

# Knowledge about the Risk of Cardiovascular Disease among Adults with Type 2 Diabetes in Taif City, Saudi Arabia: A Cross sectional study

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## Abstract

**Background:** Diabetes patients are significantly more likely to develop cardiovascular diseases (CVDs). Lack of understanding about the disease's risk for CVDs would increase morbidity and mortality.

**Objectives:** The purpose of this study was to ascertain the level of awareness among persons with type 2 diabetes in Taif, Saudi Arabia, regarding their risk of CVDs. **Methods:** A cross-sectional study was carried out on 300 type 2 diabetic patients through an online survey.

**Results:** The mean knowledge of risk of cardiovascular disease among adults in Taif was  $15.4 \pm 5.4$ . 26% of the participants had an age range from 50-59 years and 57.1% were females. Most of the participants had an age at diabetes diagnosis more than 30 years and 41.7% had a duration of disease less than 5 years. Regarding knowledge of participants it was reported that, a family history of heart disease 55.8%, old age 66%, smoking 79.5%, high blood pressure 76.9% and bad cholesterol (LDL) 74.4% at higher risk for developing heart disease. 64.4% knew they should keep their blood pressure under control and 80.1% knew regular exercise can reduce their risk of developing heart disease. There was a positive relationship between participants education level and knowledge.

**Conclusion:** This study found that adults with type 2 diabetes in Taif have a high level of knowledge about the risk of cardiovascular disease. Education and preventive measures for patients about CVD risk factors and diabetes management can improve health and reduce the risk of CVD.

**Keywords:** knowledge, risk, CVD, DM, adults, Taif

## Introduction

Cardiovascular disease (CVD) is one of the leading causes of mortality and disability in diabetics [1, 2]. The risk of CVD increases with rising fasting plasma glucose levels [3]. Adults with diabetes have historically had a higher incidence of CVD than adults without diabetes [4].

Type 2 diabetes mellitus (T2DM) is typically discovered late in the course of cardiovascular disease (CVD). As a result, many patients experience difficulties at the time of diagnosis or shortly thereafter [5]. Ischemic heart disease, heart failure (HF), stroke, coronary artery disease (CAD), and peripheral artery disease are the most common cardiovascular diseases (CVD) associated with T2DM, and they can kill at least half of T2DM patients [6].

Inadequate knowledge of CVD risk in diabetes may result in ineffective early detection and prevention. Thus, it is critical that people with diabetes have adequate 'risk knowledge' of CVD [7]. From 2014 to 2019, several studies have investigated diabetic patients' awareness of CVD risk [8-14]. In an Indian study, only 44% of respondents identified heart disease as a possible outcome of diabetes [8].

More recently, a study in Ethiopia discovered that 63.2% of participants were aware that diabetes can cause heart problems (9). Furthermore, a study in Ghana discovered that 80% of participants were unaware of the risk of heart disease from diabetes [10]. A Pakistani study found that 50-60% of people were unaware of their cardiovascular risk [11]. Furthermore, a study in Nigeria found that while diabetic complications were well-known (90.5%), only 61.9% were familiar with cardiac complications. These results were consistent with the Turkish study, in which 62.81% of participants were aware of the cardiovascular risk [7,12].

A 2018 study in Mecca, Saudi Arabia, discovered that, while general knowledge of diabetes complications was high (80%), only 40.1% had specific knowledge about the risk of heart disease in diabetes [13]. In 2022, a cross-sectional study was conducted at King Saud University Medical City (KSUMC), a tertiary hospital in Riyadh. The study included 377 patients with type 2 diabetes, in Saudis over the age of 18, and discovered a high level of CVD risk knowledge among study participants. The prevalence of multidisciplinary intensive education programs aimed at type 2 diabetes patients, such as those offered at KSUMC, may explain why study participants were more familiar with CVD risk [14].

Although there are numerous studies on the risk of cardiovascular disease among adults with type 2 diabetes in the literature, we are aware of no prior studies conducted in the Taif region of Saudi Arabia. Thus, the purpose of this study was to determine the level of knowledge about the risk of cardiovascular disease among adults with type 2 diabetes in the Taif region of Saudi Arabia.

## Subjects and Methods

**Study design, location and time frame:** a cross sectional study was conducted in Taif City of Saudi Arabia from January to April 2023.

**Study participants:** the inclusion criteria were type 2 diabetic patients of all ages and both genders, and the exclusion criteria were type I diabetic patients, non-diabetics and those who refused participating in the study.

