

## Belief about Medications among Type 2 Diabetic Patients Attending the National Diabetes Center in Iraq.

Esraa A. Hussein <sup>\*,1</sup>, Dheyaa J. Kadhim <sup>\*\*</sup> and Tawfeeq F. Al-Auqbi <sup>\*\*\*</sup>

\* Ministry of Health/Environment, Baghdad, Iraq.

\*\*Department of Clinical Pharmacy, College of Pharmacy, University of Baghdad, Baghdad, Iraq.

\*\*\*Al-Mustansiriya University, National Diabetes Center, Baghdad, Iraq.

### Abstract

Diabetes mellitus is a common health problem worldwide counting about 1.2 million cases in Iraq in 2015. Taking in account of the patient's beliefs about the prescribed medication had been reported to be one of the most important factors that affects adherence where holding positive beliefs about medications is a prerequisite for intentional adherence. The aim of the current study was to investigate and assess beliefs about medicines among type 2 diabetic patients and to determine possible association between this belief and glycemic control as well as some patient-specific factors. This study is a cross-sectional study carried out on 380 (mean age  $56.58 \pm 10.06$  years) already diagnosed T2DM patients who attended the National Diabetes Center, Al-Mustansiriya University – Baghdad/ Iraq during December-2016 to March-2017. Belief about medicine was assessed by using an arabic version of the questionnaire. The patients had a stronger agreement with the mean necessity scale (19.29) than the mean concern scale (14.27). The majority of the patients (76.3%) had strong beliefs in the necessity of anti-diabetic treatment for maintaining good control of diabetes (scores of specific-necessity was greater than score of specific-concern). However, (18.4%) of the patients reported strong concerns about the anti-diabetic treatment (scores of specific-concern greater than score of specific-necessity). The small number of the patients (5.3%), have equal scores for specific-necessity and specific-concern scores. The patient's belief about medicine was found to be poor predictor of good glycemic control.

**Keywords:** Type 2 diabetes mellitus, Beliefs about medicines, Beliefs about medicines questionnaire (BMQ), National Diabetes Center, Iraq .

### المعتقدات عن الأدوية لدى مرضى النوع الثاني من السكري المراجعين للمركز الوطني للسكري في بغداد / العراق

اسراء عواد حسين <sup>\*</sup>، ضياء جبار كاظم <sup>\*\*</sup>، توفيق فاخر العقبى <sup>\*\*\*</sup>

\* وزارة الصحة والبيئة ، بغداد ، العراق .

\*\* فرع الصيدلة السريرية ، كلية الصيدلة ، جامعة بغداد ، بغداد ، العراق .

\*\*\* المركز الوطني للسكري ، الجامعة المستنصرية ، بغداد ، العراق .

### الخلاصة

يمثل مرض السكري مشكلة صحية مشتركة في جميع أنحاء العالم مع حوالي ١,٢ مليون حالة من مرض السكري قد سجلت في العراق في عام ٢٠١٥. مع الأخذ بعين الاعتبار ان معتقدات المريض حول الدواء الموصوف تعد واحدة من أهم العوامل التي تؤثر على الالتزام بالعلاج ، حيث ان المعتقدات الإيجابية حول الأدوية هي شرط أساسي للالتزام المتعمد بالعلاج الموصوف للمريض . الهدف من الدراسة الحالية هو فحص وتقييم المعتقدات حول الأدوية ، بين مرضى السكري من النوع ٢ وتحديد الارتباط المحتمل بين هذا الاعتقاد ومراقبة نسبة السكر في الدم، وكذلك بعض العوامل الخاصة بالمريض. هذه الدراسة هي دراسة مستعرضة أجريت على ٣٨٠ مريض تم تشخيصهم سابقا بداء السكري النوع الثاني (متوسط العمر  $56.58 \pm 10.06$  سنة) ، الذين حضروا المركز الوطني للسكري، الجامعة المستنصرية - بغداد / العراق خلال الفترة من ديسمبر ٢٠١٦ إلى مارس ٢٠١٧. تم تقييم المعتقدات عن الادوية باستخدام النسخة العربية من الاستبيان. كان لدى المرضى اتفاق قوي حول ضرورة العلاج لمرض السكري بمعدل (١٩,٢٩) مقارنة بالقلق من اعراضها الجانبية والمستقبلية (١٤,٢٧). وكان لدى غالبية المرضى (٧٦,٣٪) معتقدات قوية في ضرورة العلاج المضاد للسكري للحفاظ على السيطرة الجيدة على المرض (نسبة ضرورة العلاج كانت أكبر من نسبة القلق من الآثار الجانبية والمستقبلية للأدوية). ومع ذلك، (١٨,٤٪) من المرضى عبروا عن مخاوف قوية بشأن العلاج المضاد للسكري (نسبة القلق من الآثار الجانبية والمستقبلية للأدوية أكبر من نسبة ضرورة العلاج). عدد قليل من المرضى (٥,٣٪)، لديهم نسبة متساوية لضرورة العلاج و القلق منه. ايضا وجد أن معتقد المريض كان متنبأ ضعيفا للتحكم الجيد في نسبة السكر في الدم.

