

## Assessing Awareness about Diabetes Mellitus among Attendees of Primary Health Care Centers, Makkah, Saudi Arabia

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### ABSTRACT

**Background:** diabetes is well studied in Saudi Arabia; however, there seems to be little research in the area of awareness, education and health care delivery.

**Objectives:** to assess the awareness about diabetes mellitus among attendees of primary health care centers, Makkah, Saudi Arabia.

**Subjects and Methods:** a cross-sectional study was conducted among a representative random sample of adult attendees of primary health care centers (diabetic and non-diabetics), Makkah Al-Mokkaramah, the kingdom of Saudi Arabia during the study period (1-31 November, 2016). An Arabic self-administered questionnaire was used for data collection. It includes 31 questions with sections of demographic data, community awareness regarding diabetes definition, risk factors, signs and symptoms, and complications community awareness regarding diabetes prevention.

**Results:** the study included 662 adult patients. Approximately one-third of them (32.2%) aged 60 years or more. Females represent 51.1% of them. More than one-fifth of them (21%) were university graduated whereas 6.3% were illiterates. Prevalence of diabetes among the participants was 33.7% and majority of them (97.9%) had family history of diabetes. The most frequent sources were mass media (57.4%), health sector (29.9%) and educational sector (10.6%). Overall sufficient awareness regarding diabetes mellitus was reported among majority of the participants (91.2%). Among studied factors, only marital status and income were significantly associated with sufficient awareness.

**Conclusion:** population in Makkah AL-Mokkaramah has enough knowledge of the general knowledge of diabetes regarding risk factors, symptoms, etc. However, they are not very well aware of the diabetes associated secondary complications.

**Keywords:** Awareness, Diabetes mellitus, complications, Saudi Arabia

### INTRODUCTION

Type 2 diabetes mellitus (DM) is a worldwide public health concern of great impact. According to the World Health Organization, there will be an increase in the population with type 2 diabetes from 55 million in 2000 to 83 million in 2030 in developed countries and from 30 million in 2000, to 80 million in 2030<sup>(1)</sup>.

In the Kingdom of Saudi Arabia, in parallel with other parts of the world, diabetes mellitus is an emerging major public health problem. This pandemic has accompanied the adoption of a modern lifestyle, with a resultant increase in rates of obesity and other chronic diseases, including diabetes mellitus. Additionally, the Saudi population seems to

have a special genetic predisposition to develop type 2 diabetes, which is exaggerated by a rise in obesity rates, a high rate of consanguinity and the presence of other factors such as the insulin resistance syndrome<sup>(2)</sup>.

Diabetes is well studied in Saudi Arabia; however, there seems to be little research in the area of awareness, education and health care delivery<sup>(2)</sup>.

Diabetes complications are common among Saudi patients; retinopathy prevalence was 31% after more than 10-years of diabetes, neuropathy prevalence was reported as high as 82% and despite that data on diabetic nephropathy in Saudi are scarce, diabetes

mellitus was responsible for 30% -45% of renal dialysis<sup>(2)</sup>.

Despite the etiology of DM is unknown, many of its modifiable lifestyle related risk factors have been thoroughly investigated. The accumulating evidence suggested that DM could be postponed if its risk factors are identified early and modified. Lifestyle interventions in the form of regular practicing of physical activity and maintain ideal body weight have proven to be more effective than medicine in delaying the onset of DM in high-risk group of persons. However, transferring this concept into an effective community-based intervention program requires learning the public about DM risk factors and preventive measures<sup>(3)</sup>.

The present study aimed to assess the awareness about diabetes mellitus among attendees of primary health care centers, Makkah, Saudi Arabia.

