

# Misconceptions about diabetes mellitus among adult male attendees of primary health care centres in Eastern Saudi Arabia

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## Abstract

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**Background:** Diabetes mellitus (DM) is a major public health problem in Saudi Arabia. Its prevalence is on the increase, being as high as 23.7% among adult citizens. Misconceptions and wrong beliefs regarding DM and its management among those attending primary health care centres (PHCCs) can result in poor control, more complications and increased incidence of morbidity and mortality.

**Methods:** This was a cross-sectional study conducted in eight randomly selected PHCCs in the Eastern Province of Saudi Arabia. The study population comprised all adult male attendees older than 15 years. The total number of attendees interviewed was 1 030, giving a response rate of 84.1%. Data were collected through an interviewer-administered questionnaire pertaining to the following: socio-demographic characteristics, misconceptions of PHCC attendees about DM regarding the aetiology, general concepts, diabetic diet, treatment and herbal treatment. Chi-square and logistic regression were used for statistical analysis.

**Results:** The majority of the attendees were Saudi (92%) of young age (15–34 years; 60.7%). Only 12% had DM. A high proportion of the attendees had misconceptions about the aetiology of DM (21.2%), general concepts of the disease (13.8%) and the diet of diabetic patients (10.7%). Moreover, 11.8% of the attendees had misconceptions about all aspects of DM. The factors that were found to be independently and significantly associated with increased levels of misconception were a low level of education (OR = 0.752) and lower family income (OR = 0.684).

**Conclusion:** There is a great need for continuous health education of PHCC attendees in general and regarding diabetics in particular to raise their knowledge and awareness of DM. This can be done by all primary health care team members.

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## Introduction

Diabetes mellitus (DM) is a growing health problem worldwide, in developed as well as developing countries.<sup>1-3</sup> DM in adults is now recognised as a particular threat to the public health of third-world communities, particularly those living in rapidly developing countries and disadvantaged minorities in industrialised nations.<sup>1-3</sup> An estimated global prevalence of 2.8% was reported in 2000 and a projected prevalence of 4.4% is expected in 2030 (171 million in 2000 to 366 million in 2030).<sup>4,5</sup>

DM is a major public health problem in the Kingdom of Saudi Arabia (KSA). Its prevalence is on the increase, being as high as 23.7% among adult citizens.<sup>6,7</sup> Knowledge and awareness about the disease, its risk factors, complications

and management are important aspects for better control and better quality of life for the diabetic patient.<sup>3,8</sup> Misconceptions and wrong beliefs regarding DM and its management can result in poor control, more complications and increased incidence of morbidity and mortality. These misconceptions include that DM is a genetically inherited disease, is an infectious disease, and is mostly caused by excessive sugar intake. Misconceptions concerning the treatment of DM include that insulin can be substituted with oral drugs, that native and herbal medicines can be used, and that dates and honey are good for diabetics.<sup>8</sup>

Several studies have shown that diabetic patients had several misconceptions about their disease.<sup>9-11</sup> Few studies in Saudi Arabia have demonstrated the high prevalence of misconceptions about DM among diabetic patients.

Al-Saeedi et al, in a study of 1 039 diabetic patients in Mecca, found that 39% of patients had a high treatment misconception score and that 23% believed that diabetic patients can eat what they like as long as they took their medication.<sup>8</sup> Other studies indicated a high rate of poor knowledge and misconceptions about DM, its complications and management.<sup>12-14</sup>

The aim of the present study was to identify the prevalence of misconceptions about DM among those attending primary health care centres (PHCCs) in the Eastern Province of Saudi Arabia and to determine possible associations between misconceptions and the socio-demographic characteristics of the attendees.

