Self-care, A1C and stigmatization as predictors of a negative perception of insulin among adults with type 2 diabetes: a hospital-based study in Turkey

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Abstract

Purpose – The purpose of this study was to investigate diabetes self-care behaviors, stigmatization and A1C as predictors of a negative perception of insulin treatment in insulin-treated type 2 diabetic patients.

Design/methodology/approach – A descriptive cross-sectional and relational design was used. The study was carried out in the Diabetes Training Centre and Endocrine and Metabolism Clinic of a university hospital in the southeast of Turkey between May and October 2017. The research sample consisted of 100 type 2 diabetic patients determined by using a convenience sampling method. An introductory information form for type 2 diabetic patients, the Insulin Treatment Appraisal Scale (ITAS), Diabetes Self-Care Activities Survey (DSCAS) and Barriers to Insulin Treatment Scale (BIT) were used to collect the research data. The data were analyzed using descriptive statistics, correlations and step wise multi-linear regression.

Findings – The number of daily insulin injections, training received about insulin and stigmatization was significant predictors of a negative perception of insulin treatment.

Originality/value – Strategies to decrease diabetic individuals' fear of stigmatization should be utilized to minimize their negative insulin treatment perception (giving diabetic individuals training about diabetes, planning public training to inform society and using mass media tools). Diabetes educators should know that diabetic individuals' perception of the severity of the illness could influence the daily number of injections applied and decrease the negative perception regarding insulin.

Keywords Diabetic patients, Stigmatization, Insulin, A1C, Self-care, Turkey

Paper type Research paper

Introduction

Diabetes results in the death of 1.6 million people each year and increases the risk of heart attack, stroke, blindness, renal failure and lower limb amputation [1]. Type 2 diabetes results

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in the loss of glycemic control and resulting complications. Insulin is a necessary method of treatment for patients with poor glycemic control [2]. However, patients do not always receive insulin treatment in the early phases, some receive insufficient doses of insulin or they receive it less frequently than required for the intended glycemic targets [3]. The ratio of the patients who failed to adapt themselves to insulin treatment ranged between 20 and 38% [4] and that of the patients who were reluctant to start insulin treatment was 27% [3].

In a study conducted with 426 patients in Turkey, the rate of discontinuing insulin use in the first three months of treatment was 73.1% among type 2 diabetic patients using insulin for the first time [5]. In other studies, patients with diabetes reported that they had physical restrictions and experienced poor life quality because they used insulin [4, 6]. In one study, type 2 diabetic patients with high negative perceptions of insulin treatment were compared with those with low negative perceptions of insulin treatment, and it was observed that the type 2 diabetic patients with high negative perceptions of insulin treatment considered daily use of insulin injection to be important yet were not happy to carry out a daily blood glucose test [7]. Insulin users experience hypoglycemia more frequently and consequently do less exercise and have poorer glycemic control [8].

Diabetic patients who fail to adapt to treatment have poor glycemic control and increased diabetes-related complications with insulin treatment [4, 9]. In studies conducted with type 2 diabetic patients using oral antidiabetics, no relationship was found between psychological insulin resistance (PIR) or negative perception of insulin treatment and A1C [10–12].

Initiation of insulin treatment is one of the most important, difficult and necessary decisions that diabetic patients have to make because there are a number of factors causing diabetic individuals to resist starting insulin treatment [7, 13, 14]. One of the factors causing PIR is fear of stigmatization [13, 14]."Stigmatization" refers to isolating an individual or a specific group from society, subjecting them to discrimination, devaluing and blaming them and generally treating them in a negative way [15]. Browne *et al.* [16] examined the types of stigmatization among Australian adults with type 2 diabetes. Findings indicated that these individuals felt they were judged and blamed by society in relation to their illness due to the assumption that they are eating too much, practicing poor dietary habits, lacking physical activity and being overweight caused the illness. Additionally, various negative epithets such as "fat", "obese", "overweight", "big fat pig", "lazy", "slothful", "couch potato", "overeater" and "glutton" were frequently used to describe diabetic individuals [16]. Brazeau *et al.* [17] found that diabetic patients subjected to stigmatization had higher levels of A1C and experienced serious hypoglycemia more frequently when compared to those who were not stigmatized.

