Psychological adaptation to and acceptance of type 2 diabetes *mellitus*

Adaptação psicológica e aceitação do diabetes *mellitus* tipo 2

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Keywords
Adaptation, psychological; Diabetes *mellitus*, type 2; Patient acceptance of health care; Nursing care

Descritores
Adaptação psicológica; Diabetes *mellitus* tipo 2; Aceitação pelo paciente de cuidados de saúde; Cuidados de enfermagem

Submitted
February 24, 2015

Accepted
March 4, 2015

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DOI
http://dx.doi.org/10.1590/1982-0194201500074

Abstract

Objective: To evaluate individuals' psychological adaptation to type 2 diabetes *mellitus* throughout acceptance of the disease and its relation with perceived stress and values of glycated hemoglobin (A_{1c}) before and after group educational intervention.

Methods: Quasi-experimental study developed at outpatient unit that included 77 participants who fulfilled inclusion criteria. The study instruments were a questionnaire that obtained sociodemographic variables and the Acceptance of Disease Scale and Perceived Stress Scale, both applied during interviews before and after group education intervention using Diabetes Conversations Maps.

Results: Interviewed patients showed improvements in the acceptance of the disease after educational intervention. We observed an inverse relation between acceptance of the disease, perceived stress, and the mean glycated hemoglobin (A_{1c}) value before and after the intervention.

Conclusion: Acceptance of type 2 diabetes can improve after a group educational intervention. A high score for acceptance of the disease was related to a low score for perceived stress and lower mean glycated hemoglobin (A_{1c}) value.

Resumo

Objetivo: Avaliar a adaptação psicológica de pessoas com diabetes *mellitus* tipo 2 através da aceitação da doença e sua relação com o estresse percebido e valores de hemoglobina glicada A_{1c}, antes e após intervenções educativas em grupo.

Métodos: Estudo quase-experimental desenvolvido em unidade ambulatorial, e incluiu 77 pessoas que atenderam aos critérios de inclusão. Os instrumentos de pesquisa foram: questionário com variáveis sociodemográficas, Escala de Aceitação da Doença e Escala de Estresse Percebido, que foram aplicados por entrevistas antes e após intervenções educativas em grupo, utilizando Mapas de Conversação em Diabetes.

Resultados: Os pacientes entrevistados apresentaram melhora da aceitação da doença após as intervenções. Verificou-se relação inversa entre a aceitação da doença, o estresse percebido e a média de hemoglobina glicada A_{1c}, antes e após as intervenções.

Conclusão: A aceitação da doença pode melhorar após intervenções educativas em grupo. Maiores escores de aceitação da doença foram relacionados a menores escores de estresse percebido e a menores médias de hemoglobina glicada A_{1c}.

Clinical Trials registry number: NCT01387633

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Conflicts of interest: none reported.
Study makes up the project entitled Impact of a care program for people with diabetes mellitus focused on educational interventions in the family and social support.

Introduction

The concept of "disease acceptance" entails the process of psychological adaptation wherein individuals become more active in their own care and learn to optimistically and positively face limitations imposed by the disease.[1]

The acceptance of disease provides a way to evaluate psychological adaptation in the face of demands from the disease's clinical manifestations and treatment.[2] The literature points out other ways to assess psychological adaptation to a disease, such as quality of life, well-being, self-esteem, social participation, and accomplishment of social functions.[3]

In particular in the context of non-transmissible chronic diseases, the process of adaptation consists of psychological, social and physiological adjustment throughout the course of the disease, resulting in an interaction between demands of the disease and treatment and the individual's skill to respond to these demands.[4,5]

Upon receiving a diagnosis of a non-transmissible chronic disease, such as type 2 diabetes *mellitus*, people confront new situations that require an individual assessment and must choose how to deal with such situations. So begins the psychological adaptation process.[6] The strategies chosen to deal with this new life situation can generate physiological and psychological responses that are considered maladaptive and inefficient.[1]

In type 2 diabetes *mellitus*, the adaptive physiological response can be evaluated by using glycemic control, which constitutes the main objective of treatment.[7,8]

