Evaluation of perception of insulin therapy among Chinese patients with type 2 diabetes mellitus

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Abstract

Aims. – To evaluate whether perception of insulin therapy differs between patients with type 2 diabetes treated with insulin and those treated with oral hypoglycaemic agents (OHAs), and to examine whether gender, education level, injection duration and mode of injection were associated with the patients' perception of insulin therapy.

Methods. – The validated Chinese version of the Insulin Treatment Appraisal Scale (ITAS) was used to evaluate the perception of insulin therapy among 100 insulin-treated patients and 100 OHA-treated patients. The higher the total score, the more negative is the appraisal.

Results. – The OHA-treated group had a higher mean total score (20 items), a higher mean total score for 16 negative items and a lower mean total score for four positive items than the insulin-treated group. The proportion of participants who rated the negative items as “agree” or “strongly agree” was significantly higher in the OHA-treated group than in the insulin-treated group. In addition, the proportion of participants who rated the four positive items as “agree” or “strongly agree” was lower in the OHA-treated group than in the insulin-treated group. Gender, education level, duration of insulin injection and mode of injection did not have a significant impact on perception of insulin therapy.

Conclusion. – Chinese type 2 diabetic patients taking OHAs had more negative beliefs and attitudes towards insulin therapy than patients being treated with insulin. This difference was not associated with either gender or education level. Furthermore, neither injection duration nor type of device was related to perception of insulin therapy.

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Keywords: Psychological insulin resistance; Insulin Treatment Appraisal Scale; Type 2 diabetes mellitus; Chinese; Perception

Résumé

Évaluation de la perception de l’insulinothérapie chez des diabétiques de type 2 chinois.


Méthodes. – La version chinoise validée de l’échelle d’évaluation de l’insulinothérapie (Insulin Treatment Appraisal Scale [ITAS]) a été utilisée pour évaluer la perception de l’insulinothérapie chez 100 patients insulinotraitées et 100 patients traités par ADO. Dans ce test, plus le score total est élevé, plus l’évaluation est négative.

Résultats. – Le groupe traité par ADO présentait un score total moyen plus élevé (20 éléments), un score total moyen plus élevé pour 16 éléments négatifs et un score total moyen plus faible pour quatre éléments positifs que le groupe insulinothérapie. La proportion de participants qui avaient “accepté” ou “fortement accepté” les éléments négatifs étaient significativement plus élevée dans le groupe traité par ADO que dans le groupe insulinothérapie. En outre, la proportion de participants qui avaient “accepté” ou “fortement accepté” les quatre éléments positifs était plus faible dans le groupe traité par ADO que dans le groupe insulinothérapie. Le sexe, le niveau d’éducation, la durée de l’insulinothérapie et le mode d’injection n’avaient pas d’impact significatif sur la perception de l’insulinothérapie.

Diabetes mellitus (DM) is an important public-health problem. It presents a substantial socioeconomic and quality-of-life burden mainly as a result of its chronic complications. It has been estimated that the number of diabetic patients worldwide will approach 300 million by 2025 [1]. The Diabetes Control and Complications Trial [2] and the UK Prospective Diabetes Study [3] showed that microvascular complications in patients with either type 1 or type 2 DM can be reduced by improving glycaemic control. It has been shown, however, that beta-cell function declines gradually regardless of dietary therapy, or sulphonylurea, metformin or rosiglitazone interventions, in patients with type 2 DM [3–5]. The estimated failure rates of oral monotherapy in patients with type 2 DM was 45% or greater after three years of therapy, 52% after six years of therapy and 75% or greater after nine years of therapy [6,7]. Thus, glycaemic control worsens over time.

Insulin is the oldest and most effective medication for controlling blood glucose. Patients who do not respond to oral therapy will require insulin to achieve glycaemic control. However, psychological insulin resistance (resistance against taking insulin) is common among patients with type 2 DM. This resistance is multifactorial, but mainly involves negative beliefs and perceptions regarding diabetes and insulin, and how others regard insulin therapy [8,9]. The Insulin Treatment Appraisal Scale (ITAS) is a newly developed and well-validated questionnaire for evaluating the perception of insulin therapy [10]. The developers of the instrument showed that the perception of insulin therapy among insulin-naive type 2 DM patients was more negative than among insulin-treated patients in a Caucasian population [10].

