Communicable Disease (NCD). Although the total mortality rate related to CVD was reduced by almost 46.5% from 36.7 in (2003) to 17.1 deaths in (2010) per 100,000 populations, nevertheless CVD still the leading mortality cause in Qatar as also confirmed by many references [3-5].

According to the National STEPwise survey of chronic disease risk factors conducted in 2012, about (66%) of Qatari adult populations live with three or more modifiable risk factors related to CVD. Besides, the prevalence of type 2 DM is about (17%), which is one of the highest prevalence globally [6].

The multiplicative interactions between different risk factors of CVD in type 2 diabetic patients were well-described [7]. Comprehensive understanding of these modifiable risk factors is crucial to direct integrated efforts, plans, and services toward earlier prevention at the level of primary health care. Such early identification of these risk factors will successively reduce the CVD burden in the long term. However, the knowledge about the common NCD well documented in Qatar, but little is knowledge about the CVD risk factors prevalence among patients with type 2 DM.

## **Aim and Objective**

Recognition of common risk factors of CVD among Qatari patients with Type 2 DM at the Primary Health Care (PHC) level, eventually helps in the development of evidence-based recommendations that assist health care workers in all care level in early identification of such risk factors and deciding for primary prevention of CVD. The efficient management of these risk factors subsequently will reduce the total burden of CVD and contributing to improving the quality of life to Qatari patients with type 2 DM in the long term. The study objective was to estimate the prevalence of risk factors related to CVD among Qatari patients with Type 2 diabetes attending PHC centres during 2014.

## **Method**

### **Study Settings and Design**

The study was conducted as a cross sectional study and patients were recruited from NCD clinics as well as general walk-in clinics at PHC centres during 2014. There were 21 PHC centres under Primary Health Care Corporation (PHCC) which is a governmental leading primary care provider cross all the country. Where, each health centre has its own well identified geographic and population catchment area.

### **Study Population**

Qatari type 2 DM patients attended the selected PHC centres during July to November 2014 and meeting the eligibility criteria. Inclusion criteria were; male & female Qatari patients with type 2 DM. Exclusion criteria were; patients refused to participate.

### **Sample Size and Sampling Technique**

Sample size was calculated by:  $n = Z^2 \times P(1-P) / e^2$  [8]. Where,  $n$ =required sample size,  $Z$ =the probability value associated with confidence level which equals to 1.96,  $P$ =the prevalence of CVD among patients with type 2 DM, which is 0.26 based on a study carried out in Oman in (2010) at PHC level [9],  $e$ =desired margin of error was set to be 0.05, The significance level was set at  $<0.05$  and confidence level of 95%. Calculation came out to be 532 patients after inflated by 20% for compensation of non-response and design effect of 1.5, the study period continued till the calculated sample was completed.

Simple cluster technique with proportionate allocation of the calculated sample size was used. Simple random sampling was conducted to select six health centres out of the 21. A cluster sampling technique was done in which PHC centres have been considered as clusters or primary sampling units. Within each selected health centre, all eligible patients were included in the study. The estimated sample size was distributed proportionately among the six randomly selected health centres according to the size of registered patients with type 2 DM within each of these centres.

### **Research Instruments**

The following instruments used in the study; 1. Arabic version interview administered questionnaire, 2. Blood Pressure (BP) measurements, 3. Body Mass Index (BMI) measurement & calculation. 4. Data extraction sheet to record metabolic variables of interest from the electronic medical records of each eligible patient. 5. The General Framingham Risk Profile (GFRP) score for primary care was used to assess 10-years total CVD risk.

The Arabic version interview administered questionnaire developed by principle investigator and involving three sections; 1. Socio-demographic characteristics of; age, gender, education

level, marital status and occupation. 2. Personal medical history of; duration of diabetes, presence of hypertension and history of taking antihypertensive medications. 3. Life-style assessment on; dietary history about fruits and vegetable consumption, consuming snacks, outside prepared meals, soft drinks consumption, fatty food intake, physical activity about both activity at work & physical activity at leisure time during a regular week and tobacco use.

Validity of the questionnaire was ensured through both content and face validity. Where, questions were developed by through literature review and consultation of experts in fields of preventive medicine, epidemiology, diabetology and cardiovascular disease.

