



## Beliefs about medicine among sample of Iraqi Type 2 Diabetic Patients in Karbala. Iraq: Across sectional study

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Submitted:08 September 2022. Accepted: 22 October 2022. Published: 24 November 2022

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### ABSTRACT

**Back ground:** Diabetes mellitus (DM) is one of the fastest-growing diseases in the world, it is a big threat to global health. The number of people with diabetes mellitus is rising quickly at alarming rate, it has been called an epidemic disease of the 21st century, affecting millions of people all over the world. Achieving ideal glycemic control can lower DM-related morbidity and mortality , As a result, adherence to medication is a critical factor in determining the efficacy of diabetes therapy. Medication adherence is influenced by the patient's medication beliefs, particularly the Patient's concern about drugs, which obstructs adherence to treatment. Therefore, especially in diabetic patients, it is significant to consider the Patient's medication beliefs . For that reason, this study aimed to investigate and evaluate beliefs about medications in patients with T2DM and assess the probable relation between this belief and glycemic control and some patient-particular factors.

**Subjects and Methods:** The present study is cross sectional study included 200 Iraqi patients with type 2 diabetes mellitus who visited the Endocrinology Center/Al-Huja Hospital in Karbala between November 2020 and December 2021. Belief about medeciations was measured using the Arabic version of the BMQ Questionnaire.

**Results:** The mean age of the patients was (51.46±9.05) years. The patients had a stronger agreement with the mean necessity scale (18.07) approximately the same as the mean total score for BMQ mean concern scale (17.79). About half of patients (45%) have great opinion for needing to anti-diabetic therapies to maintain the glucose level normal, but with great worry concerned (38.5%) to side effects of these medications. And 16.5% of patients had specific-necessity score equal to specific-concern.

**Conclusions:** These findings lead to conclude That patient's belief about medicine was found to be poor predictor of good glycemic control.Nearly half of study individuals were appeared having a high believe for needing to anti-diabetic therapy to control the disease despite the presence of a significant concern regarding the long-term effects of drug use.

**Keywords:** *Specific concern, Beliefs about medicine, Specific necessity, T2DM*

## INTRODUCTION

Diabetes Mellitus is a chronic metabolic disease which manifested with low insulin production as well as insulin resistance resulting from genetic and environmental factors. It is one of the most rapidly growing diseases globally and poses a primary risk to global health<sup>(1)</sup>. The disease could result in frequent damages and dysfunctions for different organs particularly nerve, blood vessel, kidney, heart and eye<sup>(2)</sup>.

There was a rapid elevation in prevalence of disease at an alarming rate and was reported epidemically in 21<sup>st</sup> century, to affect millions of individuals around the world<sup>(3)</sup>. As stated by the International Diabetes Federation (IDF). It is assumed that during 2019, 463 million people between 20-79 years were vivid with DM<sup>(4)</sup> and expected to skip 640 million in 2040. Nearly fifty percent of patient's number with diabetes are insensible of their illness, thus, leading to developing diabetic complications; 5 million deaths approximately in 2015 were attributed to diabetes<sup>(5)</sup>; Achieving ideal glycemic control can lower DM-related morbidity and mortality<sup>(6)</sup>. All of these factors are required for achieving optimal glycemic control<sup>(7)</sup>. As a result, adherence to medication is a critical factor in determining the efficacy of diabetes therapy. Medication adherence is influenced by the patient's medication beliefs, particularly the Patient's concern about drugs, which obstructs adherence to treatment. As a result, especially in diabetic patients, it is significant to consider the Patient's medication beliefs, resolve patients' concerns to progress adherence and manage patients using better interventions and education to address the patient's concern, medication side effects and reduce non-adherence of medications<sup>(8)</sup>. To measure beliefs about medicines, the Beliefs about Medicines Questionnaire (BMQ) was developed by Horne et al<sup>(9)</sup>. In the current study, belief about medicines was measured using the Arabic version of the BMQ questionnaire. It is the popular method for evaluating medication beliefs is a self-reporting questionnaire with established validity and reliability<sup>(10)</sup>. and in this study the reliability was good about 0.757. This questionnaire was developed by Horne et al to assess a patient's mental representation of medication and validated for use among chronic diseased individuals<sup>(9)</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>(11)</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.

## SUBJECTS AND METHODS

### *Subjects*

The present cross-sectional study included (200) type 2 diabetes patients who visited the Endocrinology Center / Al-Al-Huja hospital in Karbala, Iraq, between November 2020 and December 2021. A control group of 120 healthy people was also included.

