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Factors Correlating with Anti-Diabetic Medicine Beliefs in Vietnamese Outpatients with Type 2 Diabetes

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ABSTRACT

An key issue for both patients and clinicians has been poor antidiabetic drug adherence, which raises the medical burden and creates problems associated to diabetes. Partially improving patients' non-adherence status to drugs may be achieved by improving their ideas about medicine. Outpatients with type 2 diabetes at Hue University Hospital were surveyed to determine their attitudes about antidiabetic medication. The Endocrinology Clinic at Hue University Hospital recruited 396 outpatients with a diagnosis of type 2 diabetes mellitus using a simple sample approach. The research followed certain inclusion and exclusion criteria. The Beliefs about Medicines Questionnaire (BMQ-V) in Vietnamese, published by Dr. Nguyen Thang et al., served as the basis for our questionnaire that we used to interview patients. The initial step was to identify the factors that were linked with BMQ-V and subscale scores using statistical methods such as paired sample t-tests, one-way ANOVA, Kruskal-Wallis, and chi-squared. The factors were then compared using Multivariate Regression Analysis to the BMQ-V and its subscale scores. We used SPSS 20.0 to examine all of the data. The median age of the 396 individuals with type 2 diabetes who participated in the research was 66.9±13.7 years. The participants' beliefs on medicine obtained an average score of 50.3±8.1, as per the BMQ-V questionnaire. There was a statistically significant correlation between the BMQ score and HbA1c control status, duration of diabetes, and home blood glucose monitoring, as shown by multivariate regression analysis (p=0.001, p=0.003, and p<0.001). Patients with uncontrolled HbA1c levels (S-N:9.6±3.7) believed that taking antidiabetic medicines was more important than the control group (S-N:10.9±4.4), and there was a statistically significant difference in the trust that diabetic patients with longer disease duration (S-N: 9.1±3.5) had in the effects of their medications on their health compared to patients with shorter duration (S-N: 11.3±4.4). The mean scores on the Specific-Concerns, General-Overuse, and General-Harm subscales were significantly lower than those of other groups (p<0.001; p=0.003; p=0.001), suggesting that the group that monitored their blood sugar at home regularly (>2 times/week) was very worried about the potential harmful long-term effects. Consequently, to increase medication adherence and treatment efficacy, it is necessary to gradually decrease negative beliefs about medicines, educate patients about the long-term side effects of medications, encourage them to monitor their blood glucose levels at home, and encourage them to make lifestyle changes.

Antidiabetics, medication adherence, and type 2 diabetes mellitus

INTRODUCTION

Developed and emerging nations alike are grappling with the growing medical and societal impact of diabetes mellitus, a metabolic condition that affects millions of people each (ADA, 2020). The World Health Organization (WHO) lists hyperglycemia as a leading cause of early mortality, next only to hypertension and cigarette smoking (International Diabetes Federation, 2017). Patients with well-controlled diabetes are less likely to have problems, are able to continue working regularly, have a longer life expectancy, and enjoy a higher quality of life. Nevertheless, glycemic control (HbA1c < 7%) remains unmet for a minimum of 45% of individuals diagnosed with type 2 diabetes. Medication non-adherence is a defining feature (Polonsky & Henry, 2016). The topic of antidiabetic drug adherence has been investigated in a number of research, with conflicting conclusions. Researchers in the UAE, Ethiopia, and the Kingdom of Saudi Arabia found that 85% of people taking their diabetes medicine as prescribed (Abebaw et al., 2016; Alakhali, 2015; Arifulla et al., 2014; Bagonza et al., 2015). However, Aminde et al. (2019) and Huber and Reich (2016) found lower prevalence rates in Cameroon and Switzerland, with estimates ranging from 40% to 52%. This has far-reaching consequences for clinical outcomes, is expensive for contemporary healthcare systems, and is a major public health concern (Al-Temimi et al., 2021). Seuring et al. (2015), Khunti et al. (2017), and Lê ThịHương Giang & Hà Văn Như (2013) found that individuals with diabetes incur unnecessary healthcare expenses and suffer irreparable harm owing to non-adherence to treatment. Treatment adherence is already an issue, and efforts to explain and improve it are