Ellis, Mulnier and Forbes [18] reported that there were a number of studies conducted not only on how frequently diabetes self-care behaviors (exercise, hypoglycemia, self-monitoring of blood glucose and diet) were exhibited by patients who did not respond to diabetes treatment, gave up insulin treatment or were insulin users but also on patients' fear of hypoglycemia, anxiety and depression. No quantitative research was found examining the influence of diabetes self-care behaviors of insulin-treated type 2 diabetic patients (e.g. diet, exercise and blood glucose self-monitoring) on their perceptions of insulin treatment. Furthermore, the number of studies investigating the relationship between A1C, negative perception of insulin treatment and fear of stigmatization among insulin-treated type 2 diabetic patients is quite limited. The purpose of this study was to investigate diabetes self-care behaviors, stigmatization and A1C as predictors of negative perception of insulin treatment in insulin-treated type 2 diabetic patients.

Methodology

Study design and setting

A cross-sectional and relational research design was used in this study, which was conducted in the Diabetes Training Centre and Endocrine and Metabolism Clinic of a university hospital

in the southeast of Turkey. This clinic has the capacity to take care 25 hospitalized patients suffering from diabetes and other endocrine diseases. The Diabetes Training Centre provides outpatients with individual and group training as well as counseling services and employs a certified diabetes nurse. Individuals applying to the Diabetes Training Centre were those who were newly diagnosed, who had just started insulin treatment or whose follow-up were in progress. All the type 2 diabetic adults who were outpatients at the Diabetes Training Centre were expected to have a medical examination every three or six months, and their records were stored in the center. The volunteer outpatients applying for counseling or receiving training about diabetes were also included.

Research sample

The research sample included 100 type 2 diabetic patients. Using the convenience sampling method, patients who met the following inclusion criteria were recruited: being diagnosed with type 2 diabetes, using insulin, volunteering to take part in the study and being aged 18 or older. The exclusion criteria included having a psychiatric diagnosis/illness and the use of oral anti diabetics. For the calculation of the sample size, G*power software, version 3.1 was used [19]. The power of the study was calculated as 0.87 with the post hoc power analysis (effect size = 0.5; p = 0.05; number of participants = 100 and number of predictor variables = 4).

Data collection tools

An introductory information form for the type 2 diabetic patients, the Insulin Treatment Appraisal Scale (ITAS), the Diabetes Self-Care Activities Survey (DSCAS) and Barriers to Insulin Treatment Scale (BIT) were used to collect the research data.

Introductory information form. The Introductory Information Form was developed by the researchers in line with the literature [3, 15, 20–22]. The form included two sections. The first section was related to the sociodemographic backgrounds of the type 2 diabetic patients (age, gender, marital status, educational background, employment, financial status, residential status – living alone or with others – and perception of health). The second section included characteristics related to type 2 diabetes: diabetes duration, A1C, body mass index (BMI), diabetes-related chronic complications, nondiabetic chronic illnesses, training received about insulin, telling others about his or her diabetes, taking insulin when being alone in public and delaying taking insulin when in public.

Insulin treatment appraisal scale (ITAS). The scale was developed by Snoek, Skovlund and and Pouwerin [20] to evaluate the insulin treatment of type 2 diabetic individuals. The scale was adapted to the Turkish community [23], and it included the headings of "feeling ill", "painful injections", "high risk of hypoglycemia", "restricted daily life", "over-dependence", "protection from complications" and "feeling energetic" [20]. The scale consisted of 20 Likert-type items with two sub-dimensions. The scale items were assigned scores ranging from 1 ("completely disagree") to 5 ("completely agree"). The sum of 16 items with negative statements (16–80) constituted the sub-dimension of negative evaluation, and the sum of four items with positive statements (4–20) constituted the sub-dimension of positive evaluation. The sum of all the items (20 items) produced the total score (20–100). A high positive evaluation score indicated a high positive evaluation of insulin, while a high total score and a high negative evaluation score showed a negative attitude toward insulin use. The cut-off point of the scale was not provided [19]. The validity and reliability testing of the scale revealed that the internal consistency reliability coefficients (Cronbach's alpha) were 0.89 for the whole scale, 0.68 for the sub-dimension of positive evaluation and 0.90 for the sub-dimension of negative evaluation.