### *Inclusion criteria*

Patients were all patients who fulfilled the study criteria throughout the study period:

- 1-Diabetic individuals identified as type 2 by the American Diabetes Association (more than 6 months before the date of participation in the study)
- 2-Age 30 to 65 years.
3. Patient communication and willingness to engage in the study.

### *Exclusion criteria*

To prevent interfering with the research design, several exclusion criteria were followed:

- 1-Patients with T1DM.
- 2-Patients with hearing, speech, or cognitive impairments (physical or mental condition) that would make it difficult for them to grasp the inquiries.
- 3-Patients with significant health problems, such as kidney disease, liver illness, cardiovascular disease, hypo- or hyperthyroidism, cancer, and other dangerous medical issues.
- 4-Women who are pregnant or lactating women.
- 5-patients with covid-19.
- 6-Patients who provide insufficient information throughout the questionnaire completion process will also be eliminated from the research.
- 7-Patients taking antidepressant medication or receiving therapy for any neurological or psychiatric disorder were excluded from the study as such events could negatively influence their HRQOL.

### **Method** **questionnaire**

Belief about medicine was assessed by using an Arabic version of the BMQ questionnaire. It is the popular method for evaluating medication beliefs. It is a self-reporting questionnaire with established validity and reliability<sup>(10)</sup>. and in this study the reliability was good about 0.757. There are two sections in the BMQ: general and specific.

BMQ specific section evaluates patients' attitudes toward prescription drugs described to a specific disease and in turn, this specific part contains two subparts; specific necessity of prescribed drugs for a particular disease (5 statements) and Specific-Concerns about taking prescribed medications because of worries regarding dependence and disruptive effects. The scores for each component of the particular questionnaire range from five to twenty-five. A general section of the BMQ is about general beliefs about medicines and also contains two 4-item factors two subparts, the general overuse, which is about how doctors overuse drugs and medicines. The 4 statements and Part of general harm are assessing beliefs about harmful, addictive, and poisonous medicines<sup>(12)</sup>. Scores for each part of the standard survey range from 4 to 20. Rate and response of each statement based upon 5-point Likert scale (Strongly Disagree, Disagree, Not Sure, Agree, and Strongly Agree). A high Necessity Score indicates a strong belief in the current and future need for medication to maintain good health<sup>(13)</sup>. Higher concern scores indicate greater emphasis on negative outcomes. Abuse and damage scores ranged 4 – 20, and greater scores indicated a tendency to view drugs as dangerous and stressful. A higher overall score indicates a more negative perception of how doctors prescribe drugs and a belief that they are overused<sup>(14)</sup>.

### **Administration of questionnaire**

The researcher herself collected the data for the study, when patients arrived at the hospital to complete their programmed laboratory data and receive treatment, they were asked if they agreed to participate in the study. If they agreed, they were given a complete explanation of the questions in the questionnaire; Each patient spent around 18 minutes entirely filling out the study questionnaire. We assessed weight and height to get BMI. We performed to determine the

glycemic control fasting blood sugar (FBS), glycosylated hemoglobin (HbA1c) that were defined as good (<7%) and poor (≥7%) at the time of admission. Details are shown in Table 3.

### **Ethical approval**

1. The proposal of the research was discussed and approved by the College of Pharmacy Scientific and Ethics Committee, and the agreement of Al Huja hospital in Iraq. Karbala was achieved.
2. verbal consent obtained from participants before participation in the study.
3. Patient data kept confidential and did not disclose to unauthorized personnel.

### **Statistical Analysis**

The data were coded using the following software, SPSS Inc, version 26 of the statistical program for social sciences. The Continuous data reported in this study were presented as mean ±SD when frequencies are used to represent categorical variables & their percentages, mean, and standard deviation were used to show the data and results. The independent student t-test was used to compare normally distributed numerical variables between two groups compared two discrete variables for categorical variables; chi-square was utilized.  $\chi^2$  test was performed to statistical analyzing data of gender, marital status, monthly income, education level. Pearson's or Spearman's rank was used to completing the correlation coefficient analyzes. A p-value of less than 0.05 or equal was considered statistically significant.

## **RESULTS**

### **Demographic characteristics of patients with type 2 DM and control subjects**

In this study. More than half of the patients (57.5%) were females. and 90 % of them were married. Only 22% of patients were presented with high monthly income (≥ 1000 \$), less than half of participants presented with level of education as secondary school and college. However, There was no statistically significant difference in age, gender, BMI, marital status, monthly income, or educational level ( $p>0.05$ ) between DM patients and healthy control (Table 1).