الكلمات المفتاحية: مرض السكري النوع الثاني ، استبيان المعتقدات حول الادوية ، المركز الوطني للسكري .

### Introduction

Diabetes mellitus (DM) is defined by the American Diabetes Association (ADA) as a metabolic disorders characterized hyperglycemia due to defects in insulin secretion and/ or insulin action <sup>(1)</sup>. Globally, an estimated 422 million adults

were living with diabetes in 2014, compared to 108 million in 1980 <sup>(2)</sup>. Type 2 diabetes mellitus (T2DM) represents about 90 to 95% of the overall diabetes types worldwide <sup>(3)</sup>.

<sup>1</sup>Corresponding author E-mail: esraa\_pharma87@yahoo.com

Received: 21/10/ 2017

Accepted: 11 /11/2017

Research conducted in patients with a variety of long-term conditions suggests that the key beliefs influencing patients' commonsense evaluations of prescribed medicines can be grouped under two categories: Necessity beliefs and concern beliefs <sup>(4)</sup>. Concern beliefs are about the adverse consequences of taking a drug, whereas necessity beliefs are about the positive effects of a drug on someone's health <sup>(5)</sup>. Socio-demographic factors (including gender, Cultural backgrounds, and age) have been shown to be related to beliefs in medicines <sup>(6-9)</sup>. In addition, clinical characteristics of individuals (including duration of disease, experience of taking medicines) have been also shown to be related to beliefs in medicines <sup>(8, 10)</sup>. Furthermore, taking account of the patient's beliefs about the prescribed medication had been reported to be one of the most important factors that affects adherence where holding positive beliefs about medications is a prerequisite for intentional adherence <sup>(4, 11, 12)</sup>. To measure beliefs about medicines, the Beliefs about Medicines Questionnaire (BMQ) was developed by Horne *et al* <sup>(10)</sup>. The BMQ questionnaire is a self-administered questionnaire, which focuses directly on the beliefs and concerns of the patient about the use and efficacy of medicines. It can be used for a wide range of diseases where prescribed medication is required <sup>(13)</sup>. The aim of the current study was to investigate and assess beliefs about medicines, among type 2 diabetic patients and to determine possible association between this belief and glycemic control as well as some patient-specific factors.

## Patients and Method

### Patients

The current cross-sectional study was carried out on 380 (mean age  $56.58 \pm 10.06$  years) already diagnosed T2DM patients who attended the National Diabetes Center, Al-Mustansiriyah University – Baghdad/ Iraq during December-2016 to March-2017. The number of male patients was 183 (48.16%) while the number of female patients was 197 (51.84%).

### Inclusion criteria

The inclusion criteria for the current study were:

- 1-T2DM patients, age  $\geq 30$  years of either sex.
- 2-Patients have been diagnosed with T2DM at least one year before.
- 3- Patients should be able to communicate and willing to participate in the study.

### Exclusion criteria

- Exclusion criteria including the following:
- 1-Patients excluded if they did not consent to participate.
  - 2-Patient who had hearing, speech or cognitive deficits (physical or mental state) that would impair understanding of the questions.

3-Female patients who are pregnant or breast feeding.

### Sample size calculation population

Sample size was calculated using Raosoft sample size calculator <sup>(14)</sup>. Assuming the margin of error of 5% and the confidence level is 95%, the total number of diabetic patients registered at the above center were 33,408 patients at the beginning of the current study then the sample size will be of minimally 380 patients.

## Method

### The questionnaires

Belief about medicine was assessed by using an Arabic version <sup>(15)</sup> of the beliefs about medicines questionnaire (BMQ) developed by Horne *et al* <sup>(10)</sup> (figure-1). The BMQ consists of two sections; general and specific. The specific section assesses patients' beliefs about medications prescribed for a particular illness and comprises two domains assessing personal beliefs about the necessity (Specific necessity) of prescribed medication for controlling their illness (5 statements) and concerns (specific concern) about the potential adverse consequences of taking it (5 statements). The general section of the BMQ deals with more general beliefs about medicines and comprises also two domains, the (General overuse) scale addresses views about the way in which medicines are used by doctors (4 statements) and the (General harm) scale which assesses beliefs about the degree to which they perceive medicines as essentially harmful. Patients indicate their degree of agreement with each question in subparts; belief about medicines on a five-point Likert scale, where :1 = strongly disagree, 2 = disagree, 3 =uncertain, 4 = agree, and 5 = strongly agree.

