Chung Shan Medical Journal 2024; 35:9-18

airiti

Original Article

Comparison of Diabetes-Related Distress Between Insulin and Anti-Diabetic Medication Users in Adult Type 2 Diabetes

Yueh-Chu Wu[1,2], Edy Kornelius[3,4], Chien-Ning Huang[3,5], Ya-Fang Ho[6*], Yu-Ming Wang[7,8*]

[1] *Diabetes Education Center and Department of Nursing, Chung Shan Medical University Hospital, Taichung City, Taiwan*
[2] *Ph.D. Program in Healthcare Science, China Medical University, Taichung City, Taiwan*
[3] *Division of Endocrinology and Metabolism, Department of Internal Medicine, Chung Shan Medical University Hospital, Taichung City, Taiwan*
[4] *School of Medicine, Chung Shan Medical University, Taichung City, Taiwan*
[5] *School of Medicine, Institute of Medicine of Chung Shan Medical University, Taichung City, Taiwan*
[6] *School of Nursing, China Medical University, Taichung City, Taiwan*
[7] *Department of Psychology, Chung Shan Medical University, Taichung City, Taiwan*
[8] *Clinical Psychological Room, Chung Shan Medical University Hospital, Taichung City, Taiwan*

Purpose: To investigate factors related to distress in type 2 diabetes patients with poor glycemic control, comparing insulin-treated (observation group) and oral-treated (control group) patients.
Methods: All participants were adults (aged 20 to 70 years) with a diagnosis of Type 2 DM for a minimum of one year, who were being treated with medication for diabetes, and had a HbA1c value greater than 8.5%. Both groups completed the following questionnaire surveys: Problem Areas in Diabetes (PAID), Insulin Treatment Appraisal Scale (ITAS), Hypoglycemia Fear Survey II (HFS II), and Demoralization Scale Mandarin Version (DS-MV).
Results: Comparisons of insulin-treated patients (n = 35) with oral-treated patients (n = 34) showed that in patients with a PAID score >40, the insulin-treated group reported significantly higher distress than the oral-treated group. Patients treated with insulin had a higher negative attitude toward ITAS than those treated with oral therapy. Compared with oral-treated patients, the incidence of mild and moderate hypoglycemia was significantly higher in the insulin-treated patients. The insulin-treated patients (40.89 ± 6.43) had a significantly higher negative perception of demoralization syndrome than the oral-treated patients (26.88 ± 2.85).
Conclusion: Compared with the oral-treated patients, insulin-treated patients reported significant distress associated with diabetes and held a more negative attitude, as these patients were particularly fearful of hypoglycemia, which has implications for their mental health. Healthcare providers should be mindful of distress in patients with type 2 diabetes receiving different treatment options during the course of the disease, especially when insulin treatment is required or complications occur.

Keywords: Type 2 diabetes, poor glycemic control, diabetes-related distress, insulin-treated, oral-treated, different treatment

* Corresponding Author: Yu-Ming Wang (Y.M.W) and Ya-Fang Ho (Y.F.H)
Address: No. 110, Sec. 1, Jianguo N. Rd., Taichung City, 40201, Taiwan.
Tel: +886-4-2473-0022 ext. 12373
E-mail: wym@csmu.edu.tw (Y.M.W); avonho97@mail.cmu.edu.tw (Y.F.H)

1. Introduction

Type 2 Diabetes Mellitus (T2DM) is one of the most prevalent chronic diseases worldwide. There is

airiti

now a large amount of evidence demonstrating the importance of long-term blood glucose control due to its association with improved results (Glycated Hemoglobin A1c, HbA1c)(1-3). The main indicator of diabetes blood glucose control is HbA1c. The current international guidelines recommend an HbA1c target value of about 7.0%(4-6). Despite recent advances in medical technology, diabetes remains an incurable disease. Nonetheless, blood sugar can be controlled and this approach is still the best way to delay the development of diabetes complications. Complex environmental, social, behavioral, and emotional factors, known as psychosocial factors, influence the ability to live with diabetes, both type 1 and type 2, and affect the attainment of satisfactory medical outcomes and psychological well-being. Thus, individuals with diabetes and their families are challenged with complex, multifaceted issues when integrating diabetes care into daily life. As a consequence, psychosocial factors affect self-care, such as diabetes distress (burdens of diabetes and its treatment, worries about adverse consequences), lack of social and economic resources, and other psychological states (e.g., depression, anxiety, eating disorders, cognitive impairment). In addition, evaluation is indicated during major disease and life transitions, including the onset of complications and significant changes in treatment (e.g., initiation of insulin or other forms of intensification) or life circumstances (e.g., living arrangements, job, and significant social relationships)(7, 8). Medical management of diabetes requires patient implementation of a treatment regimen. Blood glucose control depends on proper diet, exercise, blood glucose monitoring, injections, and insulin dosage adjustments. These self-care techniques require behavior modification and many patients receiving insulin therapy (Insulin Therapy, IT) may have difficulty implementing changes in their life and indeed may find that the required lifestyle changes are a burden(9, 10). Therefore, these sources of distress are related to poor self-care behaviors, most of which are due to poor patient compliance with medications leading to poor blood glucose control(11). Taiwanese research evidence shows that only about one-third of diabetic patients achieve treatment goals. This has prompted calls for joint efforts to increase the proportion of patients achieving good blood sugar control (12).

