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# Factors Associated with Adherence to Treatment in Patients with HIV and Diabetes Mellitus

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**Abstract:** We aim to identify the factors that influence the therapeutic adherence of subjects with chronic disease. The design followed in this work was empirical, not experimental, and cross-sectional with a correlational objective. The sample consisted of a total of 400 subjects (199 patients with HIV and 201 patients with diabetes mellitus). The instruments applied for data collection were a sociodemographic data questionnaire; the Morisky, Green, and Levine Medication Adherence Scale (MGL); and the Coping Strategies Questionnaire. In the group of subjects with HIV, the use of emotional coping strategies was related to lower adherence to treatment. On the other hand, in the group of subjects with diabetes mellitus, the variable related to compliance with treatment was the duration of illness. Therefore, the predictive factors of adherence to treatment were different in each chronic pathology. In the group of subjects with diabetes mellitus, this variable was related to the duration of the disease. In the group of subjects with HIV, the type of coping strategy used predicted adherence to treatment. From these results, it is possible to develop health programs to promote issues ranging from nursing consultations to the adherence and treatment of patients with HIV and diabetes mellitus.

**Keywords:** nurses; nursing; adherence to treatment; chronic diseases; HIV; diabetes mellitus



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## 1. Introduction

Currently, we are facing an increase in life expectancy and a clear ageing of the world's population. This has led to a significant increase in the incidence of chronic diseases, which represent a public health problem [1]. In this way, subjects with chronic pathologies must have good management of their disease to minimize its impact, improve health outcomes, prevent further disability and reduce healthcare costs. In this context of study, the concept of therapeutic regimen management is presented as a key component in the management of these diseases [2]. However, a high number of subjects with chronic pathologies do not comply with treatment adequately, and the rate of adherence to it in this type of patient is low [3].

Based on these assumptions, this study wishes to determine the factors that are related to better drug adherence in certain chronic diseases. In addition, knowing these factors is essential to achieve adequate management of the therapeutic regimen. This is justified because, in order to favor the management of the therapeutic regimen, it must be taken into account that health must be centered on the patient, for which reason their active collaboration is needed, taking into account their fears, their will or their difficulties in the treatment [4].

However, it should be noted that each chronic pathology has clinical characteristics and a particular therapeutic plan, which is why we cannot include all of them under the same heading of "chronicity". Consequently, in this study we have considered it necessary

to specifically analyse adherence to treatment in two specific chronic diseases: HIV and diabetes mellitus.

HIV remains a relevant chronic disease worldwide. This infection, has had an enormous impact on morbidity, the demography and economy of the most affected countries. The latest data recorded in Spain show that 3244 new cases of HIV were diagnosed since 2019 [5].

The introduction of highly active antiretroviral therapy (HAART) has modified the natural history of HIV infection, despite the adverse reactions associated with such treatment [6,7]. The antiretroviral treatments currently used allow for reducing transmission rates, as well as increasing the survival of patients diagnosed with HIV [8]. In this way, this infection has become a chronic disease [9]. There is evidence that the incorrect taking of antiretroviral treatment is associated with the appearance of viral strains resistant to it, increasing the risk of disease progression. Therefore, despite the clear advantages of the treatment, it is essential to maintain correct management of the therapeutic regimen [10–12]. However, most research on subjects with HIV indicates that adherence to treatment in this group of patients is low [9,13,14].

On the other hand, diabetes mellitus is one of the most prevalent chronic diseases diagnosed today. In 2002, the WHO announced a global prevalence of diabetes of 3%, which corresponds to 170 million people in the world diagnosed with this pathology [15]. It was even estimated that this figure would more than double by the year 2025 [16]. Currently, these forecasts have already been exceeded, since the latest figures provided by the International Diabetes Federation (IDF), corresponding to 2019, state that 9.3% of adults between 20 and 79 years old have diabetes, which corresponds to a total of 463 million people. Based on this data, the IDF estimates that 578 million adults will live with the disease in 2030. In 2045, they estimate that the figure will rise to 700 million [17]. Through the National Health Survey/European Health Survey in Spain (ENS/EESN), estimates of the prevalence of diabetes in Spain have also been obtained. The last one, corresponds to the year 2017, and states that the prevalence has almost doubled in Spain between 1993 (4.1%) and 2017 (7.8%). In subjects with diabetes, the importance of adherence to treatment to achieve adequate metabolic control is highlighted, which allows for delaying and preventing the development of complications associated with this disease [18,19]. However, it has been described that pharmacological compliance in diabetic subjects is also low [20,21].

