Iranian Journal of Clinical Psychology, Vol 1, No 1, 2012

The Effectiveness of Cognitive-Behavioral Stress Management Training on Glycemic Control, Psychological Distress and Quality of Life in People with Type2 Diabetes

Mohamad Hasan Davazdahemamy[1], PhD Candidate
Ali Mehrabi[2], PhD Candidate
Abbas Attari[3], MD
Rasool Roshan[4], PhD

Objectives: This study was designed to evaluate the effectiveness of cognitive-behavioral stress management training on glycemic control, psychological distress (depression, anxiety and stress) and quality of life in people with type2 diabetes.

Method: 60 type2 diabetic patients (34 females and 26 males; mean age 49.5 ± 5.7 years) were studied. They were randomly divided to two groups. Members of one group attended 10 weekly sessions of cognitive-behavioral stress management training, while other group did not. Test of HbA1c and, DASS and quality of life questionnaires were administered on both groups before and after intervention. This assessment procedure was repeated within 3 months follow up.

Results: After intervention HbA1c, psychological distress and quality of life improved significantly ($p<0.01$) in trained patients, but there was no significant change in these measures in control group. These results remained constant within 3 months follow up.

Conclusion: Results show that cognitive-behavioral stress management training is an effective intervention to improve glycemic control, psychological well-being and quality of life in people with type2 diabetes.

Key words: Glycemic control, Cognitive-Behavioral Stress Management, Psychological distress, Quality of life

---

1- Department of Clinical Psychology, University of Social Welfare and Rehabilitation Sciences
* corresponding author: mo.emamy@uswr.ac.ir
2- University of Social Welfare and Rehabilitation Sciences
3- Isfahan University of Medical Sciences
4- Shahed University

Introduction

Diabetes mellitus is a major public health problem which affects an increasing number of people around the world. Worldwide rise in number of adults with diabetes has been estimated to be 122%, from 135 million in 1995 to 300 million in 2025 (King, Aubert & Herman, 1998). It seems that 14 to 23% of Iranian people who are more than 30 years old are under the effects of diabetes while the estimates of type2 diabetes reached to 90 - 95% of these cases (Larijani, Zahedi, & Aghakhani, 2003). This is a complex metabolic condition in which the patient has a life-long responsibility for managing their condition. The first aim of diabetes management is the control of blood glucose levels, the so-called glycemic control, which is measured by an HbA1c blood test (Stratton et al., 2000). Just like other chronic diseases, patients suffering type2 diabetes may also experience a variety of stress factors as a result of the illness and its treatment, including pain, disfigurement, impaired physical functioning, life-threat, permanent changes in lifestyle, dependency, self-management tasks, threats to dignity, diminished self-esteem, disruption of normal life transition, decreasing resources, and changes in future perspectives (Bisschop, Kriegsman, Beekman & Deeg, 2004). It has been observed that these disease-related stress factors may play an important role in the development of anxiety and depression among patients with chronic diseases (Zhang, Chen & Chen, 2008). Diabetic patients compared to general population rate higher on depression and anxiety (Peyrot & Rubin, 1997; Anderson, Freedland, Clouse & Lustman, 2001; Huang, Chiu, Lee & Wang, 2011). Such symptoms were associated with poor glycemic control (Lustman et al, 2000), diabetes complications (Groot, Anderson, Freedland, Clouse & Lustman, 2001) and worsened prognosis and quality of life (Tossani, Cassano & Fava, 2005), which in turn may lead to increased activity of sympathetic nervous system and to elevated levels of cortisol and catecholamines, which can elevate the risk of metabolic syndrome (Rosmond, 2005; Lamounier- Zepter, Ehrhart-Bornstein & Bornstein, 2006). Importantly, those patients who experienced significant psychological distress were more likely to have difficulties with diabetes self-care (Das-Munshi, Stewart, Ismail & Bebbington, 2007) leading to worse glycemic control and the development of serious complications (Groot, Anderson, Freedland, Clouse, & Lustman, 2001), which easily turn to a vicious circle (Peyrot et al., 2005). Moreover, the presence of clinical complications of type2 diabetes tends to negatively influence the perception of quality of life (Lloyd, Sawyer, Hpkinson, 2001).

The United Kingdom Prospective Diabetes Study (UKPDS, 1998) has demonstrated that intensive blood glucose control is essential for reducing the risk of diabetic complications in type2 diabetic patients. Essentially, no glycaemia thresholds have been observed for any type of diabetes complication: the lower the glycaemia, the lower the risk of complications (Stratton et al., 2000). Alam, Sturt, Lall and Winkly (2009) suggest that patients with long-standing sub-optimal glycemic control may benefit from psychological interventions. Also many people with diabetes perceive that they need additional help and support with the psychosocial issues associated with

diabetes (Davies, Dempster, & Malone, 2006). Psychological interventions appear to be effective in improving psychological distress and glycemic control, however there is a shortage of psychological specialists in diabetes care systems and psychological treatments are difficult to access for most patients living with diabetes (Alam, Sturt, Lall, & Winkley, 2009). Peyrot and Rubin (2007) in their report suggest that, rather than waiting for a specific problem or deterioration of psychological status to be identified, psychological screening, assessment and treatment should be routinely incorporated into patients' care. Among different psychological interventions, cognitive-behavioral interventions have been used for improving psychological distress in type1 (Snoek, Nicols, Ven, & Lubach, 1999; Amsberg et al., 2009) and type2 (Welschen, Oppen, Dekker, Bouter, Stalman, & Nijpels, 2007; Pourisharifi et al., 2010) diabetes.