## SUBJECTS AND METHODS

A cross-sectional study was conducted among all adult attendees of primary health care centers (diabetic and non-diabetics), Makkah Al-Mokkaramah, the Kingdom of Saudi Arabia during the study period (1-30 November 2016). Makkah Province is the most populous province of Saudi Arabia, located in the west of the country, with an extended coastline. It has an area of 164,000 km<sup>2</sup>. Its capital is the sacred city of Makkah AL-Mokarramah<sup>(4)</sup>. It is the holy capital of Saudi Arabia with a population of 1,534,731 million (2010 census)<sup>(5)</sup>. It provides medical services through 47 primary health care (PHC) centers. Illiterate people were excluded because the data collection tool was self-administered questionnaire, and using it by another way such as interviewing the participants will affect the validity of the questionnaire.

The dependant variable was the awareness about diabetes mellitus whereas the independent variables in the study are age, gender, educational status, family history of diabetes mellitus.

Sample size was determined using Raosoft sample size calculator<sup>(6)</sup>. Assuming that, from the literature review of the same subject, public awareness about diabetes mellitus was 50%<sup>(3)</sup>. Accepting a confidence

level of 95 % with margin of error of 4%. If the population size was >20000, the estimated minimum sample size was 583.

Four primary health care centers were randomly selected from different geographical locations of Makkah. All attendees of these centers during the study period who fulfill the inclusion criteria (adults, at least able to read and write) and accept participation were included in the study till sample size was reached.

An Arabic self-administered questionnaire was used for data collection. It has been used previously and proved to be valid and reliable<sup>(7)</sup>. Permission was taken from the author to utilize it through personal contact. It has a cover letter to clarify the study's objective and the assurance of confidentiality. The study was approved by the Ethics Board of *Umm Al-Qura University*.

The questionnaire includes 31 questions with the following sections: **First section:** 7 questions about demographic data. **Second section:** 20 questions about community awareness regarding diabetes definition, risk factors, signs and symptoms, and complications. **Third section:** 4 questions about community awareness regarding diabetes prevention. The questions include information about diabetes mellitus irrespective to type1, type 2 or other types of diabetes.

For every correct answer, 1 point was given. For incorrect or not knowing answers, 0 point was given. Then, scores of < or =50%, were classified as "insufficient" and scores >50% were classified as "sufficient," respectively as an evaluation of the awareness level tested by the questionnaire.

After having approval from Regional Research and Ethics committee, the self administered questionnaire was distributed and collected by the researchers during regular day working hours over 1 month period (November, 2016).

The data collected from the questionnaire were verified by hand then coded and entered to a personal computer. Analysis was carried out by using SPSS version 22 software statistical program. For categorical variables, frequency and percentage were reported. Chi-square test was utilized to test for

the association between awareness and associated factors. The level of statistical significance was accepted at  $p$ -value  $<0.05$ .

## RESULTS

The study included 662 adult patients. Their baseline characteristics are presented in table 1. Approximately one-third of them (32.2%) aged 60 years or more. Females represent 51.1% of them. More than one-fifth of them (21%) were university graduated whereas 6.3% were illiterates. Most of them (71%) were married. Family members ranged between 5 and 7 among 48.8% of the participants. The income ranged between 5000 and 10000 SR/month among 48% of them.

Prevalence of diabetes among the participants was 33.7% and majority of them (97.9%) had family history of diabetes.

The reported sources of information about diabetes are summarized in figure 1. The most frequent sources were mass media (57.4%), health sector (29.9%) and educational sector (10.6%).

Responses of the participants to diabetes mellitus awareness questions are presented in table 2. All of them were aware that diabetes mellitus is not an infectious disease. Majority of them were aware that diabetic patient can marry (99.8%), lack of physical activity increase the risk of diabetes mellitus (99.7%), diabetes mellitus is a chronic disease (99.2%), diabetic patient can live normally if he effectively care of his status (97%), diabetic patient can practice physical exercise (96.8%), elderly persons are more susceptible to diabetes (95.9%) and the objective from diabetes mellitus treatment is to control the disease and prevent complications (92.9%). On the other hand, only 4.2% of the participants were aware that DM is not a preventable disease and 19.9% only were aware of the normal fasting blood glucose level. Overall sufficient awareness regarding diabetes mellitus was reported among majority of the participants (91.2%) as evident from figure 2.

