

# Level of Treatment Adherence in Patients with Type 2 Diabetes in Primary Care

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## Abstract

**Introduction:** The glycemic control of type 2 diabetes is a very important challenge that requires a multidisciplinary group of specialists, an adequate psychosocial environment and family support and searching for better measures for the control and prevention of complications, which encourages the patient to improve his lifestyle. **Method:** The analysis was made with two primary care medical units, the Mutual Aid Group (GAM) from the Los Pinos Medical center, and the Chronic disease Specialized Medical Unit (UNEME EC), which provided integral care in the municipality of San Cristóbal de Las Casas, Chiapas. A sample of 138 patients was obtained through a random sampling with 95% confidence and a margin of error of  $\pm 5$ . The recollection of data was made with the application of the questionnaire "Lifestyle and adherence to pharmacological treatment in patients with type 2 diabetes, which consists of four sections that evaluate 1) socio-demographic data; 2) anthropometric and clinical; Pharmacological adherence with Morisky's 8-item questionnaire (MMSA-8); 3) Lifestyle: with the instrument to Measure Lifestyle in Diabetics (IMEVID). **Results:** 37.6% had an HbA1c lesser than 7%, A prevalence of 50.7% was obtained in patients adhering to the pharmacological treatment, and 39.8% patients with a favorable lifestyle. The association of the patients' results with an adequate glycemic control demonstrated by an HbA1C lesser than 7% was obtained through Student's T test in which these patients are related with a better score on questionnaires by IMEVID and MMAS-8. **Conclusions:** The units with integral care and multidisciplinary treatment are fundamental in the care of patients with type 2 diabetes; the use of questionnaires such as IMEVID or MMAS-8 is useful in the daily clinical practice.

## Keywords

Diabetes, Pharmacological Adherence, Lifestyle, Glycemic Control,

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## Multidisciplinary Care

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### 1. Introduction

Mexico ranks fifth in the world on diabetes prevalence with approximately 12 million cases [1]. In 2019 a prevalence of 10.3% was reported on the National Health and Nutrition Survey 2018 with a 11.4% prevalence for the female gender and 9.1% for the male gender [2]. The glycemic control in diabetes is a very important challenge in the health system, which requires the attention of a multidisciplinary group of specialists. Previous studies conclude that education through a structured program in newly diagnosed patients results in improvements in weight control, knowledge of the disease, promotes a decrease in tobacco and alcohol consumption, and improves HbA1c levels and lifestyle [3], being group and individual interventions greater than 10 hours those associated with greater change in HbA1c [4], associating the lack of pharmacological adherence to higher health care costs, increased hospitalizations and emergency room admissions and lifestyle with glycemic values, large increases in the IMEVID questionnaire score in any of its domains correspond to small decreases in blood glucose [5]. Many governmental strategies have been implemented in Mexico such as, PREVENIMSS, PREVENISSSTE, Mutual Aid Groups and Chronic Disease Specialized Medical Units, in order to sensitize the patient in the control and prevention complications of Diabetes, as a result of that, it is estimated that the prevalence of the glycemic control via glycated hemoglobin a1c in patients only reaches 50% in patients and it is related to a non-favorable lifestyle and a low adherence to the treatment. As a result of this, the complications are increased, as well as the costs of care, from 22.8% to 46.9% causing a high wear to the patient, family and health system. Posing as a research question, what is the level of adherence to the treatment in patients with type 2 diabetes, in primary care?

### 2. Method and Material

Analytical descriptive and prospective observational cross-sectional type. The analysis was made with two primary care medical units, the Mutual Aid Group (GAM) from Los Pinos Medical center, and the Chronic Disease Specialized Medical Unit (UNEME EC), which provided integral care in the municipality of San Cristóbal de Las Casas. Chiapas. A sample of 138 patients was obtained through a random sampling with 95% confidence and a margin of error of  $\pm 5$ . The inclusion criteria were: patient with a previous diagnosis of DT2, age < 20 years old, patients that presented for medical care at GAM and UNEME EC; exclusion criteria: diagnosis of type 1 diabetes, gestational or other specific types.