Thus, Points of each scale are summed to give a scale score. Higher scores indicate stronger beliefs in the concepts of the scale. Specific necessity and specific concerns scales have 5 items and scores range from 5 to 25. Higher specific necessity scores represent stronger perceptions of personal need for the medication to maintain health now and in the future. Higher specific concerns scores represent stronger concerns about the potential negative effects of the medication. The general overuse and the general harm scales range from 4 to 20. Higher scores on the general harm scale represent more negative views about medicines as a whole and a tendency to see medicines as fundamentally harmful, addictive poisons. Higher scores on the general overuse indicate more negative views about the way in which medicines are prescribed and beliefs that they are overused by doctors <sup>(16)</sup>.

**Figure(1): The beliefs about medicines questionnaire (BMQ) <sup>(10)</sup>.**

	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
<b>Specific necessity</b>					
1-My life would be impossible without medicine					
2-Without medicine I'll be very ill					
3-My health , at present depend on my medicine					
4-My medicine protected me from becoming worse					
5-My health in the future depends on my medicine					
<b>Specific concern</b>					
6-I sometimes worry about the long term effect of my medicine					
7-Having to take medicine scares me					
8-I sometimes worry about becoming too dependent on my medicine					
9-My medicine disrupt my life					
10-My medicines are mystery to me					
<b>General-Harm</b>					
11-People who take medicines should stop their treatment for a while every now and again					
12-Most medicines are addictive					
13-Medicines do more harm than good					
14-All medicines are poison					
<b>General-Overuse</b>					
15-Natural remedies are safer than medicines					
16-Doctors use too many medicines					
17-Doctors place too much trust on medicines					
18-If doctors had more time with their patients they would prescribe fewer medicines					

**Study design****The pilot study**

A pilot study was conducted on 40 T2DM patients to test wording and to optimize the Arabic phrasing of the questionnaires used in the current study. These data were not included in the main study.

**Administration of questionnaires and blood sample collection**

The data related to the study were collected by the researcher. The patients were interviewed (each patient spent approximately 30 minutes to fill the research questionnaires completely) after briefly explaining of study purpose. In addition, when blood sample was collected for analysis (which is a routine in this center) a sample was taken by the researcher for the analysis of glycosylated hemoglobin (HbA1c) from each patient.

**Statistical analysis**

Anderson darling test was done to asses if continuous variables follow normal distribution, if follow normal distribution, then mean and standard deviation used, if did not follow normal

distribution, then median and interquartile range (25% to 75%

percentile range) was used to present the data (box plot and whisker used to present them graphically). Discrete variables presented using their number and percentage, chi square test used to analyze the discrete variable or Fisher exact test used to analyze the distribution between 2 groups (used instead of chi square for 2x2 table, if total sample <20 and if 2 or more with expected frequency less than 5). Two samples t test used to analyzed the differences in means between two groups (if both follow normal distribution with no significant outlier). Mann Whitney U test used to analyzed the differences in median of two groups (if they do not follow normal distribution). Linear regression analysis performed to assess the relationship between different variables, if one or both of them follow normal distribution person regression used but if both did not follow normal distribution spearman correlation will used. Scatter plot used to present the regression analysis, r (correlation coefficient or standardized beta is a representative

of magnitude and direction of the relationship),  $r < 0.25$  weak,  $0.25 - 0.5$  mild,  $0.5 - 0.75$  moderate,  $> 0.75$  strong correlation. Negative sign indicate inverse relationship, but positive sign represent direct relationship. Receiver operating characteristic (ROC) curve used to see the validity of different parameters in separating cases with torsion from none torsion and area under the curve (AUC) and its p value prescribe this validity (if  $AUC \geq 0.9$  mean excellent test,  $0.8 - 0.89$  means good test,  $0.7 - 0.79$  fair test otherwise unacceptable). Trapezoidal method used for calculate the curve. In a ROC curve the true positive rate (Sensitivity) is plotted in function of

the false positive rate (100-Specificity) for different cut-off points. Each point on the ROC curve represents a sensitivity/specificity pair corresponding to a particular decision threshold.

## Results

### Personal, demographic and disease characteristics of participants

The personal characteristics of the participants involved in the current study and comparison with glycemic control are shown in table-1. In all of the variables, there were no significant difference between them according to the glycemic control.