**Data collection:** data were collected through an online questionnaire. The questionnaire had two sections. The first section included demographic data (age, gender, level of education, marital status). It also consisted of information about diabetes-related factors (duration of DM, family history of diabetes, and diabetes regimen). The second section of the questionnaire comprised the Arabic-translated version of the Heart Disease Fact Questionnaire (HDFQ). HDFQ is a validated questionnaire of 25 items for measuring heart disease risk knowledge, with possible answers of 'true', 'false', and 'I do not know'. The scores were calculated by giving one point for each correct answer and zero points for incorrect answers or 'I do not know' responses. The total knowledge score was calculated by summing the points for the correct answers and then grading the score out of 25.

**Ethical considerations:** ethical approval for the study was obtained from the research Ethics Committee of Armed forces Hospital in in Taif city, Saudi Arabia.

**Data analysis:** data were analyzed statistically using SPSS program version 26. Qualitative data was expressed as numbers and percentages. Quantitative data was expressed as mean and standard deviation (Mean  $\pm$  SD), and non-parametric variables were tested using the Mann-Whitney and Kruskal Wallis tests. Correlation analysis was performed using the Spearman's test, and a p-value of less than 0.05 was considered statistically significant.

## Results

(Table 1) shows that 26.3% of the participants had an age range from 50-59 years and 57.1% were females. Of them, 50.6% had a university level of education and 72.4% were married.

Most of the participants had an age of DM diagnosis >30 years and 41.7% had a disease duration of less than 5 years. Almost one third (33.3%) of them were on insulin, while 32.7% were on oral hypoglycemic drugs for DM treatment. More than half of the participants (56.4%) had a family history of DM (Table 2).

The participants responses to the 25 items of the HDFQ are illustrated in Table 3. Of them, 22.4% correctly mentioned that the following statements are false:

- 1) a person always knows when they have heart disease (22.4%),
- 2) Eating fatty foods does not affect blood cholesterol levels (55.8%),
- 3) If your 'HDL' cholesterol is high, you are at risk for heart disease (41%),
- 4) Only exercising at a gym or in an exercise class will lower a person's chance of developing heart disease (46.8%) and
- 5) Men with diabetes have higher risk of heart disease than women with diabetes (14.1%).

As for the correct true answers:

- 55.8% reported that if they have a family history of heart disease, they are at risk of developing heart disease, 66% knew that the older a person is, the greater their risk of developing heart disease and 79.5% reported that smoking is a risk factor for heart disease.

- 68.6% reported that a person who stops smoking will lower their risk of developing heart disease, 76.9% knew that high blood pressure is a risk factor for heart disease, 74.4% knew that if their 'bad' cholesterol (LDL) is high, they are at risk of heart disease and 78.2% knew that being overweight increases a person's risk for heart disease.

- 80.1% knew that regular physical activity will lower a person's chance of getting heart disease; 76.9% report that walking and gardening are considered exercise that will help lower a person's chance of developing heart disease, 66.7% correctly knew it is true that diabetes is a risk factor for developing heart disease and 68.6% knew that high blood sugar puts a strain on the heart.

- 60.3% reported that if their blood sugar is high over several months, it can cause their cholesterol level to go up and increase the risk of heart disease, 74.4% knew that a person who has diabetes can reduce their risk of developing heart disease if they keep their blood sugar levels under control and only 28.8% knew that people with diabetes rarely have high cholesterol.

- 69.2% correctly knew that if a person has diabetes keeping their cholesterol under control will help to lower their chance of developing heart disease; 38.5% knew that people with diabetes tend to have low HDL cholesterol and 75% knew that a person who has diabetes can reduce their risk of developing heart disease if they keep their weight under control.

- 41.7% knew that men with diabetes have higher risk of heart disease than women with diabetes and 64.4% knew that a person who has diabetes can reduce their risk of developing heart disease if they keep their blood pressure under control.

The mean knowledge score was  $15.4 \pm 5.4$ . Table 4 demonstrates that participants who were on both oral hypoglycemic drugs and insulin for DM treatment had a significant higher mean HDFQ score compared to other types of DM treatments ( $p < 0.05$ ). On the other hand, a non-significant relationship was found between the mean HDFQ score and all participants' demographics and DM clinical data other than treatment ( $p > 0.05$ ).

Figure 1 illustrates that a significant positive correlation was found between the participants' educational level and the HDFQ score ( $r = 0.22$ ,  $p\text{-value} = 0.005$ ).