Data collection was made with the application of the questionnaire "Lifestyle and adherence to pharmacological treatment in patients with type 2 diabetes, which consists of four sections that evaluate 1) socio-demographic, age, gender, marital status, occupation, education level, 2) anthropometric and clinical; HbA1c,

evolution time, number of prescribed medications, comorbidities and complications associated with T2D, weight, height and UNC; 3) Pharmacological adherence with Morisky's 8-item questionnaire (MMSA-8); 4) Lifestyle: with the instrument to Measure Lifestyle in Diabetics (IMEVID). Hemoglobin figures were considered adequate glycemic control <7%, the pharmacologic adherence was classified as adherent to the treatment with 7 or 8 points in the survey and non-adherent with less than 7 points, the lifestyle was classified as favorable with > 80 points, less favorable with <80 points and non-favorable with <60 points.

## 2.1. Statistic Analysis

The data was collected on an Excel 2013 sheet and subsequently recollected into the SPSS VERSION 22 program, for statistical analysis, measures of central tendency and dispersion were obtained, we used Student's T test for statistical correlation of data, considering a value of  $P < 0.05$  as statistically significant.

## 2.2. Socio-Demographic Characteristics

The final sample consisted of 138 patients, of which 69.5% belonged to the UNEME EC. 72.4% of the population was established as female gender, 25.8% females were married; 60.8% were unemployed and the highest prevalence of the population had as its major degree elementary school with 51.4% (**Table 1**).

**Table 1.** Socio-demographic characteristics.

Population	Total (%)	GAM (%)	UNEME EC (%)
Female	138 (100)	42 (30.4)	96 (69.5)
Male	38 (27.5)	6 (4.3)	32 (23.1)
Age	54.78 ( $\pm 10.5$ )	58 ( $\pm 11.1$ )	53.3 ( $\pm 10.1$ )
<b>Marital status</b>			
Single	8 (5.7)	3 (2.1)	5 (3.6)
Married	73 (25.8)	18 (13)	55 (39.8)
Widower	18 (13)	5 (3.6)	13 (9.4)
Divorced	16 (11.5)	4 (2.8)	12 (8.6)
Free Union	23 (16.6)	12 (8.6)	11 (7.9)
<b>Occupation</b>			
Employee	51 (36.9)	9 (6.5)	42 (30.4)
Unemployed	84 (60.8)	32 (23.1)	52 (37.6)
Retired	3 (2.1)	1 (0.7)	2 (1.4)
<b>Scholarship</b>			
Illiterate	19 (13.7)	10 (7.2)	9 (6.5)
Elementary School	71 (51.4)	22 (15.9)	49 (35.5)
Junior High school	34 (24.6)	22 (15.9)	29 (21)
High School	11 (7.9)	5 (3.6)	7 (5)
University	3 (2.1)	1 (0.7)	2 (1.4)

### 2.3. Anthropometric, Clinical and HbA1c Characteristics

The average size was  $1.5 \pm 0.11$  m, with a weight of  $64.5 \pm 13.2$  Kg. and a BMI of  $29.4 \pm 19.1$  kg/M<sup>2</sup>; 46.3% had overweight and 26% had some degree of obesity. The 37.6% had an HbA1C lesser than 7%; the average age of evolution was  $10.5 \pm 8$ ; 43.4% had prescribed 3 or more drugs as treatment. Associated comorbidities were arterial hypertension systemic and dyslipidemia with 28.2% and 16.6% respectively and the secondary complications of diabetes with the highest prevalence was diabetic retinopathy with 15.9% (Table 2).