Therefore, there is no doubt that incorrect adherence to treatment is a major health problem. Thus, the work of professionals is important to guarantee individualized and comprehensive patient care, allowing their active participation and improving the therapeutic relationship [22]. In addition, both in diabetic subjects and in those with a diagnosis of HIV, the adherence to treatment is a highly complex phenomenon, in which different variables may intervene [23]. Among these, factors related to the treatment itself stand out, such as the duration of illness, number of doses or associated side effects [24]. On the other hand, psychosocial factors are reflected, among which coping strategies have stood out. Certain coping strategies have been described as possible health protective factors, indicating their relationship with adherence to pharmacological treatment. Thus, it is stated that low levels of adherence to treatment are related to the use of emotional or avoidant strategies, while rational coping strategies can predict high adherence to treatment in certain chronic pathologies [25,26]. On the other hand, in relation to the sociodemographic variables, there was more heterogeneity of evidence, finding different results on the relationship between sex, marital status, educational level and the age of the patient with the level of adherence to treatment [27–29].

Consequently, the objective of this study was to identify those factors associated with adherence to drug treatment in subjects with diabetes mellitus or HIV. This could guide health teams in planning strategies that favor the management of the therapeutic regimen, through a more active collaboration of the patient.

## 2. Materials and Methods

### 2.1. Design

The study had a non-experimental cross-sectional design, with a correlational objective.

### 2.2. Participants

Subjects diagnosed with Diabetes or HIV+. The sample was collected at the University Hospital of Salamanca (HUS) and at different Primary Care centers in that province.

In the first place, the sample of subjects with HIV was obtained through an incidental sampling, in the infectious diseases unit of the Salamanca clinical hospital. Subsequently, we obtained the sample of subjects with diabetes. A quota sampling was applied in order to obtain homogeneous subsamples. Said subsample of diabetic subjects was defined as having a size equivalent to that of subjects with HIV. The collection of the subsample of diabetic patients was carried out from different Internal Medicine floors of the Clinical Hospital of Salamanca and different Salamanca health centres (namely, "Periurbana Sur" and "Capuchinos" Health Centres).

The following inclusion criteria were having a confirmed diagnosis of the disease (HIV or diabetes), regardless of its stage. They also had to be in current treatment, be of legal age and voluntarily participate in the study. As exclusion criteria, any illness or disorder that would prevent the patient from signing the informed consent was considered or completing the study.

### 2.3. Data Collection

The data was collected taking a total of two years to collect them (2018–2020). The questionnaires used were:

#### 2.3.1. Sociodemographic Data Questionnaire

The variables collected through this instrument were of a sociodemographic nature and information related to health:

Type of disease (HIV or diabetes)

Duration of diagnosis of the disease (1–5 years, 5–10 years or more than 10 years)

Sociodemographic variables studied (age, sex, marital status and educational level)

#### 2.3.2. Morisky, Green, and Levine Medication Adherence Scale (MGL)

This questionnaire was originally developed by Morisky et al. (1986) under the name the "Morisky, Green and Levine Medication Adherence Scale (MGL)". The Spanish version of this questionnaire was validated by Val-Jiménez et al. (1992). The scale is made up of four questions with a dichotomous response format (Yes/No), reflecting the patient's behavior regarding compliance. A patient shows good adherence to treatment when he/she correctly answers the four questions (No/Yes/No/No) and presents poor adherence if he/she answers three or fewer questions adequately. Therefore, through this questionnaire, patients are categorized as adherent to treatment or nonadherent to treatment [30].