## Methods

This was a cross-sectional study conducted in eight PHCCs in the Eastern Province of Saudi Arabia during December 2008. Eight PHCCs were randomly selected from all the PHCCs in Dammam and Qatif cities (22 and 26 PHCCs respectively). They were distributed as follows: five in Dammam city (namely in South Dammam, Iskan Al-Dammam, Ibn Roshd, Aljameeaeen and Ohod) and three in Qatif city (namely in Sihat 1, Al-Showaikah and Al-Dakhal Al-Mahdood). The study population comprised all adult men above 15 years of age attending the PHCCs for any reason during the period of the study. The sample size was estimated according to the following equation<sup>15</sup>:

$$N = \frac{(Z_{(1-\alpha/2)} + Z_{(1-\beta)})^2 P (1-P)}{d^2}$$

N = sample size

Z = reliability coefficient (z = 1.96 at 95% confidence interval)

P = the proportion of the population of attendees who have misconceptions about DM

As there were no previous studies on misconceptions about DM among attendees of PHCCs in KSA – as far as the investigators could establish from a literature search – p was considered to be 0.5 (50%).

d = 0.04, i.e. absolute precision of 4% (i.e. a range of prevalence of misconceptions 46–54%).

Type I error ( $\alpha$ ) was 0.05 and type II error ( $\beta$ ) was 0.2 (i.e. a power of 80%).

The sample size was calculated as:

$$N = \frac{(1.96 + .84)^2 \times 0.5 \times 0.5}{(0.04)^2} = 1\,225$$

The total number of attendees interviewed was 1 030, giving a response rate of 84.1%.

Data collection was accomplished through an interviewer-administered questionnaire designed by the researchers.

A pilot study was conducted in a sub-sample of attendees who were not included in the study proper, after which the necessary changes were made. Attendees were interviewed under standardised conditions to ensure valid responses. Every statement in the questionnaire was formulated as a misconception. All the questions were close-ended. The questionnaire consisted of the following main parts:

1. The attendees' socio-demographic characteristics: age, nationality, marital status, occupation, family income, history of DM and attendance of any health education regarding DM
2. Misconceptions of PHCC attendees about different aspects of DM under the following main headings: aetiology, general concepts, diabetic diet, treatment and herbal treatment
3. Sources of information on DM

If the attendee responded to any statement by indicating 'yes', this was considered to be a misconception and given a score of one; otherwise it was considered not to be a misconception and given a score of zero. The total DM misconception score as well as the misconception scores for each subheading were divided into two groups, namely low (acceptable) and high (unacceptable) level of misconception.

The collected data were reviewed, coded, verified and statistically analysed using the Statistical Package for Social Sciences (SPSS) software version 16. Descriptive statistics for all studied variables and chi-square test were used. Stepwise logistic regression analysis was used to find the association between the characteristics of PHCC attendees (independent variables) and their level of misconception (dependant variable). A p-value of < 0.05 was considered significant throughout the study.

The study was approved by the Department of Family and Community Medicine, then by the Research Committee of the College of Medicine, King Faisal University, and subsequently by the university authorities. The Ministry of Health in the Eastern Province, KSA, approved the study, after which official letters were distributed to the relevant PHCCs. The objectives of the study were explained to the PHCC attendees involved in the study, after which they gave their informed consent to participate. Confidentiality of the information was strictly adhered to by assuring the attendees that no personal details (e.g. names) would be distributed and that data would be used for research purposes only.

## Results

Table I shows the socio-demographic characteristics of the PHCC attendees. The majority of the attendees were

Table I: Socio-demographic characteristics of primary health care centre attendees

Socio-demographic characteristics	PHCC attendees (n = 1030)	
	No	%
<b>1. Age in years</b>		
15–34 years	625	60.7
35–54 years	306	29.7
≥ 55 years	99	9.6
(Mean ± 1SD) = 33.01 ± 14.06		
<b>2. Nationality</b>		
Saudi	944	91.7
Non-Saudi	86	8.3
<b>3. Marital status</b>		
Single	421	40.9
Married	579	56.2
Widowed	14	1.4
Divorced	16	1.6
<b>4. Educational level</b>		
Illiterate or read and write	68	6.6
Primary and intermediate	203	19.7
Secondary and diploma	417	40.5
University and higher education	342	33.2
<b>5. Occupation</b>		
Free labour	124	12.0
Doctor, engineer	72	7.0
Civil service	351	34.1
Unemployed	93	9.0
Retired	77	7.5
Student	313	30.4
<b>6. Total family income per month in Saudi Riyals</b>		
< 5 000 SR	343	33.3
5 000–10 000 SR	394	38.3
≥ 10 000 SR	285	27.7
Refused to answer	8	0.8
<b>7. Presence of DM</b>		
Yes	120	11.7
No	864	83.9
Don't know	46	4.5
<b>8. Receiving health education about DM</b>		
Yes	248	24.1
No	782	75.9

Saudi (92%), of young age (15–34 years; 60.7%) and married (56%). About 34% worked in the civil service and approximately 75% had a secondary school or higher education. About 76% of the attendees did not receive any health education about DM. Only 12% had DM.