Table 1. Distribution of studied participants according their demographic data (No.:156)

Variable	No. (%)
<b>Age (years)</b>	
<30	38 (24.4)
30-39	17 (10.9)
40-49	29 (18.6)
50-59	41 (26.3)
60-70	25 (16)
>70	6 (3.8)
<b>Gender</b>	
Female	89 (57.1)
Male	67 (42.9)
<b>Educational level</b>	
Illiterate	9 (5.8)
Read and write	5 (3.2)
Primary	5 (3.2)
Middle	11 (7.1)
Secondary	37 (23.7)
University	79 (50.6)
Postgraduate	10 (6.4)
<b>Marital status</b>	
Single	43 (27.6)
Married	113 (72.4)

Table 2. Distribution of studied participants according to DM clinical data (No.:156)

Variable	No. (%)
<b>Age at diagnosis</b>	
≤30 years	54 (34.6)
>30 years	102 (65.4)
<b>Disease duration</b>	
<5 years	65 (41.7)
5-10 years	41 (26.3)
>10 years	50 (32.1)
<b>DM treatment</b>	
Oral hypoglycemic drugs	51 (32.7)
Insulin	52 (33.3)
Both	19 (12.2)
Dietary modifications	34 (21.8)
<b>Family history of DM</b>	
No	68 (43.6)
Yes	88 (56.4)

Table 3. Participants responses to the HDFQ (No.:156)

Variable	False No. (%)	True No. (%)	I don't know No. (%)
A person always knows when they have heart disease	35 (22.4) *	57 (36.5)	64 (41)
If you have a family history of heart disease, you are at risk for developing heart disease	32 (20.5)	87 (55.8) *	37 (23.7)
The older a person is, the greater their risk of developing heart disease	22 (14.1)	103 (66) *	31 (19.9)
Smoking is a risk factor for heart disease	11 (7.1)	124 (79.5) *	21 (13.5)
A person who stops smoking will lower their risk of developing heart disease	23 (14.7)	107 (68.6) *	26 (16.7)
High blood pressure is a risk factor for heart disease	10 (6.4)	120 (76.9) *	26 (16.7)
Keeping blood pressure under control will reduce a person's risk for developing heart disease	14 (9)	116 (74.4) *	26 (16.7)
High cholesterol is a risk factor for developing heart disease	12 (7.7)	120 (76.9) *	24 (15.4)
Eating fatty foods does not affect blood cholesterol levels	87 (55.8) *	47 (30.1)	22 (14.1)
If your 'good' cholesterol (HDL) is high, you are at risk for heart disease	64 (41) *	49 (31.4)	43 (27.6)
If your 'bad' cholesterol (LDL) is high, you are at risk for heart disease	14 (9)	116 (74.4) *	26 (16.7)
Being overweight increases a person's risk for heart disease	13 (8.3)	122 (78.2) *	21 (13.5)
Regular physical activity will lower a person's chance of getting heart disease	13 (8.3)	125 (80.1) *	18 (11.5)
Only exercising at a gym or in an exercise class will lower a person's chance of developing heart disease	73 (46.8) *	47 (30.1)	36 (23.1)
Walking and gardening are considered exercise that will help lower a person's chance of developing heart disease	15 (9.6)	120 (76.9) *	21 (13.5)
Diabetes is a risk factor for developing heart disease	19 (12.2)	104 (66.7) *	33 (21.2)
High blood sugar puts a strain on the heart	15 (9.6)	107 (68.6) *	34 (21.8)
If your blood sugar is high over several months, it can cause your cholesterol level to go up and increase the risk of heart disease	20 (12.8)	94 (60.3) *	42 (26.9)
A person who has diabetes can reduce their risk of developing heart disease if they keep their blood sugar levels under control	1 (7.1)	116 (74.4) *	29 (18.6)
People with diabetes rarely have high cholesterol	55 (35.3)	45 (28.8) *	56 (35.9)
If a person has diabetes keeping their cholesterol under control will help to lower their chance of developing heart disease	10 (6.4)	108 (69.2) *	38 (24.4)
People with diabetes tend to have low HDL cholesterol	30 (19.2)	60 (38.5) *	66 (42.3)
A person who has diabetes can reduce their risk of developing heart disease if they keep their blood pressure under control	21 (13.5)	101 (64.4) *	34 (21.8)1
A person who has diabetes can reduce their risk of developing heart disease if they keep their weight under control	5 (9.6)	117 (75) *	24 (15.4)
Men with diabetes have higher risk of heart disease than women with diabetes	22 (14.1) *	65 (41.7)	69 (44.2)