Originally, the questionnaire had adequate psychometric properties with high discrimination ($\rho_{bp}$ = 0.43), high sensitivity (sensitivity = 0.81), and low specificity (specificity = 0.44). In Spain, this test was validated by Val-Jiménez et al. (1992) using a sample of hypertensive patients. The sensitivity was somewhat lower, while the specificity value was practically the same (sensitivity = 0.52, specificity = 0.44).

#### 2.3.3. Coping Strategies Questionnaire (Sandín and Chorot)

Coping styles were measured by means of the structured self-assessment known as the Coping Strategies Questionnaire (Cuestionario de Afrontamiento del Estrés (CAE)). The scale assesses seven coping factors: social support seeking, religious coping, overt emotional expression, avoidance coping, problem-solving coping, positive reappraisal and negative auto-focused coping. Also, it allows measuring the two most general dimensions, evaluated in our study: Rational Coping and Emotional Coping. The scale is made up

of 42 items with a response range that goes from 0, never, to 4, almost always The total variance explained by the two general dimensions (Rational and Emotional) was 49.3% [31].

### 2.4. Ethical Considerations

This study obtained a favourable report from the Ethics Committee "Research with Medicines in the Salamanca Health Area" (CEIC code: PI02/01/2018). In addition, it received authorization by the Healthcare Complex of the University of Salamanca and by the Salamanca Primary Care Directorate.

### 2.5. Data Analysis

Data analysis was performed using the Statistics Package for the Social Sciences (SPSS) version 25 (IBM Corp, Armonk, NY, USA).

A descriptive analysis of the sociodemographic variables was carried out, analyzing the differences between the subsamples. For this, Pearson's $\chi^2$ test was applied, determining the size of the effect through Cramer's V.

To identify the factors that influence or help predict therapeutic adherence in subjects diagnosed with HIV and diabetes mellitus, logistic regression analysis was used. In this case, for each group of subjects with diabetes and HIV, a logistic regression analysis was carried out. The dependent variable was adherence to the treatment on the part of patients. This variable had two values, presence or absence of adherence. The independent variables were the type of coping strategy, sex, educational level, age, duration of illness and marital status.

The level of statistical significance used throughout the study was 0.05, with a 95% confidence interval.

## 3. Results

### 3.1. Descriptive Analysis

#### 3.1.1. Variables Related to the Type of Disease

A total of 400 patients participated in the present study. Depending on the type of disease of the subjects, two groups are differentiated: HIV patients (N = 199) and diabetics (N = 201). Marital status was the only significant variable ($\chi^2$ = 42.484; $p < 0.01$). However, Cramer's V value (V = 0.322) reflects that the effect is moderate. Most of the participants are male (N = 294), with mainly secondary or lower education (N = 328) and with a mean age of between 44 and 50 years (N = 124). Also, we observe that separated or divorced subjects are a minority (N = 38) (Table 1).

**Table 1.** Sociodemographic variables based on health status.

| | HIV | | Diabetes | | Total | | $\chi^2$ | TE | $p$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | | | |
| N participants | 199 | 49.8% | 201 | 50.2% | 400 | 100% | | | |
| Sex | | | | | | | | | |
| Woman | 48 | 24.1% | 58 | 28.9% | 106 | 26.5% | 1.151 | 0.054 | 0.283 |
| Man | 151 | 75.9% | 143 | 71.1% | 294 | 73.5% | | | |
| Civil status | | | | | | | | | |
| Married/couple | 58 | 29.1% | 123 | 61.2% | 181 | 45.3% | | | |
| Single/widowed/others | 117 | 58.8% | 64 | 31.8% | 181 | 43.3% | 42.484 | 0.322 | 0.000 |
| Separated/divorced | 24 | 12.1% | 14 | 7.0% | 38 | 9.5% | | | |
| Level of studies | | | | | | | | | |
| Secondary or lower | 168 | 84.4% | 160 | 76.9% | 328 | 82% | 1.574 | 0.063 | 0.210 |
| Superior | 31 | 15.6% | 41 | 20.4% | 72 | 18% | | | |