As shown in Table II, more than 60% of the attendees stated that DM was mainly an inherited disease (64.8%) and that excessive sugar intake is a primary cause of DM (65.9%). Approximately 60% of the attendees believed that routine intake of vitamins is important for diabetic patients. The misconception that artificial sweeteners are carcinogenic in humans was held by 28% of the attendees. A quarter of the attendees held the misconception that treatment should be stopped if diabetes is well controlled for months. A high proportion of the attendees (47.6% and 38.3% respectively) believed that warming the feet near a fire or with a hot water bottle is an essential treatment modality for diabetic patients.

Table II: Distribution of attendees according to their misconceptions about the aetiology and general concepts of DM

Misconception statements	Attendees who answered yes (n = 1030)	
	No	%
<b>A. Aetiology</b>		
1. DM is mainly an inherited disease	667	64.8
2. DM is an infectious disease	57	5.5
3. DM is mainly caused by severe stress	514	49.9
4. Excessive sugar intake is a primary cause of DM	679	65.9
5. Anger, emotion and bad news are the main leading causes of DM	569	55.2
<b>B. General concepts</b>		
1. DM is an obstacle for normal marital life	389	37.8
2. Routine vitamins are very important for diabetic patients	613	59.5
3. Sugar substitutes (artificial sweeteners) are carcinogenic in humans	287	27.9
4. Water intake should be reduced in cases of excessive urination	186	18.1
5. High blood glucose level is worse than high sugar level in urine	387	37.6
6. Diabetic patients should avoid any surgical interventions even in controlled patients	522	50.7
7. Medications of DM should be stopped during other illnesses	128	12.4
8. Treatment of DM should be stopped on the day of blood glucose testing	344	33.4
9. Treatment should be stopped if DM is well controlled for months	261	25.3
10. In cold weather, the diabetic patient should warm his or her feet near the fire	490	47.6
11. In winter, it is preferred to use a hot water bottle to warm feet	395	38.3
12. Complete cure from DM is expected after a short course of treatment	139	13.5

As shown in Table III, about one-fifth of the PHCC attendees held the misconception that diabetic patients on medication can eat any type of food. Approximately one-third of the attendees held the misconception that dates, honey and bitter food are good foods for diabetic patients. Regarding the treatment of diabetic patients, quite a high proportion of the attendees had the misconception that oral hypoglycaemic drugs are more effective than insulin (28.8%) and that they can always serve as substitute for insulin (31.5%), as shown in Table III. The misconception that different types of herbs are effective in the management of DM was held by a large proportion of the attendees. The herbs most commonly mentioned by the attendees were black seed, garlic and fresh onions (51.8%, 48.0% and 34.2% respectively).

The attendees' responses to misconception statements were categorised as low level of misconception (acceptable) or high level of misconception (unacceptable)

Table III: Distribution of attendees according to their misconceptions about diet, treatment and herbs used for DM