Besides the questionnaire, data extraction sheet used to record B.P, BMI, recent HbA1C %, serum High Density Lipoprotein (HDL) and Low-Density Lipoprotein (LDL) levels for each patient from the electronic medical records.

Cardiovascular risk was calculated by using the electronic GFRP score, which is an Excel® sheet-based calculator. The researcher entered the following risk factors for all eligible patients; sex, age in years, systolic blood pressure in (mmHg), either on antihypertensive or not, smoking or non-smoking, and BMI. The calculator gave the probability as a percentage automatically and patients categorized into four categories based on the management recommendations:

- Low risk (<10%): patients in this category were at low risk, and low risk does not mean “no” risk.
- Moderate risk (10% to <20%): patients in this category were at moderate risk of fatal or nonfatal cardiovascular events.
- High risk (20% to <30%): patients in this category were at high risk of fatal or nonfatal cardiovascular events and risked lowering medications recommended.
- Very high risk (≥30%): patients in this category were at a very high risk of fatal or nonfatal cardiovascular events and risked lowering medications recommended.

### Research Approach

After obtaining Institutional Review Board (IRB) approvals. Arabic speaking nurses assigned to assist in data collection. The researcher explained to assigned nurses aim of the study, data collection process and answered their enquiries. Inside the selected health centres; eligible patients were invited to participate voluntarily, after detailed explanation of study’s aim, future benefits and process of data collection. All eligible patients were kindly asked to sign informed consent which was approved by the IRB committee. The researcher and/or assigned nurses interviewed patients prior to their visit to their treating physician in a vital signs assessment room, where also blood pressure and anthropometric measurements were measured. Standardized methods for measurements were used as recommended by PHCC guidelines.

Electronic medical records were accessed to record HbA1C% and lipid profile for every patient. All accomplished questionnaires were reviewed to ensure completeness and consistency.

### Data Management

The researcher entered all collected data from completed questionnaires and extracted spread sheet into an Excel® sheet daily and later all data was exported to a “Statistical Package of Social Science” version 20.0 (SPSS®) software database for analysis [10]. Different questions included in the interview questionnaires were coded and entered on regular basis.

Descriptive statistics: frequency tables, proportions, figures such bar, mean and standard deviation were used as appropriate.

### Results

Five hundred thirty-two Qatari patients with type 2 DM met the eligibility criteria were recruited voluntarily during the study period.

### Background Characteristics of the Study Participants

The most common age group was (50- 59) years with (40.6%), with mean age of (56.06 ± 8.16 Standard Deviation (SD)). Almost two thirds of them were females (66.7%). Elementary school was the most frequent educational level encountered among the patients (34.0%). The vast majority of patients were married (86.5%) and being a housewife was found to be in more than half of total sample (54.0%) as shown in the Table 1.

Variable	Frequency (%)
<b>Age</b>	
40 - 49	128 (24.0)
50 - 59	216 (40.6)
60 - 69	158 (29.7)
≥ 70	30 (5.7)
<b>Gender</b>	
Male	177 (33.3)
Female	355 (66.7)
<b>Educational Level</b>	
Illiterate	169 (31.8)
Elementary School	181 (34.0)
Secondary school	85 (16.0)
University and above	97 (18.2)
<b>Marital Status</b>	

Single	17 (3.2)
Married	460 (86.5)
Divorced or Widowed	55 (10.3)
<b>Occupation</b>	
Housewife	287 (54.0)
Retired	121 (22.7)
Professional / Clerk / Admin	117 (22.0)
Others	7 (1.3)

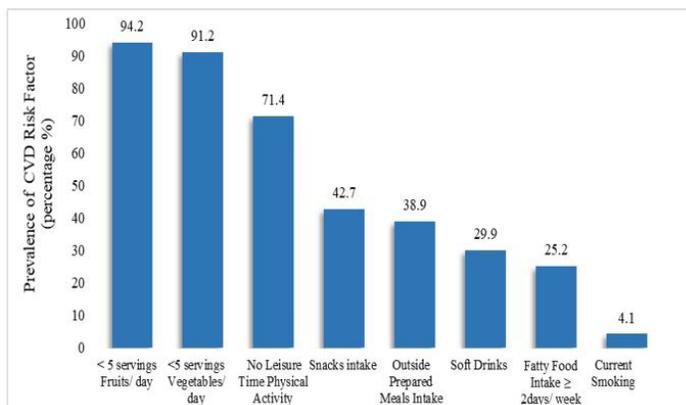
**Table 1:** Distribution of Background Characteristics of Qatari Patients with Type 2 DM, Primary Health Care Centers, 2014. (N = 532).