Table 3 shows that married patients had the lowest rate of sufficient DM knowledge compared to other marital status categories,  $p=0.018$ . Those having low income had the lowest rate of sufficient awareness, 0.021. Other studied factors (age, gender, educational level, family

size, source of information, personal and family history of diabetes) were not significantly associated with DM awareness.

## DISCUSSION

The present study illustrates that the diabetes awareness among adult attendees of primary health care centers, Makkah AL-Mokarramah, Saudi Arabia was sufficient among the majority of them. This sufficient awareness may be attributed to the fact that DM is an emerging major public health problem in Saudi Arabia.

The present study failed to confirm an association between DM awareness and level of education among participants. This finding inconsistent with those reported in previous studies from other parts of the world<sup>(8-11)</sup> and from Saudi Arabia<sup>(12)</sup> that showed an association between level of education and the increase in DM awareness.

Despite the overall sufficient awareness of DM, misconception and areas of deficiency have been identified for targeted health education effort.

DM is a chronic disease that requires ongoing monitoring and treatment<sup>(13)</sup>. Sabra *et al.*<sup>(14)</sup> have reported in their cross-sectional study conducted in Eastern Saudi Arabia among primary health care centers attendees, that a quarter of the attendees held the misconception that, treatment should be stopped if diabetes is well controlled for months. This misconception for the majority may lead to an increased number of diabetics over the next years in the region, especially due to increasing urbanization and general changes in behavior patterns and sedentary lifestyles. Contrast to that, in the present study the majority of the participants agreed that control of DM should be continued periodically and that the objective of DM treatment is to control DM and prevent complications.

Saudi Arabia has experienced a rapid increase in wealth over a relatively short period of time, as a consequence of the financial gains rendered by the oil industry, paralleled with swift industrialization and urbanization<sup>(15, 16)</sup>. This was accompanied with increase in the prevalence of DM<sup>(17)</sup>. In the current study, less than half of the participants (46.5%) knew

correctly the prevalence of DM in KSA. However, more than three-quarters of them recognized that this prevalence is increasing.

The awareness of DM risk factors is good in the present study whereas that of symptoms was suboptimal among participants. This result disagrees with that of Aljouidi and Taha<sup>(3)</sup> who reported lack of knowledge of risk factors of DM in Eastern Saudi Arabia and in accordance to that reported by Mohieldein *et al.*<sup>(18)</sup> who reported that the knowledge of risk factors of DM was 63.4.

This study revealed low level of awareness about the complications of DM. Although most of the participants knew that DM has complications, yet more than half of them were not aware that these complications affect all of heart, kidney, eye, nervous system and feet. The same has been reported previously in Saudi Arabia<sup>(3, 18)</sup>. Internationally, awareness about complications of DM was found to be lower in Pakistan. Ulvi *et al.*<sup>(19)</sup> reported that, approximately 88% of respondents in that study were unable to say that, they had any idea as to what the complications of diabetes might be. Moreover, this demand for required efforts to educate general population about complications of DM was reported from India and Malaysia<sup>(20, 21)</sup>.

Regarding the sources of information about DM among the participants, the healthcare sector represented 29.9%. This figure is higher than that reported by Sabra *et al.* (2010) (17.8%) from Eastern Saudi Arabia<sup>(14)</sup>. Primary health care (PHC) is the first level of professional contact in the community and forms the cornerstone strategy for the attainment of level of health that will permit socially and economically productive life<sup>(22)</sup>. This highlights the need for more efforts about educating general population about DM within the PHC.

The results of this study could contribute positively and meaningfully to the design of future educational programme and materials. An improved educational programme that tackles the areas of weaknesses or misconceptions can potentially increase the level of public awareness of diabetes.