The management of diabetes is complicated by the progressive nature of the disease; as β cell function diminishes, oral hypoglycemic agents alone are frequently insufficient for maintaining glycemic control and insulin therapy is required. When type 2 diabetic patients are treated with one or two oral hypoglycemic agents and the HbA1c is still ≥7.0%, insulin therapy should be considered(2, 3). Past studies have suggested that when diabetic patients resist insulin injections, the main reason is the lack of awareness of insulin, and the attitude and psychological resistance to insulin injections have been attributed to the belief that insulin treatment represents the last step of the treatment of the disease. The stigma of insulin “addiction”, loss of autonomy of the body, and punishment for poor personal disease control have also been described(13). Clinically, when patients are unable to adapt to insulin they are forced to choose between insulin and oral hypoglycemic drugs. Therefore, whether patients can continue to inject insulin does not depend on a temporary decision, as they must rely on psychological adjustment and lifestyle adaptations.

Diabetes is closely related to the patients’ lifestyle habits. Patients can adjust their daily work to achieve stable blood sugar control. In fact, not every patient has to use oral hypoglycemic drugs or insulin therapy. Clinicians may not base treatment decisions solely on the patient's blood glucose level. If blood sugar control is not perfect, the doctor may consider the patient's work, adjustments to changes in behavior in daily life, financial pressure, and so on. Therefore, if a doctor believes that a patient may have difficulty achieving behavior changes, she may consider prescribing insulin injections to assist with blood sugar control. Oral hypoglycemic drugs and insulin therapy each have their own particular advantages and disadvantages. In the early stages of the disease, physicians typically use oral hypoglycemic drugs as the initial treatment method and adjust them according to the patient's lifestyle habits, but the overall clinical performance of the patient may not be satisfactory(2, 3).

Moreover, in addition to dietary adjustment and exercise, the main drugs used for diabetes treatment are oral hypoglycemic drugs and insulin. Most

airiti

patients have no choice but to rely on a doctor's assessment of their health. Of course, patients must comply with their oral hypoglycemic drug regimen and diet control, or doctors will also consider adding insulin therapy to assist with blood sugar control. Insulin therapy not only controls blood sugar, but also reduces the psychological burden that diabetic patients often experience. When patients use insulin therapy, they can improve their physical symptoms including clearer eyes, improvement of dry skin and desquamation, and a decrease in the trouble index when behavior changes(14). However, in addition to controlling blood sugar, insulin supplementation can also bring about the above benefits. Past studies have shown that patients' discomfort after insulin injection is greatly reduced, and the pressure and burden of disease self-behavior changes are improved, which can be achieved immediately. Insulin is relatively effective at achieving good blood sugar control(14). However, studies have found that patients do not benefit from increasing insulin, though this effect is not caused by the insulin drugs themselves. Rather, there are socio-psychological effects caused by insulin injections, including the stigma of insulin injections and the patient's own increase in needle pain, which can even result in fear and panic after each injection. The psychological beliefs of most patients mean that the disease is more serious or incurable, and this in turn increases the risk of poor blood sugar control, such as hypoglycemia(15). Therefore, while insulin can be used as an adjuvant therapy, the effect may not be favorable and possibly may even be counterproductive.

A large-scale population survey in the United States found that adults with T2DM who took insulin therapy had higher rates of depression and other diseases than those who did not use insulin therapy(11, 16). The literature confirms that T2DM adults on insulin therapy, compared with patients treated with oral hypoglycemic drugs or diet therapy, had a longer illness, a higher incidence of diabetes complications, and poor blood sugar control(15, 17). Past studies have found that the duration of the course of diabetes and diabetes-related problems, as well as diabetes complications were significant(18). In addition, a qualitative study showed that among insulin therapy participants, the hassle of adjusting blood sugar, worrying about future complications, and guilt and anxiety during diabetes follow-up, were more frequently reported compared with oral therapy participants. Emotional distress and depression have a huge impact. Insulin participants were more likely to describe pain related to functional limitation, and diseases related to pain and neuropathy(7, 18). Studies have shown that adults with T2DM on insulin therapy reported significantly more diabetic distress, including distress related to lower social support, and patients who used insulin therapy had higher diabetes-related emotional distress. The main sources of suffering were concerns about the occurrence of more serious diseases, fear of recurrence of hypoglycemia, which indirectly affects the health of patients, and unclear treatment goals(15, 17).