N.B.: \* Correct answer

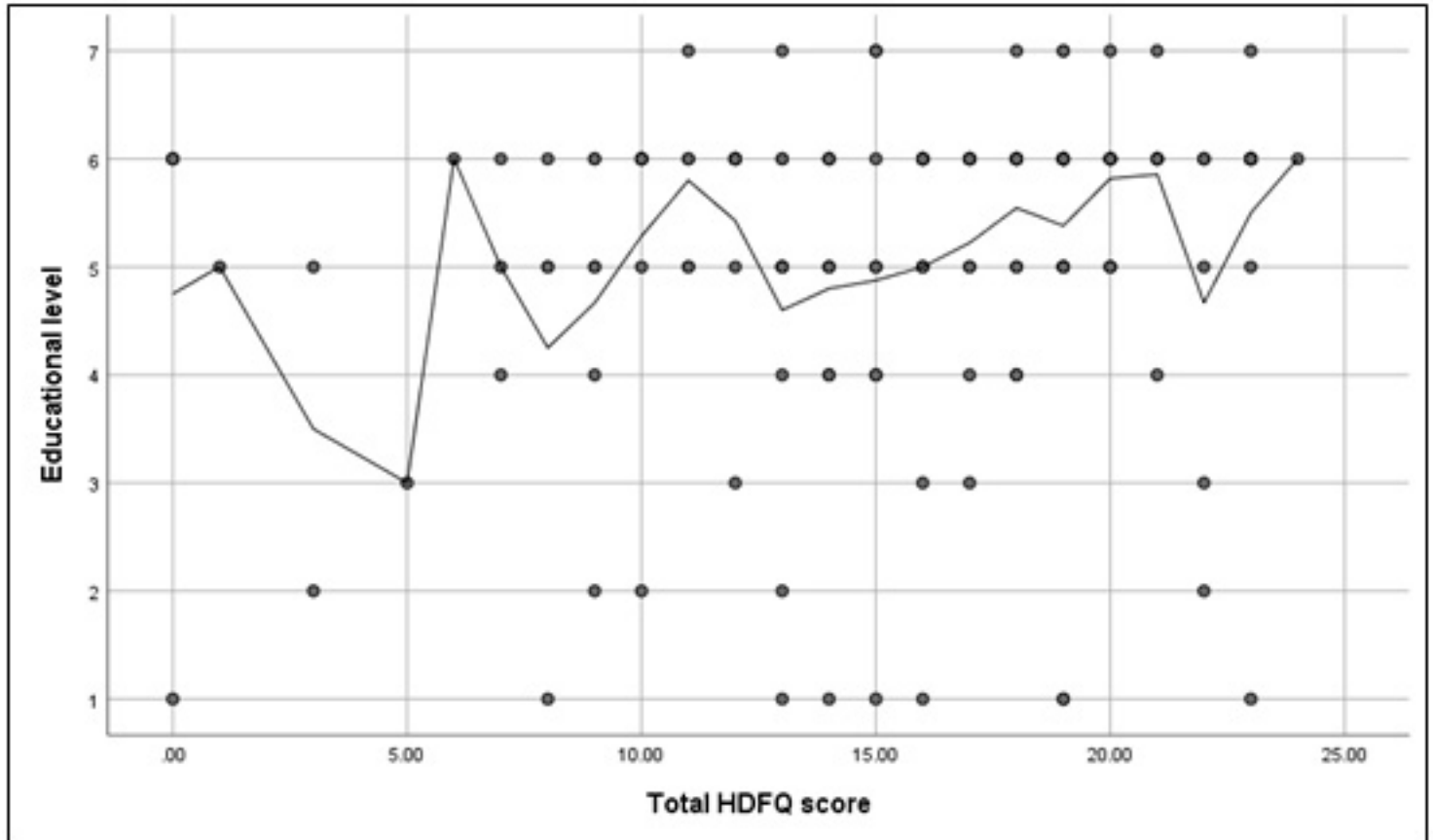
Table 4. Relationship between the mean HDFQ score and participants' demographics and DM clinical data (No.:156)

