Personality and adherence to the treatment with continuous subcutaneous insulin infusion and continuous glucose subcutaneous monitoring system in patients with type 1 diabetes mellitus


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Abstract

Background: Although in the written material, the importance of adherence to prescribed treatment to maintain an adequate metabolic control, has been reported a proportion of patients with diabetes have a low adherence to treatment. Personality seems to be an important variable. Objectives: To study the adherence of adult patients with type 1 diabetes to treatment with integrated system of continuous subcutaneous insulin infusion (CSI) and real time continuous glucose subcutaneous monitoring system (RT-CGMS). Materials and methods: Twenty patients with long duration type 1 diabetes received intensive treatment with CSI and RT-CGMS during 6 months. Million personality inventory (MCMI-II) and a satisfaction scale were employed. Results: Patients with type 1 diabetes mellitus who abandoned the treatment, had higher scores on the dimensions of histrionism, narcissism, aggressiveness and drug abuse, as well as worse glycemic control, and were more dissatisfied with the treatment. Conclusions: The profile of patients who decided to leave the treatment was of patients dissatisfied with the treatment (CSI and RT-CGMS) which does not improve the metabolic control, personality style characterized by histrionism, narcissism and aggressiveness, and recent or recurrent history of abuse of drugs, with difficulty to repress impulses or to maintain them inside the conventional social limits.

Keywords: personality, CSI, RT-CGMS, type 1 diabetes mellitus, metabolic control.

Introduction

The scientific study of the personality starts under the supposition that it can be measured through factorial analysis, focusing on features, dedicated to the analysis of its determining factors. From this approach, such factors, named features, will constitute the structure of the individual’s personality. The features are defined as patterns of stable behaviour (temporal stability) consistent (situational stability) and coherent (in relation to the rest of the individual’s characteristics).
Thus, we could define features as dispositions (internal) that determine the behavior of the individuals, causing specific behavior patterns. In this sense, they constitute the most particular and unique aspect of the subject. However, the features have a probabilistic nature, as they refer to potential behaviors that might be expressed or not in the subject. Therefore, they would be latent behaviors of the subject that could be manifested or not depending on the circumstances of each person. Despite everything, as from this approach, the importance lies in the existence of features, regardless whether or not it is expressed.

Eysenck, one of the best known authors on this approach, developed an assessment tool named EPQ (Eysenck Personality Questionnaire) that evaluates three basic dimensions of the personality: extraversion (E), neuroticism or emotivity (N) and psychoticism or severity (P). The extraversion indicates a sociable, lively, active, assertive, sensation searcher, adventurous spirit and carefree, as well as the non inhibition of the individual. The neuroticism refers to the general emotional hyper-reaction and the predisposition to suffer dysthymic or hysterical disorders under the stress effects. The features that make up this dimension are anxious, irrational, shy, sad and emotive. The psychoticism scale evaluates the normal personality, but when the scores are extreme, it indicates predisposition both to psychotic disorders and bipolar disorder, the schizophrenia, the antisocial behavior and the psychopathy. The features that are part of this dimension are aggressive, cold, egocentric, impersonal, impulsive, antisocial, low empathy, creative and rigid.

The first studies about personality and diabetes were based on the findings of Eysenck and they used the EPQ as evaluation instrument. The main results of these investigations show that the adequate metabolic control is related to low scores of neuroticism. Using other evaluation techniques, these results have been confirmed subsequently in other investigations. Encountering more neuroticism and less extraversion in these patients. Other complementary studies have been focused on the analysis of features that make up the dimension of the neuroticism. In this sense, Lane et al. found that the patients with an inadequate metabolic control showed higher scores in the features of anxiety, anger, hostility and depression. Some authors associate this type of patients with an anxious mood, histrionic, obsessive (specifically, perfectionism), asthenic, explosive, psychotic and depressive. To sum up, these results allow determining a clear association between neuroticism and a poor glycemic control.

There is a close conception to the features, though more recent. The personality styles are behavioral patterns developed from the features but with a more multidimensional and versatile nature. These behavior patterns would act as dispositions or relative stable trends. From this point of view, the investigation on diabetes has been lower. Some especially relevant works have been developed about the type C personality styles and type A, but no studies have been carried out so far that analyze the personality styles (as the ones described by Millon) in patients with T1D, so that the presented work is original.