**Table (1): Comparison of sociodemographic data according to glycemic control.**

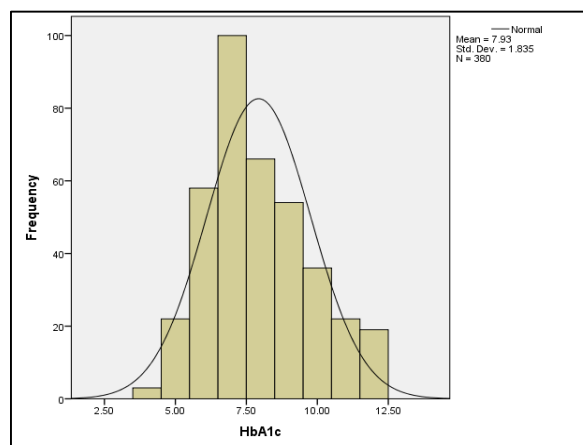
Glycemic control	Poor (HbA1C $\geq$ 7%)	Good (HbA1C<7%)	All	P value
<b>Number</b>	297	83	380	-
<b>Age, mean <math>\pm</math> SD</b>	56.3 $\pm$ 9.8	57.6 $\pm$ 11.2	56.6 $\pm$ 10.1	0.302
$\geq 65$ years	59 (19.9%)	25 (30.1%)	84 (22.1%)	-
<65 years	238 (80.1%)	58 (69.9%)	296 (77.9%)	
<b>Weight, mean <math>\pm</math> SD</b>	79.8 $\pm$ 11.9	79.1 $\pm$ 12.5	79.6 $\pm$ 12.0	0.648
<b>Height, mean <math>\pm</math> SD</b>	1.6 $\pm$ 0.1	1.7 $\pm$ 0.1	1.6 $\pm$ 0.1	0.304
<b>Body Mass Index, mean <math>\pm</math> SD</b>	29.5 $\pm$ 4.3	28.8 $\pm$ 5.0	29.3 $\pm$ 4.4	0.230
<25	38 (12.8%)	18 (21.7%)	56 (14.7%)	-
$\geq 25$	259 (87.2%)	65 (78.3%)	324 (85.3%)	
<b>Gender, no (%)</b>				0.452
Female	157 (52.9%)	40 (48.2%)	197 (51.8%)	
Male	140 (47.1%)	43 (51.8%)	183 (48.2%)	
<b>Social status, no (%)</b>				0.424
Divorced	5 (1.7%)	0 (0.0%)	5 (1.3%)	
Married	267 (89.9%)	79 (95.2%)	346 (91.1%)	
Widowed	15 (5.1%)	2 (2.4%)	17 (4.5%)	
Single	10 (3.4%)	2 (2.4%)	12 (3.2%)	
<b>Level of education</b>				0.564
Illustrate	15 (5.1%)	3 (3.6%)	18 (4.7%)	
Primary	50 (16.8%)	18 (21.7%)	68 (17.9%)	
Secondary	142 (47.8%)	34 (41.0%)	176 (46.3%)	
College	90 (30.3%)	28 (33.7%)	118 (31.1%)	

### HbA1C: glycosylated hemoglobin.

The use of insulin therapy, number of medications, duration of DM, presence of co-morbid diseases and emergency room admission are shown in table-2 also with a comparison of glycemic control. Patient with poor glycemic control had longer median duration of diabetes mellitus compared to good glycemic control (7 versus 4 years) and it was significant. The use of insulin therapy was significantly higher in patients with poor glycemic control compared to those with good glycemic control; the rest of the variables had no significant difference between them using glycemic control.

### HbA1C: glycosylated hemoglobin.

The mean HbA1c value for the sample population was  $(7.93 \pm 1.83)$  % as illustrated in figure-1.



**Figure(1):- Mean HbA1c value for the sample population.**

**Belief about medicine**

Table-3 highlights the results from BMQ-subparts score presented according to the mean (SD), median and interquartile range (IQR). The findings showed the patients had a stronger

agreement with the mean necessity scale (19.29) than the mean concern scale (14.27). Furthermore, the mean score for BMQ general harm is (13.8) approximately the same as the mean total score for BMQ general overuse, (14.78).

**Table( 2): Comparison of insulin therapy use, medications, co-morbid disease and ER admission using glycemic control**

Glycemic control		Poor (HbA1C $\geq$ 7%)	Good (HbA1C<7%)	All	P value
<b>Number</b>		297	83	380	-
<b>Insulin use</b>	No	183 (61.6%)	76 (91.6%)	259 (68.2%)	<0.001
	Yes	114 (38.4%)	7 (8.4%)	121 (31.8%)	
<b>DM medications</b>	Singl e	125 (42.1%)	34 (41.0%)	159 (41.8%)	0.255
	Two	163 (54.9%)	49 (59.0%)	212 (55.8%)	
	>Two	9 (3.0%)	0 (0.0%)	9 (2.4%)	
<b>Hypertension</b>	No	119 (40.1%)	38 (45.8%)	157 (41.3%)	0.350
	Yes	178 (59.9%)	45 (54.2%)	223 (58.7%)	
<b>Dyslipidemia</b>	No	139 (46.8%)	42 (50.6%)	181 (47.6%)	0.540
	Yes	158 (53.2%)	41 (49.4%)	199 (52.4%)	
<b>Hypertension and dyslipidemia</b>	No	198 (66.7%)	57 (68.7%)	255 (67.1%)	0.731
	Yes	99 (33.3%)	26 (31.3%)	125 (32.9%)	
<b>Emergency room admission</b>	No	286 (96.3%)	81 (97.6%)	367 (96.6%)	0.566
	Yes	11 (3.7%)	2 (2.4%)	13 (3.4%)	
<b>Duration of Diabetes (median [interquartile range])</b>		7.0 (7.0 – 11.5)	4.0 (3.0 – 7.0)	7.0 (4.0 – 10.0)	<0.001