### 2.4. Drug Adherence and Lifestyle and Association with HbA1c

A prevalence of 50.7% of patients adherent to pharmacotherapy was obtained, and 39.8% had a favorable lifestyle meanwhile 39.8% had a less favorable lifestyle. Thereon it was found through Student's T test that in accordance to the association between patient outcomes and an adequate glycemic control (HbA1C lesser than 7%), these patients were related to better score in questionnaires of IMEVID and MMAS-8. For the IMEVID questionnaire score, the mean age, the MMSA-8 questionnaire score and HbA1c were associated with the patients who qualified as a favorable, unfavorable and unfavorable lifestyle, finding a significant difference with the MMSA questionnaire score 8 and HbA1c, the higher the IMEVID score, the higher the MMSA-8 score and the lower the HbA1c percentage (Tables 3-6).

## 3. Discussion

It is important to point out the limitations that were found to carry out the study, which was, in the first place, the lack of regular control with HbA1C tests in the patients' records, there were also incomplete records, which made it difficult to obtain an important sample for patients to be able to carry out the pertinent statistical analyzes.

**Table 2.** Anthropometric data and HbA1c.

Population	Total (%)	GAM (%)	UNEME EC (%)
Size (m)	$1.5 \pm 0.11$	$1.50 \pm 0.06$	$1.51 \pm 0.13$
Weight (Kg)	$64.5 \pm 13.2$	$61 \pm 10.4$	$66 \pm 14.1$
BMI (Kg/m <sup>2</sup> )	$29.4 \pm 19.1$	$27 \pm 4$	$30.4 \pm 22.7$
Normopeso (%)	38 (27.5)	15 (10.8)	23 (16.6)
Overweight (%)	64 (46.3)	19 (13.7)	45 (32.6)
Obesity I (%)	29 (21)	7 (16.6)	22 (22.9)
Obesity II (%)	6 (4.3)	1 (2.3)	5 (5.2)
Obesity III (%)	1 (0.7)	0	1 (1)
HbA1c	$7.7 \pm 1.8$	$7.8 \pm 1.5$	$7.7 \pm 1.9$
<7% (%)	52 (37.6)	14 (33.3)	38 (39.5)
≥7% (%)	86 (62.3)	28 (66.6)	58 (60.4)

BMI: Body Mass Index. HbA1c: Glycated hemoglobin a1c.

**Table 3.** Association of MMAS-8, IMEVID and HbA1c.

	HbA1c < 7% N = 52 (%)	HbA1c ≥ 7% N = 86 (%)	Total N = 138 (%)
MMAS			
Yes (≥7)	34 (65.3)	34 (39.5)	68 (49.2)
No (<7)	18 (34.6)	52 (60.3)	70 (50.7)
IMEVID			
Favorable	28 (53.8)	27 (31.3)	55 (39.8)
Less favorable	22 (41.2)	33 (38.3)	55 (39.8)
Unfavorable	2 (3.8)	26 (30.1)	28 (20.2)

**Table 4.** Statistical association according to therapeutic objectives.

	HbA1c		p
	<7%	≥7%	
Age	55 ± 1.4	54.6 ± 1.1	0.827
MMAS-8	6.6 ± 1.7	5.5 ± 1.9	0.001*
IMEVID	78.8 ± 1.5	67.2 ± 1.7	0.000*

Average, Standard error, \*p < 0.05.

**Table 5.** Statistical association according to MMAS-8.

	No adherent	Adherent	p
Age	54.5 ± 1.2	55.0 ± 1.2	0.814
IMEVID	63.1 ± 1.8	80.3 ± 1.2	0.000*
HbA1c	8.5 ± 0.2	6.9 ± 0.1	0.000*

Average, Standard error, \*p < 0.05.

**Table 6.** Statistical association according to IMEVID.

	Favorable	Less favorable	Unfavorable	p
Age	56.9 ± 1.3	54.2 ± 1.3	51.6 ± 12.4	0.085
MMAS-8	7.1 ± 0.1	5.8 ± 0.2	4.1 ± 1.7	0.000*
HbA1c	7.1 ± 0.1	7.7 ± 0.2	9.0 ± 1.6	0.000*

Average, Standard error, \*p < 0.05, Post hoc Bonferroni.