One of the main variables related to the treatment of the T1D is the adherence. Beléndez and Méndez define the adherence to the treatment as “the realization of self-care behaviors involved in the treatment components of the diabetes: insulin, hypoglycemics, diet and exercise, according to the levels required by the individual at any given time, according to the results of the evaluation of the glycemic condition, with the aim of optimizing at maximum the resources offered by the treatment”.

A group of investigations has focused their efforts on studying the factor associated to the therapeutic adherence in patients with T1D, finding social and personality factors. Littlefield et al. observed different social and personality characteristics in patients with low and high therapeutic adherence. The first one showed levels of self-esteem and self-efficiency expectations lower than the second ones. Moreover, the patients with low therapeutic adherence had more depressive symptoms compared to the patients with high adherence to the treatment. Likewise, these patients showed higher HbA1c levels than those who kept a high therapeutic adherence.

Other factors associated with adherence therapy in DM1 are locus of control and coping styles. The first refers to the patient’s perception about their ability to control events that happen to him related to the disease. Some authors indicate that the internal locus of control (internal attribution of the outcome) is associated to an increase of the adherence to the treatment and to an adequate metabolic control. On the other hand, the coping strategies are also present in the process of adherence to the treatment, intervening as modulating variables of such process. In this sense, Hanson et al. refer that the frequent use of avoidance strategies (as for example, to blame others or avoid problematic situations or persons) is related to a low or no adherence to the treatment among insulin-dependent adolescents. Though there are other factors associated to the therapeutic adherence, the exhaustive development of these factors exceed the aim of this work.

The general objective of this investigation was to study the adherence of patients with T1D who underwent an intensive treatment with continuous subcutaneous insulin infusion (CSII) together with a real time continuous glucose monitoring system RT-CGMS (PRT® -MiniMed Paradigm Real-Time® -MiniMed Northridge, CA). To this end, we analyze if there are differences in the personality style, the satisfaction to the treatment and the glycemic control of the patients who keep adherence to the treatment and those who give up.

**Material and methods**

**Data from the participants**

Twenty patients with T1D were part of this study, seen at the Diabetes Unit of the Endocrinology and Nutrition Service of the Hospital Carlos Haya of Málaga, under intensive treatment with CSII to whom an integrated CSII system was added after the informed consent together with RT-CGMS (PRT®). After 6 months of treatment, 13 patients decided to continue (group C. patients who continue) and 7 discontinued it (group A: patients who dis-
continued). There were 7 men and 6 women in the group C. The group A was made up of 7 women. The mean age of group C was of 35.69 years (typical deviation [TD] 7.58), with a mean evolution of 22.77 years (TD 17.31) with a mean of 22.86 years of evolution (TD 12.15). The 38.5% of the patients of group C (n= 5) showed complications before starting the treatment (baseline level), while the percentage was of 28.6% in group A (n= 2). No relevant differences were found in the scores on personality style considering the complications of patients. No relevant differences were either found among the groups C and A in the variables of age, years with diabetes, body mass index or number of self-controls.

The inclusion criteria were: a) patients with T1D under treatment with CSII during more than 1 year, b) protocol approved by the local ethics committee and c) signing of the informed consent.

Variables and instruments
- **Millon Personality Inventory II (Millon clinical multiaxial inventory II or MCMI-II)**. This instrument is based on Millon’s personality theory, which makes a difference among styles and personality disorders, but evaluates also some of the main clinical syndromes (DSM-IV). It includes measures of validity, desirability, alteration and sincerity for a better assessment of each case. It consists of basic scales (schizoid, phobic, dependent, histrionic, narcissist, antisocial, aggressive/sadistic, compulsive, passive-aggressive, self-destructive), which assess personality styles and pathological personality scales (schizotypal, limit, paranoid) that measure serious personality disorders (Axis II of DSM). It also includes clinical syndromes (Axis I of DSM) of moderate seriousness (anxiety, hysteriform, hypomania, depressive neurosis, alcohol abuse, drug abuse) and serious (psychotic thought, major depression, delusional disorder). A score of basis index over 85 provide a strong support to the existence of pathological symptoms. The instrument achieved a high internal consistency in this study (0.918).

- **Satisfaction scale of the WHO.** It is made up of 13 positive items and 3 negative items assessed from 1 to 5 through a Likert scale type. The instrument has demonstrated an adequate internal consistency (α= 0.818).