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often fruitless (Hugtenburg et al., 2013). Research on drug adherence has mostly concentrated on studies that examine the correlation between demographic, clinical, and adherence. It seems, however, that the majority of clinical and demographic characteristics do not significantly explain medication adherence. Hence, a plethora of research has zeroed in on an alternative method that is based on behavioral aspects and demonstrates a strong association between patients' pharmacological beliefs and their level of adherence to treatment. Consequently, one possible solution to the non-compliance issue is to have a better knowledge of patients' views on pharmaceuticals and to improve their overall awareness. (Vermeire et al., 2001; Izzah et al., 2013; Raniah et al., 2014). According to The Beliefs about Medicines Questionnaire (BMQ) is the most popular instrument (Horne et al., 1999). The BMQ, which was created by Horne and colleagues to evaluate how medicine is perceived, is backed by theory and science, with several quantitative and qualitative studies to back it up. Patients with long-term health conditions, such as diabetes, might use it to gauge their own opinions toward medication (Horne et al., 1999). Istilli et al. (2015), Jamous et al. (2014), Jimenez et al. (2017), Khdour et al. (2020), and Supramaniam et al. (2019) are just a few of the many research that have used the BMQ scale to assess patients' views toward the use of antidiabetic medications in type 2 diabetes. Medication is essential for people's present health, according to a survey. Most participants agreed or strongly agreed with this statement. There was some anxiety among the participants about developing a dependency on their medications, however, with over 50% expressing this fear. According to multivariate analysis, patients were more likely to be adherent if they considered their drugs were necessary. Alternatively, individuals who were worried about side effects were less likely to take their medication as prescribed (Jamous et al., 2014). Few studies in Vietnam have evaluated patients' opinions about the use of antidiabetic medications by using the whole BMQ questionnaire. Research has also failed to examine how patients' demographic, clinical, and behavioral characteristics affect their adherence. As a result, we surveyed Vietnamese outpatients diagnosed with type 2 diabetes to determine their opinions about antidiabetic medication.

MATERIALS AND METHODS

Study design

This descriptive cross-sectional study was conducted at the Endocrinology Outpatient Clinic of Hue University Hospital, a tertiary teaching hospital in Central Vietnam, between April 2021 and August 2022. Participants were approached and interviewed by the pharmacist using the convenient sampling method.

Study subject

The eligibility criteria for patients were: (1) being 18 years old or older; (2) being diagnosed with type 2 diabetes and not pregnant; (3) taking antidiabetic medicine for at least six months; (4) having information about glycated hemoglobin (HbA1C) test, and (5) being willing to participate in the research.

The exclusion criteria were: (a) having cognitive problems, (b) treating comorbidities that affect the glycemic control status (pancreatitis, using glucocorticoids, etc.), and (c) serious acute diseases involving cardiovascular disease, myocardial infarction, surgery, cancer, etc. The sample size was calculated using this formula:

$$n = (Z^2_{1-\alpha/21-\alpha/2}\, p\,(1-p))/\, d^2$$

Measurement instruments

Robert Horne and colleagues created the Beliefs about Medicines Questionnaire (BMQ) (Horne et al., 1999; Jimenez et al., 2017). The full BMQ version is an 18-item survey with two parts: the BMQ-General and the BMQ-Specific. The former has eight items spread out over two scales, General-Harm and General-Overuse, while the latter has ten items spread out over two scales, Specific-Concerns and Specific-Necessity. You may use them together or on their own. On a 5-point Likert scale, where 1 indicates strong agreement, 2 agrees, 3 is uncertain, 4 disagrees, and 5 is strongly disagreed, all items are evaluated (Horne et al., 1999; Jimenez et al., 2017). According to Anghel et al. (2019) and Sweileh et al. (2014), a lower score on each subscale indicates greater convictions in the corresponding ideas. Validation of the BMQ in patients with asthma, diabetes, mental and cardiac diseases, and other conditions has been shown in many national translations and adaptations (Horne et al., 1999; Lavsa et al., 2011). With the help of Beaton et al. (2000) and conventional forward and backward translation procedures (2007), Dr. Nguyen Thang (Nguyen et al., 2019) translated this scale into Vietnamese. In order to make it acceptable for the study's aims, our authors—who consist of clinical

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pharmacists and endocrinologists—self-modified it after Dr. Nguyen Thang's version. In order to gauge the patients' views on medicine, we administered this Vietnamese version of the BMQ. A preliminary sample of fifty people served as pilots for the questionnaire. After receiving comments, the researchers made necessary adjustments to the questionnaire to make sure it was uniform throughout. The acceptable Cronbach's α-value for exploratory study was 0.758. Additionally, we gathered information about the participants' socio-demographic characteristics (e.g., age, gender, education level, location, etc.), their lifestyle habits (e.g., exercise, nutrition, smoking), their clinical profile of diabetes-related characteristics (e.g., family history, duration of diabetes, comorbidities, etc.), the outcomes of their blood glucose control level, and their treatment plans.

