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The importance of measuring self-efficacy in patients with diabetes

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Objectives. Self-efficacy is an important factor influencing diabetes self-management behaviours. Previous studies have examined self-efficacy as a general measure in diabetes care for all self-care treatment recommendations together. This current study was designed to examine if low self-efficacy in each of the measured self-care treatment recommendations is related to decreased adherence for each specific recommendation.

Methods. The self-efficacy was measured in 119 patients for four different treatment recommendations: blood glucose self-monitoring, exercise, diet and oral medication intake and correlated with The Resistance to Treatment Questionnaire.

Results. Significant and positive Pearson's correlations were found between the frequency of adherence to treatment recommendations and the self-efficacy regarding different recommendations. The correlation between self-efficacy and diet and physical activity was 0.5 and 0.67, respectively. The higher the resistance to treatment score, the less confident the patient is in his or her ability to adhere with treatment recommendations. This pattern was not present in adherence to medication intake.

Conclusions. Self-efficacy impacts adherence to treatment and therefore plays a role in the clinical outcome. The practical implication is that assessment of self-efficacy in people with diabetes may be a first step in the development of individually tailored interventions.

Keywords. Diabetes mellitus, patient adherence, self-care, self-efficacy.

Introduction

Diabetes is a chronic illness associated with high rates of morbidity and mortality, as well as increased health care costs.[1] Effective diabetes treatment requires changes in important aspects of each patient's daily routine. It may include oral medications, insulin injections, home blood glucose testing, appropriate diet and exercise regime. Diabetes education is concerned with encouraging independence and self-confidence so that people carry out their self-care activities. Patients report that carrying out their self-management programme is even more difficult than dealing with the diagnosis of diabetes. The challenge is to help individuals develop their own strategies for the long-term management of their diabetes.[2]

Self-efficacy has been shown to be important in the self-management of diabetes.[3,4] Self-efficacy is a behaviour-specific construct, which plays a major role in the behaviour change process. An individual's perceptions of his or her ability to overcome the difficulties in a specific task will predict future attempts to engage in various behavioural challenges related to this task.

The level of self-efficacy influences the effort applied to a target behaviour and impacts the individual's ability to persist in the task in face of obstacles or failure.[5]The measurement of self-efficacy can be utilized to predict intention to change and to decide on interventions aimed at increasing self-care.[6,7] Self-efficacy is predictive of future behaviour, and it can serve as the inducer or inhibitor of appropriate actions.[6–8] Increased self-efficacy can enhance adherence to recommended treatment regimens in a chronic disease.[9]

The self-efficacy framework and its application to the treatment of diabetes are being studied and implemented in a variety of diabetes education programmes.[10–12] Although the self-efficacy measure is widely acceptable as an important motivational factor in the treatment of diabetes, it is usually assessed as a general measure, across different treatment recommendations. This approach may adversely affect its predictive value since self-efficacy is situation and

behaviour specific. In this regard, self-efficacy has been found to correlate with physical activity,[13] diet[14] and to be associated with HbA1c level.[6,11] Diabetes-related self-efficacy measures, focusing on diet, exercise behaviour, blood glucose control and insulin injections together, are only moderately related to general self-efficacy.[15]

Recent studies reveal that people with diabetes have difficulty in engaging in multiple self-care behaviours simultaneously and at the same level.[16,17] While patients tend to adhere to specific behaviours, such as insulin use, oral medication intake and blood glucose monitoring, other self-care behaviours, diet and exercise, which require lifestyle changes, are less followed.[6] Although patients understand that maintaining a healthy diet and increasing physical activity will improve their well-being, they often fail to change their behaviour.[17] It may be that each treatment recommendation requires a different approach and self-management strategies. Hence, it is important to assess and understand self-efficacy across the range of self-regulatory behaviours associated with the treatment of diabetes.

The Transtheoretical model (TTM) developed by Prochaska and DiClemente[18] is an integrative model of behaviour change, intended to predict a patient's readiness in achieving a proposed behaviour change. It has been very extensively investigated and therefore was chosen for use in our study. The stages of change theory of the TTM has been validated using decisional balance and self-efficacy constructs.