Misconception statements	Attendees who answered yes (n = 1030)	
	No	%
<b>A. Diet</b>		
1. Diabetic patients taking medication can eat any type of food	216	21.0
2. Dates are very important for the health of diabetic patients	343	33.3
3. Honey is a good food for diabetic patients	361	35.0
4. All carbohydrates should be removed from the diabetic diet	355	34.5
5. Bitter foods will reduce elevated blood glucose level	393	38.2
6. Dried bread contains less sugar than normal bread	324	31.5
7. Regular intake of snacks between main meals is essential for adult diabetic patients	462	44.9
<b>B. Treatment</b>		
1. Effectiveness of oral hypoglycaemic drugs depends on its cost	235	22.8
2. Oral hypoglycaemic drugs can always replace insulin	324	31.5
3. Prolonged use of oral hypoglycaemic drugs and insulin can lead to serious side effects	332	32.2
4. Oral hypoglycaemic drugs are more effective than insulin	297	28.8
5. Treatment with herbs is better than treatment with medication	391	38.0
<b>C. Herbs used in management of DM</b>		
1. Black seed ( <i>Nigella sativa</i> )	534	51.8
2. Garlic ( <i>Allium sativum</i> )	494	48.0
3. Fresh onion ( <i>Urginia maritima</i> )	352	34.2
4. Qesher Al-Roman ( <i>Punica granatum</i> )	339	32.9
5. Al-Shaeer ( <i>Hordeum vulgare</i> )	315	30.6

Table IV: Distribution of attendees according to their level of misconception concerning DM

Variables	Level of misconception				Total	
	Low		High		No	%
	No	%	No	%		
Aetiology of DM	812	78.8	218	21.2	1030	100.0
General concepts of DM	888	86.2	142	13.8	1030	100.0
Diet for diabetic patients	920	89.3	110	10.7	1030	100.0
Treatment of DM	954	92.6	76	7.4	1030	100.0
Herbal treatment used in control of DM	927	90.0	103	10.0	1030	100.0
Total diabetes misconception score	908	88.2	122	11.8	1030	100.0

(see Table IV). A high proportion of the attendees (21.2%) had misconceptions about the aetiology of DM, followed by misconceptions about general concepts of the disease (13.8%) and about the diet for diabetic patients (10.7%). Misconception scores about all aspects of DM were added together to form the total misconception score. Results showed that 11.8% of the attendees had misconceptions about the disease.

According to Table V, there is a statistically significant association between the attendees' level of misconception and their educational level. A high level of misconception was found among 23.5% of illiterate or read-and-write attendees. Moreover it was found that retired attendees and those that were free labourers had statistically significant higher levels of misconception (20.8% and 17.7% respectively) in comparison to students (6.7%) and doctors and engineers (5.6%). In addition, attendees with a low family income (< 5 000 SR) had a high level of misconception (18.7%). By studying the correlation between the level of misconception and other attendee characteristics (age, nationality, marital

Table V: Association between socio-demographic characteristics of attendees and their total diabetes misconception score

Socio-demographic characteristics	Level of misconception				Total		$\chi^2$ Test	P-value
	Low		High		No	%		
	No	%	No	%				
<b>1. Educational level</b>								
Illiterate or read-and-write	52	76.5	16	23.5	68	100.0	46.042	0.000
Primary and intermediate	159	78.3	44	21.7	203	100.0		
Secondary and diploma	375	89.9	42	10.1	417	100.0		
University and higher education	322	94.1	20	5.9	342	100.0		
<b>2. Occupation</b>								
Free labour	102	82.3	22	17.7	124	100.0	22.73	0.002
Doctor, engineer	68	94.4	4	5.6	72	100.0		
Civil services	303	86.4	48	13.6	351	100.0		
Unemployed	82	88.2	11	11.8	93	100.0		
Retired	61	79.2	16	20.8	77	100.0		
Student	292	93.3	21	6.7	313	100.0		
<b>3. Total family income per month in Saudi Riyals (SR)</b>								
< 5 000 SR	279	81.3	64	18.7	343	100.0	23.79	0.000
5 000–10 000 SR	358	90.9	36	9.1	394	100.0		
≥ 10 000 SR	264	92.6	21	7.4	285	100.0		
Refused to answer	7	87.5	1	12.5	8	100.0		

**Table VI:** Stepwise logistic regression analysis of significant factors predicting misconception among attendees

Variables	B-coefficient	SE	P-value	OR	95% confidence interval	
					Lower	Upper
1. Educational level	-0.285	0.083	0.001	0.752	0.639	0.885
2. Family income	-0.379	0.139	0.006	0.684	0.521	0.899
Constant	0.490	0.649				

Model  $\chi^2_{(3)} = 48.14, p < 0.001$

status, presence of DM and attendance of health education sessions on DM), it was found that there was no statistically significant association.