Cultural belief systems can influence the way people approach disease. Chinese medicine emphasizes a holistic approach towards health [11,12]. Furthermore, Chinese people with diabetes believe that sweating is an effective method for eliminating toxins [13] and that oral hypoglycaemic agents (OHAs) can induce renal dysfunction [13]. These beliefs are rather different from those in Western cultures, and led us to evaluate the perception of insulin therapy in a Chinese population. As gender differences are seen in many aspects of medicine, and as it is often assumed that people with higher education levels have better access to medical information than those with low education levels, we also examined whether gender or education-level differences were associated with perception of insulin therapy. In addition, as insulin delivery instruments have become more convenient in recent years, in the group of patients treated with insulin, we also evaluated whether the perception of insulin therapy was associated with the mode of insulin delivery and the duration of insulin therapy.

### 2. Patients and methods

The validated Chinese version of the ITAS [14] was used to evaluate perception of insulin therapy. The ITAS has 20 items (16 negative items and four positive items) scored on a five-point Likert scale, where strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4 and strongly agree = 5. For calculating the total score, rating of the four positive items was in reverse, with strongly disagree = 5, disagree = 4, neither agree nor disagree = 3, agree = 2 and strongly agree = 1. The total possible score for the ITAS is 100. Higher total ITAS scores indicate a more negative appraisal of insulin therapy.

A total of 200 patients with type 2 DM (100 OHA-treated patients and 100 insulin-treated patients) were recruited.
consecutively from the outpatients clinic of the China Medical University Hospital. All of the patients had participated in the Diabetes Case Management Program in Taiwan for at least one year. This nationwide, multiprofessional, integrated healthcare program provides systematic non-pharmacological and pharmacological diabetes care [15,16]. Data were collected from the self-reported Chinese version of the ITAS questionnaires. In the case of illiterate patients, an outpatients clinical diabetes educator read and explained the meaning of the questions in Taiwanese to help these patients complete the questionnaires. Informed consent was obtained from each participant, and the study was approved by the Human Research Committee of the China Medical University Hospital.

3. Statistical analysis

All data are presented as means ± standard deviation (SD) for continuous variables, and as n (%) for categorical variables. Continuous variables were analyzed by Student’s t test. Nominal variables were analyzed by the chi-square test to determine significant differences between the groups. All analyses were performed with the SAS statistical software package 9.1 (SAS Institute, Cary, NC, USA). A P value of less than 0.05 represented a statistically significant difference between the compared datasets.

4. Results

As shown in Table 1, the proportions based on male gender, age, body mass index (BMI) and DM duration were similar between the two treatment groups. The OHA-treated group had a greater proportion of individuals with junior college or higher levels of education than the insulin-treated group. Also, glycaemic control in the OHA-treated group was better than in the insulin-treated group. Also, glycaemic control in the OHA-treated group was better than in the insulin-treated group (52.2 ± 6.5 vs 45.8 ± 6.0; P < 0.001). Table 2 shows that the mean total score for the 16 negative items was greater in the OHA-treated group than in the insulin-treated group (52.2 ± 6.5 vs 45.8 ± 6.0; P < 0.001). The proportions of most items rated as “agree” or “strongly agree” differed significantly between the two groups. Only three items — “taking insulin increases the risk of low blood glucose levels (hypoglycaemia)”, “injecting insulin is embarrassing” and “taking insulin makes me more dependent on my doctor” — did not differ significantly between the two groups. The mean total score of the four positive items was lower in the OHA-treated group than in the insulin-treated group (13.3 ± 2.5 vs 14.7 ± 1.8; P < 0.001). The number of patients who rated the four positive items as “agree” or “strongly agree” was significantly lower in the OHA-treated group than in the insulin-treated group. The mean total score of the ITAS was higher in the OHA-treated group than in the insulin-treated group (62.9 ± 7.1 vs 55.0 ± 6.1; P < 0.001). However, there were no significant differences in the mean total score of the negative items, mean total score of the positive items, and mean total score between men and women (Table 3). There were also no significant differences in mean total score of negative items, mean total score of positive items, and mean total score between patients with low levels of education (uneducated and primary school) and patients with higher levels of education (junior college or greater; Table 3). In the OHA-treated group, more patients in the junior college or higher subgroup rated the item “taking insulin means my health will deteriorate” as “agree” or “strongly agree” than patients in the uneducated or primary-school subgroup (51.9% vs 21.7%; P = 0.008; data not shown). In addition, more patients in the junior college or higher subgroup than in the uneducated or primary-school subgroup thought that “injecting insulin is embarrassing” (62.5% vs 16.7%; P = 0.005; data not shown). In the insulin-treated group, neither duration of insulin injection nor mode of injection was associated with perception of insulin (Table 3).