To obtain glycemic control, people with type 2 diabetes *mellitus* must be adapted to the demands imposed by the disease and by the treatment, which are sources of stress in daily life. These include signs and symptoms of disease, diet, regular exercise, oral medicines, insulin application, auto-monitoring of glycemia, and periodic medical follow-up.[9,10]

In the adaptation process for type 2 diabetes *mellitus*, patients must acquire self-care skills and use efficacious ways to manage stress related with the disease and treatment.[10] The education program with cognitive-behavioral approach has been used to promote needed behavioral changes and influence the perception of stress.[10]

The health team's ability to supply clear and consistent information about type 2 diabetes *mellitus* and its treatment facilitate adaptation to the disease, whereas stressful life events were considered barriers that could modify the perception of stress and self-care behavior.[6]

A greater perception of stressful life events by patients with diabetes *mellitus* was also associated with elevated levels of glycated hemoglobin (A_{1c}).[11,12]

Our study evaluated the psychological adaptation of individuals with type 2 diabetes *mellitus* through acceptance of the disease and the relationship of adaptation with reported stress and glycated hemoglobin (A_{1c}) values measured before and after a group educational intervention.

Methods

This quasi-experimental study was developed in an outpatient unit at a teaching hospital in São Paulo, Brazil. Initially, we included 114 individuals with diabetes *mellitus* type 2 who were recruited from June 2011 to May 2013.

The sample was selected through weekly review of all records from the health team care to apply inclusion/exclusion criteria. Participants were recruited from June 2011 to July 2012. We included men and women who were receiving drug therapy with insulin and oral antidiabetic medications (monotherapy and/or associations) who were able to communicate verbally and did not have chronic complications in an advanced stage. We excluded patients who had participated in other intervention studies, were undergoing hemodialysis treatment, had amaurosis, had experienced sequelae of stroke or heart failure, had previously undergone amputation or had an active ulcer in the lower limbs, were in a wheelchair or were confined to a bed, or were unable

to understand or verbally respond to the interview questions or to participate in the group educational intervention.

Recruiters approached patients while they were waiting to receive medical care. Patients were informed about the aim of the study and guarantee of confidentiality of their information, those agreeing to participate were directed rooms designated for data collection. Participants received the consent form, which was read aloud to them, and signed it.

Of 144 participants who initially agreed to participated in the study in T_0, 37 leave the study for following reason: death, no attendance in group education meetings, refusal for the need of taking care of family member, refusal for transport difficulties, refusal because they have work during, had traffic accident, had an amputation of lower limb, refusal because they start hemodialysis treatment, had a wound in lower limb, and had a stroke.

The final sample in T_{12} included 77 patients who attended all group education meetings. Participants with type 2 diabetes *mellitus* who agreed to participated responded the study instruments in two phases: before begin educational interventions, after signed the consent form (T_0), and after 12 months from the beginning of the study (T_{12}), through interviews previously conducted by trained researchers, with a mean duration of 20 minutes.

Sociodemographic data of the sample were obtained using a structured instrument. To evaluate the degree of disease acceptance, we used an Acceptance of Disease Scale,[1] translated and validated version in European Portuguese.

To evaluate the perceived stress, we used the Perceived Stress Scale, tanslated and validated version in Brazilian Portuguese, which is a Likert-type instrument. This latter instrument total score is the sum of points for the 14 questions, which can range from 0 to 56;the higher the score, the greater the perception of stress. Glycated hemoglobin (A_{1c}) values were collected from participants medical records at T_0 and T_{12}.

Before data collection began, we conducted a pilot study with 15 participants to assess the appearance and content of the instruments. After the pilot study, we saw the need for cultural adaptation and analysis of the psychometric properties of the Acceptance of Disease Scale among patients with type 2 diabetes *mellitus* for the Brazilian Portuguese language because of the changes in item 6 of the scale. The cultural adaptation and analysis of the psychometric properties of the Acceptance of Disease Scale were done after interviewing 80 participants with type 2 diabetes *mellitus* who were not included in the study and were followed up in the same outpatient unit.