Table VI represents the results of the stepwise logistic regression analysis of significant factors predicting misconception among PHCC attendees. The following factors were found to be independently and significantly associated with an increased level of misconception: low level of education (OR = 0.752, CI = 0.639–0.885) and lower family income (OR = 0.684, CI = 0.521–0.899).

Regarding the sources of information on DM among PHCC attendees, it was noticed that television was mentioned as the main source (57.6%), followed by friends (55.1%) and family members (54.7%), while PHCCs were mentioned by only 17.8% and exhibitions and health occasions by 14.5% of the attendees.

## Discussion

The sample involved in this study was composed mainly of subjects with Saudi citizenship. This implies that their health-related culture is mainly derived from local community health traditions. In addition, the sample represented a group with a reasonable education who were mostly of young age. Another characteristic of the sample is that about one-tenth of the subjects have DM, which approximates to the known national prevalence of the disease in Saudi Arabia.<sup>6,7</sup>

About two-thirds of the attendees believed that DM is mainly an inherited disease. This may be sound knowledge, but it lacks precision. It would be more productive if subjects considered the risk of DM so that some measures for prevention could be understood and applied to avoid the disease.<sup>16</sup> The results revealed that a substantial proportion of the sample (65.9%) believed that excessive sugar intake can directly cause DM. This has an element of truth in it, in that excessive sugar intake may lead to obesity and hence to DM. But the fact is that the misconception may be based on another non-scientific basis that requires correction and explanation by means of health education.

Also, the study revealed that 60% of the sample believed that multivitamins are important in the management of DM. There is no scientific evidence regarding the benefits of vitamins in diabetes management,<sup>17</sup> and this misconception, if left uncorrected, may lead to unnecessary expenditure on drugs.

One-fifth to one-third of the attendees had misconceptions regarding diabetic nutrition. Such misconceptions include believing that taking medication can take the place of eating correctly, and believing in the benefits of honey and date consumption. These misconceptions should be taken seriously. For example, it has been shown that the glucose content of dates is high.<sup>18</sup> The whole subject of nutrition in DM, which is now well outlined and dictated,<sup>19</sup> should be part of the health education and management of DM, in order to achieve the recommended standards of disease control.

The attendees also displayed a lack of education regarding the use of insulin and oral hypoglycaemic drugs; there is a misconception that oral medications are more effective than insulin. This may be due to patients not being pleased with receiving daily injections, regarding it as diminished quality of life. Health education in this area is necessary to improve compliance and achieve control.

A substantial proportion (38%) of the sample also held the misconception that herbs are more effective in treating DM than medications. This misconception also needs to be addressed by diabetic health educators in order to avoid unnecessary herbal side effects and deterioration of compliance to proven modern therapy for DM. Other studies have also shown that many people, including diabetics, still believe in and use herbal medicine as part of their management of the disease.<sup>8,20</sup> Over 50% of diabetic patients expressed their belief in the use of herbal medicine for the management of DM.<sup>8</sup>

The study, in general, revealed that significantly more subjects who have a lower educational level held misconceptions about DM. Similar results were reported from a study in Pakistan,<sup>21</sup> in which non-diabetic individuals with five to sixteen years of education attending PHCCs in Karachi had fewer misconceptions than illiterate people. Efforts should be made to promote education and health awareness regarding diseases, with more emphasis on addressing myths regarding DM. This group should be targeted for effective health education using proper doctor–patient relations and communication.

## Conclusions

This study revealed a high prevalence of misconception about the aetiology of, role of diet in and management of DM among attendees of PHCCs in the Eastern Province of Saudi Arabia. About one-third of the attendees held the belief that intake of dates, honey and herbs is effective in managing DM. More than half of the sample believed that routine multivitamins are important in the management of DM. Low socioeconomic status manifested by low educational level and low income level were significant factors associated with misconceptions about DM.

There is a great need for continuous health education of PHCC attendees in general and diabetics in particular to raise their knowledge and awareness of different aspects of DM. This can be done by all members of the private health care team through a structured programme using different health education strategies such as focus group discussions, demonstrations and story-telling.

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