In addition, the participants were concerned about the idea of self-injecting insulin; however, they adapted to this treatment and were still able to enjoy activities of daily living. Participants felt more aware of their diabetes after insulin was started, and more confident in managing their diabetes. When they used insulin and were willing to share their knowledge with others, they adapted to this treatment change and could manage their health well(14). These studies found evidence of diabetes-related problems in adult patients with T2DM receiving insulin treatment. Some of the issues that were identified may be due to the burden of self-management, but some participants adapted well to the treatment change. Therefore, in addition to the role of drugs in diabetes care, behavior management and psychological effects also need to be considered. Past studies have confirmed that it is important for patients to maintain psychological stability and effective blood sugar control(19). The power that comes from the patient's initiative rather than relying on external drug treatment to control blood sugar is a key component of successful management in T2DM. A healthy mental concept is more important than the meaning of disease treatment(19). Although this issue is very important, the addition of oral hypoglycemic drugs and oral hypoglycemic drugs followed by insulin therapy have rarely been reported in the literature. Few studies have compared these two strategies. The purpose of this study was to use the Problem Areas in Diabetes (PAID), the Insulin Treatment Appraisal

airiti

Scale (ITAS), Hypoglycemia Fear Survey II (HFS II), the Demoralization Scale Mandarin Version (DS-MV), and 4 other types of social psychological index survey results. According to the abovementioned studies, for patients receiving oral medications or insulin therapy (IT), each treatment approach has its own set of problems with respect to diabetes health management. Comparing the two treatment options (only oral hypoglycemic drugs or insulin regimens), differences in distress may provide practical insights into the difficulties encountered by patients. The goal of this study was to understand the life distress caused by different treatment options in adults with type 2 DM, and to gain an understanding of the different psychological feelings and self-management burdens of type 2 DM patients.

2. Material and Method

2.1. Study design

A quasi-experimental study design was used. All patients in this study were adults with type 2 diabetes who were assigned to the insulin group or the only oral medication group. The differences between the two treatment options (only oral hypoglycemic drugs or insulin) were compared. Figure 1 depicts the allocation of patients to the two study groups.

2.2. Study participants

The study was conducted at the Diabetes Education Center (DEC) of a tertiary hospital in central Taiwan, from September 2017 to November 2017. Eligible participants were adults (aged 20 to 70 years) with a diagnosis of type 2 DM for a minimum of one year, who were being treated with oral medication or receiving insulin therapy for diabetes, and had an HbA1c value greater than 8.5%. Exclusion criteria were cognitive deficits (based on medical records, such as dementia), severe depression, or any other severe psychiatric condition. This study obtained approval from the Institutional Review Board and all subjects provided written informed consent prior to enrollment. This research complies with the Helsinki Declaration (CS17046).

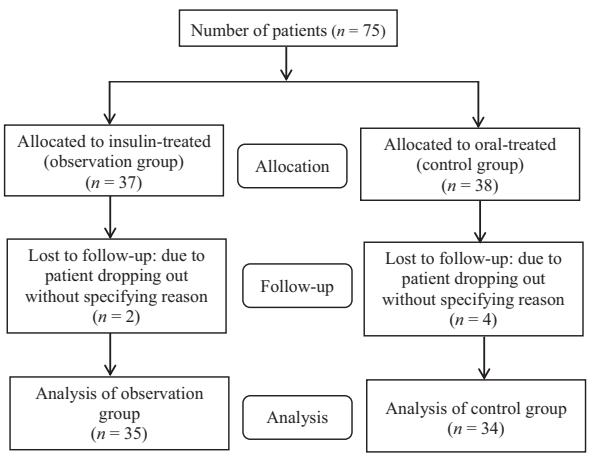


Figure 1. Flowchart of patient selection and group allocation.

2.3. Data collection methods

Participants provided demographic and health information, including length of time since diagnosis, family history, and number of diabetes-related complications. They also completed diabetes-related distress instruments, including the Problem Areas in Diabetes (PAID), the Insulin treatment appraisal scale (ITAS), the Hypoglycemia Fear Survey II (HFS II), and Demoralization Scale Mandarin Version (DS-MV), to compare the effects of the two treatment options (only oral hypoglycemic drugs or insulin).