While several studies applied the stage of change model (TTM) to diet-related behaviours in the context of diabetes, they did not examine diabetes-specific self-efficacy.[19,20] Most of the studies applying self-efficacy construct to diabetes-related behaviours did not include all the diabetes-specific treatment recommendations.[10,14] Kavookjian was the first researcher to take the concept of adherence and relate it to each self-care diabetes measure separately. She developed a set of questionnaires that were designed to measure the following variables: self-efficacy, decisional balance, stage of change and self-reports regarding the frequency of appropriate patient behaviour, as specified in the diabetes guidelines. Each of the questionnaires addresses each of the following behaviours separately: diet, exercise, blood glucose monitoring, insulin treatment and oral medication intake. The questionnaire relating to self-efficacy and insulin use was not used because we did not examine insulin use in the Resistance to Treatment Questionnaire (RTQ). In addition, it is difficult to be non-compliant with insulin use because of the more advanced stage of the illness. Each validated questionnaire yields different scores for the patient regarding different behaviours examined.[6,7]

In the present study, self-reported frequency of adherence and self-efficacy questionnaires were used together in order to measure self-efficacy of patients with diabetes regarding different treatment recommendations and their implementation in practice. In parallel, the findings were further validated using The RTQ[21,22] and the Decisional Balance questionnaire, which examines the balance between positive and negative factors that predict a certain behaviour. The assumption being that a patient with low self-efficacy will be at an early stage (pre-contemplation or contemplation) in the state of change model, will be more resistant to performing certain behaviour and his decisional balance score will be negative and not positive for the behaviour. This study was designed to examine if low self-efficacy in each of the measured recommended behaviours is related to decreased adherence of the specific behaviour.

Methods

Setting

This study was undertaken in Maccabi Health care Services, a Health Maintenance Organization organization, serving over one and a half million members (23% of the population) throughout Israel. This is the third phase of the study; the methods have been reported in detail.[21] Institutional review board approval for the current study was granted.

Recruitment process

Patients were recruited to participate in the study by 80 health care professionals (dietitians, social workers and psychologists), working in community-based diabetes care clinics. All patients with diabetes were eligible for inclusion in the study. The only exclusion criteria were if that of patients unable to fill out the questionnaires because of language or visual difficulties. All the patients were approached by health professionals known to them, agreed to participate and signed the appropriate consent forms.

Measures

Self-efficacy. The self-efficacy questionnaires were measured against four specific treatment recommendations: blood glucose self-monitoring, physical activity, diet and oral medication intake. The questionnaires assessed the degree to which participants felt competent to follow the treatment recommendations in a number of different situations, such as exercising when the patient feels depressed or when travelling away from home. For each item, participants used a five-point Likert scale to indicate their level of confidence in their ability to follow the treatment recommendation. The total score was calculated by averaging the responses to situations that refer to

each one of the diabetes treatment recommendations. Internal reliability (Cronbach's alpha) of the questionnaire as reported in previous studies was alpha of 0.84 for oral medication intake, alpha of 0.90 for blood glucose self-monitoring, alpha of 0.88 for diet maintenance and alpha of 0.82–0.93 for physical activity. The self-efficacy confidence scale was originally developed by Kavookjian,[6] translated into Hebrew and validated for the current study.

The state of change algorithm was used in order to assess the correlation between the patients' readiness to change and self-efficacy. For each self-care variable, there are five statements such as 'I am following the instructions for >6 months' each one relating to a different state of change. The psychometrics has been previously published by Prochaska. We and Kavookian validated this measure in diabetic patients for self-care measures that are related to decisional balance and self-efficacy.

Resistance to treatment. The RTQ[21] includes 40 items that are related to four categories of reasons for resistance to treatment: (i) lack of faith or dissatisfaction with the treatment or with the medical team, (ii) emotional reasons, (iii) specific problems or constraints and (iv) factors connected to despair and failure. The question regarding frequency of adherence was also validated.