This report shows that, population in Makkah AL-Mokkaramah has enough knowledge of the general knowledge of diabetes

regarding risk factors, symptoms, etc. However, they are not very well aware of the diabetes associated secondary complications. Therefore, we recommended educating general population about DM within the PHC, particularly, complications and risk factors. This may be achieved by using audio-visual aids, as well as posters showing patients with diabetes complications and their consequences such as lower limb amputation, blindness, and renal dialysis.

## REFERENCES

1. **World health organization, Wild S, Roglic G, Green A, Sicree R, King H (2004):** Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care*, 27: 1047-1053.
2. **Elhadd TA, Al-Amoudi AA, Alzahrani AS (2007).** Epidemiology, clinical and complications profile of diabetes in Saudi Arabia : a review *Ann Saudi Med.*, 27(4):241-50.
3. **Aljouidi AS, Taha AZ (2009).** Knowledge of diabetes risk factors and preventive measures among attendees of a primary care center in eastern Saudi Arabia. *Ann. Saudi. Med.*, 29(1):15-19
4. Wikipedia. Saudi Arabia. Available at: [en.wikipedia.org/wiki/Saudi\\_Arabia](http://en.wikipedia.org/wiki/Saudi_Arabia).
5. Central Department of Statistics and Information, Saudi Arabia. Census 1431 H (2010). Available at: [www.cdsi.gov.sa/census31](http://www.cdsi.gov.sa/census31).
6. Online Roasoft sample size calculator. Available at: [www.Sample Size Calculator by Raosoft, Inc.htm](http://www.Sample Size Calculator by Raosoft, Inc.htm).
7. **Saleh SFA (2013).** Assessment of awareness about diabetes mellitus among attendees of Al-Eskan primary health care Center, Makkah AL-Mokarramah, Saudi Arabia. Joint Program of Family Medicine, Makkah, 2013, family medicine residents researches. Available at: <https://fmresidentsresearches.wordpress.com/tag/saudi-arabia/>
8. **Kamel M, Badawy YA, El-Zeiny NA, Merdan IA (1999).** Sociodemographic determinants of management behaviour of diabetic patients Part II. Diabetics' knowledge of the disease and their management behaviour. *Eastern Mediterranean Health J.*, 5: 974- 983.
9. **Caliskan D, Ozdemir O, Ocaktan E, Idil A (2006).** Evaluation of awareness of diabetes mellitus and associated factors in four health center areas. *Patient Educ. Couns*, 62: 142-147.
10. **Powell CK, Hill EG, Clancy DE (2007).** The Relationship between health literacy and diabetes