Diabetes self-care activities survey (DSCAS). The DSCAS was developed by Toobert, Hampson and Glasgow (2000) to determine the self-care activities of type 2 diabetic

individuals [24]. The survey was translated into Turkish by Kav *et al.* in 2010 [25]. This instrument measures the number of times patients have carried out self-care activities in the last seven days under the headings of diet, blood glucose test, foot care and medical treatment. The Cronbach's alpha values (α coefficients) for the sub-dimensions of the original version of the survey were 0.60 for diet, 0.93 for exercise, 0.89 for a blood glucose test, 0.46 for foot care and 0.82 for medical treatment [25]. Each of the sub-dimensions of the scale was scored separately and could be used independently. Scores for each sub-dimension ranged between 0 and 7. The higher the total score received from the scale, the better the individuals with diabetes had adapted to it.

Barriers to insulin treatment (BIT). The BIT scale was developed by Petrak *et al.* in 2007 to evaluate the psychological barriers to insulin treatment among type 2 diabetic individuals [22]. The scale includes three positive and 11 negative items. The scores range from 1 ("completely disagree") to 10 ("completely agree"). As a five-dimensional scale, the BIT deals with four negative sub-dimensions (fear of injection and self-testing, expected difficulty regarding insulin therapy, stigmatization of insulin injections and fear of hypoglycemia) and one positive sub-dimension (expectations regarding positive insulin-related outcomes). The numerical values for a set of items in a particular sub-scale were added, and the total was divided by the number of items in the sub-scale. Reliability and validity testing of the scale revealed that the internal consistency reliability coefficients (Cronbach's alpha) were 0.78 for the whole scale and 0.62 for the sub-dimension of stigmatization. The scale for stigmatization, one of the negative sub-dimensions of the BIT scale, was applied. A higher mean score for stigmatization indicated a higher level of fear of being stigmatized. The Cronbach's alpha value for the sub-dimension of the stigmatization scale was calculated as 0.73.

Procedure

The researcher visited the Diabetes Training Centre on certain days of the week and remained whole day at the clinic. Literate diabetic patients who volunteered to take part in the study were asked to complete the given questionnaire alone in a room in the Diabetes Training Centre. The researcher examined the patients' medical records in the Endocrine and Metabolism Clinic and collected data from the volunteering patients who had been informed about the study and met the inclusion criteria.

Illiterate volunteer patients were included in the study by applying the face-to-face interview method. In order to avoid any bias, the researcher only read the questionnaires to the patients without making any comments and marked the questionnaires in accordance with the patients' responses.

BMI and A1C values of the diabetic patients were obtained from the patients' medical records by the researcher.

A total of four patients were reluctant to participate in the study for various reasons even though they met the inclusion criteria. It took about ten minutes for each participant to complete the data collection forms.

Statistical analysis

The data were analyzed using SPSS 16.0. For the descriptive statistics, the independent variables found to have a statistically significant relationship with the total negative perception of insulin treatment (the dependent variable) were analyzed using the stepwise multi-linear regression method. Prior to forming the regression model, the standardized residual for the dependent variables and multi-collinearity for the independent variables was examined [26]. "Receiving training about insulin (Table 4)" is a categorical variable, so it was included in the regression analysis as a "dummy" variable [27]. In order to include the variables in the regression equation, the statistical significance level was taken as $\alpha < 0.05$.

Ethical considerations

Approval was obtained from the Non-Interventional Clinical Research Ethics Committee of the Faculty of Medicine of Dicle University (Date: 4 April 2017 and Decision Number: 90).

Results

Demographics

The average age was 63 years old (±19.00), 64% were female, 93% were married, 95% lived with spouses, children or other relatives, and the majority of them were unemployed (95%) with at least an elementary school education (60%) (Table 1).

Table 2 presents data regarding the disease-related characteristics of insulin-treated type 2 diabetic individuals. Among the type 2 diabetic patients, 83% did not have any chronic diabetic complications, 52% had nondiabetes chronic illnesses, 88% had received training about insulin and 93% had told their friends/social group about their diabetes. In total, 61% of type 2 diabetic patients did not refrain from using insulin in public/crowded places, 62% did not take insulin in public, 91% did not smoke and the mean duration of diabetes was 11.24 (±4.94) years.