**TABLE 1:** Demographic data of T2DM patients compared to that of a control group.

| Characteristics          |               | Control<br>N=120 | T2DM<br>N=200 | p-value |
|--------------------------|---------------|------------------|---------------|---------|
| Age (years)              | Mean±SD       | 51.04±10.17      | 51.46±9.05    | 0.703   |
|                          | ≤ 50          | 50 (41.7)        | 85 (42.5%)    | 0.907   |
|                          | > 50          | 70 (58.3)        | 115 (57.5%)   |         |
| Gender                   | Sample size   | No. (%)          | No. (%)       | 0.166   |
|                          | Female        | 54 (45.0%)       | 107 (53.5%)   |         |
|                          | Male          | 66 (55.0%)       | 93 (46.5%)    |         |
| BMI (kg/m <sup>2</sup> ) | Mean±SD       | 29.23±3.41       | 29.83±3.95    | 0.170   |
|                          | Normal Weight | 18 (15.0%)       | 49 (24.5%)    | 0.103   |
|                          | Overweight    | 37 (30.8%)       | 61 (30.5%)    |         |
|                          | Obesity       | 65 (54.2%)       | 90 (45.0%)    |         |
| Marital Status           | Single        | 16 (13.3%)       | 20 (10.0%)    | 0.361   |
|                          | Married       | 104 (86.7%)      | 180 (90.0%)   |         |
| Monthly Income           | ≤ 500 \$      | 23 (19.2%)       | 54 (27.0%)    | 0.122   |
|                          | 500-1000 \$   | 75 (62.5%)       | 102 (51.0%)   |         |
|                          | ≥ 1000 \$     | 22 (18.3%)       | 44 (22.0%)    |         |
| Education level          | Illiterate    | 20 (16.7%)       | 42 (21.0%)    | 0.116   |
|                          | Primary       | 32 (26.7%)       | 70 (35.0%)    |         |
|                          | Secondary     | 37 (30.8%)       | 55 (27.5%)    |         |

(P-value &gt;0.05) = No -significant

This study found that out of 200 people, 75% had poor glycemic control, 57% had a positive family history for diabetes, 28 (14%) people had diabetes for less than a year, 68 (34%) had it for 1-5 years, and 104(52%) had it for more than 5 years. Regarding the prescriptions given for diabetics, the majority of the patients, 105 (52.5%), were treated with one oral

hypoglycemic agent, 77 (38.5%) were on two oral hypoglycemic agents, and 18 (9%) were taking more than two oral hypoglycemic agents, regarding the hypertension (HTN)23% and dyslipidemia were 32.5%. The disease characteristics of diabetic patients are shown (Table 2) and Descriptive statistics of Laboratory Investigations for diabetic patients (Table 3)

**TABLE 2:** Clinical characteristics of diabetic patients included in the present study.

| Diabetic Features            | Category    | No=200 | %     | p-value |
|------------------------------|-------------|--------|-------|---------|
| Glycemic control             | Poor ≥7%    | 150    | 75.0% | 0.001** |
|                              | Good <7%    | 50     | 25.0% |         |
| Family history for DM        | Positive    | 114    | 57%   | 0.048 * |
|                              | Negative    | 86     | 43%   |         |
| Duration of DM groups        | < 1 year    | 28     | 14.0% | 0.001** |
|                              | (1-5) year  | 68     | 34.0% |         |
|                              | > 5 years   | 104    | 52.0% |         |
| Diabetes medications no.     | One cure    | 105    | 52.5% | 0.001** |
|                              | Two cures   | 77     | 38.5% |         |
|                              | ≥ Two cures | 18     | 9.0%  |         |
| Hypertension                 | Yes         | 47     | 23.5% | 0.001** |
|                              | No          | 153    | 76.5% |         |
| Dyslipidemia                 | Yes         | 65     | 32.5% | 0.001** |
|                              | No          | 135    | 67.5% |         |
| Hypertension and dylipidemia | Yes         | 18     | 9.0%  | 0.001** |
|                              | No          | 182    | 91.0% |         |

(\* ) Significant differences at p-value ≤ 0.05, (\*\*) highly significant differences at P-value ≤ 0.01), HbA1C: glycosylated hemoglobin. DM: diabetes mellitus.