**Table 1.** *Cont.*

| | HIV | | Diabetes | | Total | | $\chi^2$ | TE | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | | | |
| Age | | | | | | | | | |
| 43 years or younger | 50 | 25.1% | 46 | 22.9% | 96 | 24% | 5.521 | 0.117 | 0.137 |
| 44 to 50 years | 61 | 30.7% | 63 | 31.3% | 124 | 31% | | | |
| From 51 to 55 years old | 57 | 28.6% | 44 | 21.9% | 101 | 25.3% | | | |
| 56 years or older | 31 | 15.6% | 48 | 23.9% | 79 | 19.8% | | | |

N: Number of subjects; %: percentage, $\chi^2$ : chi − square TE: effect size; *p*: *p*-value.

#### 3.1.2. Variables Related to Adherence to Treatment

The final sample consisted of 400 subjects, with 66% showing nonadherent behaviour. Table 2 shows the descriptions of the sociodemographic variables based on adherence. No significant differences were found in any of the sociodemographic variables regarding adherence to treatment.

**Table 2.** Sociodemographic variables according to adherence.

| | Adherence | | Non-Adherence | | TOTAL | | $\chi^2$ | TE | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | | | |
| N participants | 264 | 34.0% | 136 | 66.0% | 400 | 100% | | | |
| Sex | | | | | | | | | |
| Woman | 68 | 25.8% | 38 | 27.9% | 106 | 26.5% | 0.220 | 0.023 | 0.639 |
| Man | 196 | 74.2% | 98 | 72.1% | 294 | 73.5% | | | |
| Civil status | | | | | | | | | |
| Married/couple | 121 | 45.8% | 60 | 44.1% | 181 | 45.25% | 1.229 | 0.055 | 0.541 |
| Single/widowed/others | 121 | 45.8% | 60 | 44.1% | 181 | 45.25% | | | |
| Separated/divorced | 22 | 8.3% | 16 | 11.8% | 38 | 9.5% | | | |
| Level of studies | | | | | | | | | |
| Secondary or lower | 215 | 81.4% | 113 | 83.1% | 328 | 82% | 0.165 | 0.020 | 0.684 |
| Superior | 49 | 18.6% | 23 | 16.9% | 72 | 18% | | | |
| Age | | | | | | | | | |
| 43 years or younger | 69 | 26.1% | 27 | 19.9% | 96 | 24% | 5.064 | 0.113 | 0.167 |
| 44 to 50 years | 77 | 29.2% | 47 | 34.6% | 124 | 31% | | | |
| From 51 to 55 years old | 61 | 23.1% | 40 | 29.4% | 101 | 25.25% | | | |
| 56 years or older | 57 | 21.6% | 22 | 16.2% | 79 | 19.75% | | | |

N: Number of subjects; %: percentage, $\chi^2$ : chi − square TE: effect size; *p*: *p*-value.

### *3.2. Factors Predicting Treatment Adherence*

#### 3.2.1. Subjects with HIV

Table 3 shows the values of the covariates before becoming part of the model. The only variables that are related to adherence to treatment in subjects with HIV were emotional coping and rational coping ($p < 0.05$).

The regression by specific steps showed that the best model was the one that only included the covariate use of emotional coping strategies (B = −0.065, ET = 0.024, Wald = 7.501, $p = 0.006$). Table 4 shows the values of the final model. It can be observed that the greater the use of emotional coping strategies in patients with HIV was, the lower the adherence to treatment (B = −0.065, Exp(B) = 0.937).