In accordance with the 2020 edition of the Standards of Medical Care in Diabetes (American Diabetes Association, or ADA), the following glycemic control targets were utilized: in adult patients who are not pregnant, the targets are fasting plasma glucose (FPG) within 80 - 130 mg/dL (4.40 - 7.15 mmol/l), and HbA1c <7%. In older adult patients who have complex health issues, such as long-term diagnosed diabetes, multiple comorbidities, or a history of severe hypoglycemia, the targets are FPG within 90 - 150 mg/dL (5.0 - 8.3 mmol/l), and HbA1c <8%. According to ADA in 2020.

Approval from an ethical perspective

Document Number: H2021/232 attests to the study's approval by Hue University of Medicine and Pharmacy's Scientific and Ethics Committee. Respect for participants' right to choose whether or not to participate in the research was central to its design and implementation.

Quantitative Evaluation

The statistical package SPSS, version 20.0, was used for all data analysis. In the event that the continuous variable did not follow a normal distribution, it was represented as median and interquartile range; otherwise, it was represented as mean ± standard deviation. Percentages were used to characterize discrete variables. We utilized chi-squared tests to find out how the variables were related to each other. To compare two means for two correlated samples, paired sample t-tests were used with normally distributed variables. To find out whether there were any significant variations between the means of several different samples, one-way ANOVA tests were used. The Mann-Whitney test and the Kruskal-Wallis test will be used in lieu of them when dealing with variables that do not follow a normal distribution, respectively. The correlation between the dependent and independent variables was examined using regression analysis.

RESULTS AND DISCUSSION

Demographic baseline data and clinical characteristics of the participants

Three hundred and ninety-six outpatients were included in the study, of whom the median age (±SD) was 66.9 ± 13.7 years. The proportion of females in the study was 57.6%. The majority (75%) of the participants underwent regular periodic health examinations.

Table I. Baseline data of participants (N = 396)

Characteristics		Number (%)
Age (year old)	18-<60	119 (30.1)
	≥60	277 (69.9)
	Median ±SD	66.9 ±13.7
	Min - max value	25 - 93
Gender	Male	168 (42.4)
	Female	228 (57.6)
Occupation	Employed	131 (33.1)
	Retired or staying at home	265 (66.9)
Level of education	High school diploma or below	243 (61.4)
	High school or above	153 (38.6)
Location	Urban areas	219 (55.3)
	Rural areas	177 (44.7)
Lifestyle	Alone	10 (2.5)
	With family	386 (97.5)
Periodic health examination	No	99 (25.0)
	Yes	297 (75.0)
Exercise	< 3 times a week	111 (28.0)
	3-5 times a week	99 (25.0)
	>5 times a week	186 (47.0)
Diet	On a diet	295 (74.5)
	Vegetarian	7 (1.8)
	Normal	94 (23.7)
Smoking	Never	262 (66.2)
	In the past	100 (25.2)
	Still smoking	34 (8.6)
Drinking alcohol	Never	256 (64.6)
	In the past	91 (23.0)
	Still drinking	49 (12.4)

The proportion of participants who exercised regularly, had dietary, were non-smokers and non-drinkers, were 47%, 74.5%, 66.2%, and 64.6%, respectively (Table I).

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About half of the patients had diabetes for over ten years, and 27% of respondents had no positive family history of diabetes, most (94.7%) of patients had comorbidities, of which hypertension accounted for 75.3%. These results were similar to studies in Brazil and Egypt (Istilli *et al*., 2015; Salama & Saudi, 2020). At the time of the study, the patients' average fasting blood glucose level was 10.3 ± 4.1 mmol/L, with 20.7% of the patients reaching the target fasting blood glucose index. The mean HbA1c value in the study was 8.7 ± 2.1%. Thus, most patients in the study did not achieve FPG and HbA1c targets (Table II). In our study, there were five groups of medications used to treat type 2 diabetes: biguanide (metformin), sulfonylurea, DPP-4 inhibitor, SGLT2 inhibitor and insulin. The percentage of patients using metformin in the study was 81.6%. A combination of insulin therapy and oral medications was also prescribed to a significant proportion of patients (38.9%). By the time the ADA 2015 was published, this view was completely changed after many experimental studies proving that it was completely reasonable to combine metformin into a multi-medication insulin regimen and reduce the amount of insulin the patient needs (American Diabetes Association, 2015) (Table II).