**TABLE 3:** Descriptive statistics of Laboratory Investigations for diabetetic patients .

| Variables                       | Mean±SD      | Min   | Max   | Median |
|---------------------------------|--------------|-------|-------|--------|
| <b>Glycemic indicators</b>      |              |       |       |        |
| HbA1C%                          | 8.94±2.19    | 5.2   | 16.1  | 8.47   |
| Fasting Blood Sugar (mg/dl)     | 186.54±59.1  | 104   | 368   | 174.5  |
| S. insulin (µU/mL)              | 14.54±7.77   | 4     | 43    | 12.9   |
| Insulin resistance              | 6.64±4.3     | 1.54  | 27.39 | 5.54   |
| <b>Lipid Profile</b>            |              |       |       |        |
| Total serum cholesterol (mg/dl) | 197.51±46.8  | 118.0 | 330.0 | 193.5  |
| S.LDL (mg/dl)                   | 120.86±41.66 | 32.0  | 259.0 | 113    |
| S.HDL (mg/dl)                   | 42.27±8.97   | 19.3  | 74.0  | 40.50  |
| S. VLDL (mg/dl)                 | 36.41±16.3   | 11.6  | 93.8  | 32.6   |
| S. Triglycerides (mg/dl)        | 187.07±93.7  | 40.0  | 595.0 | 164    |

Data are presented as Mean ± SD.

### **Belief about medicine**

Table-4 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 (18.07)

approximately the same as the mean total score for BMQ mean concern scale (17.79). Furthermore, the mean score for BMQ general harm is (13.09±2.79) which is approximately equivalent to the BMQ general

**TABLE 4:** Mean value of BMQ domains for patients believes.

| BMQ Domains             | DM patients n=200 |        |       |
|-------------------------|-------------------|--------|-------|
|                         | Mean ± SD         | Median | IQR   |
| Specific necessity (SN) | 18.07±3.99        | 19     | 15-21 |
| Specific concern (SC)   | 17.79±3.57        | 18     | 15-20 |
| General harm (GH)       | 13.09±2.79        | 13     | 11-15 |
| General-Overuse (GO)    | 13.92±2.85        | 14     | 12-16 |

BMQ: beliefs about medicines questionnaire. Data presented as mean ± SE, BMQ: belief of medication questionnaire.

About half of patients (45%) (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, (38.5%) of the

patients reported strong concerns about the antidiabetic treatment (scores BMQ specific-concern greater than score BMQ specific-necessity). This group of patients was worried about the adverse effect of the medications prescribed to them and the need to consume the medication daily. The remaining of the patients (16.5%), have equal scores for BMQ specific-necessity and specific-concern scores (Table -5).

**TABLE 5:** BMQ necessity – concern differential.

| Necessity – Concern differential | N   | Percentage |
|----------------------------------|-----|------------|
| Necessity > Concern              | 90  | 45%        |
| Concern > necessity              | 77  | 38.5%      |
| Necessity = Concern              | 33  | 16.5%      |
| Total                            | 200 | 100%       |