**Table 3.** Variables not included in the null model. HIV subjects.

| | Score | gl | *p* |
|---|---|---|---|
| Level of studies | 3.804 | 1 | 0.051 |
| Sex | 0.223 | 1 | 0.637 |
| Marital status: Married/partner | 0.827 | 2 | 0.661 |
| Marital status: Single/widowed/others | 0.604 | 1 | 0.437 |
| Marital status: Separated/divorced | 0.589 | 1 | 0.443 |
| Age: 43 years or younger | 3.714 | 3 | 0.294 |
| Age: 44 to 50 years | 1.546 | 1 | 0.214 |
| Age: 51 to 55 years | 0.166 | 1 | 0.684 |
| Age: 56 years or older | 0.011 | 1 | 0.918 |
| Duration of the disease: 1–5 years | 3.612 | 2 | 0.164 |
| Duration of the disease: 5–10 years | 1.575 | 1 | 0.209 |
| Duration of the disease: More than 10 years | 3.606 | 1 | 0.058 |
| Emotional coping strategies | 7.767 | 1 | 0.005 |
| Rational coping strategies | 5.610 | 1 | 0.018 |
| Other types of coping strategies | 0.240 | 1 | 0.624 |

Gl: degrees of freedom; *p*: *p*-value.

**Table 4.** Variables included in the proposed model. HIV subjects.

| | B | E.T. | Wald | gl | *p* | Exp(B) |
|---|---|---|---|---|---|---|
| Emotional coping strategies | −0.065 | 0.024 | 7.501 | 1 | 0.006 | 0.937 |
| Constant | 1.842 | 0.474 | 15.085 | 1 | 0.000 | 6.310 |

B: regression coefficient; E.T.: standard error; gl: degrees of freedom; *p*: *p*-value; Exp(B): exponential of the regression coefficient.

Table 5 shows the results of different tests to assess the adequacy of the model. With a cut-off point of 0.6, about 66% of patients were correctly classified as adherent or non-adherent. Compared with the null model, the mismatch was reduced by 5.3% when the emotional coping variable was included. Finally, the Hosmer-Lemeshow test was not significant ($p = 0.789$). All these results led to the idea of a good fit of the model.

**Table 5.** Tests on the adequacy of the model. HIV sujects.

| | Value | *p* |
|---|---|---|
| % well classified cases * | 65.800% | - |
| Cox and Snell's $R^2$ | 0.038 | - |
| Nagelkerke's $R^2$ | 0.053 | - |
| Hosmer-Lemeshow | 3.923 | 0.789 |

* cut point: 0.6; *p*: *p*-value.

### 3.2.2. Subjects with Diabetes

Table 6 shows the independent variable values in the null model. The only variable that improved the prediction of the null model was the duration of disease ($p < 0.05$).

Table 7 shows the results of the independent variables that have intervened in the equation. The only variable that was significant was the duration of disease. More specifically, the proportion of patients who were adherent was the same between people with 1–5 years of disease and 5–10 years of disease ($p > 0.05$). However, the proportion of patients who were adherent was higher among patients with more than 10 years of disease duration compared to that among patients with 1–5 years of disease duration (B = 0.275, ET = 0.358, Wald = 0.590, $p = 0.443$). The odds of showing adherence with more than 10 years of disease duration was 2.65 times the odds of adherence with 1–5 years of disease duration.

**Table 6.** Variables not included in the null model. Diabetes Mellitus sujects.

| | Score | gl | *p* |
|---|---|---|---|
| Sex | 0.035 | 1 | 0.851 |
| Marital status: Married/partner | 0.701 | 2 | 0.704 |
| Marital status: Single/widowed/others | 0.032 | 1 | 0.857 |
| Marital status: Separated/divorced | 0.592 | 1 | 0.442 |
| Age: 43 years or younger | 4.075 | 3 | 0.253 |
| Age: 44 to 50 years | 0.083 | 1 | 0.773 |
| Age: 51 to 55 years | 2.374 | 1 | 0.123 |
| Age: 56 years or older | 2.811 | 1 | 0.094 |
| Duration of the disease: 1–5 years | 6.817 | 2 | 0.033 |
| Duration of the disease: 5–10 years | 0.165 | 1 | 0.685 |
| Duration of the disease: More than 10 years | 6.185 | 1 | 0.013 |
| Emotional coping strategies | 0.002 | 1 | 0.964 |
| Rational coping strategies | 0.165 | 1 | 0.684 |
| Other types of coping strategies | 1.925 | 1 | 0.165 |

gl.: degrees of freedom grados de libertad; *p*: *p*-value.