The patients' medication beliefs according to the BMQ-V questionnaire

The mean score of the BMQ-V questionnaire of the study was 50.3 ± 8.1. Patients' beliefs about using medicine play an important role in the use of medicine to treat diseases, and beliefs about medicine significantly affect their attitudes and adherence to medication use (Horne *et al*., 1999).

Table II. Baseline data of medical condition of participants (N = 396)

Characteristics		Number (%)
Duration of diabetes	< 5 years	79 (20.0)
	5-10 years	111 (28.0)
	> 10 years	206 (52.0)
Family history related to diabetes	No	289 (73.0)
	Yes	107 (27.0)
Comorbidity	Yes	375 (94.7)
	Hypertension	298 (75.3)
	Dyslipidemia	192 (48.5)
	Cardiovascular diseases	100 (25.3)
	Hepatic disease	31 (7.8)
	Kidney disease	103 (26.0)
Self-Monitoring of Glucose	> 2 times a week	56 (14.1)
	1-2 times a week	110 (27.8)
	Never/ Rarely	230 (58.1)
HbA1c (%)	Uncontrolled	322 (81.3)
	Controlled	74 (18.7)
	Median ± SD	8.7 ± 2.1
	Min - max value	6.5 - 28.6
FPG	Uncontrolled	314 (79.3)
	Controlled	82 (20.7)
	Median ± SD	10.3 ± 4.1
	Min - max value	4.1 - 36.9
Antidiabetic medication regimen	Oral only	204 (51.5)
	Insulin only	38 (9.6)
	Oral + insulin	154 (38.9)
Class of diabetic medications	Biguanide (Metformin)	323 (81.6)
	Sulfonylurea	193 (48.7)
	DPP-4 inhibitor	55 (13.9)
	SGLT-2 inhibitor	19 (4.8)
	Insulin	192 (48.5)

If people with diabetes believe that medication has a negative effect on the body, the likelihood of adherence to medication will be lower. Most studies on medication adherence have concluded that negative beliefs about medication are a substantial barrier (Gatti *et al*., 2009; Sirey *et al*., 2013; Sweileh *et al*., 2014). Therefore, trust in medication and adherence to treatment are closely related. The mean score of each opinion ranges from 2 to 3 points, with question Q15 being the highest point (4 ± 1.2), showing that most of the patients in the study did not agree to stop taking the medicine for a short time. However, the majority of respondents agreed that their future health would depend on antidiabetic medicine, with the lowest mean score being 1.8 ± 0.9 points (Table III). With the maximum score of each of the General - Overuse and General - Harm subscales of 20 points, the mean scores in our study were 12.9 ± 2.9 and 13.1 ± 3.1, respectively. This shows that the patients in the study moderately believed that doctors were less likely to overprescribe medications and did not have more negative opinions about treatment medications. With the maximum score of each of the Specific-Necessity and Specific-Concerns subscales of 25, the mean score of the patient's rating was 9.8 ± 3.9 and 14.5 ± 3.8, respectively. This shows that patients believed that the use of diabetes medications was

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essential for their health, and patients were less concerned about the adverse consequences of the medication, and the patients believed the medications had few harmful long-term effects and that the use of the medications had little negative effects on their lives. Our results differ from those of Ngo VM, Bui THD, and Sweileh (Ngo VM & Bu i THD, 2021; Sweileh *et al*., 2014).

Table III. Assess the patients' medication beliefs according to the BMQ-V questionnaire.