- knowledge and readiness to take health actions. *Diab. Educ.*, 33: 144-151.
11. **Al Shafae MA, Al-Shukaili S, Rizvi SGA, Al Farsi Y, Khan MA, Ganguly SS, et al (2008).** Knowledge and perceptions of diabetes in a semi-urban Omani population. *BMC public Health*, 8: 249.
  12. **Mohieldein AH, Alzohairy MA, Hasan M (2011).** Awareness of diabetes mellitus among Saudi non-diabetic population in Al-Qassim region, Saudi Arabia. *Journal of Diabetes and Endocrinology*, 2(2): 14-19.
  13. **Grandy S, Chapman RH, Fox KM (2008).** Quality of life and depression of people living with type 2 diabetes mellitus and those at low and high risk for type 2 diabetes: findings from the Study to Help Improve Early evaluation and management of risk factors leading to Diabetes (SHIELD). *Int. J. Clin. Pract.*, 62: 562-68.
  14. **Sabra AA, Taha AZ, Al-Zubier AG, Al-Kurashi NY (2011).** Misconceptions about diabetes mellitus among adult male attendees of primary health care centres. *SA. Fam. Pract.*, 52(4): 344-349.
  15. **Al-Daghri NM, Al-Attas OS, Al-Rubeaan K, Mohieldin M, Al-Katari M, Jones A F et al (2007).** Serum leptin and its relation to anthropometric measures of obesity in pre-diabetic Saudis. *Cardiovasc. Diabetol.*, 6: 18.
  16. **Al-Attas OS, Al-Daghri NM, Al-Rubeaan K, da Silva NF, Sabico SL, Kumar S et al. (2009).** Changes in endotoxin levels in T2DM subjects on anti-diabetic therapies. *Cardiovasc. Diabetol.*, 8: 20.
  17. **Al-Nozha MM, Al-Matouq MA, Al-Mazrou YY, Al-Harathi SS, Arafah MR, Khalil MZ et al (2004).** Diabetes in Saudi Arabia. *Saudi Med J.*, 25(11): 1603-10
  18. **Mohieldein AH, Alzohairy MA, Hasan M (2011).** Awareness of diabetes mellitus among Saudi non-diabetic population in Al-Qassim region, Saudi Arabia. *Journal of Diabetes and Endocrinology*, 2(2): 14-19.
  19. **Ulvi OS, Chaudhary RY, Ali T, Alvi R A, Khan M F A, Khan M et al. (2009).** Investigating the awareness level about Diabetes Mellitus and associated factors in Tarlai (Rural Islamabad). *J. Pak. Med. Assoc.*, 59: 798-801.
  20. **Murugesan N, Snehalatha C, shobhana R, Roglic, G, Ramachandran A (2007).** Awareness about diabetes and its complications in the general and diabetic population in a city in southern India. *Diab. Res. Clin. Pract.*, 77: 433-437.
  21. **Yun S, Hassan Y, Abd. Aziz N, Awaisu A, Ghazali R (2007).** A comparison of knowledge of diabetes mellitus between patients with diabetes and healthy adults: a survey from north Malaysia. *Patient Educ. Counsel*, 69: 47-54.
  22. **Oparah AC, Arigbe-Osula EM (2002).** Evaluation of Community Pharmacists' Involvement in Primary Health Care. *Trop. J. Pharm. Res.*, 1: 67-74.

**Table 1:- Baseline characteristics of participants in the study (n=662)**

<b>Variables</b>	<b>Number (%)</b>
<b>Age (years)</b>	
20-39	229 (34.6)
40-59	220 (33.2)
≥60	213 (32.2)
<b>Gender</b>	
Male	324 (48.9)
Female	338 (51.1)
<b>Education</b>	
Just able to read and write	42 (6.3)
Primary	84 (12.8)
Intermediate	46 (6.9)
Secondary	351 (53.0)
University	139 (21.0)
<b>Marital status</b>	
Single	79 (11.9)
married	470(71.0)
Divorced	58 (8.8)
Widowed	55 (8.3)
<b>Family number</b>	
<5	92 (13.9)
5-7	323 (48.8)
>7	247 (37.3)
<b>Income (SR/month)</b>	
<5000	151 (22.8)
5000-10000	318 (48.0)
10001-15000	143 (21.6)
>15000	50 (7.6)

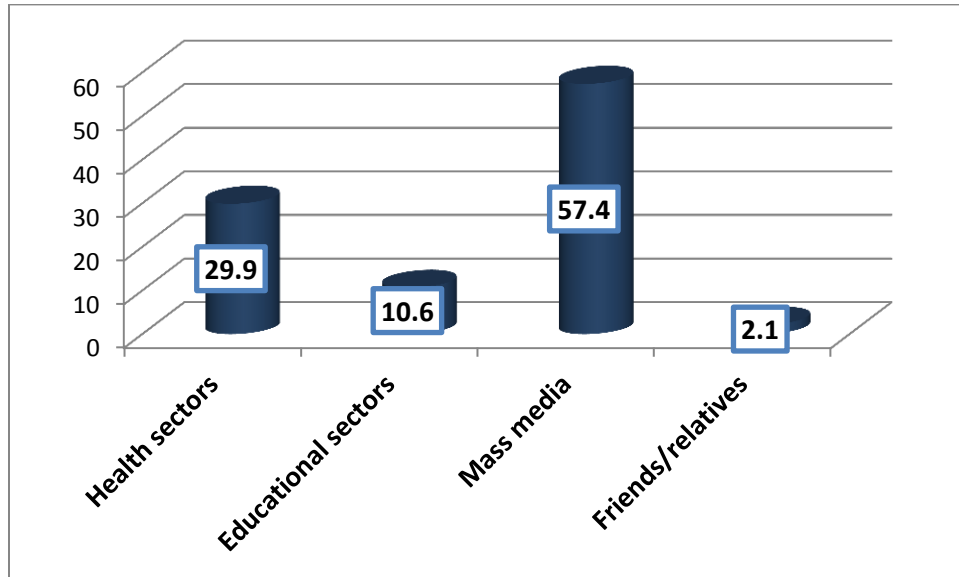
**Table 2:- Awareness of the participants about DM.**