The mean number of daily insulin injections was 2.88 (±1.18), mean BMI was 30.81(±8.65) kg/cm^2, mean A1C was 9.12 (±2.51), the mean number of cigarettes smoked per day was 7.33 (±8.97), mean score for diabetes self-care behaviors was 1.98 (±0.94), mean score for exercise was 0.67 (±0.52), mean score for medicine use (insulin) was 1.68 (±0.77), mean score for self-monitoring of blood glucose was 0.88(±0.61) and mean score for foot care was 0.73 (±0.62). The total ITAS score of the diabetic individuals was 54.83 (±6.01), their mean score for a

Variable	Number / Mean	Percentage
Age	63.00 ± 19.00 (min–max = 18.00–85.00)	
Gender		
Female	64	64.0
Male	36	36.0
Marital status		
Single	7	7.0
Married	93	93.0
Educational background		
Illiterate	11	11.0
Literate	7	7.0
Elementary school	60	60.0
Secondary school	11	11.0
High school and university	11	11.0
Employment		
Employed	5	5.0
Unemployed	95	95.0
Financial status		
Income less than expenditures	14	14.0
Income equal to expenditures	76	76.0
Income more than expenditures	10	10.0
Living alone		
Living alone	5	5.0
Living with husband/wife, children or relatives	95	95.0

Table 1. Sociodemographic backgrounds of the insulin-treated individuals with type 2 diabetes

Variable	Number / Mean	Percentage
Diabetes chronic complications		
Yes	17	17.0
No	83	83.0
Nondiabetes chronic illness		
Yes	52	52.0
No	48	48.0
Insulin training		
Yes	88	88.0
No	12	12.0
Telling friends/others about his/her diabetes		
Yes	93	93.0
No	7	7.0
Delaying insulin use when in public/crowded places		
Yes	39	39.0
No	61	61.0
Not taking insulin in public		
Yes	38	38.0
No	62	62.0
Smoking		
Yes	9	9.0
No	91	91.0
Mean (min–max)		
Number of injections per day	2.85 ± 1.13 (min–max = 1.00–4.00)	
Diabetes duration	11.24 ± 4.94 (min–max = 0.30–30.00)	
BMI	30.81 ± 8.65 (min–max = 17.26–70.34)	
A1C	9.12 ± 2.51 (min–max = 5.40–17.32)	
Daily number of cigarettes smoked	7.33 ± 8.97 (min–max = 1.00–30.00)	
Diabetes self-care behaviour	1.98 ± 0.94 (min–max = 0.00–4.00)	
Exercise self-care behavior	0.67 ± 0.52 (min–max = 0.00–2.00)	
Medicine (insulin) self-care behavior	1.68 ± 0.77 (min–max = 0.29–3.00)	
Self-monitoring of blood glucose	0.88 ± 0.61 (min–max = 0.00–2.00)	
Foot care	0.73 ± 0.62 (min–max = 0.00–2.00)	
Negative insulin appraisal	44.73 ± 5.77 (min–max = 33.00–59.00)	
Positive insulin appraisal	13.91 ± 2.41 (min–max = 6.00–19.00)	
Total negative insulin treatment appraisal (ITAS)	54.83 ± 6.01 (min–max = 43.00–74.00)	
Stigmatization	0.91 ± 0.59 (min–max = 0.30–2.50)	

Table 2.
Disease-related characteristics of insulin-treated individuals with type 2 diabetes

positive perception of insulin treatment was 13.91(±2.41) and their mean score for stigmatization was 0.91(±0.59) (Table 2).

Correlations

A statistically significant positive relationship was found between the negative perception of insulin treatment and stigmatization ($r = 0.226$) ($p < 0.05$). On the other hand, there was a statistically significant negative relationship between negative perception of insulin treatment and receiving training about insulin ($r = -0.232$) and the number of daily injections ($r = -0.273$) ($p < 0.05$) Table 3.

In addition, no significant relationship was found between the negative perception of insulin treatment and age, gender, marital status, educational background, employment,

financial status or living alone ($p > 0.05$). Also, no significant relationship was found between negative perception of insulin treatment and chronic diabetes complications, nondiabetic chronic illnesses, telling others about his or her diabetes, using insulin in public places, not taking insulin in public, smoking, diabetes duration, BMI, A1C or positive perception of insulin treatment ($p > 0.05$). Moreover, there was no significant relationship between negative perception of insulin treatment and diabetes self-care behaviors of exercise, diet, use of medicine, self-monitoring of blood glucose and foot care ($p > 0.05$). As the number of the variables was high, the data having no significant relationship with the total negative perception of insulin treatment were not included in Table 3. Lastly, no multi-collinearity was found among the independent variables (Table 3).