Variable	Mean HDFQ score (Mean $\pm$ SD)	Test	p-value
<b>Age (years)</b>			
<30	15.18 $\pm$ 5.73	5*	0.558
30-39	16.94 $\pm$ 3.74		
40-49	14.62 $\pm$ 5.21		
50-59	16.04 $\pm$ 5.67		
60-70	15.04 $\pm$ 5.23		
>70	13.33 $\pm$ 7.47		
<b>Gender</b>		0.05**	0.948
Female	15.26 $\pm$ 5.71		
Male	15.58 $\pm$ 5.01		
<b>Educational level</b>		6*	0.165
Illiterate	14.11 $\pm$ 6.79		
Read and write	11.4 $\pm$ 6.94		
Primary	14.4 $\pm$ 6.34		
Middle	14.63 $\pm$ 4.03		
Secondary	14.35 $\pm$ 5.11		
University	16.21 $\pm$ 5.47		
Postgraduate	17.4 $\pm$ 3.77		
<b>Marital status</b>		0.31**	0.755
Single	15 $\pm$ 5.74		
Married	15.55 $\pm$ 5.29		
<b>Age at diagnosis</b>		0.03	0.969
$\leq$ 30 years	15.31 $\pm$ 5.41		
>30 years	15.45 $\pm$ 5.43		
<b>Disease duration</b>		2	0.295
<5 years	16.23 $\pm$ 4.81		
5-10 years	14.46 $\pm$ 6.08		
>10 years	15.1 $\pm$ 5.5		
<b>DM treatment</b>		3	<0.001
Oral hypoglycemic drugs	16.25 $\pm$ 4.97		
Insulin	12.9 $\pm$ 5.29		
Both	17.21 $\pm$ 4.93		
Dietary modifications	16.94 $\pm$ 5.29		
<b>Family history of DM</b>		1.83	0.067
No	14.54 $\pm$ 5.56		
Yes	16.06 $\pm$ 5.22		

N.B.: \* = Kruskal Wallis test

\*\* =Mann-Whitney test

Figure 1. Spearman's correlation analysis between the participants' educational level and the HDFQ score



N.B.: ( $r = 0.22$ ,  $p\text{-value} = 0.005$ )

## Discussion

The current study aimed to determine the knowledge about the risk of cardiovascular disease among adults with type 2 Diabetes in Taif region, Saudi Arabia. The study revealed that about two-thirds of the diabetic respondents had the disease recently (less than 5 years), and more than half of them had a family history of DM.

Regarding CVD knowledge, the participants had a mean knowledge score of  $15.4 \pm 5.4$  out of 25 (61.6%) which means that study patients had higher than average knowledge level about the risk of CVDs. The knowledge score was scientifically lower among patients on insulin therapy and borderline lower among others with no family history of DM. Other biodemographics had no significant relationship with diabetic patients' knowledge scores. Zehirioglu L et al. [7] reported a mean knowledge score of  $62.8 \pm 17.6$ , similar to previous studies. Furthermore, authors discovered that CVD risk was lower in subjects with a high level of knowledge about CVD risk and a shorter duration of diabetes. Similarly, in 2019, a more recent study conducted in Ethiopia found that 63.2% of participants were aware of the potential heart problems associated with diabetes, which is consistent with the current study findings [9]. In Oman, Al Shafae MA et al. [15] discovered that only 20.4% of the population thought heart disease was a possible complication of diabetes. Furthermore, a study conducted in Makkah, Saudi Arabia [13] found that, while 80% of people had a basic understanding of diabetic consequences, only 40.1% had a precise understanding of the risk of heart disease in diabetics.

Other studies revealed a lower level of knowledge about CVD risk, with a study in India showing that only 44% of respondents reported heart disease as a possible complication of diabetes [8]. Furthermore, a study in Ghana [11] found that only 20% of diabetic participants had adequate knowledge of the risk of heart disease in diabetes.

A study in Pakistan [12] also found lower levels of CVD risk knowledge, ranging from 50 to 60% among diabetic patients. According to a study conducted in Nigeria [10], only 61.9% of diabetics had a clear understanding of cardiac problems, despite a high awareness of diabetic complications (90.5%). In contrast, in Saudi Arabia, Alduraywish SA et al. [14] reported a higher knowledge of CVD risk. Age, marital status, and type of residence all had a significant association with higher knowledge levels. Mani K and Shanmugam A in India [16] found that 89% of diabetic patients were aware of macrovascular complications.

### Limitations:

The current study's limitation was the use of a self-administered questionnaire, which could lead to recall bias.

## Conclusions

The current study found that diabetic patients, particularly those on insulin therapy, had an average level of knowledge about the risk of CVD. The highest knowledge was reported primarily for risk factors of heart disease in diabetes, but the lowest for self-perception of having heart disease. Given the increase in diabetes prevalence in Saudi Arabia over the last decade, health promotion, along with other measures to prevent and control this growing health problem, is critical.

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