**Table (3): Descriptive analysis for beliefs about medicines questionnaire.**

	N	Min	Max	Mean	Std. Dev.	Median	Interquartile range
<b>SN</b>	380	5	25	19.29	4.51	20.0	17.0 - 23.0
<b>SC</b>	380	5	25	14.27	5.58	15.0	10.0 - 19.0
<b>GH</b>	380	4	20	13.87	4.25	14.0	12.0 - 17.0
<b>GO</b>	380	5	20	14.78	3.23	15.0	13.0 - 17.0
<b>BMQ</b>	380	34	84	62.21	10.26	62.0	54.3 - 70.0

**SN:** Specific necessity, **SC:** Specific concern, **GH:** General-Harm, **GO:** General-Overuse, **BMQ:** beliefs about medicines questionnaire.

The majority of the patients (76.3%) had strong beliefs in the necessity of anti-diabetic treatment for maintaining good control of diabetes (scores BMQ specific-necessity greater than score BMQ specific-concern). However, (18.4%) of the patients reported strong concerns about the anti-diabetic treatment (scores BMQ specific-concern greater than score BMQ specific-necessity). The small number of the patients (5.3%), have equal scores for BMQ specific-necessity and specific-concern scores (Table-4).

**Table(4): BMQ necessity – concern differential**

Necessity – concern differential	N	Percentage (%)
<b>Necessity &gt; concern</b>	290	76.3
<b>Concern &gt; necessity</b>	70	18.4
<b>Necessity = concern</b>	20	5.3
<b>Total</b>	380	100.0

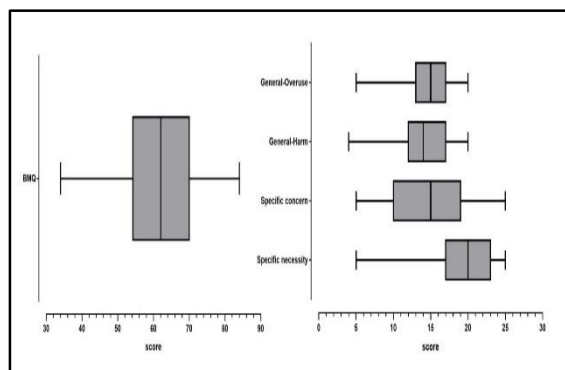
**BMQ:** beliefs about medicines questionnaire. Regarding specific necessity, the majority of the patients were either agree or strongly agree with median and interquartile range of 20 (17 – 23),

specific concern had a median and interquartile range of 15 (10 – 19). While the general harm had a median and interquartile range of 14 (12 – 17) and the general over use had a median and interquartile range of 15 (13 – 17) as illustrated in table-5.

**Table(5): Patient's belief about medicine (BMQ) [concern, necessity, harm and overuse]**

	Median	Interquartile range
<b>Specific necessity</b>		
Q1	4	(3 - 5)
Q2	4	(3 - 5)
Q3	4	(3 - 5)
Q4	4	(3 - 5)
Q5	4	(3 - 5)
Overall	20	(17 - 23)
<b>Specific concern</b>		
Q6	4	(2 - 5)
Q7	3	(2 - 4)
Q8	3	(2 - 5)
Q9	2	(1 - 4)
Q10	2	(1 - 3)
Overall	15	(10 - 19)
<b>General harm</b>		
Q11	3	(1 - 4)
Q12	4	(3 - 5)
Q13	4	(2 - 5)
Q14	4	(3 - 5)
Overall	14	(12 - 17)
<b>General-Overuse</b>		
Q15	3	(1 - 5)
Q16	4	(3 - 5)
Q17	4	(3 - 5)
Q18	5	(3 - 5)
Overall	15	(13 - 17)

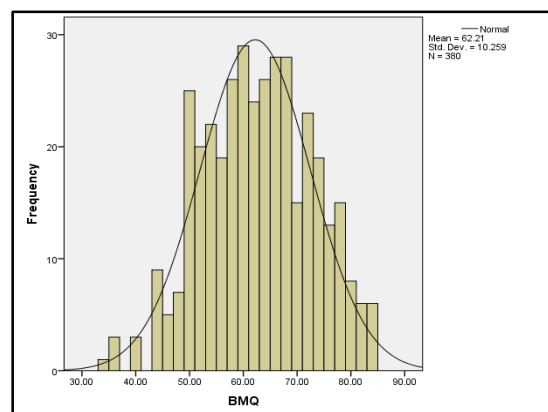
Figure-2 represents a boxplot of patient's belief about medicine score for each component separately (the right figure), and total score (the left figure) represented by median and interquartile range for both respectively.