Predictors of negative perception of insulin treatment

To determine the contribution of the factors related to the total negative insulin treatment perception, stepwise regression analysis was conducted. The total negative perception of insulin treatment was found to have a normal distribution for the regression analysis. The variables found to have a significant relationship with a negative perception of insulin treatment for the insulin-treated type 2 diabetic individuals (number of insulin injections per day, receiving training about insulin and stigmatization) were included in the regression model (Table 4).

When the total negative perception of insulin treatment in insulin-treated type 2 diabetic individuals was examined, it was observed that the number of insulin injections per day ($\beta = -0.299$, $p < 0.05$), receiving training about insulin ($\beta = -0.244$, $p < 0.05$) and stigmatization ($\beta = 0.215$, $p < 0.05$) were significant predictors of a negative perception of insulin treatment (Table 4).

Discussion

The number of insulin injections for insulin-treated type 2 diabetic individuals receiving training about insulin and fear of stigmatization was found to be a significant predictor of total negative insulin perception.

Variable	1	2	3	4
ITAS	–			
Receiving training on insulin	−0.232*	–		
Number of daily injections	−0.273**	−0.090	–	
Stigmatization	0.226*	−0.067	0.020	–

Note(s): *$p < 0.05$; **$p < 0.01$; *** for the discrete data and the dependent variables without normal distribution, nonparametric test (spearmen) was applied, and for the variables with normal distribution, parametric test (Pearson) was used
In the present study, receiving training on insulin (yes = 1 and no = 0) was the dummy variable

Table 3. Relationship between independent variables and total ITAS score ($n = 100$)

	Beta	SE	*T*	*p*
Total ITAS				
Number of insulin injections per day	−0.299	0.470	−3.236	0.002
Receiving training on insulin	−0.244	1.704	2.636	0.010
Stigmatization	0.215	0.925	2.334	0.022

Table 4. Predictors of negative insulin treatment perception for insulin-treated individuals with type 2 diabetes ($n = 100$)

As the number of injections per day increased, the insulin-treated type 2 diabetic individuals had less fear of insulin. In the related literature, researchers reported different results from those obtained in the present study. In one study, an increase in the number of injections per day was found to result in an increased negative perception of insulin treatment [13]. In addition, the results of another study demonstrated that as the number of injections per day increased, the patients increasingly neglected to inject themselves with insulin [28]. In another study, when the patients were asked whether they had difficulty in terms of the number of daily injections, only 23.1% of them had problems, while 58% of doctors thought that their patients had difficulty with respect to the number of daily injections [29]. This finding alone shows that patients and their doctors had quite different perceptions. Perception of illness is a reflection of an individual's beliefs and expectations regarding the illness or a related symptom [30]. In other words, culture may have an influence on an individual's perception of illness, which has a profound influence on how it is managed. In one study, patients who took diabetes and its complications very seriously were 12.3 times more likely to exhibit diabetes self-care behaviors when compared to those who did not take them seriously [31]. In another study, patients using insulin were compared with those using oral antidiabetic drugs, and the former took the illness more seriously to a statistically significant extent [32]. In the present study, the reason why the negative perception of insulin treatment decreased as the number of injections per day increased might be that all the patients in the study were insulin users and that negative perception of insulin treatment decreased due to taking the illness more seriously, as the number of insulin injections per day increased (because they were in a phase of transition to intensive insulin treatment).

The study revealed that training about insulin injections received by the insulin-treated type 2 diabetic individuals decreased their negative perception of insulin treatment. Similar results were reported in the literature [33, 34]. Studies conducted on diabetic patients demonstrated that as the self-efficacy of diabetic individuals increased, their negative perception of insulin treatment decreased [12, 13]. Experimental studies showed that, thanks for following training about diabetes, there was an increase in the self-care behaviors of diabetic individuals and their diabetes self-efficacy [35, 36]. In addition, self-efficacy was proven to play a significant role in the development of diabetes self-care behaviors such as diet, exercise and medical treatment [37]. In the present study, the negative perception of insulin treatment of insulin-treated type 2 diabetic individuals decreased probably because the insulin training they had received raised their awareness and increased their diabetes self-efficacy.