Statistical analysis

The correlation between the self-efficacy questionnaire and other questionnaires, as well as the results of the RTQ, was calculated using Spearman's rho and Pearson's correlations. Statistical software used for the analyses was the Statistical Package for the Social Science (SPSS), Version 13.0 (SPSS Corp., 2004)

Results

A total of 119 patients (67 women) participated in this study. Mean age 57.45 years (SD = 10.91). Significant and positive Pearson's correlations were found between the frequency of adherence to treatment recommendations and the self-efficacy regarding different recommendations. For medication intake, the correlation was significant but weak (Table 1).

Correlation between the RTQ and the self-efficacy questionnaire (Table 2) reveals that the higher resistance to treatment score is, the less confident the patient is in his or her ability to adhere with treatment recommendations, as appears in the self-efficacy questionnaire. This pattern was not present in adherence to medication intake.

Significant and positive correlations (Spearman's rho) were found between the stage of change of the participants and their self-efficacy regarding all the different treatment recommendations. The weakest correlations were regarding medication intake (Table 3).

Performance of study measures

Internal reliability (Cronbach's alpha) of the self-efficacy questionnaire in this study was alpha of 0.98 for oral medication intake, alpha of 0.98 for blood glucose self-monitoring, alpha of 0.96 for diet maintenance and alpha of 0.88 for physical activity.

TABLE 1 *Pearson's correlations between frequency of adherence and self-efficacy questionnaires regarding different diabetes treatment recommendations*

Oral medication intake, $n = 89$	Home glucose monitoring, $n = 96$	Physical activity, $n = 115$	Diet, $n = 115$	Frequency of adherence
0.25 ($P < 0.05$)	0.47 ($P < 0.01$)	0.67 ($P < 0.01$)	0.50 ($P < 0.01$)	Self-efficacy

TABLE 2 *Pearson's correlations between the RTQ and self-efficacy questionnaire, regarding the different diabetes treatment recommendations*

Oral medication intake, $n = 89$	Home glucose monitoring, $n = 96$	Physical activity, $n = 115$	Dietary, $n = 115$	Resistance to treatment
–0.06 (NS)	–0.36 ($P < 0.01$)	–0.37 ($P < 0.01$)	–0.48 ($P < 0.01$)	Self-efficacy

TABLE 3 *Spearman's rho between the stage of change algorithm and self-efficacy questionnaires regarding different diabetes treatment recommendations*

Oral medication intake, $n = 89$	Home glucose monitoring, $n = 96$	Physical activity, $n = 115$	Diet, $n = 115$	Stage of change
0.21 ($P < 0.05$)	0.37 ($P < 0.01$)	0.66 ($P < 0.01$)	0.50 ($P < 0.01$)	Self-efficacy

Significant and positive Pearson's correlations were found between the Decisional Balance and self-efficacy regarding different treatment recommendations, except for medication intake (Table 4).

A hierarchical regression analysis of Decisional Balance, self-efficacy and stages of change model in the prediction of frequency of adherence to different diabetes treatment recommendations reveals that Decisional Balance and self-efficacy of the participants significantly predicted frequency of adherence to different treatment recommendations as can be seen from Table 5.

Discussion

The results show that we should consider measuring self-efficacy for each separate treatment recommendation in diabetes and not just as a general measure. As hypothesized, higher resistance to treatment is significantly correlated with lower self-efficacy of the patients. Correlations between the self-efficacy questionnaire and of the patients' place on the stage of change model, as well as the RTQ were detected across different treatment recommendations, except for adherence to medication intake. This may be because most patients were on prescribed medication and therefore, the variance was small. However, it may be that taking medication is less dependent on the feeling of self-efficacy than other measures that require more behaviour change, such as physical activity or diet.