BMQ-V	Mean (SD)
BMQ-V Specific-Necessity (S-N)	9.8 (3.9)
Q1. My health at present depends on my medicines	2.1 (1)
Q2. My life would be impossible without my medicines	2 (1)
Q3. Without my medicines I would be very ill	2.1 (1.1)
Q4. My health in the future will depend on my medicines	1.8 (0.9)
Q5. My medicines protect me from becoming worse	2 (1)
BMQ-V Specific-Concerns (S-C)	14.5 (3.8)
Q6. Having to take medicines worries me	3.1 (1.1)
Q7. I sometimes worry about long-term effects of my medicines	2.9 (1.2)
Q8. My medicines are a mystery to me	2.4 (1.2)
Q9. My medicines disrupt my life	3.2 (1.1)
Q10. I sometimes worry about becoming too dependent on my medicines	2.9 (1.1)
BMQ-V General-Overuse (G-O)	12.9 (2.9)
Q11. Doctors use too many medicines	3.8 (1.2)
Q12. Natural remedies are safer than medicines	3 (1.2)
Q13. Doctors place too much trust in medicines	3 (1)
Q14. If doctors had more time with patient, they would prescribe fewer medicines.	3.1 (1)
BMQ-V General-Harm (G-H)	13.1 (3.1)
Q15. People who take medicines should stop their treatment for a while every now and again	4 (1.2)
Q16. Most medicines are addictive	3 (1)
Q17. Medicines do more harm than good	3 (1)
Q18. All medicines are poisons	3 (1)
Total	50.3 (8.1)

These studies showed that the use of diabetes medicines was necessary for patients; however, patients also expressed high anxiety about antidiabetic medicine use because diabetes medication must be used regularly, on time, at the right dose, making patients more dependent on the medicines (Ngo VM& Bu i THD, 2021; Sweileh *et al*., 2014). Research in Palestine and Egypt showed that patients expressed strong beliefs about the need for the medication and concerns about the side effects of the medication (Khdour *et al*., 2020; Salama & Saudi, 2020). Raza's study (2020) in Pakistan reported results similar to our study on the Specific-Concerns subscale and different from our study on the Specific-Necessity subscale - which showed lower expectations on medications (Raza *et al*., 2020).

The reason for the difference may be that our patients had a relatively high rate of comorbidities (94.7%), so they had to use both antidiabetic medications and medications for other diseases. Therefore, taking medicines was a daily routine for them. They did not have to worry about taking them all the time, did not feel uncomfortable using them, and thought that taking medicines for patients with diabetes was necessary. The educational level of the patients in the study was quite low, with 61.4% attending secondary school or lower. Besides, Vietnamese people in general and the patients in the study, in particular, do not have the habit of learning about the medication that they are using. They mostly only follow the doctor's prescription, so most of the patients in the study reported that they still did not fully understand the medications they were taking (Table III).

Correlation between characteristics and beliefs about the medicine of participants

The mean scores of the BMQ-V between men and women ($p=0.004$), employed or stay-at-home groups ($p=0.012$), and educational levels ($p=0.007$) were found to have statistically significant differences. The scores of Specific - Concern and General - Harm were also found to have significant differences between subjects in the occupational group, education level and nutritional regimen ($p < 0.05$).

Table IV. Correlation between demographics and beliefs about the medicine of participants