- **Metabolic control.** The glycosylated hemoglobin (HbA1c) has been used as metabolic control indicator, measured through a high pressure liquid chromatography (HPLC).

**Procedure**
After 6 months of treatment with a CSII integrated system together with RT-CGMS (PRT®), 13 patients continued with the treatment (group C) and 7 discontinued (group A). Due to the reduced size of the groups, non parametric tests were applied (the U of Mann-Whitney and the Wilcoxon signed-rank test) with the aim of evaluating the possible differences between the groups C and A and in personality styles, glycemic control (6 months) and satisfaction with the treatment (6 months) as well as the difference intra-group (baseline 6 months) observed in the glycemic control of the patients. The hypothesis contrasts were performed with a 95% confidence interval using the version 16.0 of the SSPS program.

### Results

Relevant differences were found in some of the MCMI-II scales, among the patients with T1D who decided to continue with an intensive insulin treatment (CSII) plus RT-CGMS integrated system (PRT®) and those who gave up. The patients who did not continue with such treatment (group A) had higher scores as regards to the personality styles “histrionism” (p= 0.001), “narcissism” (p= 0.029) and “aggressiveness” (p= 0.026), as well as the clinical syndrome of moderate seriousness named “drugs abuse” (p= 0.011) (table 1). Moreover, they had a higher level of HbA1c (7.60 ± 0.53) than the group of patients who decided to continue (7.02 ± 0.58), in spite of the fact that no relevant differences existed initially, otherwise said, the HbA1c level was similar (p= 0.149) in both groups when the treatment started (table 2).

As depicted in table 3, relevant difference were found in the HbA1c levels of the patients of group C after 6 months of treatment (p= 0.014) while no relevant changes were recorded in the glycemic control of the patients of group A (p= 0.216). Likewise, relevant differences were stated between both groups in the satisfaction scale after 6 months of treatment. The patients of group A were less satisfied with the treatment (p= 0.001) compared to the patients who decided to continue (table 4).

### Discussion

The intentation of this investigation work was to study if the adherence to the indicated treatment (RT-CGMS integrated system PRT®) allowed differenting the patients with T1D considering three types of variable: personality styles, satisfaction with the treatment and glycemic control. In this way, the conducted investigation analyzed if there were relevant statistical differences among the patients who continued the treatment and those who abandoned it as regards to these variables. Therefore, it is a descriptive study, designed with a practical aim, in order to determine
whether the 7 patients who abandoned the treatment were different in some of the three mentioned variables compared to those who continued. Thus, the statistical analysis that have been carried out do not have the objective of performing attributions on the causes of the treatment discontinuation.

Relevant differences were found in the personality between both groups of patients (group C and group A). The patients who discontinued treatment (group A) had higher scores on personality styles “histrionicism”, “narcissism” and “aggressiveness”. They also obtained a higher scale score on “drugs abuse” which constitutes a clinical syndrome of moderate seriousness. Likewise, these patients had higher levels of HbA1c and were more satisfied with the treatment than the group of patients who did not discontinue (group C).

Before discussing these results, it should be considered that it is the first time that the MCMI-II inventory is used to evaluate the personality in patients with T1D under treatment with RT-CGMS integrated system PRT®. Therefore, the conclusions arisen from such results should be considered cautiously, being necessary further investigation on this regard.

In general, the results support previous research. Many publications indicate that some high scores in neuroticism are associated to a deficient metabolic control. It could be observed in this study that patients who discontinued treatment and had poor metabolic control and achieved relevant higher scores in the scale of histrionicism (neuroticism) than those who continued. In the scientific literature, it is also found that this personality feature is associated to a low poor therapeutic adherence.11

As regards to the aggressiveness, the patients with T1D who discontinued the treatment, besides showing a low metabolic control, had relevant higher scores in the aggressiveness scale than the patients who continued. These results support those of other investigations in which a relation between the poor metabolic control and high levels of hostility and violent outbursts have been found. The peculiarity of this study is that this style of personality is associated to the therapeutic adherence for the first time.

As regards to the third personality style in which relevant differences were found, there is no empirical evidence. Thus, the results observed in the narcissist personality style turn out to be clearly innovative. In this way, a personality style characterized by an excess of egocentrism (to the point of being arrogant or conceited before others) seems that it does not favor the adherence of the patient to the treatment.