The Problem Areas in Diabetes (PAID) questionnaire was used to measure diabetes-related distress(20). This is a widely recognized measure of diabetes distress, assessing the general emotional burden of diabetes and distress related to diabetes treatment, food choices, and social support. The PAID questionnaire comprises 20 items, producing a total score ranging from 0 to 100, with higher scores representing higher distress. A score ≥ 40 on the PAID questionnaire represents high distress(21). The Dutch PAID scale has good convergent and discriminant validity and high internal consistency. The questionnaire has been shown to be a useful measure to assess diabetes-related distress, and its responsiveness has been tested, supporting its sensitivity to change over time(22).

The insulin treatment appraisal scale (ITAS) captures type 2 diabetes patients' current appraisal of insulin therapy. The instrument assesses both positive and negative attitudes. The questionnaire has a total of 20 items (4 positive and 16 negative statements) using a 5-point Likert scoring method, with a score from 1 to 5 (strongly disagree: 1, disagree: 2, neither agree nor no objection: 3, agree: 4, strongly agree:

airiti

5). In calculating the total score, 4 forward questions are scored in reverse, from 5, strongly disagree, to 1, strongly agree. The ITAS calculates a sum score with a maximum score of 100 points reflecting severe negative appraisal of insulin therapy (<49 points, slight concerns about insulin therapy; 49–62 points, moderate; 62–75 points, severe; >75 points, most intense concerns) (23).

The Hypoglycemia Fear Survey II (HFS II) measures worry about hypoglycemia using the Worry subscale of the HFS(24). The subscale is comprised of 18 questions that measure degree of patient fear in the past 6 months, and is measured on a scale from 0 to 72, with items rated on a 5-point Likert scale ranging from 0 (never) to 4 (always). The higher the total score, the greater the fear of the past hypoglycemia experience.

The Demoralization Scale Mandarin Version (DS-MV) measures a phenomenon of existential distress and loss of meaning in life in patients suffering from cancer or advanced diseases. The questionnaire has a total of 24 items (19 negative questions and 5 positive questions, no. 1,6,12,17, and 19) using a 5-point Likert scoring method, with a score from 1 to 5 (strongly disagree: 1, disagree: 2, neither agree nor object: 3, agree: 4, strongly agree: 5). In calculating the total score, 5 forward questions are scored in reverse, i.e., strongly disagree, 5; strongly agree, 1. Based on the total DS-MV, a higher score indicates a more negative perception(25).

Data analysis

The primary outcome was calculated on an intention-to-treat (ITT) basis which included all randomized patients. All participants who were enrolled prior to commencement of the study were included in the data analysis set. Dropouts and missing data due to failure to comply with the measurement protocol were replaced with immediately preceding values. We used Chi-square test or Independent t tests to examine quantitative differences between treatment regimen groups. The tests of intervention effects were performed using a two-sided significance level of .05 unless otherwise stated. All statistical analyses were conducted using SPSS version 22.0 (SPSS, Armonk, NY, USA).

3. Result

Sixty-nine individuals (insulin-treated=35; oral-treated=34) participated (see Table 1). There were 40 women (58%). Among all participants, only 30.4% had graduated from university and over half (69.6%, n = 48) had not graduated from college. Almost two thirds of patients (62.3%, n = 43) had a family history of type 2 diabetes. As would be expected, participants on insulin had higher HbA1c levels, had diabetes for significantly longer than those on oral medications only ($p < .05$), and reported more diabetes-related complications. Patients were middle-aged or older, overweight, and had been living with diabetes for more than ten years, but had poor glycemic control. The insulin-treated group included more patients with longer diabetes duration, higher BMI (kg/m^2) , higher fasting blood glucose, and higher HbA1c levels than the oral medication only group. Forty-eight patients (69.5%) showed long-term diabetes complications (macrovascular disease, 42%; microvascular disease, 27.5%). There was greater frequency of self-monitoring of blood glucose in the insulin group, and more specific exercise sessions in the oral medication only group.

The Problem Areas in Diabetes (PAID) scores were not significantly different between the insulin-treated patients (52.7 ± 11.7) and the oral-treated patients (48.8 ± 14.0), but Table 2 shows that insulin-treated patients (85.7%, n =30) had significantly higher PAID > 40 scores, indicating high distress compared with the oral-treated patients (64.7%, n =22) ($p < .05$).