By using (GFRP) score, the 10-years CVD risk prediction was low (<10%) in (12.2%) of the participants, moderate (10% to <20%) in (30.2%), high (20% to <30%) in about one fourth of them, while (33.5%) were at very high risk.

**Life-Style related Risk Factors**

Lifestyle-related risk factors were dominant among the studied patients. The majority of patients did not consume the recommended daily 5 servings of fruit and vegetable (94.2%) and (91.2%) of patients respectively, as well as, consuming snacks, outside prepared meals, soft drinks and fatty food consumption more than two times per week, in (42.7%), (38.9%), (29.9%) and (25.2%) of patients respectively.

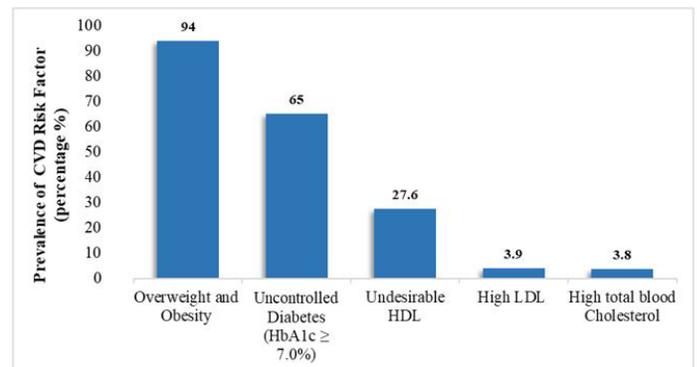
While the mean number of fruits and vegetables servings was (0.8 and 1.4) respectively. Additionally, they did not practice the recommended frequency of physical activity at leisure time (71.4%). Furthermore, current smoking habit was only reported in (4.1%) of the studied patients as illustrated in Figure 1.



**Figure 1:** Prevalence of cardiovascular lifestyle related risk factors among Qatari patients with type 2 DM, Primary Health Care Centers, 2014. (N=532).

**Metabolic Characteristics of the Study Participants**

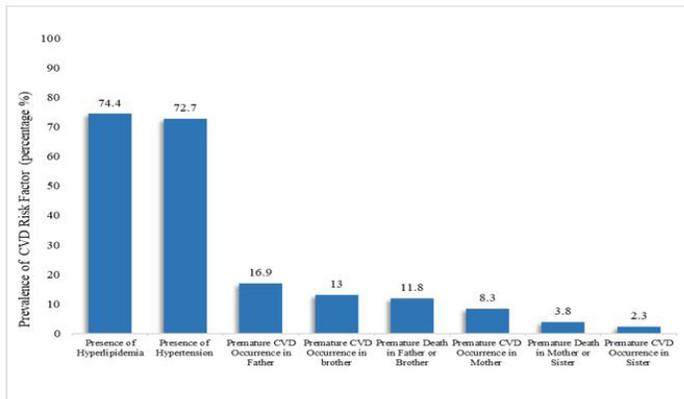
Metabolic risk factors were the second most common CVD risk factors seen among patients of this study. By using World Health Organization (WHO) definition of BMI, only (6%) of patients were found to be within the normal range, one fourth were in the overweight and as high as (69%) of patients were obese [3]. The combined overweight and obesity were the leading metabolic risk factors as it was calculated in (94%) of the studies patients. Type 2 DM glycemic control is determined by HbA1C (%) level which measures it over the past three months. Target was to keep the HbA1C level ≤ 7.0% as per PHC guidelines [11]. More than two thirds (65%) of the participants were uncontrolled (HbA1C level >7.0%). Total serum cholesterol was measured and classified as desirable, borderline and high according to PHCC clinical guidelines. Around (82.0%) of the participants were within the normal range. Moreover, more than a quarter of them (27.6%) were within the undesirable range for HDL, as seen in Figure 2.