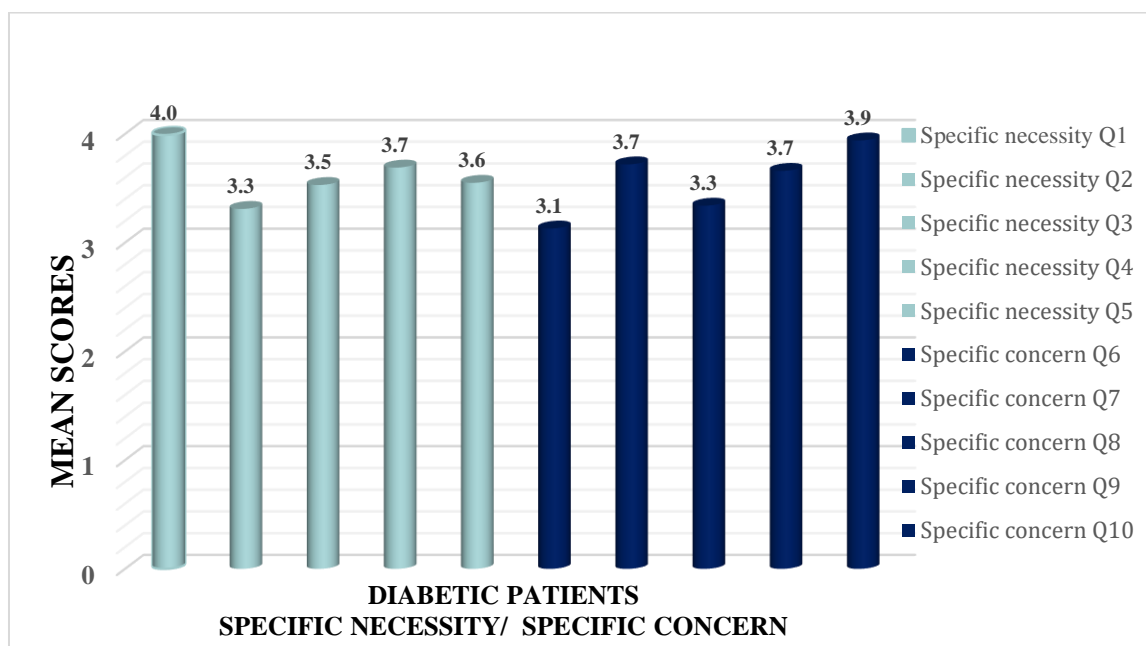


Regarding specific necessity, the majority of the patients were either agree or strongly agree with median and interquartile range of 20 (13.3 – 22), specific concern had median and interquartile range of 19 (14 – 23), While the general harm had

a median and interquartile range of 13 (10 – 16) and the general over use had a median and interquartile range of 10 (10 – 16) as illustrated in table-5.as illustrated in (Table- 6 , Figure 1) .

**TABLE 6:** Patient's belief about medicine) [ necessity, concern]

|                           | Strongly disagree (1) | Disagree (2) | Uncertain (3) | Agree (4) | Strongly agree (5) | Median | IQR      |
|---------------------------|-----------------------|--------------|---------------|-----------|--------------------|--------|----------|
| <b>Specific Necessity</b> |                       |              |               |           |                    |        |          |
| Q1                        | 3                     | 22           | 33            | 58        | 84                 | 4      | 3-5      |
| Q2                        | 16                    | 51           | 27            | 67        | 38                 | 4      | 2-4      |
| Q3                        | 5                     | 45           | 31            | 78        | 41                 | 4      | 2.3-4    |
| Q4                        | 9                     | 23           | 43            | 71        | 54                 | 4      | 3-5      |
| Q5                        | 12                    | 36           | 29            | 76        | 47                 | 4      | 3-4      |
| Overall                   | -                     | -            | -             | -         | -                  | 20     | 13.3 –22 |
| <b>Specific Concern</b>   |                       |              |               |           |                    |        |          |
| Q6                        | 16                    | 54           | 44            | 61        | 25                 | 3      | 2-4      |
| Q7                        | 6                     | 26           | 41            | 72        | 55                 | 4      | 3-5      |
| Q8                        | 19                    | 43           | 26            | 75        | 37                 | 4      | 2-4      |
| Q9                        | 16                    | 22           | 29            | 80        | 53                 | 4      | 3-5      |
| Q10                       | 2                     | 22           | 23            | 92        | 61                 | 4      | 4-5      |
| Overall                   | -                     | -            | -             | -         | -                  | 19     | 14-23    |
| IQR: interquartile range  |                       |              |               |           |                    |        |          |



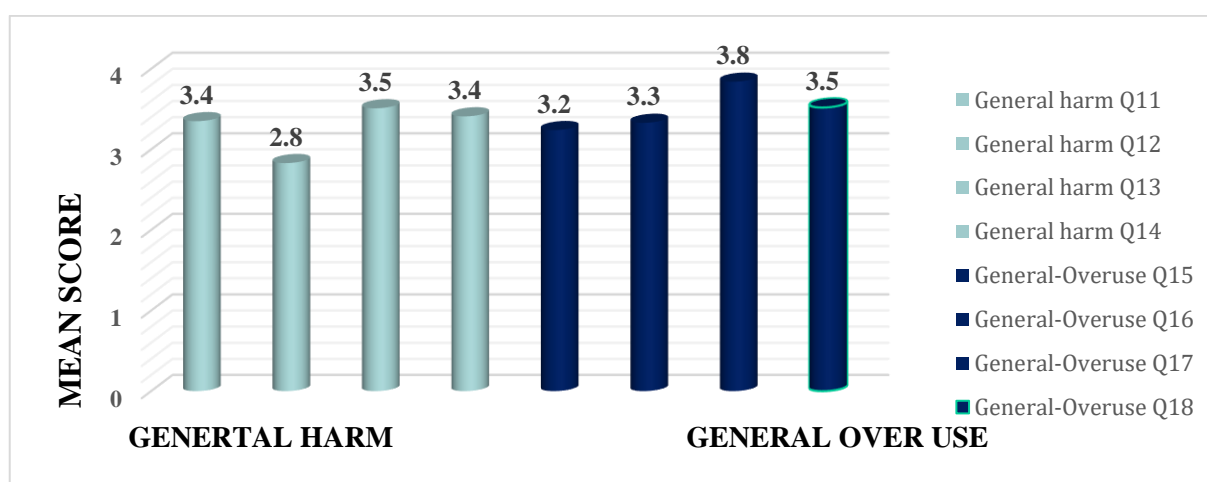
**FIGURE 1:** Patient's belief about medicine) [ necessity, concern]

The general harm had a median and interquartile range of 13 (10-16) and the general overuse had

a median and interquartile range of 10 (10 – 16), as illustrated in (Table 7, Figure 3).