	Right answer	
	No.	%
Normal fasting blood glucose level	132	19.9
Diabetes mellitus is a chronic disease ( <i>True</i> )	657	99.2
Diabetes mellitus is a genetic disease ( <i>True</i> )	554	83.7
Diabetes mellitus is an infectious disease ( <i>False</i> )	662	100
<i>Diabetes mellitus is acquired through excessive sweet intake (False)</i>	81	12.2
<i>Diabetes mellitus is a simple disease (false)</i>	188	28.4
Diabetes symptoms	224	33.8
Diabetes mellitus diagnosis	328	49.5
There are two types of Diabetes mellitus ( <i>True</i> )	497	75.1
Diabetes mellitus could be a silent disease ( <i>True</i> )	587	88.7
There is a particular age for getting diabetes mellitus ( <i>False</i> )	187	28.2
Elderly persons are more susceptible to diabetes (true)	635	95.9
There are risk factors for diabetes mellitus (true)	324	48.9
Increase in the body weight raising the risk of diabetes mellitus (true)	510	77.0
Lack of physical activity increase the risk of diabetes mellitus ( <i>True</i> )	660	99.7
Positive family history increase the risk of diabetes mellitus ( <i>True</i> )	496	74.5
Prevalence of DM in Saudi Arabia (21-30%)	308	46.5
Is the prevalence of diabetes mellitus increasing in KSA (true)	521	78.7
Is there an effective treatment for diabetes mellitus (true)	328	54.1
The objective from diabetes mellitus treatment is to control the disease and prevent complications (true)	615	92.9
It is important to control diabetes periodically ( <i>True</i> )	564	85.2
Diabetes mellitus has complications on human body ( <i>True</i> )	519	78.4
Diabetes mellitus has complications on all of the heart, kidney. Eye, nervous system and feet ( <i>True</i> )	289	43.7
Diabetic patient can live normally if he effectively care of his status ( <i>True</i> )	642	97.0
Diabetic patient can marry (true)	661	99.8
Diabetic patient cannot practice physical exercise ( <i>False</i> )	641	96.8
Diabetic patient cannot fast during Ramadan ( <i>False</i> )	587	88.7
Is there organizations in KSA concerned with DM (Yes, I have information about them)	253	38.2
It is possible to prevent DM ( <i>false</i> )	28	4.2
It is possible to prevent complications of DM ( <i>True</i> )	535	80.8