**Figure 2:** Prevalence of metabolic risk factors for cardiovascular disease among Qatari patients with type 2 DM, Primary Health Care Centers, 2014. (N=532).

Analysis of the lipid profile showed that (27.6%) of the participants were in undesirable range for HDL, while only (3.9%) had high LDL and (3.8%) with high total serum cholesterol, as seen in Figure 2. Participants were divided into 5 groups based on 5 years duration of type 2 DM occurrence. Almost (29%) of the participants had type 2 DM between 5 years and less than 10 years. Around (98.7%) of them used antihypertensive medications.

The third most common CVD risk factors among the Qatari patients with type 2 diabetes were the medical & family history. Three quarters (74.4%) of the studied patients were found to have hyperlipidaemia in their confirmed history, and (72.7%) are with confirmed history of hypertension. The family history of the premature CVD occurrence in the father and/or the brother was reported in (16.9% and 13%) of the studied diabetic patients respectively. Furthermore, history of premature death in the father and/or the brother due to CVD was found in (11.8%) of the sample, as illustrated in Figure 3.



**Figure 3:** Prevalence of family and medical history related risk factors for cardiovascular disease among Qatari patients with type 2 DM, Primary Health Care Centers, 2014. (N=532).

## Discussion

The leading CVD risk factors were lifestyle-related factors followed by the metabolic as well as the medical and family history related risk factors.

This study showed that (59.6%) of the participated patients used to have a daily fruits intake in a typical week with mean days number of (4.88±2.34 SD), but (94.2%) of them reported the consumption of less than 5-servings of fruits a day, with mean number of servings (1.81±1.14SD) per day. Furthermore; despite that (84.5%) of the patients reported eating vegetables daily with mean of (5.77±1.85SD) days, but (91.2%) of them used to consume less than the recommended 5-servings a day, with mean number of the servings (1.92±1.33SD).

These results were much better than those seen in the STEPwise survey conducted among the Qatari general population during (2012), out of which (16.7%) were type 2 diabetic. It reported that the majority of the Qatari population (91.1%) consume less than the 5-servings for fruits and/or vegetables on average per day [6]. The survey calculated the mean number of days for fruits and vegetables consumed as (3.4 and 5.5) days respectively. While the mean number of fruits and vegetables servings was (0.8 and 1.4) respectively. Such narrow difference in figures compared to the current study might be due to the influence of dietary counseling and/or recall bias.

Physical inactivity is a well-known risk factor for CVD development in the general population as well as in patients with type 2 DM. The current study showed that (71.4%) of participants were not practicing physical activity for at least 30 minutes once a day weekly. This was much better than results addressed by a study conducted by Qatar-Bio bank (2015), where a survey was done questioning the Qatari general population and non-

Qatari individuals residents for 15years and more, where (81%) of participants were not practicing the minimum recommended frequency of weekly physical activity [12]. This is even better than published findings reported by Al-Kaabi and colleagues in a cross-sectional study done in the UAE during (2006) among patients with type 2 DM. Only (3%) of participants reported the minimum recommended frequency of physical activity [13].

Although the current study showed, better proportion of patients practicing the recommended physical activity, but it was still far less than what is expected in high-risk population. This could be explained by the limited effect of counselling conducted to such patients.

The present study showed that current tobacco use among Qatari patients with type 2 DM is unexpectedly low (4.1%) compared to the general population (16.4%) as reported in the national STEPwise survey done in Qatar (2012). This prevalence is considered also low if it is compared to several other studies conducted among diabetic patients, like in Canada during (2012) where more than two thirds (36%) of the studied sample were currently tobacco users [14], or a study from Pakistan where current tobacco smokers were (27%) during (2014) [15]. The possible justification for the current study low tobacco usage may be affiliated to that more than two thirds of the study participants are older female adults where smoking in general is uncommon, plus the possible denial by patients always will be blamed if they continue a bad habit after being counselled against.