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Characteristics		BMQ-V	S-N	S-C	G-O	G-H
		p=0.004[a]	p=0.985	p=0.008[b]	p=0.06[b]	p=0.009[b]
Gender	Male	48.8 (9)	9.9 (4)	13.9 (3.8)	12.5 (3.1)	12.5 (3.3)
	Female	51.3 (7.1)	9.8 (3.8)	14.9 (3.8)	13.2 (2.8)	13.4 (2.9)
		p=0.012[c]	p=0.272	p=0.005[d]	p=0.029[d]	p=0.027[d]
Occupation	Employed	46.4 (8.7)	10.5 (3.6)	12.1 (3.1)	11.9 (2.5)	11.8 (3.7)
	Retired or staying at home	51.9 (7.6)	10.1 (3.9)	14.7 (3.6)	13.6 (3)	13.5 (3.1)
		p=0.007[b]	p=0.065[b]	p=0.002[b]	p=0.137[b]	p<0.001[b]
Level of education	High school diploma or below	51.1 (7.6)	9.6 (3.9)	14.9 (3.8)	12.5 (3.1)	13.5 (3)
	High school or above	49 (8.6)	10.2 (3.8)	13.8 (3.7)	13.2 (2.8)	12.3 (3.3)
		p=0.758	p=0.811	p=0.965	p=0.738	p=0.829
Location	Urban areas	50.2 (8.5)	9.8 (3.6)	14.5 (3.8)	12.9 (2.9)	13 (3.3)
	Rural areas	50.4 (7.5)	9.9 (4.2)	14.4 (3.9)	13 (3)	13.1 (3)
		p=0.731	p=0.762	p=0.628	p=0.342	p=0.271
Lifestyle	Alone	49.4 (8.4)	10 (3.3)	15.2 (4.6)	12.2 (2.7)	12 (3.1)
	With family	50.3 (8.1)	9.8 (3.9)	14.4 (3.8)	12.9 (2.9)	13.1 (3.1)
		p=0.903[b]	p=0.931[d]	p=0.919[d]	p=0.666[d]	p=0.883[d]
Periodic health examination	No	50.4 (8.1)	9.9 (4.1)	14.4 (4.1)	13 (3.1)	13.1 (3.4)
	Yes	50.2 (8.1)	9.8 (3.8)	14.5 (3.7)	12.9 (2.9)	13 (3.1)
		p=0.617	p=153	p=0.139	p=0.077	p=0.355
Exercise	< 3 times a week	50.7 (7.9)	9.2 (3.4)	15 (4.1)	13.1 (2.7)	13.4 (3.2)
	3-5 times a week	49.6 (7.4)	10.2 (3.7)	14.1 (3.5)	12.4 (3.1)	13 (2.9)
	>5 times a week	50.3 (8.5)	10 (4.2)	14.4 (3.8)	13.1 (3)	12.9 (3.2)
		p=0.731[c]	p=0.035[a]	p=0.036[a]	p=0.354[a]	p=0.595[a]
Diet	On a diet	50.1 (8.1)	9.7 (3.9)	14.2 (3.8)	13 (3)	13.1 (3.1)
	Vegetarian	51.1 (6.7)	13.3 (3.2)	13.1 (3.8)	11.9 (2.1)	12.9 (2.9)
	Normal	50.8 (8)	10 (3.9)	15.3 (3.7)	12.7 (2.8)	12.8 (3.2)
		p=0.241	p=0.424	p=0.588	p=0.597	p=0.011
Smoking	Never	50.8 (7.5)	9.7 (3.8)	14.6 (3.8)	13 (2.9)	13.4 (2.9)
	In the past	49.4 (8.8)	10.3 (4.2)	14.1 (3.9)	12.6 (2.8)	12.3 (3.4)
	Still smoking	49.2 (9.6)	9.3 (3.8)	14.5 (4.1)	13 (3.6)	12.5 (3.4)
		p=0.067	p=0.436	p=0.089	p=0.349	p=0.006
Drinking alcohol	Never	50.9 (7.4)	9.7 (3.8)	14.8 (3.8)	13.1 (2.9)	13.4 (3)
	In the past	49.5 (8.1)	10 (4.1)	14.1 (3.6)	12.8 (2.9)	12.7 (3.2)
	Still drinking	48.3 (10.7)	10.5 (4)	13.5 (4.1)	12.3 (3.3)	11.9 (3.4)

[a]Independent Samples t-Test; [b] Independent-Samples Mann-Whitney U Test; [c]OneWay ANOVA; [d]Independent-Samples Kruskal-Wallis Test

In addition, the General - Harm score among patients with unhealthy lifestyles such as smoking and drinking was also significantly higher than in the group who had never used them (Table IV). The mean Specific-Necessity score of patients with diabetes duration of over ten years was lower than that of patients with a shorter duration of the disease with a statistically significant difference. This proves that the longer patients have diabetes, the better they understand the medicines they are using, so the more trust they have in the positive effects of the medications on their health, and the more they perceive the need for the medication to maintain their good health. (Table V). The patient's glycemic control status and confidence were also associated, with the mean score of Specific-Necessity belief in patients achieving HbA1c control (< 7%) being 10.9 ± 4.4, higher than that of patients without HbA1C control (≥ 7%), being 9.6 ± 3.7. The difference was statistically significant ($p < 0.05$). Thus, the group of patients who did not achieve good HbA1c levels (<7%) felt that taking antidiabetic medicines was more necessary than in the control group (Table V).

Table V. Correlation between medical conditions and beliefs about the medicine of participants