**Table 7.** Variables included in the proposed model. Diabetes Mellitus sujets.

| | B | E.T. | Wald | gl | *p* | Exp(B) |
|---|---|---|---|---|---|---|
| Duration of the disease: 1–5 years | | | 6.618 | 2 | 0.037 | |
| Duration of the disease: 5–10 years | 0.275 | 0.358 | 0.590 | 1 | 0.443 | 1.316 |
| Duration of the disease: More than 10 years | 0.974 | 0.381 | 6.546 | 1 | 0.011 | 2.649 |
| Constant | 0.318 | 0.232 | 1.879 | 1 | 0.170 | 1.375 |

B: regression coefficient; E.T.: standard error; gl: degrees of freedom; *p*: *p*-value; Exp(B): exponential of the regression coefficient.

Table 8 shows the results of different tests to assess the adequacy of the model. When interpreting the goodness of fit through Nagelkerke's R2, we observed that the mismatch was reduced by 4.8%. Furthermore, 60.5% of well-predicted cases were detected in the alternative model, using a 0.6 cut-off point for classification.

**Table 8.** Tests on the adequacy of the model. Shows Diabetes Mellitus.

| | Valor |
|---|---|
| % well classified cases * | 60.500 |
| Cox and Snell's $R^2$ | 0.035 |
| Nagelkerke's $R^2$ | 0.048 |

* cut point: 0.6; *p*: *p*-value.

## 4. Discussion

In the present study, it was observed that a greater use of emotional coping strategies was related to lower adherence to treatment among subjects diagnosed with HIV. However, this variable was not relevant to determine adherence to treatment in subjects with diabetes. On the other hand, the duration of disease was related to the presence of adherence to treatment in subjects with diabetes, observing that adherence was more likely among patients with more than 10 years of disease duration than among patients with 1–5 years of disease duration. These results were not found in the sample of patients with HIV.

In addition, the sociodemographic variables studied, such as sex, marital status, age or educational level of the subjects, did not show a significant relationship with compliance with pharmacological treatment in either of the two subsamples.

In comparison with other studies, as we have indicated in the background of the article, some authors have pointed out the relationship between active or rational coping strategies with high adherence to treatment. In a complementary manner, others highlight that low levels of adherence are related to avoidant and emotional coping strategies, which

are also called passive, palliative or maladaptive Strategies [32]. We highlight that these data have been confirmed in different investigations with certain chronic pathologies, such as kidney disease, multiple sclerosis or HIV [25,26,33].

In relation to the pathologies addressed in our study, we highlight the research of Weaver et al. (2005) carried out on subjects with HIV, which showed that coping strategies aimed at problem-solving were not related to adherence to HAART [34]. These results are similar to those found in our research, where only emotional coping strategies predicted the level of adherence. However, Delmas et al. (2008) did detect that those subjects with HIV who used active coping strategies experienced higher levels of adherence to treatment. It should be noted that, although the coping variable focused on the solution of the problem was significant considered in isolation in our results, it was not included in the final model [35].

Different investigations carried out in subjects with HIV have confirmed that the use of emotional, passive or maladaptive coping strategies are associated with a lack of adherence to treatment [36–38]. These results are consistent with those obtained in our research.

In parallel, the results identified in various projects involving patients with diabetes also coincided with those obtained in our study. In this way, different authors defend that there is no statistically significant relationship between the use of different types of coping strategies and adherence [39–42].

In relation to sociodemographic variables, there is more heterogeneity of results, both in subjects with diabetes mellitus and in those with a diagnosis of HIV.

Based on age, there is no consensus as to its role in adherence, since some studies confirm that adherence increases as age increases [29,43,44] and other investigations affirm the opposite [45].

The level of studies has also been proposed as a factor related to adherence in chronic diseases, highlighting less adherence at a lower level of studies [45–47]. However, other investigations present opposite data, justifying that subjects with a high level of education present with multiple responsibilities and occupations that require a lot of time and attention, which negatively interferes with their adherence [48]. Other research with diabetic subjects indicates that the titration does not predict adherence to treatment [44]. The study by Quiñones et al. (2018) only found a relationship between said variable and adherence in those diabetic patients who also suffered kidney damage [49]. Similarly, we have found studies on patients with HIV that also indicated the level of education is not related to adherence [29].