The Acceptance of Disease Scale was a Likert-type instrument composed of 8 items that expressed success in the admission of feelings of incapability, dependency, and inutility in the face of the disease and treatment. Answers on the scale have options: 1, completely agree; 2, agree; 3, neither agree nor disagree; 4, disagree; and 5, completely disagree. A score of 1 indicates lower acceptance and of score of 5 indicates higher acceptance. Seven questions use this format, and one question is addressed in the opposite site (item 6: "My health did not make feel incapable"); for this question, 1 means high acceptance. The maximal score obtained on this scale is 40 points, corresponding to high acceptance of the disease, and the minimal score is 8, corresponding to non-acceptance of the disease.

Parallel to the preparation of the field and training of interviewers, for 6 months we conducted meetings for training and discussion of standards in using Diabetes Conversation Maps. This educational tool was developed by the American Diabetes Association and Healthy Interactions Inc.[13]

We used maps that approached the following contexts of learning: Map 1: how the body and diabetes work; Map 2: healthy eating and exercise; Map 3: blood glucose monitoring; Map 4: reaching insulin goals.

The educational intervention was conducted in agreement with presuppositions of Albert Bandura's Social Cognitive Theory[14] by the use of Diabetes *Mellitus* Conversion Maps.

The intervention was developed in four meetings with open groups of no more than

eight participants. Meetings occurred on Mondays from 12:30 p.m. and 2:00 p.m. at rooms of the Outpatient unit for Education in Diabetes of the Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto at Universidade de São Paulo. Each meeting followed a previous described protocol, i.e., themes proposed for each Conversation Map began and ended at the same meeting, this approach was justified because the modality used was open groups.

We used open groups because dates of meeting were different of dates of patients' return consultation, or even because participants preferred to participate in meeting on differently dates of their medical consultation.

All data collected were analyzed using the Statistical Package for Social Sciences (SPSS) program, version 21.0. The reliability of the Acceptance of Disease Scale was verified using three calculations: internal consistency, estimated by the Cronbach alpha for reliability; item-total correlation; and Pearson's correlation coefficient. The strength of correlation was classified as follows: weak ($r<0.3$), moderate ($0.3<r<0.6$), or strong ($r>0.6$). The level of significance adopted was 0.05. Scores of disease acceptance at T_0 and T_{12} were compared by using the Wilcoxon test. Correlations between variables were verified by Spearman correlation coefficient. Differences were considered significant at $p<0.05$.

Development of this study followed national and international ethical and legal aspects of research on human subjects.

Results

Of 114 participants who began the study, 62 (54.4%) were women, 83 (72.8%) were married/cohabitated, and 91 (79.8%) were from Ribeirao Preto (SP) or that region. The mean participant age was 59.5 years (standard deviation, 8.7). Most individuals were retired/pensioners (48.2%), followed by those who did unpaid work at home (18.4%). The mean duration of education was 4.9 years (standard deviation, 4.2) and the mean family income was R$ 1,765.40 (standard deviation, R$1,347.40). Mean time since diagnosis was 15 years (standard deviation 8.2).

The sample of 80 individuals in the study of cultural adaptation and analysis of psychometric properties of the Acceptance of Disease Scale was extremely similar to the participants in our study with regard to sociodemographic and clinical variables.

In the pilot study, we identified the need to change one item that some respondents had difficulty comprehending; the change was suggested by the interviewers. Hence, item 6, originally worded as "My health does not make feel inadequate" was changed to "My health does not make feel useless". We believe that using the word "useless" is more common in the Brazilian context of the health-disease process than the word "inadequate".

After analysis of apparent validity and context, we interviewed 80 individuals with type 2 diabetes *mellitus* to evaluate the reliability of the Brazilian version of the Acceptance of Disease Scale. In the analysis of reliability, evaluated by Cronbach alpha for reliability, we obtained a value of 0.81. If item 1 is removed, the Cronbach alpha will increase from 0.81 to 0.82. When any one of the other items is removed, this coefficient will decrease from 0.81 for values that ranged from 0.76 to 0.81. Concerning the correlation item-total, we obtained values of 0.31 to 0.68, all of which were positive (Table 1).