**Figure(2): Box plot of Patient's belief about medicine (BMQ) score for each component (figure in the right) and total score (left figure)**

Figure-3 shows the distribution of total scores for the BMQ which is slightly greater than the middle

point of the scale. The greater the number of total score from the middle point of the scale, the higher the agreement to the conceptual proposal of belief.



**Figure (3): -The distribution of total scores for the BMQ.**

There was good inter-correlation between most of the components, except between (general harm or general overuse) with (specific necessity or concern), and all component correlate significant and directly with compensate score as illustrated in table-6.

**Table(6): Spearman correlation between the components of patient's belief about medicine score**

	Specific necessity	Specific concern	General harm	General-Overuse
Specific concern	0.273**	-	-	-
General harm	-0.086	0.096	-	-
General - Overuse	0.059	0.046	0.247**	-
BMQ	0.572**	0.719**	0.506**	0.468**

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**BMQ:** beliefs about medicines questionnaire. Overall there was significant direct linear correlation between HbA1c and BMQ score, indicating as the score increase the HbA1c also will increase, however for each group (poor or good glycemic control) there was no relationship between BMQ score and HbA1c, as illustrated in table-7 and figure- 4.

**Table(7): Linear regression analysis to predict HbA1c using BMQ score**

	$\beta$	P value
All	0.133	0.010
Poor control	0.063	0.278
Good control	0.160	0.149
$\beta$ : Correlation coefficient		

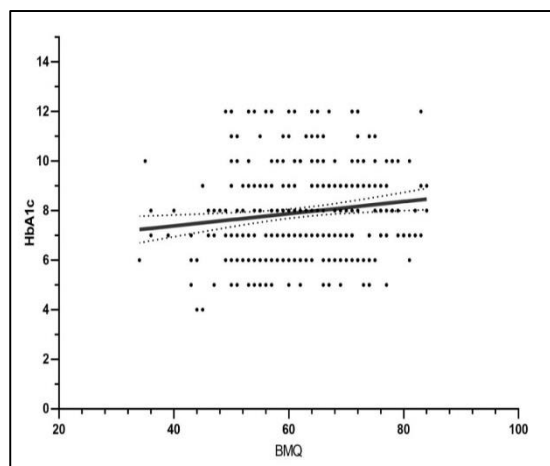
**Figure(4):Scatter plot of the relationship between HbA1c and BMQ score in all patients**

Table-8 demonstrates the comparison of BMQ score and its subparts with glycemic control where a poor control patients has a higher median score compared to good control patients regarding specific necessity and it was significant ,while no significance was available with other subparts and glycemic control.

**Table(8): Comparison of BMQ score and its component in their glycemic control.**

	Good	Poor	P value
Specific necessity	18 (12 – 22)	21 (18 – 23)	<0.001
Specific concern	13 (8 – 19)	15 (10 – 19)	0.137
General harm	15 (12 – 17)	14 (12 – 17)	0.165
General-Overuse	14 (12 – 16)	15 (13 – 17)	0.240
BMQ	60 (51 – 67)	63 (56 – 71)	0.018
Data presented using median and interquartile range			

**BMQ:** beliefs about medicines questionnaire ,to assess the ability of patient's belief about medicine in predicting good glycemic control, we noted that patient's belief about medicine had poor ability to predict good glycemic control as shown in table-9.

**Table(9): ROC analysis to determine the best predictor of good glycemic control using BMQ score.**

Score	AUC		P value	Optimal cut point (days)
Specific necessity	0.553	Poor	0.003	$\leq 18$
Specific concern	0.638	Poor	0.162	$\leq 13$
General harm	0.522	Poor	0.168	$> 12$
General-Overuse	0.542	Poor	0.233	$\leq 13$
BMQ	0.585	Poor	0.017	$\leq 56$

**ROC:** receiver operating characteristic, **AUC:** area under the curve, **BMQ:** beliefs about medicines questionnaire.

Table 10 shows that there was no significant relationship between **BMQ** and gender, duration of DM and body mass index, while a significant positive relation found with HbA1C and a negative one with age.