The Insulin Treatment Appraisal Scale (ITAS) questionnaire results revealed that adult patients with diabetes had a mean ITAS sum score of 55.4 ± 26.3 points. According to the results of the ITAS questionnaire, the barriers to insulin therapy were more substantial for the oral-treated patients (80.1 ± 6.1 vs. 29.9 ± 7.9; $p < .01$). The results of the ITAS questionnaire are presented in detail in Table 2.

The Hypoglycemia Fear Survey II (HFS II) questionnaire revealed that adult patients with diabetes (see Table 2) showed a mean HFS II sum score of 25.0 ± 10.8 points. The HFS II sum score of insulin-treated patients (31.7 ± 10.8) was significantly higher than that of oral-treated patients (18.0 ± 4.6; p

airiti

Table 1. Clinical characteristics

Variable	All (*n* = 69)	Insulin-treated (*n* = 35)	Oral-treated (*n* = 34)	χ^2	*p*
	n (%)	*n* (%)	*n* (%)		
Gender				0.12	0.729
Male	29(42.00)	14(40.00)	15(44.10)		
Female	40(58.00)	21(60.00)	19(55.90)		
Education level				0.50	0.481
College	21(30.40)	12(34.30)	9 (26.50)		
No college	48(69.60)	23(65.70)	25(73.50)		
Family history of diabetes	43(62.30)	21(60.00)	22(64.70)	0.16	0.687
Diabetes complications				4.93	0.085
No complication	21(30.40)	7(20.00)	14(41.20)		
Macrovascular disease	29(42.00)	15(42.90)	14(41.20)		
Microvascular disease	19(27.50)	13(37.10)	6(17.60)		
	M (SD)	*M (SD)*	*M (SD)*	t	*p*
Age (years)	61.7(9.90)	61.2 (9.40)	62.1 (10.60)	0.37	0.713
Diabetes duration (years)	14.3 (6.10)	16.2 (5.20)	12.2 (6.30)	-2.98**	0.004
Frequency of SMBG (times/week)	4.4 (6.00)	5.5 (7.30)	3.3 (4.20)	-1.54	0.130
Physical activity (minutes/week)	67.4 (91.50)	65.7 (73.30)	69.1 (108.10)	0.15	0.879
BMI (kg/m^2)	24.9 (3.80)	25.8 (3.70)	24.0 (3.80)	-1.95	0.055
FPG (mg/dL)	167.6 (47.50)	172.9 (57.60)	162.2 (34.30)	-0.94	0.353
HbA1c (%)	8.8 (1.50)	8.9 (1.00)	8.7 (1.80)	-0.68	0.499

**p < .05 , **p < . 01 .*

HbA1c, glycated hemoglobin A1c; FPG, fasting plasma glucose; SMBG, self-monitoring of blood glucose. BMI, Body Mass Index.

< .01). The incidence of mild/moderate hypoglycemia in the oral-treated patients (76.5%, n=26) was significantly higher compared with the insulin-treated patients (40%, n=14) ($p < .05$). The incidence of severe/very severe hypoglycemia in the insulin-treated patients (60%, n=21) was significantly higher compared with that of the oral-treated patients (23.5%, n=8) ($p < .05$).

The Demoralization Scale Mandarin Version (DS-MV) total scores were not significantly different between the insulin-treated patients (47.7 ± 7.4) and the oral-treated patients (44.8 ± 4.6).

4. Discussion

In this study, the key findings were as follows: [1] Adult diabetic patients exhibited higher diabetes-related distress, especially in those receiving insulin treatment. [2] The insulin-treated diabetic patients had a significantly higher negative attitude toward their insulin therapy in comparison with the oral-treated patients. [3] Patients who received insulin therapy had a higher degree of fear of hypoglycemia than those who received oral medication. [4] Patients receiving insulin therapy showed higher frustration

airiti

Table 2. Comparison of PAID, ITAS, HFS II, and DS-MV scores between the two groups

Variable	All patients (n = 69)	Insulin-treated (n = 35)	Oral-treated (n = 34)	χ^2/ t	*p*
	M±SD	M±SD	M±SD		
The PAID total points	50.78 ± 12.93	52.71 ± 11.67	48.79 ± 14.02	1.27	0.210
PAID >40 score (%)	52(75.4%)	30(85.7%)	22(64.7%)	4.10*	0.043
ITAS points	55.35 ± 26.26	80.11 ± 6.05	29.85 ± 7.92	-29.67**	<0.001
The DS-MV points	46.29 ± 6.27	47.71 ± 7.37	44.82 ± 4.55	-1.95	0.055
The HFS II total points	24.96 ± 10.79	31.74 ± 10.79	17.97 ± 4.58	6.87**	<0.001
Level of severity hypoglycemia				9.42**	0.002
Mild/Moderate hypoglycemia	40(58%)	14(40%)	26(76.5%)		
Severe/Very severe hypoglycemia	29(42%)	21(60%)	8(23.5%)		

**p < .05 , **p < . 01 .*

PAID, Problem Areas in Diabetes. ITAS, Insulin treatment appraisal scale. HFS II, Hypoglycemia Fear Survey II. DS-MV, Demoralization Scale Mandarin Version.

than patients receiving oral medication.