It highlights the 72.5% prevalence of the female sex with average age of 54 ± 10.5 years, with at least a degree of Elementary school, most were married and unemployed, similar to reports of different authors, 60% of females take care of their home [6] and 59.9% and 70.9% of women are of indigenous and non-indigenous population respectively [7]; population with the highest risk of development of diabetes were of female sex and an age over 40 years.

In 2019, ENSANUT 2018 reported a prevalence combined of overweight and

obesity of 75.2% [2], in the present study 72.3% was obtained.

The average number of drugs prescribed for a day is highly variable according to the literature found, from  $2.5 \pm 1.2$  in this study to 4 [8] or  $5.6 \pm 2.9$  [9], concluding that a higher number of drugs difficulties the patient's knowledge of his schedule, drugs name, indications or it is related to non-adherence.

The gold standard for measuring glycemic control in patients is HbA1c, a prevalence of control patients with less than 7% HbA1c of 37.6% was obtained, prevalence that only exceeds what was reported by another author with 25.3% [10] and still it was lower than it was reported by other authors with lesser than 50% of patients in control, with 43.9% [11], 40.8% [12], to which the results that report a prevalence of 52.6% differ [13], due to this one had some elimination criteria such as not meeting an 80% attendance, it reflected on the fact that at the beginning of the study they had a prevalence of 21% of patients in control.

In relation to pharmacological adherence, an adhesion prevalence of 48.5% was obtained, according to the information found the prevalence varies from 80% in the municipality of Chiapas [14], to 37% in the Michoacan state [15] being the cause of variability in the results the use of different instruments to measure the pharmacological adhesion, as well as the difference between regions and cultures, which can be underestimated when self-administered surveys are used; following the same and using a technique of quantification of medicinal products used in each delivery of medicinal products, a prevalence of 42% was obtained.

About lifestyle, a 40% favorable rating prevalence was obtained, which contrasts with the results of other authors with 15% [16], or the 23.5% [17], the cause of this might be the lack of comprehensive care, being that the studied population of these authors, were patients who only came to control consultation.

In the Results obtained in this work, a statistically significant relationship was found in terms of the relationship between glycemic control, lifestyle and therapeutic adherence, HbA1c results are therapeutic targets in patients who qualify as adherents to pharmacological treatment and with a favorable lifestyle, similar to other studies that conclude that there is a relationship between these two variables [17], with a better adherence there will be a better control [15], or that there is greater adherence in those who had hba1c levels between 6% and 6.9% [18], that favorable lifestyle is a protective factor for glycemic control [11], a good lifestyle contributes to a good metabolic control [19], however there are studies that did not find a significant relationship between these variables [20] [21].

#### 4. Conclusion

Type 2 diabetes continues to be a difficult disease to control, with a not very encouraging prevalence in glycemic control, which in the long term has repercussions on the health system and the patient. The use of instruments such as

MMSA-8 and IMEVID in clinical practice, where the use of HbA1c is limited, could favor the screening of patients prone to glycemic dyscontrol and be able to act effectively on this risk group. The importance of comprehensive and multi-disciplinary care in patients with DT2 in the first level of care medical units is highlighted.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Appendix

Questionnaire Lifestyle and adherence to pharmacological treatment in patients with type 2 diabetes.

### Identification card

1) Age: \_\_\_\_\_ years

2) Sex

Male  Female

3) Marital status

Married  Widower  Divorced  Free union

4) Occupation

Employed  Unemployed  Retired

5) Education level

Illiterate  Elementary school  Junior High School

High school  University

### Anthropometric and clinical

6) Evolution time \_\_\_\_\_ year

7) HbA1c \_\_\_\_\_

8) Number of prescribed medication \_\_\_\_\_

9) Comorbidities  No  Yes which? \_\_\_\_\_

10) Complications associated with Diabetes:

Diabetic retinopathy  Diabetic foot

lower limb amputation  cardiovascular disease

diabetic nephropathy  diabetic neuropathy

11) Weight (kg) \_\_\_\_\_

12) Size (m) \_\_\_\_\_

13) BMI \_\_\_\_\_

### Morisky's 8-item.

- 
- 14) Do you sometimes forget to take your medication?  Yes  No
- 15) People sometimes miss taking their medications for reasons other than forgetting.  Yes  No  
Over the past 2 weeks, were there any days when you did not take your medication?
- 16) Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?  Yes  No
- 17) When you travel or leave home, do you sometimes forget to bring your medication?  Yes  No
- 18) Did you take all your medication yesterday?  Yes  No
- 19) When you feel like your symptoms are under control, do you sometimes stop taking your medication?  Yes  No
- 20) Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?  Yes  No
- 21) How often do you have difficulty remembering to take all your medication?  Never/Rarely  
 Once in a while  
 Sometimes  
 Usually  
 All the time
-

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**Instrument to Measure Lifestyle in Diabetics**


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22) how often do you eat vegetables	<b>Every day of the week</b>	<b>some days</b>	<b>rarely</b>
23) how often do you eat fruits	<b>Every day of the week</b>	<b>some days</b>	<b>rarely</b>
24) How many pieces of bread do you eat a day	<b>0 a 1</b>	<b>2</b>	<b>3 or more</b>
25) how many tortillas do you eat a day	<b>0 a 3</b>	<b>4 a 6</b>	<b>7 or more frecuentemente</b>
26) Do you add sugar to your food or drinks?	<b>rarely</b>	<b>sometimes</b>	<b>frequently</b>
27) Do you add salt to food when you are eating it?	<b>rarely</b>	<b>sometimes</b>	<b>Usually</b>
28) Do you eat food between meals?	<b>rarely</b>	<b>sometimes</b>	<b>frequently</b>
29) Do you eat food outside the home?	<b>rarely</b>	<b>sometimes</b>	<b>frequently</b>
30) When you finish eating the amount initially served, do you ask for more?	<b>rarely</b>	<b>sometimes</b>	<b>Usually</b>
31) How often do you exercise at least 15 minutes? (fast walk, run or some other)	<b>3 or more for week</b>	<b>1 or 2 for week</b>	<b>rarely</b>
32) Keep busy outside of your normal work activities?	<b>frequently</b>	<b>sometimes</b>	<b>rarely</b>
33) What do you do most often in your free time?	<b>leaving home</b>	<b>Work at home</b>	<b>Watch TV</b>
34) Do you smoke?	<b>No</b>	<b>sometimes</b>	<b>Daily</b>
35) How many cigarettes do you smoke per day?	<b>None</b>	<b>1 a 5</b>	<b>6 or more</b>
36) Do you drink alcohol?	<b>Never</b>	<b>rarely</b>	<b>1 or more for week</b>
37) How many alcoholic drinks do you drink on each occasion?	<b>None</b>	<b>1 a 2</b>	<b>3 or more</b>
38) How many talks for people with diabetes have you attended?	<b>4 or more</b>	<b>1 a 3</b>	<b>None</b>
39) Do you try to get information about diabetes?	<b>Usually</b>	<b>sometimes</b>	<b>rarely</b>
40) Get angry easily?	<b>rarely</b>	<b>sometimes</b>	<b>Usually</b>
41) Do you feel sad?	<b>rarely</b>	<b>sometimes</b>	<b>Usually</b>
42) Do you have pessimistic thoughts about your future?	<b>rarely</b>	<b>sometimes</b>	<b>Usually</b>
43) Do you do your best to get your diabetes under control?	<b>Usually</b>	<b>sometimes</b>	<b>rarely</b>
44) Do you follow diets for diabetics?	<b>Usually</b>	<b>sometimes</b>	<b>rarely</b>
45) Forget to take your diabetes medications or take your insulin?	<b>rarely</b>	<b>sometimes</b>	<b>Frequently</b>
46) Do you follow the medical instructions for your care?	<b>Usually</b>	<b>sometimes</b>	<b>rarely</b>

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