**TABLE 7:** Patient's belief about medicine [harm and overuse]

|                        | Strongly agree (5) | Agree (4) | Uncertain (3) | Disagree (2) | Strongly disagree (1) | Median | IQR     |
|------------------------|--------------------|-----------|---------------|--------------|-----------------------|--------|---------|
| <b>General harm</b>    |                    |           |               |              |                       |        |         |
| Q11                    | 7                  | 60        | 34            | 55           | 44                    | 3      | 2-4     |
| Q12                    | 15                 | 83        | 44            | 38           | 20                    | 3      | 2-4     |
| Q13                    | 5                  | 36        | 43            | 85           | 31                    | 4      | 3-4     |
| Q14                    | 11                 | 34        | 58            | 56           | 41                    | 3      | 3-4     |
| Overall                | -                  | -         | -             | -            | -                     | 13     | 10 –16  |
| <b>General-Overuse</b> |                    |           |               |              |                       |        |         |
| Q15                    | 4                  | 65        | 48            | 46           | 37                    | 3      | 2-4     |
| Q16                    | 7                  | 54        | 45            | 55           | 39                    | 3      | 2-4     |
| Q17                    | 0                  | 11        | 47            | 105          | 37                    | 4      | 3-4     |
| Q18                    | 4                  | 34        | 55            | 68           | 39                    | 4      | 3-4     |
| Overall                | -                  | -         | -             | -            | -                     | 10     | 10 – 16 |



**FIGURE 2:** Patient's belief about medicine [harm and overuse]

There was good inter-correlation among most of the components, except between (general overuse) with (specific necessity), and all component correlate significant and directly with compensate score as illustrated in (table 8).

**TABLE 8:** Spearman correlation between the components of patient's belief about medicine score.

| BMQ domains      |                         | Specific Necessity | Specific Concern | General Harm |
|------------------|-------------------------|--------------------|------------------|--------------|
| Specific Concern | Correlation Coefficient | 0.573**            | --               |              |
|                  | p-value                 | 0.001              |                  |              |
| General Harm     | Correlation Coefficient | 0.160*             | 0.224**          | --           |
|                  | p-value                 | 0.023              | 0.001            |              |
| General-Overuse  | Correlation Coefficient | -0.019             | 0.284**          | 0.260**      |
|                  | p-value                 | 0.793              | 0.001            | 0.001        |

\*\* . Correlation is significant at the p-value <0.01 level.

\*. Correlation is significant at the p-value <0.05 level.

(Table 9) shows the correlations among age, gender, BMI, social State, education level, monthly uncome, family history for DM, diabetes duration, diabetic medication, presence of hypertension, dyslipidemia or both with diabetic medication believe domains. There was positive Significant weak correlation between specific beliefs (specific necessity, specific concern) and married patients ( $r = 0.144$  at  $P \leq 0.05$ ) with negative weak correlation among

specific concern belief with education level at value  $\leq 0.05$ . while Significant positive weak correlation between specific believe (specific necessity, specific concern) and positive family history for T2DM at value  $\leq 0.01$ . However, other patient's characteristics, such as age, gender, BMI, monthly income, diabetes medication number, duration, hypertension, dyslipidemia and both had no significant remaining had significant correlations with BMQ domains.