The results (Table 1) showed that patients who received insulin had a significantly longer disease duration than those who received oral hypoglycemic drugs, which is consistent with previous studies(7, 26). This may be due to the fact that our patients suffered from diabetes for a long time, and usually their drug treatment process starts with taking oral hypoglycemic drugs before progressing to insulin treatment. In this study, the frequency of SMBG (times/week), BMI (kg/m2), and HbA1c (%) was higher in insulin-treated patients than in patients treated with oral hypoglycemic drugs. These findings are consistent with previously reported results(7, 26).

In addition, the findings in Table 2 show that PAID questionnaire scores ≥40 represent high distress, and the proportion of patients receiving insulin therapy was significantly higher than that of patients receiving oral medication. Thus, the proportion of patients receiving insulin treatment had a higher proportion of distress, which could be related to their longer duration of diabetes and the higher proportion of diabetic complications. Therefore, the proportion of people in this group was relatively high(18). Although mean PAID scores in patients receiving insulin were higher than those receiving oral medication, there was no statistically significant difference. However, the mean scores of the PAID questionnaire in both groups were higher than 40 points, which is line with previous studies showing that pain in insulin-treated patients is related to diabetes and treatment burden, particularly glycemic control(7, 17, 18).

The results of the ITAS questionnaire showed that the average total score of the insulin-treated patients (80.1±6.1 points) was higher than the average total score of the oral-treated patients (29.9±7.9 points), and the total score of the ITAS questionnaire was >75 points, indicating the most serious problem. The mean total score in insulin-treated patients was over 75 points, reflecting a severe negative self-evaluation. The results were statistically significant and consistent with previously published findings(7, 23). More frequent insulin injections in insulin-treated patients may influence their negative thoughts about diabetes self-management in daily life. This phenomenon was also reported in a previously published study that found that participants who received insulin were more likely than those who received oral therapy to describe pain associated with functional limitations, as well as pain and pain associated with neuropathy and other conditions(27). Consequently, insulin-treated patients all experience substantial associated distress, and the overall burden of diabetes in insulin-treated patients has previously been shown to be

airiti

greater(15, 17). Therefore, far more emphasis should be placed on the benefits of insulin to reduce the negative attitude of patients to insulin therapy, which is known to be greatly beneficial to patients.

This study found that patients receiving insulin therapy have higher levels of concern and fear of hypoglycemia compared with patients with oral hypoglycemic drugs. Just as previous studies have shown, we found that individuals with type 2 diabetes and receiving insulin treatment have more fear of hypoglycemia and experience hypoglycemic events more frequently. Indeed, those who have experienced hypoglycemia have greater worry and fear about experiencing low blood sugar. The impact of frequent and severe hypoglycemia experiences in diabetic patients emphasizes the need to support diabetes-specific self-efficacy and guide programs to prevent hypoglycemia(28). For type 2 diabetes, promptly starting insulin therapy is important for achieving metabolic control, but our findings show that the patient's negative perception of insulin hinders the treatment and delays the injection of insulin, which is consistent with previously reported results. In the treatment of early diabetes, it is crucially important for patients on oral therapy to be provided with accurate knowledge about insulin therapy(28, 29). Therefore, medical personnel should inform patients about the necessity of insulin therapy as soon as possible(30).

For patients undergoing insulin therapy for the first time, more intensive and phased interventions are required, including training of injection techniques, injections to relieve pain, and treatment of hypoglycemia. Patients experiencing fear of suffering require greater lifestyle adaptation, especially with respect to correcting the perceived stigma of insulin therapy. It is important to note that most of our research subjects were middle-aged and elderly people, with an average age of 61.7±9.9 years. Thus, our findings highlight the fact that patients may require different interventional measures depending on their age(29).

Studies have demonstrated that understanding the diabetic problems associated with insulin therapy may have an impact on evaluation and treatment. As previous studies have found, insulin-treated patients experience hypoglycemia and a reduction in hope. The use of supportive education intervention and intensive insulin therapy to help manage diabetes-related pain and improve self-management strategies can effectively control blood sugar and reduce diabetic distress(29, 30).