Characteristics		BMQ-V	S-N	S-C	G-O	G-H
		p=0.033[a]	p<0.001[a]	p=0.944[a]	p=0.076[a]	p=0.676[a]
Duration of diabetes	< 5 years	52.1 (8.6)	11.3 (4.4)	14.6 (4.5)	13.4 (3)	12.8 (3.4)
	5-10 years	50.7 (7.9)	10.3 (3.8)	14.5 (3.5)	12.7 (2.8)	13.3 (3.3)
	> 10 years	49.3 (7.8)	9.1 (3.5)	14.4 (3.8)	12.8 (2.9)	13 (2.9)
		p=0.446[b]	p=0.788[d]	p=0.678[d]	p=0.975[d]	p=0.103[d]
Family history related to diabetes	No	50.1 (7.9)	9.8 (3.8)	14.5 (3.8)	12.9 (2.9)	12.9 (3.1)
	Yes	50.8 (8.6)	10.1 (4.2)	14.4 (3.8)	12.9 (3)	13.5 (3.1)
		p=0.768[a]	p=0.932	p=0.168	p=0.826	p=0.218
Comorbidity	No	49.8 (8.9)	9.5 (3.1)	13.4 (3.9)	13 (3.1)	13.9 (3.2)
	Yes	50.3 (8)	9.9 (3.9)	14.5 (3.8)	12.9 (2.9)	13 (3.1)
		p<0.001[a]	p=0.057[c]	p<0.001[c]	p=0.003[c]	p=0.001[c]
Self-Monitoring of Glucose	> 2 times a week	46.4 (7)	10.5 (3.1)	12.6 (3.2)	11.7 (2.7)	11.6 (3.2)
	1-2 times a week	50.1 (7.5)	9.8 (3.8)	14.2 (3.6)	13 (2.9)	13.1 (3.1)
	Never/ Rarely	51.3 (8.3)	9.7 (4.1)	15 (3.9)	13.1 (2.9)	13.4 (3.1)
		p=0.001	p=0.04	p=0.102	p=0.069	p=0.096
HbA1c (%)	Uncontrolled	49.6 (7.8)	9.6 (3.7)	14.3 (3.9)	12.8 (3)	13 (3.1)
	Controlled	53.1 (8.4)	10.9 (4.4)	15.2 (3.5)	13.5 (2.6)	13.5 (3.5)
		p=0.103	p=0.337	p=0.273	p=0.496	p=0.411
FPG	Uncontrolled	49.9 (8.2)	9.7 (3.8)	14.4 (4)	12.8 (2.9)	13 (3.2)
	Controlled	51.6 (7.2)	10.2 (4)	14.9 (3.2)	13.2 (2.9)	13.3 (3)
		p=0.005	p<0.001	p=0.031	p=0.118	p=0.188
Antidiabetic medication regimen	Oral only	51.1 (8.3)	10.7 (4.2)	14.8 (3.9)	12.8 (2.8)	12.9 (3.2)
	Insulin only	46.6 (8.3)	8.9 (3)	13.1 (3.3)	12.2 (3.2)	12.3 (3.3)
	Oral + insulin	50 (7.4)	9 (3.4)	14.4 (3.8)	13.2 (2.9)	13.4 (3)

[a]Independent Samples t-Test; [b] Independent-Samples Mann-Whitney U Test; [c]OneWay ANOVA; [d]Independent-Samples Kruskal-Wallis Test

The group of patients who never or rarely monitored their blood glucose at home had the highest mean scores on the Specific-Concerns, General-Overuse, and General – Harm subscales, indicating that the patients in this group had the least concern about adverse medication reactions, as well as the strongest belief that doctors were not over-prescribing them and did not think the medications were harmful. The group with the lowest Specific-Concerns, General-Overuse, and General-Harm scores was the group that regularly (>2 times/week) monitored blood sugar at home, having the most insufficient confidence among other groups. They believed that antidiabetic medicines had harmful long-term effects, medications were overprescribed and sometimes patients should stop treatment (Table V). The multivariable linear regression model reported that the patient's self-management of blood sugar, the duration of diabetes, and the glycemic control status were statistically significantly associated with the BMQ score (Table VI). Our study's data were collected using a cross-sectional survey. Therefore, it is only for evaluation purposes, and there were no interventions on research subjects to change patients' beliefs, improve treatment adherence, and contribute to helping patients achieve the best treatment effect. However, the results of the study can be considered the basis for further studies. With the results of this study, we would like to propose carrying out further research in the future, combined with interventions to improve patients' trust in using medications, and prospective follow-up for a period of 3 months, 6 months, or longer. Strengthening the coordination of clinical pharmacists with physicians is necessary to improve their positive beliefs and gradually reduce their negative beliefs about medicines, thereby increasing medication adherence, and improving

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disease treatment effectiveness. Intervention programs need to be developed to bring more knowledge to patients, to ensure they are fully equipped with the knowledge and to avoid unnecessary worries, which will reduce patient adherence to treatment.