**Table (10): Univariate analysis between BMQ and various variables**

	Beta	Odd ratio	P value
Age	-0.105	-	0.040
Duration of DM	-0.042	-	0.380
Body Mass Index	0.020	-	0.695
Gender <sup>a</sup>	-0.006	0.994	0.31
HbA1c	0.133	-	0.010
Binary logistic regression used to find the relationship between BMQ and various variables			

**BMQ:** beliefs about medicines questionnaire.

## Discussion

Type 2 diabetes mellitus is characterized as hyperglycemia due to insulin resistance causing reduced tissue response towards insulin<sup>(16)</sup>. There is some uncertainty about the prevalence of diabetes mellitus in the Iraqi population. Iraq has undergone rapid economic development in the last 10 years. In December 2011, the International Diabetes Federation reported that, of the ten countries with the highest prevalence of diabetes in adults aged 20–79 years, six were in the Middle East, i.e., Kuwait (21.1%), Lebanon (20.2%), Qatar (20.2%), Saudi Arabia (20.0%), Bahrain (19.9%), and the United Arab Emirates (19.2%).Iraq is considered as having a medium prevalence (9.3%) of diabetes in the Middle East based on surveys from 2006 to 2007<sup>(17)</sup>. Reversing this “epidemic” will require major lifestyle changes and remaking our health care delivery system into one focused on proactive prevention and continuous access to coordinated, evidence-based management of chronic disease<sup>(18)</sup>.

In this study we assessed beliefs about medicines, among type 2 diabetic patients and to determine possible association between this belief and glycemic control as well as some patient-specific factors. In our study we used belief about medicine questionnaire (BMQ) to measure patients' belief about medicines. The BMQ has been translated into several languages to assess beliefs about medicines across a wide range of disease like diabetes mellitus, mental health illnesses, rheumatoid arthritis and others<sup>(15,19,20)</sup>. Findings of our study was that positive beliefs about the necessity of medication had recorded the highest mean among the rest of the questions and the concept of over using of the medicines and the concerns about potential adverse effects of medication recorded the same mean level of the questionnaire score while beliefs that medicines are generally harmful recorded the lowest mean level. This result was consistent with Sweileh *et al.* study in 2014 in Palestine who found that most diabetic patients strongly believe that anti-diabetic medications are necessary for their current and future health (highest score) while beliefs that medicines are generally harmful recorded the lowest mean level. However; unlike the results of current study, specific- concern score was higher than general – overuse score<sup>(21)</sup>. Concerns about long-term effects of using anti-diabetic medications should be assessed by healthcare providers to reduce it, thus improving medication adherence. Patients with DM need to know that their medicines are not addictive and have a good safety profile for long-term use<sup>(21)</sup>. Aflakseir A. in 2012 suggested that when people are concerned about the negative effects of prescribed medicines, they are less likely to adhere to their medication<sup>(22)</sup>. This study results showed that 76.3% of patients cleared up that patient beliefs on necessity outweighs concern, while 18.4% of patients have concern belief out-weighs necessity that need further attention. These findings are closely to that of (Manan *et al* 2014)<sup>(23)</sup> where 70.2% of patients belief of necessity outweighs concern, and 20% have concern beliefs outweighs necessity. These negative perceptions of medication are often associated with the beliefs that the dangerous aspects of medicines are due to their chemical/unnatural origins and therefore complementary or traditional treatments are perceived to be more “natural” and safer. This explanation supported by finding that the majority of the sample patients perceived that natural remedies are safer than medicines. In an effort to assess the ability of patient's belief about medicine in predicting good glycemic control, the result of the current study revealed that patient's belief about medicine had a poor ability to predict good glycemic control, this result was consistent to that of James and John in 2009 where neither anti-

hyperglycemic medication necessity nor concern was significantly associated with HbA1c<sup>(12)</sup>. The results of our study indicated that age of the patients was negatively related to patients' belief while Neame *et al.* in 2005<sup>(20)</sup> have reported that concerns about adverse consequences medications is independent of patients' age.

Most of the patients in this study strongly disagreed with the statement that "if doctors had more time with patients they would prescribe fewer medicines". Shorter visits associated with increased rate of medication prescribing<sup>(24)</sup>. Openness between the doctor and the patient during consultations will ultimately lead to clearer understanding, both in terms of the patient's understanding of the disease and treatment options, and in terms of the doctor's understanding of the patient's attitudes<sup>(25)</sup>. This finding had reflected that there's a lack of patients' – healthcare provider confidence which is considered as major problem in advocating patient disease management

## Conclusion

The majority of the patients had strong beliefs in the necessity of anti-diabetic treatment for controlling their illness. However, patient's belief about medicine had poor ability to predict good glycemic control.