There was no significant difference in DS-MV scores between the two groups (Table 2), because the two groups' DS-MV total score was not high. This result differs from previous studies. Therefore, our systematic review of barriers to insulin therapy, individualized diabetes treatment plans, and patient information may help overcome this negative attitude, resulting in faster initiation of therapy, improved treatment adherence, and better quality of life. In addition, similar to results reported in the previous literature, the descriptions of patients' difficulties provided herein can also help medical providers identify and set individualized goals. The treatment plan for the progression of diabetes should include a reduction in the psychological burden of patients on different treatments(25, 31). Therefore, it is recommended that patients participate in discussions with a view to increasing their empowerment.

This study had a number of strengths. This study used a total of 4 questionnaires (psychosocial indicators), PAID, ITAS, HFS II, and DS-MV, which may provide complete information of existing measures in order to accurately capture each patient's real-world experience of their disease and treatment. Multiple sources of distress related to diabetes and its treatment were collected and analyzed. There were also several limitations in this study. This investigation was observational in nature and the groups were not randomized. Psychological adaptation in diabetes, such as expectation of results, coping strategies, and so on, is difficult to quantify. Although our main analysis only considered diabetes-related distress and psychological effects as independent results, it is likely that patients had different sensitivities to the events studied (for example, showing the time since the diagnosis of diabetes), which could have affected the development process. These issues warrant further study.

5. Conclusion

The results of our study showed that patients

airiti

receiving insulin therapy reported higher diabetes-related distress compared with patients receiving oral therapy. Participants receiving insulin therapy reported more severe distress, including distress caused by insulin injections, and fear of experiencing hypoglycemia. Patients receiving insulin therapy had a negative attitude toward diabetes management. The insulin-treated patients had a more negative perception, based on the evaluation of demoralization syndrome. Negative perceptions of diabetes control or insulin may influence the patient's final decision on medication. Therefore, before formulating a drug treatment plan, an individual's conception of their disease and treatment should be properly addressed and resolved. In Asian cultures, it may also be necessary to emphasize further understanding of the benefits of insulin use and address the patient's concerns. In some cases, insulin serves as a trigger for negative emotions. Therefore, it is necessary to enhance the ability, confidence, and actual performance of self-management activities in insulin-treated type 2 diabetes patients. In the early stages of diabetes development, it is crucial to discover any cultural concepts, beliefs, or values that may prevent or influence the use of insulin therapy.

Reference

1. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9(th) edition. Diabetes Res Clin Pract. 2019;157:107843.
2. American Diabetes A. 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2020. Diabetes Care. 2020;43(Suppl 1):S98-S110.
3. American Diabetes A. 6. Glycemic Targets: Standards of Medical Care in Diabetes-2020. Diabetes Care. 2020;43(Suppl 1):S66-S76.
4. Holman RR, Paul SK, Bethel MA, Matthews DR, Neil HA. 10-year follow-up of intensive glucose control in type 2 diabetes. N Engl J Med. 2008;359(15):1577-89.
5. Dluhy RG, McMahon GT. Intensive glycemic control in the ACCORD and ADVANCE trials. N Engl J Med. 2008;358(24):2630-3.
6. Group AS, Gerstein HC, Miller ME, Genuth S, Ismail-Beigi F, Buse JB, et al. Long-term effects of intensive glucose lowering on cardiovascular outcomes. N Engl J Med. 2011;364(9):818-28.
7. Tanenbaum ML, Kane NS, Kenowitz J, Gonzalez JS. Diabetes distress from the patient's perspective: Qualitative themes and treatment regimen differences among adults with type 2 diabetes. J Diabetes Complications. 2016;30(6):1060-8.
8. Young-Hyman D, de Groot M, Hill-Briggs F, Gonzalez JS, Hood K, Peyrot M. Psychosocial Care for People With Diabetes: A Position Statement of the American Diabetes Association. Diabetes Care. 2016;39(12):2126-40.
9. American Diabetes A. 5. Facilitating Behavior Change and Well-being to Improve Health Outcomes: Standards of Medical Care in Diabetes-2020. Diabetes Care. 2020;43(Suppl 1):S48-S65.
10. Ali S, Stone M, Skinner TC, Robertson N, Davies M, Khunti K. The association between depression and health-related quality of life in people with type 2 diabetes: a systematic literature review. Diabetes Metab Res Rev. 2010;26(2):75-89.
11. Jansen HJ, Vervoort GM, de Haan AF, Netten PM, de Grauw WJ, Tack CJ. Diabetes-related distress, insulin dose, and age contribute to insulin-associated weight gain in patients with type 2 diabetes: results of a prospective study. Diabetes Care. 2014;37(10):2710-7.
12. Yu NC, Su HY, Chiou ST, Yeh MC, Yeh SW, Tzeng MS, et al. Trends of ABC control 2006-2011: a National Survey of Diabetes Health Promotion Institutes in Taiwan. Diabetes Res Clin Pract. 2013;99(2):112-9.
13. Brod M, Alolga SL, Meneghini L. Barriers to initiating insulin in type 2 diabetes patients: development of a new patient education tool to address myths, misconceptions and clinical realities. Patient. 2014;7(4):437-50.
14. Phillips A. Experiences of patients with type 2 diabetes starting insulin therapy. Nurs Stand. 2007;21(23):35-41.
15. Delahanty LM, Grant RW, Wittenberg E, Bosch JL, Wexler DJ, Cagliero E, et al. Association of diabetes-related emotional distress with diabetes