Table VI. Factors associated with beliefs about the medicine of participants (Multivariate Regression Analysis)

Characteristics	Raw regression coefficients (95%)	p	Adjusted regression coefficient (95%)	p
Gender				
Male	1		1	
Female	2.5 (0.9-4.1)	0.002	2.8 (-0.1-5.6)	0.055
Level of education				
High school diploma or below	1		1	
High school or above	-2.1 (-3.7 - -0.5)	0.01	-0.7 (-2.5-1.03)	0.42
Blood glucose controlled (HbA1c)				
Uncontrolled	1		1	
Controlled	3.5 (1.5 - 5.5)	0.001	3 (0.9-5.1)	0.005
Duration of diabetes				
>10 years	1		1	
< 5 years	2.7 (0.6-4.8)	0.011	2.8 (0.7-4.8)	0.008
5-10 years	1.4 (-0.5 - 3.2)	0.152	2.1 (0.2-3.9)	0.03
Drinking alcohol				
Never	1		1	
In the past	-1.4 (-3.3 - 0.5)	0.154	1.2 (-1.8-4.1)	0.447
Still drinking	-2.6 (-5.1 - (-0.2))	0.036	1.1 (-2.3-4.5)	0.528
Self-Monitoring of Glucose				
> 2 times a week	1		1	
Never/ Rarely	4.9 (2.6-7.2)	<0.001	4 (1.6 - 6.3)	0.001
1-2 times a week	3.8 (1.2-6.3)	0.004	3.8 (1.3-6.3)	0.003
Occupation				
Employed	1		1	
Retired or staying at home	4 (0.9-7.1)	0.012	2.2 (-1.1 - 5.5)	0.191
Antidiabetic medication regimen				
Oral only	1		1	
Insulin only	-4.5 (-7.3 - (-1.8))	0.001	-3 (-6.2-0.1)	0.061
Oral + insulin	-1.1 (-2.8 - 0.6))	0.194	0.2 (-1.7-2)	0.871

REFERENCES

Abebaw, M., Messele, A., Hailu, M., & Zewdu, F. (2016). Adherence and Associated Factors towards Antidiabetic Medication among Type II Diabetic Patients on Follow-Up at University of Gondar Hospital, Northwest Ethiopia. Advances in Nursing, 2016, 1–7. https://doi.org/10.1155/2016/8579157

ADA. (2020). Standards of medical care in diabetes. 45, 270.

Alakhali, K. (2015). Description Of Patients' Compliance In Aseer Region, Kingdom Of Saudi Arabia. Indonesian Journal Of Pharmacy, 26(4), 228. https://doi.org/10.14499/indonesianjpharm26iss4pp228

Al-Temimi, A. A., Krishnan, S., Kaur Sandhu, A., & Sajid Ali Bangash, N. (2021). Medication Nonadherence: Implications for patient health outcomes in pharmacy practice. Indonesian Journal of Pharmacy, 416–428. https://doi.org/10.22146/ijp.2236

American Diabetes Association. (2015). Standards of medical care in diabetes. 45.

Aminde, L. N., Tindong, M., Ngwasiri, C. A., Aminde, J. A., Njim, T., Fondong, A. A., & Takah, N. F. (2019). Adherence to antidiabetic medication and factors associated with non-adherence among patients with type-2 diabetes mellitus in two regional hospitals in Cameroon. BMC Endocrine Disorders, 19(1), 35. https://doi.org/10.1186/s12902-019-0360-9

Anghel, L. A., Farcas, A. M., & Oprean, R. N. (2019). An overview of the common methods used to measure treatment adherence. Medicine and Pharmacy Reports. https://doi.org/10.15386/mpr-1201

Arifulla, M., John, L. J., Sreedharan, J., Muttappallymyalil, J., & Basha, S. A. (2014). Patients' Adherence to Anti-Diabetic Medications in a Hospital at Ajman, UAE. Malays J Med Sci, 21(1), 44–49. https://doi.org/PMC3952347

Bagonza, J., Rutebemberwa, E., & Bazeyo, W. (2015). Adherence to anti diabetic medication among patients with diabetes in eastern Uganda; a cross sectional study. BMC Health Services Research Volume, 15(1), 1–7. https://doi.org/DOI 10.1186/s12913-015-0820-5

Gatti, M. E., Jacobson, K. L., Gazmararian, J. A., Schmotzer, B., & Kripalani, S. (2009). Relationships between beliefs about medications and adherence. American Journal of Health-System Pharmacy, 66(7), 657–664. https://doi.org/10.2146/ajhp080064