Metabolic CVD risk factors were the second most common factors among studied patients. Overweight and obesity were prevalent CVD risk factors among the studied Qatari patients with type 2 DM. The present study showed that (25% and 69%) of the studied patients were overweight and obese respectively. This was higher than the numbers obtained from the general population, where overweight prevalence was (28.7%) and obesity (41.4%) during (2012) [6]. The present study findings were also higher than that found in Yemen, where a bigger proportion of the diabetic patients were with normal weight (45.5%), (43.5%) were overweight and (11%) were obese [16]. The higher prevalence of overweight and obesity in this study could be related to the higher proportion of them were older female adults and the majority were housewives or retired with considerably low physical activity and living a sedentary life.

The majority of the studied patients (65%) were within uncontrolled level of the HbA1C (>7.0%) with a mean of (8.01±1.70 SD). This was consistent with many other studies carried out to assess the glycemic control among patients with type 2 DM. In UAE (68%) of the studied patients in (2006) were uncontrolled based on HbA1C assessment [13]. Similarly, some other studies showed relatively higher proportion (71%) of patients with high HbA1C level as in a study done by Sabanaygam in Singapore [17].

On contrary; some studies indicated less proportion of diabetic patients within the uncontrolled limit of the HbA1C as by Leiter in Canada (2012) were only (50.4%) of the studied patients were uncontrolled with mean of (7.4±1.3 SD) [15]. The differences in HbA1C level may vary from one community to another mostly due to proper counselling, compliance to the diet and medications, as well as other lifestyle modification role.

The current study revealed low prevalence (3.8%) of high serum cholesterol level among the participated Qatari patients with type 2 DM, with mean level (4.48±0.91 SD) compared to the prevalence of (28.8%) among patients with type 2 DM in a study conducted in Saudi Arabia during (2009) by Al-Rowais [18]. Such apparent difference could be attributed to effective pharmacological influence of the lipid lowering medications which was taken by almost all of the current study patients (97.5%).

Moreover, low prevalence of undesirable HDL and LDL blood levels in the current study could be explained by effective pharmacological effect of the lipid lowering medications. Where; undesirable level of the HDL blood level (<1.0 mmol/l) was around one fourth (27.6%) among patients in this study, while the high LDL level (≥4.1mmol/l) was seen in (3.9%) of patients.

These results were lower than those found in a cross-sectional study carried out in Jordan during (2008) among patients with type 2 DM, where (60.2%) were with undesirable HDL blood level and (52.7%) of participants with high LDL blood level [19].

The third most common CVD risk factors among the studied Qatari patients with type 2 DM were medical and family history. Hypertension is a well-recognized associated risk factors in patients with type 2 DM. The prevalence of the systolic hypertension (≥140 mmHg) in this study was (21.4%) which was lower than a study conducted in Canada by Leiter at the PHC level during (2012), which showed more than one third of the patients (36%) were suffering systolic hypertensive [15]. Although, the mean of the systolic blood pressure in the two studies were close (127±13.44 SD) and (128±14 SD) respectively. This prevalence was also low in comparison with the Omani diabetic patients with systolic hypertension (40%) and the mean (130.5±12.7 SD) study done by Al-Lawati [9].

Such differences in the prevalence of systolic hypertension not only could be explained by more proportion of elderly patients in the above-mentioned studies compared to the current study, but also to the proportion of patients on anti-hypertensive medications. In the current study the majority (98.7%) of patients were on anti-hypertensive medications, which was higher than that in the study done by Leiter and his colleagues yielding a prevalence of (83%), and also a prevalence of (40%) in the study of AL-Lawati. The explanation here could be also referred to the extent of management compliance and/or anti-hypertensive

pharmacological effectiveness.

Study limitations were; inability to demonstrate the temporality between the type 2 DM and different related risk factors due to study design as cross sectional. Insufficient references of such descriptive study for risk factors prevalence in Arabian Gulf population, which share similar risk factor profile.

## Conclusions

The most common CVD risk factors among Qatari patients with type 2 DM were seen to be in the following sequence; the lifestyle related risk factors, followed by the metabolic ones and finally risk factors in relation to the medical and family history. Such results must stimulate further focused effort toward secondary prevention on patients with type 2 DM in more comprehensive and multi-disciplinary team management.

## Conflict of Interest

Authors have no financial interest, arrangement or affiliation with anyone in relation to this research that could be perceived as a real or apparent conflict of interest in the context of the subject of this study.

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