On the basis of results for the analysis of reliability, conducted with three measures, we suggest that the Brazilian version of the Acceptance of Disease Scale was reliable (Table 2).

After study of cultural adaptation and analysis of psychometric properties of the Acceptance of Disease Scale, we analyzed scores for disease acceptance in individuals with type 2 diabetes *mellitus* and their relationship with scores for perceived stress and glycated hemoglobin (A_{1c}) values at T_0 and T_{12}.

Before participation in the group educational intervention, the mean score for disease acceptance among the 114 patients enrolled in the study was

Table 1. Cronbach alpha reliability and item-total correlation of Brazilian version of the Acceptance of Disease Scale

Items of Brazilian version of the Acceptance of Disease Scale (α=0.81)	Item-total correlation	Cronbach alpha if the item is removed
To me, accepting limitations of my disease is difficult	0.31	0.82
Because of my health I can´t do things I'd like to do	0.55	0.78
Sometimes my disease makes me feel useless	0.68	0.76
Health problems make me more dependent on others than I'd like to	0.54	0.79
My disease makes me feel like a burden to my family and friends	0.66	0.77
My disease does not make feel useless	0.36	0.81
I'll never be self-sufficient at such a level to feel happy	0.44	0.80
I often think that people feel uncomfortable staying with me because of my disease	0.66	0.77

Table 2. Pearson's correlation coefficients between items of the Acceptance of the Disease Scale

Items	1 r (p-value)	2 r (p-value)	3 r (p-value)	4 r (p-value)	5 r (p-value)	6 r (p-value)	7 r (p-value)	8 r (p-value)
1	1							
2	0.30(0.007)*	1						
3	0.15(0.184)	0.56(0.000)*	1					
4	0.22(0.052)	0.35(0.001)*	0.50(0.000)*	1				
5	0.32(0.003)*	0.30(0.006)*	0.49(0.000)*	0.48(0.000)*	1			
6	0.23(0.044)*	0.30(0.008)*	0.31(0.004)*	0.17(0.126)	0.30(0.009)*	1		
7	0.08(0.942)	0.36(0.001)*	0.47(0.000)*	0.34(0.002)*	0.37(0.001)*	0.20(0.078)	1	
8	0.25(0.023)*	0.36(0.001)*	0.60(0.000)*	0.44(0.000)*	0.74(0.000)*	0.24(0.034)*	0.30(0.007)*	1

*p-value <0.05; r = Pearson's correlation coefficient

Table 3. Disease acceptance of individuals with type 2 diabetes *mellitus* and its relationship with perceived stress score and glycated hemoglobin (A_{1c}) values (Hb A_{1c}) before (T_0) and after (T_{12}), the group educational intervention

Variable	$\bar{X}$ Hb A_{1c} T_0 r* (p-value)	$\bar{X}$ Hb A_{1c} T_{12} r* (p-value)	Perceived Stress Scale T_0 r** (p-value)	Perceived Stress Scale T_{12} r** (p-value)
Acceptance of the disease Scale	-0.23 0.03*	-0.36 0.00***	-0.47 <0.00***	-0.49 <0.00***

*r indicates Spearman partial correlation coefficient, adjusted for change in medication; **r indicates Spearman correlation coefficient; ***p<0.05 statistically significant

24.6. After the educational intervention, the score was 26.2. This difference was statistically significant (p<0.0001) according to the Wilcoxon test and suggested that the sample had improved acceptance of the disease after the intervention.

Among the variables for perceived stress and disease acceptance, we also observed a statistically significant inverse relationship at T_0 and T_{12}. This finding suggests that the greater the perceived stress among patients with type 2 diabetes, the lower the psychological adaptation (Table 3).