5. Discussion

Patients with type 2 DM taking OHAs had more negative beliefs and attitudes regarding insulin therapy than those already being treated with insulin. The positive and negative perception of insulin therapy between male and female patients was similar. Education level, duration of insulin injection and mode of injection did not significantly influence the participants’ perception of insulin therapy.

The present study found that Chinese type 2 DM patients treated with OHA appraised insulin less than those who were already taking insulin therapy. This result is similar to that reported by Snoek et al. [10] in Caucasian type 2 DM patients. However, this finding is not surprising because insulin-treated patients are a group of people who are willing to take insulin. On the other hand, this finding might indicate that OHA-treated patients are not sufficiently educated regarding insulin therapy. In the report by Snoek et al. [10], the proportion of patients who rated the item “fear of needle injection” as “agree” or “strongly agree” fell from 47% in insulin-naïve patients to 6% in insulin-treated patients. In the present study, however, 27% of insulin-treated Chinese patients rated this item as “agree” or “strongly agree”.

When further compared with Caucasian patients in the study by Snoek et al. [10], more Chinese patients in the present study believed that starting insulin therapy meant they had failed to manage their diabetes with diet and OHAs. In addition, a greater proportion of Chinese patients believed that taking insulin indicates that their diabetes has worsened. This can also, in turn, influence the way these patients perceive how others may view their illness. Therefore, the proportion of Chinese patients who believe that other people see them as sicker people is larger than in Caucasian patients.

This difference may be due to different attitudes towards life and illness between Chinese and Caucasian people [17]. Caucasians believe that life is happiness, and view illness as disruptions of normal life. They seek to control and fight illness. In contrast, the Chinese think that life is suffering, and illness is part of the normal cycle of life. This means that they tend to accept the natural course of illness and assume its inevitable deterioration.

Furthermore, a higher percentage of Chinese patients (both OHA-treated and insulin-treated) than Caucasian patients believe that being treated with insulin causes family and friends...
Scores for the OHA-treated versus insulin-treated patients with type 2 diabetes mellitus.