In the study, as the insulin-treated type 2 diabetic individuals felt more fear of stigmatization, their negative perception of insulin treatment increased. This finding is consistent with those reported in the related literature [13, 14]. In one qualitative study, diabetic individuals experienced stigmatization when they felt rejected or experienced rejection or blame due to their illness or their self-care behaviors which were necessary for the management of the illness [16]. In another study, feelings of fear and guilt were found to be the most important obstacles to effective insulin treatment for type 2 diabetic individuals [9]. In the present study, because the type 2 diabetic individuals who were all insulin users had high levels of guilt and fear, their fear of stigmatization and thus their negative insulin treatment perception might have increased.

In the study, no significant relationship was found between negative perception of insulin treatment and diabetes self-care behaviors such as diet, self-monitoring of blood glucose, exercise, smoking and foot care. In the literature, there is no quantitative research examining the relationship between diabetes self-care behaviors and negative perception of insulin treatment. In related studies, it was pointed out that diabetic individuals felt restricted and had poor quality of life as a result of being insulin users [6, 9]. In one study, patients were, in some cases, recommended to be careful about their diet, blood glucose value and taking a dose

of insulin before exercise to avoid hypoglycemia, which caused them to feel restricted [6]. In another study, the quality of life of patients who initially received oral antidiabetics, diet and exercise treatments and then started intensive insulin treatment deteriorated [9]. In another study, the type 2 diabetic individuals with little knowledge about diabetes demonstrated poor compliance with insulin treatment [38]. In the present study, the reason why there was no significant relationship between negative perception of insulin treatment and diabetes self-care behaviors such as diet, self-monitoring of blood glucose, exercise and foot care could be due to the characteristics of the research sample because almost all the participants had received training about insulin.

In this study, no relationship was found between smoking and negative insulin treatment perception of the insulin-treated type-2 diabetic patients. Studies demonstrate that smoking increases insulin resistance, risk of diabetes, risk of diabetic nephropathy, retinopathy and neuropathy for diabetic patients and causes macrovascular complications [39–41]. In one study, it was found that insulin-treated diabetic patients smoked more than those who received other medical treatments [42]. In the present study, smoking might not have led to negative insulin treatment perception probably because the number of smoking diabetic patients was low, and these patients thought smoking did not have a direct influence on insulin treatment.

In the present study, A1C was not a significant predictor of a negative perception of insulin treatment for insulin-treated type 2 diabetic patients. This result is consistent with those reported in the related literature [10–12]. In studies conducted with type 2 diabetic patients using oral antidiabetics, no relationship was found between negative perception of insulin, PIR and A1C [10–12]. Based on these results, it can be stated that regardless of whether patients with diabetes use insulin or oral antidiabetics, the variable of A1C does not lead to any negative perception of insulin treatment.

Conclusion

Study results revealed that the total negative perception of insulin treatment decreased with the increasing daily number of injections used by the insulin-treated type 2 diabetic individuals and with the increasing number of patients receiving training about insulin. In addition, as their fear of stigmatization increased, the patients' negative perception of insulin treatment increased.

Implications for nursing practice

In order to minimize the negative insulin treatment perceptions of diabetic individuals, strategies to decrease fear of stigmatization should be used. Examples of these strategies could include giving diabetic individuals training about diabetes, planning public training programs to inform society and using mass media tools. Diabetes educators should know that diabetic individuals' perception of the severity of the illness could influence the daily number of injections applied and decrease the negative perception regarding insulin. In addition, to decrease the negative insulin treatment perception for diabetic individuals, their perception of the severity of the illness should be evaluated before training about diabetes, and this training should be planned accordingly. In order to help type 2 diabetic individuals to not only cope with the fear of the stigmatization that not only affects their negative perception of insulin treatment but also develop their perceptions regarding the severity of the illness, healthcare professionals should support diabetic individuals and could invite them to join support groups when necessary. In order to determine how the insulin training organized with the use of culture-specific and different training methods influences diabetic individuals' negative insulin treatment perception, more randomized and controlled studies can be conducted.

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