We found a statistically significant inverse relationship between disease acceptance and mean glycated hemoglobin (A_{1c}) value at T_0 and T_{12},: the greater the acceptance of the disease the lower the mean glycated hemoglobin (A_{1c}) level. This finding might indicate a better physiologic adaptation between individuals who had the best score for acceptance of the disease (Table 3).

Discussion

This study was limited by its quasi-experimental design, which did not involve a control group or randomization and not enable the establishment of cause and effect relationships.

The results presented will help improve nursing teams' knowledge of adaptation of individuals with type 2 diabetes *mellitus* to the disease and its treatment, which may include in nursing care planning the group educational interventions and promotion of disease acceptance that in the our study was inversely correlated with stress perceived and glycated hemoglobin (A_{1c}) values. The disease acceptance scores are inversely proportional to the mental discomfort and negative emotions experienced by the patient.[15]

The sample consisted of adults with low levels of education and income. The patients were

retired (mean age, 61.5 years) and featured a slight majority of women (51.2%). Such results are similar to those of a study used to construct the Acceptance of Disease Scale[1] and a review study of epidemiologic data on type 2 diabetes in Brazil.[16]

In this study, we verified the reliability of the Brazilian version of the Acceptance of Disease Scale through internal consistency estimated by the Cronbach alpha for reliability. The Cronbach alpha is considered a good measure of internal consistency; values must range from 0.70 to 0.95.[17] The value found in our study was 0.81, which suggested that Brazilian version of the Acceptance of the Disease Scale is reliable.

Similar alpha values were found in the study of original instrument construction in English (α=0.83), despite possible cultural difference between the nationalities of these studies that can influence the reliability.[1,18]

In assessment of reliability by Pearson's correlation coefficient, we observed a statistically significant correlation from weak to moderate among items, except between items 1 and 3, 1 and 4, 1 and 7, 4 and 6, and 6 and 7. A possible reason for lack of significant correlation between items 4 and 6 and between 6 and 7 can be the inverse analysis of item 6, which was worded differently than the other items.[1] Another explanation for the lack of correlation between these items can be the low education of participants, which may have influenced their interpretation of the items of the scale.[1]

For disease acceptance, the score may range from 8 to 40; the mean score in our study was 24.6 at T_0 and 26.2 at T_{12}.There is no gold standard to establish a referral parameter. However, studies concerning large values indicate a tendency toward better acceptance of the disease.[1,2,18,19] We infer that no definite tendency exists in the studied sample, but there was statistically significant improvement after the educational intervention in groups with a cognitive-behavioral approach.

A descriptive study that evaluated the acceptance of disease between individuals with diabetes *mellitus* by using the same scale as in the present study reported a similar mean score,[2] suggesting disease acceptance among people with diabetes *mellitus*, even when this acceptance is moderate.

A literature review reported that disease acceptance was related to a variety of clinical and sociodemographic varibles, therefore the acceptance constitutes an important element of the holistic and medical care.[15]

Disease acceptance was inversely related to perceived stress and glycated hemoglobin (A_{1c}) at T_0 and T_{12}, suggesting that a high score for acceptance was related to a lower score for perceived stress and lower mean glycated hemoglobin (A_{1c}) level. Other studies found a direct relationship between acceptation of the disease, social support, self-efficacy, health-related quality of life, and religion. An inverse relation was seen between acceptance of the disease, depression, and anxiety.[2,9,15,18-22]

Conclusion

Scores for disease acceptance improved after performance of a group educational intervention based on a cognitive-behavioral model. High scores for disease acceptance were related to lower scores for perceived stress and lower mean of glycated hemoglobin (A_{1c}) level.

Acknowledgements

This study was supported by *Fundação de Amparo à Pesquisa do Estado de São Paulo* - FAPESP, process 2011/09037-6.

Collaborations

Bertolin DC and Pace AM contributed to the conception of the study, analysis and interpretation of data, drafting of the manuscript, critical review relevant for intellectual content and approval of final version to be published. Cesarino CB; Ribeiro RCHM and Ribeiro RM contributed drafting the manuscript, critical review relevant for intellectual content and approval of final version to be published.

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