<table>
<thead>
<tr>
<th>Q</th>
<th>Statement</th>
<th>Mean ± SD</th>
<th>Agree or strongly agree (%)</th>
<th>Mean ± SD</th>
<th>Agree or strongly agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Taking insulin means I have failed to manage my diabetes with diet and tablets</td>
<td>3.6 ± 0.9</td>
<td>77</td>
<td>3.3 ± 1.0a</td>
<td>58b</td>
</tr>
<tr>
<td>Q2</td>
<td>Taking insulin means my diabetes has become much worse</td>
<td>3.6 ± 0.9</td>
<td>78</td>
<td>3.3 ± 1.0b</td>
<td>64a</td>
</tr>
<tr>
<td>Q3</td>
<td>Taking insulin helps to prevent complications of diabetes</td>
<td>3.3 ± 0.8</td>
<td>48</td>
<td>3.6 ± 0.7b</td>
<td>69b</td>
</tr>
<tr>
<td>Q4</td>
<td>Taking insulin means other people see me as a sicker person</td>
<td>3.6 ± 0.9</td>
<td>71</td>
<td>3.0 ± 1.0c</td>
<td>44e</td>
</tr>
<tr>
<td>Q5</td>
<td>Taking insulin makes life less flexible</td>
<td>3.4 ± 0.9</td>
<td>64</td>
<td>2.8 ± 1.0c</td>
<td>33e</td>
</tr>
<tr>
<td>Q6</td>
<td>I am afraid of injecting myself with a needle</td>
<td>3.5 ± 1.0</td>
<td>67</td>
<td>2.6 ± 0.9c</td>
<td>27f</td>
</tr>
<tr>
<td>Q7</td>
<td>Taking insulin increases the risk of low blood glucose levels (hypoglycaemia)</td>
<td>3.3 ± 0.8</td>
<td>39</td>
<td>3.0 ± 0.9c</td>
<td>40</td>
</tr>
<tr>
<td>Q8</td>
<td>Taking insulin helps to improve my health</td>
<td>3.3 ± 0.8</td>
<td>52</td>
<td>3.7 ± 0.8c</td>
<td>78c</td>
</tr>
<tr>
<td>Q9</td>
<td>Insulin causes weight gain</td>
<td>2.9 ± 0.5</td>
<td>8</td>
<td>3.1 ± 0.9</td>
<td>40f</td>
</tr>
<tr>
<td>Q10</td>
<td>Managing insulin injections takes a lot of time and energy</td>
<td>3.3 ± 0.9</td>
<td>56</td>
<td>2.5 ± 0.9c</td>
<td>22e</td>
</tr>
<tr>
<td>Q11</td>
<td>Taking insulin means I have to give up activities I enjoy</td>
<td>2.9 ± 1.0</td>
<td>41</td>
<td>2.3 ± 0.8c</td>
<td>15g</td>
</tr>
<tr>
<td>Q12</td>
<td>Taking insulin means my health will deteriorate</td>
<td>2.9 ± 1.0</td>
<td>36</td>
<td>2.4 ± 0.8c</td>
<td>13h</td>
</tr>
<tr>
<td>Q13</td>
<td>Injecting insulin is embarrassing</td>
<td>3.0 ± 1.0</td>
<td>42</td>
<td>2.4 ± 0.9c</td>
<td>19i</td>
</tr>
<tr>
<td>Q14</td>
<td>Injecting insulin is painful</td>
<td>3.4 ± 0.9</td>
<td>58</td>
<td>3.0 ± 1.0c</td>
<td>46</td>
</tr>
<tr>
<td>Q15</td>
<td>It is difficult to inject the right amount of insulin correctly at the right time every day</td>
<td>3.0 ± 1.0</td>
<td>44</td>
<td>2.4 ± 0.9c</td>
<td>17f</td>
</tr>
<tr>
<td>Q16</td>
<td>Taking insulin makes it more difficult to fulfill my responsibilities (at work, at home)</td>
<td>2.7 ± 0.9</td>
<td>28</td>
<td>2.3 ± 0.7c</td>
<td>11b</td>
</tr>
<tr>
<td>Q17</td>
<td>Taking insulin helps to maintain good control of blood glucose</td>
<td>3.5 ± 0.8</td>
<td>66</td>
<td>3.9 ± 0.5c</td>
<td>90d</td>
</tr>
<tr>
<td>Q18</td>
<td>Being on insulin causes family and friends to be more concerned about me</td>
<td>3.5 ± 0.7</td>
<td>64</td>
<td>3.7 ± 0.6c</td>
<td>78e</td>
</tr>
<tr>
<td>Q19</td>
<td>Taking insulin helps to improve my energy level</td>
<td>3.2 ± 0.6</td>
<td>29</td>
<td>3.5 ± 0.7c</td>
<td>59f</td>
</tr>
<tr>
<td>Q20</td>
<td>Taking insulin makes me more dependent on my doctor</td>
<td>3.6 ± 0.7</td>
<td>68</td>
<td>3.8 ± 0.6c</td>
<td>80</td>
</tr>
</tbody>
</table>

Mean total score of 16 negative items 52.2 ± 6.5
Mean total score of 4 positive items (no. 3, 8, 17, 19) 13.3 ± 2.5
Mean sum of total score (20 items, 4 positive items inversely rated) 62.9 ± 7.1