**TABLE 9:** Correlation between BMQ-domains with some patients and disease characteristics.

| Characters               | Specific Necessity |          | Specific Concern |          | General Harm |          | General-Overuse |          |
|--------------------------|--------------------|----------|------------------|----------|--------------|----------|-----------------|----------|
|                          | r                  | p-value  | r                | p-value  | r            | p-value  | r               | p-value  |
| Age (years)              | -0.069             | 0.331N.S | 0.011            | 0.875N.S | -0.035       | 0.626N.S | -0.029          | 0.686N.S |
| Gender                   | 0.030              | 0.670N.S | -0.023           | 0.752N.S | 0.018        | 0.797N.S | 0.044           | 0.538N.S |
| BMI                      | -0.097             | 0.170N.S | -0.048           | 0.504N.S | 0.015        | 0.833N.S | 0.023           | 0.748N.S |
| Social status            | 0.144              | 0.041*   | 0.172            | 0.015*   | 0.085        | 0.234N.S | -0.009          | 0.895N.S |
| Education level          | -0.081             | 0.256N.S | -0.176           | 0.012*   | -0.091       | 0.198    | -0.127          | 0.074N.S |
| Monthly uncome IQ        | 0.045              | 0.531N.S | -0.113           | 0.112    | -0.108       | 0.127    | -0.065          | 0.361N.S |
| Family history for DM    | 0.209              | 0.003**  | 0.191**          | 0.007    | 0.032        | 0.650    | 0.015           | 0.837N.S |
| Duration of DM           | 0.057              | 0.427N.S | 0.081            | 0.255    | -0.013       | 0.855    | 0.096           | 0.178N.S |
| Diabetes medications no. | -0.028             | 0.695N.S | -0.079           | 0.266    | -0.009       | 0.898    | -0.065          | 0.364N.S |
| Hypertension             | 0.001              | 0.984N.S | -0.020           | 0.784    | 0.020        | 0.773    | 0.045           | 0.531N.S |
| Dyslipidemia             | 0.054              | 0.448N.S | 0.000            | 0.999    | -0.012       | 0.863    | 0.042           | 0.555N.S |
| HTN&Dyslipidemia         | -0.028             | 0.695N.S | -0.015           | 0.829    | -0.003       | 0.972    | 0.040           | 0.578N.S |

NS: not significant at p-value  $> 0.05$ , \* Correlation is significant at the p-value  $\leq 0.05$  level. \*\* Correlation is significant at the p-value  $\leq 0.01$  level.

(Table 10) represented Correlation between BMQ-Domains with Glycemic Parameters and Lipid Profile in Patients with Diabetic ,there was no significant correlation with BMQ domains, except fasting serum insulin in which patients showed a negative significant correlation at weak

level ( $r = -0.176$ ) with specific concern (P-value  $\leq 0.05$ ), Concerning lipid profile parameters, there were no significant correlation with BMQ domains, except serum HDL has significant weak correlation with specific concern, general harm at p-value  $\leq 0.05$  as mentioned in (table 11).

**TABLE 10:** Correlation between glycemic parameters And BMQ domains in patients.

| Variables          | Specific necessity |         | Specific concern |         | General harm |         | General-Overuse |         |
|--------------------|--------------------|---------|------------------|---------|--------------|---------|-----------------|---------|
|                    | r                  | p-value | r                | p-value | r            | p-value | r               | p-value |
| FSG (mg/dL)        | -0.007             | 0.926   | 0.029            | 0.688   | -0.040       | 0.573   | -0.013          | 0.860   |
| HbA1c (%)          | 0.100              | 0.157   | 0.074            | 0.297   | 0.057        | 0.427   | -0.076          | 0.287   |
| FSI ( $\mu$ IU/ml) | -0.129             | 0.068   | -0.176*          | 0.013   | -0.026       | 0.717   | -0.061          | 0.391   |
| HOMA-IR            | -0.092             | 0.196   | -0.116           | 0.103   | -0.064       | 0.369   | -0.064          | 0.368   |

\* Correlation is significant at the p-value  $< 0.05$  level.



**TABLE 11:** Spearman correlation between the components of BMQ with lipid profile tests in DM patients.

| Variables      | Specific necessity |         | Specific concern |         | General harm  |         | General-Overuse |         |
|----------------|--------------------|---------|------------------|---------|---------------|---------|-----------------|---------|
|                | r                  | p-value | R                | p-value | R             | p-value | r               | p-value |
| S.T.C(mg/dL)   | 0.000              | 0.996   | 0.057            | 0.422   | -0.033        | 0.638   | -0.009          | 0.900   |
| LDL(mg/dL)     | -0.062             | 0.382   | 0.032            | 0.657   | -0.060        | 0.402   | -0.010          | 0.894   |
| HDL(mg/dL)     | 0.051              | 0.476   | <b>0.144*</b>    | 0.042   | <b>0.158*</b> | 0.026   | 0.097           | 0.171   |
| S. VLDL(mg/dL) | -0.083             | 0.241   | -0.072           | 0.308   | 0.005         | 0.945   | -0.068          | 0.339   |
| S.TG (mg/dL)   | -0.001             | 0.985   | -0.027           | 0.705   | 0.008         | 0.913   | -0.042          | 0.554   |

\* Correlation is significant at the p-value <0.05 level.