Studies that relate gender and adherence also do not offer conclusive results on the relationship between both variables. Thus, while some projects defend that it is women who have the greatest adherence [44], others affirm the opposite [50].

Based on marital status, we found authors who observe that married or partnered subjects have better adherence to treatment [51]. However, many others defend that it is not a variable associated with the adherence of patients with chronic diseases [52,53].

By way of summary, there are studies that affirm that sociodemographic variables are not related to the level of adherence to treatment. These results are consistent with those of our study. Thus, investigations carried out with samples of subjects with HIV found that age, sex, marital status, educational level and treatment time did not have a significant relationship with adherence [27,28,54]. Also, projects carried out with diabetic subjects coincided in stating that neither age, sex, marital status nor level of study are related to the level of adherence to treatment [55,56]. The results obtained in our research are in line with those obtained in these studies.

Finally, in relation to the duration of illness, we can affirm that our results also coincide with those of some studies carried out with patients diagnosed with diabetes mellitus, which show that adherence to treatment is higher in those subjects with a greater duration of illness [57,58]. Ramos et al. (2017) more specifically detected that there were more behaviours adherent to treatment after 10 years of illness [44]. He even stated that this increase in adherence also occurred during the first 2 years of illness. In line with the

results of our work, in the investigation of Kirkman et al. (2015), it is stated that patients who were newly diagnosed with diabetes were significantly less likely to be adherent to treatment [43]. In our research, an increased probability of showing adherent behaviour was found when patients had been diagnosed for more than 10 years but not when they had been diagnosed for 2 years.

Thus, as we have presented in the introduction, these results would be useful so that, as a final objective, nursing could enhance the therapeutic management of patients. This is essential because inadequate management of the therapeutic regimen becomes a threat to the health, well-being and quality of life of the subjects [59].

Limitations: Different authors defend that adherence to treatment is a highly complex phenomenon, in which multiple factors intervene. Thus, there are studies that have demonstrated the relationship of other variables with adherence to treatment in chronic diseases that have not been included in our study, which is their weakness. Among these variables, the secondary effects of treatment, doctor-patient relationship, social support and comorbidities with other pathologies stand out [24,60]. On the other hand, we highlight as strengths the use of a larger sample than those used in other studies [61–65]. Future research should take into account other variables not considered in this study and which may be relevant but which, in order to seek parsimony in the research, we did not include.

## 5. Conclusions

Taking into account the results of the aforementioned analysis, we can affirm that the subjects with a diagnosis of HIV who use emotional coping strategies less frequently have greater adherence to treatment. Therefore, emotional coping strategies are presented as a significant variable, which allows for predicting the level of adherence to treatment. However, these data were only evidenced in subjects with HIV but not in subjects with diabetes. In parallel, only in patients with diabetes did the duration of illness have an influence on the level of adherence to treatment. Thus, it has been confirmed that diabetic subjects who have had more than 10 years of disease duration have greater adherence than patients who have had the disease 1–5 years.

However, the sociodemographic characteristics studied (sex, age, marital status and educational level) are not variables related to the level of adherence to treatment. On the other hand, rational coping strategies, or those based on the use of religion and avoidance, do not appear as significant variables that allow us to estimate adherence to treatment. These results coincide with the two subsamples studied, subjects with diabetes and subjects with HIV.

We consider it essential to know the factors related to adherence to treatment in chronic diseases. In this way, it is possible to predict and anticipate those subjects who will have poor adherence to treatment. Thus, the conclusions obtained are of great interest among nursing staff for the development of health programs that increase the patient's skills to promote and maintain the management of the therapeutic regimen.

However, the results of this study show that the factors that predict adherence to treatment are different for each chronic disease. Therefore, it is essential to continue expanding the present study with other chronic pathologies.

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