## References

1. American Diabetes Association. Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 2014; 37(Suppl. 1): S81–S90.
2. Global Report on Diabetes, World Health Organization, 2016. Available at: [www.who.int/diabetes/global-report](http://www.who.int/diabetes/global-report).
3. American Diabetes Association. Classification and Diagnosis of Diabetes. *Diabetes Care*. 2015; 38(Suppl. 1):S8–S16.
4. Rob H, Sarah C, Rhian P, *et al.* Understanding Patients' Adherence-Related Beliefs about Medicines Prescribed for Long-Term Conditions: A Meta-Analytic Review of the Necessity-Concerns Framework. *Plos One*. 2013; 8 (12): 1-24.
5. Sieta T, Joost C, Rosalie V, *et al.* Medication beliefs, treatment complexity, and non-adherence to different drug classes in patients with type 2 diabetes. *Journal of Psychosomatic Research*. 2014; 76 : 134–138.
6. Kirsten K, Hilde F, Maria R, *et al.* Beliefs about medicines among Norwegian outpatients with chronic cardiovascular disease. *Eur J Hosp Pharm*. 2013;0:1–3.
7. Isacson D, Bingefors K. Attitudes towards drugs—a survey in the general population. *Pharm World Sci*. 2002;24:104–10.
8. Horne R, Graupner L, Frost S, *et al.* Medicine in a multi-cultural society: the effect of cultural background on beliefs about medications. *Soc Sci Med*. 2004;59(6):1307-13.

9. Corey S, Tiffany S, Amber M *et al.* Older beliefs concerning mental health problems. *Am J Geriatr Psychiatry*. 2008; 16(12): 1010–1019.
10. Horne R, Weinman J, Hankins M. The beliefs about medicines questionnaire: the development and evaluation of a new method for assessing the cognitive representation of medication. *Psychol Health* 1999; 14: 1–24.
11. Mohamed M, Salmiah M, Mohd D. Beliefs and adherence to medicines among Malaysian Malay type 2 diabetes. *International Journal of Current Research*. 2014; 6 (02) :5026-5033.
12. James E, John D. Diabetic Patients' Medication Underuse, Illness Outcomes, and Beliefs About Antihyperglycemic and Antihypertensive Treatments. *Diabetes care*. 2009;32(1): 19-24.
13. Konstantina T, Markos G , Nikolaos G, *et al.* Beliefs about Medicines Questionnaire (BMQ) for inflammatory bowel disease patients in Greece. Is it useful?. *European Journal for Person Centered Healthcare*. 2016; 4 (1) :187-195.
14. Raosoft sample size calculator. Available at: [www.raosoft.com/samplesize.html](http://www.raosoft.com/samplesize.html)
15. Raniah M, Waleed M, Adham S , *et al.* Beliefs About Medicines and Self-reported Adherence Among Patients with Chronic Illness: A Study in Palestine. *Journal of Family Medicine and Primary Care*. 2014; 3 (3): 224-229.
16. Marhanis S. Omar, Kong L. san, Diabetes knowledge and medication adherence among geriatric patient with type 2 diabetes mellitus: *International Journal of Pharmacy and Pharmaceutical Sciences* . 2014;3 (6).
17. Abbas A. Mansour, Ahmed AAl-Maliky *et al.* ,Prevalence of diagnosed and undiagnosed adults' help-seeking attitudes and treatment diabetes mellitus in adults aged 19 years and older in Basrah, Iraq: Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy 2014;7 :139–144.
18. William R. Rowley, Clement Bezold, Creating Public Awareness: State 2025 Diabetes Forecasts: *Population Health Management* 2012;15 (4).
19. Jo A. Sirey, Alexandra G. *et al.* , Medication Beliefs and Self-Reported Adherence Among Community-Dwelling Older Adults: *Clinical Therapeutics* 2013 ; 35: (2).
20. R. Neame and A. Hammond, Beliefs about medications: a questionnaire survey of people with rheumatoid arthritis: *Rheumatology* 2005 ; 44 : 762–767.
21. Waleed M Sweileh, Sa'ed H Zyoud, Influence of patients' disease knowledge and beliefs about medicines on medication adherence: findings from a cross-sectional survey among patients with type 2 diabetes mellitus in Palestine: *BMC Public Health* 2014; 14: (94).
22. Aflakseir A, Role of illness and medication perceptions on adherence to medication in a group of Iranian patients with type 2 diabetes: *Journal of Diabetes* 2012; 4: 243–247.
23. Mohamed M. Manan, Salmiah M. Ali, Beliefs and Adherence Among Malaysian Malay Type 2 Diabetics: *International Journal of Current Research* 2014; 02 : (6): 5026-5033.
24. David C. Dugdale ,Ronald Epstein, Steven Z. Pantilat, Time and The Patient-Physician Relationship, *JGIM*, 1999;14 (1).
25. J S Chatterjee, From compliance to concordance in diabetes, *J Med Ethics*, 2006 ;32: 507-510