## DISCUSSION

The current study used BMQ to measure patients' beliefs about medication. Our study showed that patients strongly believed in a specific necessity (SN) for diabetes treatment, a mean score for SN ( $18.07 \pm 3.99$ ) indicated high perceptions of patients needed diabetes medication to maintain the current and future health. These results are consistent with current studies in Palestine <sup>(15)</sup>. Another study in Pakistan reported a moderate belief about SN for treatment antidiabetic drugs <sup>(16)</sup>. An analysis of this study showed that positive beliefs about the SN for medication had recorded the highest mean, while beliefs that medication are generally harmful (GH) recorded the lowest mean level. This result is consistent with that of Hussein et al. Another study conducted in Iraq <sup>(17)</sup> and in Egypt in 2017 <sup>(18)</sup>. In the current study, nearly half (45.0%) strongly believed that diabetes treatment

was necessary to maintain good diabetes control (scores of BMQ specific-necessity greater than score of BMQ specific-concern). In a previous study by Mohamed et al. (2014), in Malaysia, A majority (70.7%) were believing he needs OHA to maintain good diabetes control (BMI-specific necessity score is higher than BMI-specific concern score) <sup>(19)</sup>. Other study that done by Sweileh et al. (2014) study in Palestine SN subscale were significantly higher than that for Specific-concern (SC) scores which strongly believes that the majority of people with diabetes need diabetes medications for their current and future health. However, diabetics have expressed SC about the side effects of taking diabetes medications regularly <sup>(20)</sup>. In the current study, 38.5% of people reported strong SC about diabetes treatment, this group of patients had worried of the side effects of prescription drugs and the need to take them daily. Diabetics should be aware that their drugs are non-addictive and

have a safety profile suitable for long-term use <sup>(19)</sup>. These negative perceptions about medicines are usually related to the chemical/unnatural origin of medicines, therefore complementary or traditional treatments are perceived to be more "natural" and safer as reported by Aflakseir when people are concerned about the negative effects of prescribed medicines, that are less likely to take them <sup>(21)</sup>. Similarly, another study found that SC medication belief and negative medication belief for SN can weaken long-term drug adherence in Nigeria <sup>(22)</sup>. Adherence to diabetes medications is positively correlated with lower HbA1c. Studies in Jazan, Saudi Arabia, and France have shown that better adherence to diabetes medications is associated with better glycemic control. These results suggest that people with poor adherence have poor glycemic control <sup>(23)</sup>. This fact due to the majority (75%) of our study participants reported poor glycemic control.

Regarding the Correlation of BMQ-domains with some patients and disease characteristics, The results of the current study indicated that patient characteristics did not have a significant correlation with patient's beliefs about medicine, this result are in agree with other study results <sup>(20,21)</sup>. However; not in agree with other study in Tanzania regarding the age correlation <sup>(22)</sup>. Also, effect of this data on the beliefs of the patients involved in the current study, which was also noted by Aflakseir in Iran (2012) <sup>(21)</sup>. A possible explanation is that illness perceptions are more significant than the demographic variables in beliefs regarding medication use <sup>(21)</sup>. Furthermore, the social state, family history for disease was significantly correlated with specific patient beliefs (necessity and concerns) at weak level. while education level was inversely weak correlated with specific concern only.

Regarding to glycemic parameters, there was no significant correlation with BMQ domains, except fasting serum insulin in which patients showed a negative significant correlation at weak level with SC. In other previous study, authors mentioned that patients with positive health beliefs had lower HbA1c levels.

Concerning lipid profile parameters, there were no significant correlation with BMQ domains, except serum HDL has significant weak correlation with specific concern, general harm at weak level. In other study, researchers reported that the LDL-c levels were lower and HDL-c levels were higher in patients with positive health beliefs<sup>(24)</sup>.

### CONCLUSIONS

Nearly 45% of T2DM were having a significant believe for anti-diabetic therapy to control their illness despite the presence of a significant concern regarding the long-term effects of drug use. However, patient's belief about medicine had poor ability to predict good glycemic control. Education level for patients was inversely correlated with specific concern only. While the social state, family history for disease was correlated significantly with specific patient beliefs (necessity and concerns). Patient's belief about medicine regarding specific concern, general harm score of BMQ with have significant correlation with serum HDL.

### ACKNOWLEDGEMENTS

The researcher would like to express her thanks and gratitude to her kind son Mustafa Ehsan, for obtaining a class average in this year ministerial exams.

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