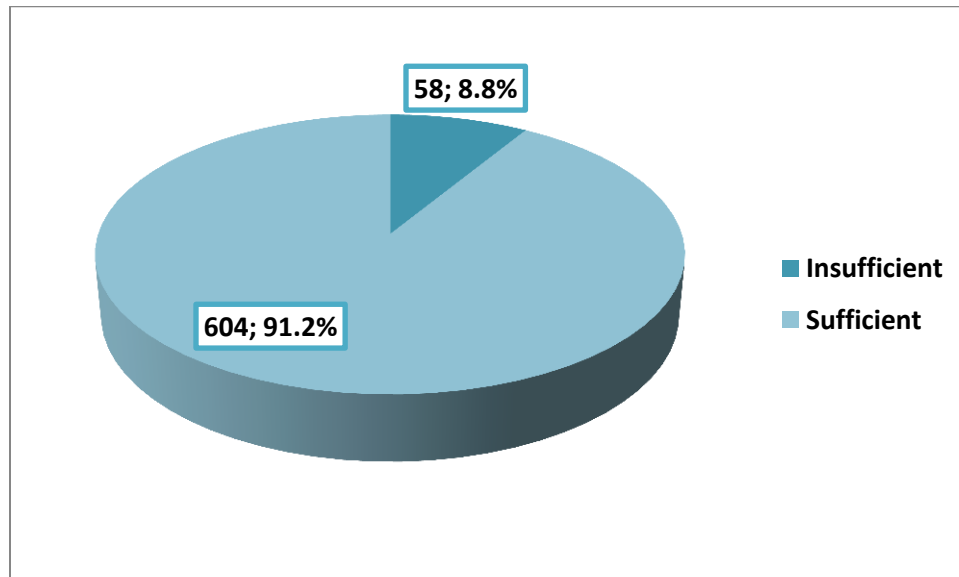
**Table 3: Factors associated with awareness of patients regarding diabetes mellitus, Makkah, Saudi Arabia**

	Awareness about diabetes mellitus		p-value
	Insufficient N=58 N (%)	Sufficient N=604 N (%)	
<b>Age (years)</b>			
20-39 (n=229)	15 (6.6)	214 (93.4)	0.342
40-59 (n=220)	22 (10.0)	198 (90.0)	
≥60 (n=213)	21 (9.9)	192 (90.1)	
<b>Gender</b>			
Male (n=324)	32 (9.9)	292 (90.1)	0.320
Female (n=338)	26 (7.7)	312 (92.3)	
<b>Education</b>			
Just able to read and write (n=42)	2 (4.8)	40 (95.2)	0.142
Primary (n=84)	11 (13.1)	73 (86.9)	
Intermediate (n=46)	5 (10.9)	41 (89.1)	
Secondary (n=351)	34 (9.7)	317 (90.3)	
University (n=139)	6 (4.3)	133 (95.7)	
<b>Marital status</b>			
Single (n=79)	3 (3.8)	76 (96.2)	0.018
Married (n=470)	50 (10.6)	420 (89.4)	
Divorced (n=58)	0 (0.0)	58 (100)	
Widowed (n=55)	5 (9.1)	50 (90.9)	
<b>Family number</b>			
<5 (n=92)	12 (13.0)	80 (87.0)	0.147
5-7 (n=323)	30 (9.3)	293 (90.7)	
>7 (n=247)	16 (6.5)	231 (93.5)	
<b>Income (SR/month)</b>			
<5000 (n=151)	22 (14.6)	129 (85.4)	0.021
5000-10000 (n=318)	26 (8.2)	292 (91.8)	
10001-15000 (n=143)	8 (5.6)	135 (94.4)	
>15000 (n=50)	2 (4.0)	48 (96.0)	
<b>Personal history of diabetes</b>			
Yes (n=223)	20 (9.0)	203 (91.0)	0.893
No (n=439)	38 (8.7)	401 (91.3)	
<b>Family history of diabetes</b>			
Yes (n=648)	58 (9.0)	590 (91.0)	0.273
No (n=14)	0 (0.0)	14 (100)	
<b>Main source of information</b>			
Health sectors (n=198)	3 (6.6)	185 (93.4)	0.079
Educational sectors (n=70)	3 (4.3)	67 (95.7)	
Mass media (n=380)	42 (11.1)	338 (88.9)	
Friends/relatives (n=14)	0 (0.0)	14 (100)	





**Figure 1: Main source of information regarding diabetes mellitus among the participants**



**Figure 2: Level of diabetes awareness among the participants**