Though it is not a personality variable, the MCMI-II scale of drugs abuse has also proved to be relevant. The patients who discontinued the treatment had higher scores in this scale compared to those who continued, indicating a difficulty in the control of the impulses within the conventional social limits, and this might suggest a recent or recurrent history of drugs abuse. The scientific literature informs that the deficit in the impulse control is one of the personality characteristics that foresee higher levels of HbA1c.27

The study also provides information about treatment satisfaction, variable associated to the life quality and relevant for the therapeutic adherence. Specifically, the patients who discontinued the treatment (CSII plus CGMS) were more unsatisfied with it than those who continued. Finally, as regards to the metabolic control, the patients who discontinued the treatment achieved higher levels of HbA1c compared to those who continued with it. Therefore, it might be concluded that the patients of this study who discontinued the treatment were adjusted to the following profile: histrionic personality style, narcissist and aggressive, with recent or recurrent history of drugs abuse, whose metabolic control does not improve after 6 months of treatment (RT-CGMS integrated system) and dissatisfaction with such treatment.

According to these findings, a stable personality could be confirmed as well as an adequate self-esteem and a quiet attitude would be the characteristics that would enhance the therapeutic adherence of the patient with T1D to this type of treatment, to which we would add healthy behaviors (no drugs), high expectation of self-efficiency and optimism. On the contrary, the neuroticism, the egocentrism (that precludes the consciousness to the reality, that is to say, the problem itself) and a bellicose or hostile attitude (frequently generator of physician-patient conflicts), as well as a low control capacity of the violent impulses, associated

Table 2. Glycemic control: inter-group differences (baseline-6 months of treatment)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>Typical deviation</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline HbA1c</td>
<td>C</td>
<td>12</td>
<td>7.45</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>7</td>
<td>7.98</td>
<td>0.70</td>
</tr>
<tr>
<td>HbA1c after 6 months</td>
<td>C</td>
<td>12</td>
<td>7.02</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>6</td>
<td>7.60</td>
<td>0.53</td>
</tr>
</tbody>
</table>

*The Mann-Whitney U test was used.

Table 3. Glycemic control: intra-group differences (baseline-6 months of treatment)

<table>
<thead>
<tr>
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<tr>
<td>Baseline HbA1c</td>
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<td>7.45</td>
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<tr>
<td>HbA1c after 6 months</td>
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<td>6</td>
<td>7.60</td>
<td>0.53</td>
</tr>
<tr>
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<td>7</td>
<td>7.98</td>
<td>0.70</td>
</tr>
</tbody>
</table>

*Wilcoxon rank signed test was used.

Table 4. Satisfaction: inter-group differences after 6 months of treatment

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>Typical deviation</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction scale of WHO</td>
<td>C</td>
<td>13</td>
<td>66.84</td>
<td>8.44</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>7</td>
<td>47.14</td>
<td>13.95</td>
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*The Mann-Whitney U test was used.
to a recent or recurrent history of drugs abuse, would be barriers to achieve an adequate therapeutic adherence. Thus, the obtained results could be clinically useful in the determination of exclusion criteria for the implementation of an integrated system of insulin subcutaneous infusion together with a real time continuous glucose monitoring system. However, though the data of this study might be useful for the clinical decision making, more investigations are necessary to confirm or refute the findings. Since the small sample size has been the main limitation of this work, a future investigation might have as objective to argue on the study with a greater sample.

As certain authors point out, the intervention in T1D has the objective of improving the metabolic control of patients and keep it at an optimal level. This objective is not achieved without an adequate adherence to the medical treatment (insulin, exercise, diet). The psychological intervention facilitates the therapeutic adherence and it is related positively to the metabolic control; therefore the incorporation of specialist psychologists in clinical psychology to the diabetes units seems not only necessary but also pertintent.

Conclusions

The profile of the patient who decided to discontinue the treatment in this study was as follows: 1) patients unsatisfied with the indicated treatment, 2) whose metabolic control did not improve, 3) with a histrionic personality style (excessive need of affection, attention and manipulating attitude), narcissist (egocentric) and aggressive (hostile) and 4) with recent or recurrent history of drugs abuse as well as the difficulty to suppress the impulses or keep them within the conventional social limits.

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Declaration of potential conflict of interests

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References