airiti

treatment in primary care patients with Type 2 diabetes. Diabet Med. 2007;24(1):48-54.
16. Li C, Ford ES, Strine TW, Mokdad AH. Prevalence of depression among U.S. adults with diabetes: findings from the 2006 behavioral risk factor surveillance system. Diabetes Care. 2008;31(1):105-7.
17. Baek RN, Tanenbaum ML, Gonzalez JS. Diabetes burden and diabetes distress: the buffering effect of social support. Ann Behav Med. 2014;48(2):145-55.
18. Kasteleyn MJ, de Vries L, van Puffelen AL, Schellevis FG, Rijken M, Vos RC, et al. Diabetes-related distress over the course of illness: results from the Diacourse study. Diabet Med. 2015;32(12):1617-24.
19. Young-Hyman D, de Groot M, Hill-Briggs F, Gonzalez JS, Hood K, Peyrot M. Erratum. Psychosocial Care for People With Diabetes: A Position Statement of the American Diabetes Association. Diabetes Care 2016;39:2126-2140. Diabetes Care. 2017;40(2):287.
20. Snoek FJ, Pouwer F, Welch GW, Polonsky WH. Diabetes-related emotional distress in Dutch and U.S. diabetic patients: cross-cultural validity of the problem areas in diabetes scale. Diabetes Care. 2000;23(9):1305-9.
21. Welch G, Weinger K, Anderson B, Polonsky WH. Responsiveness of the Problem Areas In Diabetes (PAID) questionnaire. Diabet Med. 2003;20(1):69-72.
22. Stoop CH, Nefs G, Pop VJ, Wijnands-van Gent CJ, Tack CJ, Geelhoed-Duijvestijn PH, et al. Diabetes-specific emotional distress in people with Type 2 diabetes: a comparison between primary and secondary care. Diabet Med. 2014;31(10):1252-9.
23. Snoek FJ, Skovlund SE, Pouwer F. Development and validation of the insulin treatment appraisal scale (ITAS) in patients with type 2 diabetes. Health Qual Life Outcomes. 2007;5:69.
24. Cox DJ, Irvine A, Gonder-Frederick L, Nowacek G, Butterfield J. Fear of hypoglycemia: quantification, validation, and utilization. Diabetes Care. 1987;10(5):617-21.
25. Tang PL, Wang HH, Chou FH. A Systematic Review and Meta-Analysis of Demoralization and Depression in Patients With Cancer. Psychosomatics. 2015;56(6):634-43.
26. Bahrmann A, Abel A, Zeyfang A, Petrak F, Kubiak T, Hummel J, et al. Psychological insulin resistance in geriatric patients with diabetes mellitus. Patient Educ Couns. 2014;94(3):417-22.
27. DeBoer S, Fishman D, Chwals W, Straus C, Amundson T. Body piercing/tattooing and trauma diagnostic imaging: medical myths vs realities. J Trauma Nurs. 2007;14(1):35-8.
28. Erol O, Enc N. Hypoglycemia Fear and Self-efficacy of Turkish Patients Receiving Insulin Therapy. Asian Nurs Res (Korean Soc Nurs Sci). 2011;5(4):222-8.
29. Wong S, Lee J, Ko Y, Chong MF, Lam CK, Tang WE. Perceptions of insulin therapy amongst Asian patients with diabetes in Singapore. Diabet Med. 2011;28(2):206-11.
30. Hermanns N, Kulzer B, Maier B, Mahr M, Haak T. The effect of an education programme (MEDIAS 2 ICT) involving intensive insulin treatment for people with type 2 diabetes. Patient Educ Couns. 2012;86(2):226-32.
31. Fisher L, Gonzalez JS, Polonsky WH. The confusing tale of depression and distress in patients with diabetes: a call for greater clarity and precision. Diabet Med. 2014;31(7):764-72.