Self-efficacy measurement could play an important role in diabetes management, in order to identify where the patient is most likely to adhere to recommended self-care treatment. It could for instance be used as part of the 'intake' of any new patient as a means of assessing the degree of support each patient may need to start and maintain behavioural change. Self-efficacy was found to be associated with adherence to self-care recommendations and lower HbA1c in young people with Type I diabetes,[14] as well as with a better quality of life and less depression.[23] Another finding indicates that among patients with Type 2 diabetes, a higher body mass index and poor behavioural adherence when associated with low self-efficacy are more likely to be suffer from depression.[24]

The self-efficacy questionnaire was found to be reliable across different treatment recommendations, thus replicating previous findings.[6,25] Significant correlations between The self-efficacy questionnaire and Stage of Change Algorithm, Frequency of Adherence, Decisional Balance and RTQ questionnaires further strengthen its' construct validity.

It has been shown that with respect to the TTM,[18] self-efficacy measurement is particularly important during the advanced stages of change. At this stage of change, self-efficacy is an important predictor for success. During the earlier stages, when the patient is only considering the possibility of change (precontemplation and contemplation), the self-efficacy has less impact than other important concepts, such as Decisional Balance.[18] The health care professionals have to understand how to use these concepts according to the stage of change. At earlier stages of change, the physician has to help the patient find positive reasons for change. Once this stage is completed,the physician has to enhance their belief in the ability to change, i.e. increase self-efficacy.

Health care professionals usually feel more confident with technical issues and less expert in psychological aspects of care.[26] An argument can be made for

TABLE 4 *Pearson's correlations between Decisional Balance and self-efficacy questionnaires, regarding different diabetes treatment recommendations*

Oral medication intake, $n = 89$	Home glucose monitoring, $n = 96$	Physical activity, $n = 115$	Diet, $n = 115$	Decisional Balance
0.09	0.38 ($P < 0.01$)	0.52 ($P < 0.01$)	0.38 ($P < 0.01$)	Self-efficacy

TABLE 5 *Hierarchical regression analysis of Decisional Balance, self-efficacy (stages of change model) and RTQ in the prediction of frequency of adherence to different diabetes treatment recommendations*

Oral medication intake, $n = 93$			Home glucose monitoring, $n = 100$			Physical activity, $n = 118$			Dietary, $n = 118$			
β	ΔF	ΔR^2	β	ΔF	ΔR^2	β	ΔF	ΔR^2	β	ΔF	ΔR^2	
	4.05*	0.09		17.52	0.28		67.09**	0.55		22.88**	0.29	Stages of change model measures
0.28*			0.19*			0.37**			0.18*			Decisional Balance
0.12			0.42**			0.48**			0.45**			Self-efficacy

*$p < 0.05$; **$p < 0.01$.

increasing instruction based on the psychological status of the patients. The current research suggests that one of our goals should be to intensify the ability of the patients to believe that change will come.

We must allow the patient to identify the challenges and difficulties in his or her life and trying to connect them to coping with the disease. It resembles the narrative approach, previously described,[22,27] which puts emphasis on personal experience and interpretation of this experience thus allowing the patients to shape and reshape their lives. Coping with the illness is difficult without the patients' confidence in their ability to succeed.

Strengths and limitations

A limitation of this study is that cooperation with treatment was not measured directly but by using a 'frequency of adherence questionnaire'. In addition, the participants in this study were chosen by their own care providers and thus might be a non-representative sample of all people in need of treatment, and especially those most resistant to treatment, not known to the health care systems, which were not included at all. This is reflected by the high self-efficacy and adherence to medication, which may not reperesent the general population with diabetes.

An additional limitation of the study is that the subjects from an Israeli population may be different than other populations. However, our findings were similar to those found in other populations and so this is unlikely. The participants in this study were chosen by care providers and thus might be a non-representative sample of all people in need of treatment and especially those with very low self-efficacy and those most resistant to treatment or not using the health care system.

Conclusions

This study demonstrated that low self-efficacy in each of the measured recommended behaviours is related to decreased adherence of the specific behaviour with the exception of medication adherence. The measurement of self-efficacy as a diagnostic tool for patients with diabetes can provide health care professionals with the necessary information about readiness of the patients to engage in behavioural change. Further research will be necessary to assess the applicability of these questionnaires in routine patient care.

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Declaration

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Conflict of interest: none.

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