Table 2

Table 3

Relationships between gender, education level, insulin injection duration and injection device, and insulin perception.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Education level</th>
<th>Mean total score of negative items</th>
<th>Mean total score of positive items</th>
<th>Mean sum of total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>≤ 6 years</td>
<td>48.5 ± 7.4</td>
<td>14.1 ± 2.3</td>
<td>58.4 ± 7.8</td>
</tr>
<tr>
<td>Female</td>
<td>≥ 12 years</td>
<td>49.5 ± 6.6</td>
<td>13.9 ± 2.3</td>
<td>59.6 ± 7.6</td>
</tr>
<tr>
<td>injection duration</td>
<td>Injection device</td>
<td>Syringe</td>
<td>Pen</td>
<td></td>
</tr>
<tr>
<td>≤ 1 year</td>
<td>Mean total score of negative items</td>
<td>45.4 ± 6.0</td>
<td>46.2 ± 6.0</td>
<td>45.9 ± 6.1</td>
</tr>
<tr>
<td>&gt; 1 year</td>
<td>Mean total score of positive items</td>
<td>14.5 ± 1.9</td>
<td>15.0 ± 1.8</td>
<td>14.6 ± 1.9</td>
</tr>
<tr>
<td>Mean sum of total score</td>
<td>54.9 ± 6.6</td>
<td>55.2 ± 5.6</td>
<td>55.3 ± 6.2</td>
<td>53.1 ± 5.9</td>
</tr>
</tbody>
</table>
their own. For this reason, Chinese patients believe that if they take insulin, their family and friends will become more worried about them, and they will also become more dependent on their doctors.

One previous study [9] showed that more women were unwilling to receive insulin therapy than men. However, our present study found no such gender difference in perception of insulin therapy. Education level has also been reported to affect glycaemic control. Studies have shown that patients with low levels of education tend to have poorer glycaemic control than those at higher levels of education [18,19]. Thus, it might be expected that patients with higher education levels would have a higher appraisal of insulin. However, our present study found that education level was not associated with perception of insulin therapy. Contrary to expectations, more patients in the higher education subgroup thought that taking insulin meant that their health would deteriorate and that insulin injections are embarrassing.

Furthermore, it is logical to assume that patients with a longer duration of insulin injection may have a more positive appraisal of insulin. Within the insulin-treated group, however, the perception of insulin therapy did not differ between patients treated with insulin for less than one year and those treated with insulin for more than one year. That finding implies that the perception of insulin therapy is not dependent on the duration of insulin therapy.

Polonsky and Jackson [20] reported that administration via an insulin pen rather than the traditional bottle and syringe may help patients to overcome any psychological insulin resistance. Our present study, however, found that there was no difference in perception of insulin therapy between insulin-pen users and traditional syringe users.

The present study had two limitations. First, the study sample may not have been representative of all patients with type 2 DM, as the patients were all recruited from a tertiary care clinic. Second, because this was a cross-sectional study, the data could not answer the question of whether patients in the insulin-treated group already had more positive attitudes toward insulin than insulin-naïve patients before they started taking insulin or whether their perception had changed as a result of taking insulin. To answer that question properly, a longitudinal study examining patients before and after they begin insulin therapy needs to be conducted.

6. Conclusion

The present study found that patients with type 2 DM taking OHAs had more negative beliefs and attitudes regarding insulin therapy than those who were already being treated with insulin. This difference was neither gender- nor education-related. In addition, neither injection duration nor type of device used was associated with perception of insulin therapy. Finally, Makine et al. [21] found that, in Caucasian insulin-naïve type 2 DM patients, more negative beliefs about insulin therapy tended to be associated with higher levels of depression and diabetes distress. Further studies in the future are needed to evaluate this relationship in Chinese patients.

Disclosure of interest

Dr Ching-Chu Chen has received lecture fees from Novo Nordisk and Sanofi-Aventis, and has been reimbursed by these companies for attending several conferences. These companies manufacture insulin products for the treatment of diabetes.

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