Considering shortage of psychological specialists and psychological treatments in diabetes care systems, group interventions based on approved approaches like cognitive-behavioral therapy can be helpful. This study is aimed to assess the effectiveness of cognitive-behavioral stress management on glysaemic control, psychological distress and quality of life in type2 diabetic patients.

Methods

This study was conducted on 60 type2 diabetic patients (34 females and 26 males; mean age 49.5 ± 5.7 years) referred to Isfahan charity diabetes center. The subjects were able to read and write and at least 6 months had passed after diagnosis of diabetes. Those subjects who abused drugs, needed hospitalization, insulin therapy or psychiatric medication because of diabetes complications, were excluded from the study. The results of 53 patients were analyzed, the rest dropped out due to different problems including diabetes complications or not attending therapy or follow up sessions.

Measures

- Glycosylated Hemoglobin (HbA1c): Patients' physiologic glycemic control was measured using the glycosylated hemoglobin (HbA1c) blood test, which reflects glycemic control over the previous 2 to 3months (American Diabetes Association, 1999).
- Depression, Anxiety and Stress Scale (DASS-42): Patients psychological distress was measured using the Depression, anxiety and stress scale. This scale includes 42 items and 3 subscales (i.e. Depression, anxiety and stress). In Afzali, Delavar, Borjali and Mirzamani's study (2007), the depression subscale showed a high correlation (0.849) with the BDI in a 0.01 level of statistical significance. The stress subscale also found to have a 0.757 correlation co-efficient with SSS, again statistically significant at a 0.01 level. The rates of Chronbach alpha for the depression, anxiety and Stress subscales were found to be 0.94, 0.85 and 0.87 respectively. The KMO rate for the present study was 0.88 which indicates a large-enough sample size for factor

analysis. The Cruet-Bartlett's test also showed a chi-square rate of 0.794 with a degree of freedom equal to 861, which was again significant at a 0.01 alpha level.

- Iranian brief form of WHO Quality of Life Questioner (IRQOL): IRQOL comprises 26 items and includes 4 domains of quality of life (physical health, psychological health, environment and relationships). This questionnaire was translated by Nasiri (2006) to Persian language. He reported 87% split-half reliability coefficient and reasonable concurrent validity with GHQ. Also this is a sensitive instrument to change in clinical settings.

The design of our research was randomized clinical trial applied through pre-test/post-test with control group. Our intervention was 10 weekly 2-hours sessions of cognitive-behavioral stress management training, including the following topics: what is stress?, relation between stress and diabetes, coping styles, progressive relaxation, problem solving, time management, anger management, cognitive restructuring (2 sessions) and healthy life style (Fata, Bolhari & kazemzade atufi, 2006). The pretest administered before the start of intervention and the post test administered immediately 10 weeks after the last session of intervention. The follow up assessment administered 3 months after the post test.

Statistical Analysis

Statistical analyses were performed using the SPSS 15.0. Results were analyzed through repeated measures ANCOVA.

Results

Participants' baseline scores are shown in Table 1, which demonstrates no significant differences between the two groups in HbA1c, depression, anxiety, stress and quality of life.

Table 1. Baseline variables measures

variables	intervention	Control	differences	t	P. value
HbA1c	7.60 (0.88)	7.92 (1.05)	0.32	-1.17	0.320
Depression	20.34 (5.82)	21.55 (6.06)	1.19	-0.740	0.943
Anxiety	18.19 (5.85)	19.18 (5.39)	0.99	-0.642	0.807
Stress	18.80 (6.84)	20.29 (7.57)	2.11	-0.749	0.729
Quality Of Life	75.34 (6.65)	73.25 (8.41)	2.07	0.998	0.521

The results of repeated measures ANCOVA indicate that our intervention effectively decreased HbA1c ($P=0.007$), depression ($P<0.001$), anxiety ($P=0.001$) and stress ($P<0.001$) scores and increased quality of life ($P=0.011$) score in post-test and follow up compare to pre-test. Observed powers for all variables are reasonable (Table 2).

Table 2. Tests of within-subject Effects

Variables	Type III sum of square	df	F	P. value	Partial eta square	Observed power
HbA1c	2.217	2	5.14	0.007	0.09	0.815
Depression	132.982	2	10.213	<0.001	0.16	0.984
Anxiety	168.418	2	7.10	0.001	0.122	0.924
Stress	304.756	2	17.742	<0.001	0.258	1.00
Quality Of Life	170.161	2	4.735	0.011	0.085	0.780

Results of tests between subject effects (Table 3) show that differences between two groups are significant for HbA1c (P = 0.005), depression (P = 0.012), anxiety (P = 0.009), stress (P = 0.001) and quality of life (P = 0.006). Here also observed power for all variables are reasonable specially for stress (Δ = 1.00), depression(Δ = 0.984) and anxiety(Δ = 0.924).

Table 3. Tests of between-subject Effects

Variables	Type III sum of square	df	F	P. value	Partial eta square	Observed power
HbA1c	16.314	1	8.510	0.005	0.143	0.816
Depression	572.238	1	6.87	0.012	0.119	0.730
Anxiety	563.678	1	7.34	0.009	0.126	0.758
Stress	1159.227	1	11.404	0.001	0.18	0.912
Quality Of Life	949.736	1	8.804	0.006	0.137	0.797

Finally results show that our intervention effectively improved glycemic control, psychological well-being and quality of life in patients with type2 diabetes.

Conclusion

Significant differences in HbA1c between the two groups were observed 10 weeks after intervention and were maintained in 3 months follow up. Also significant differences were observed in depression, anxiety, stress and quality of life between two groups 10 week after intervention and 3 month follow up.
Questions concerning the underlying mechanism(s) of improving glycemic control through this intervention and – the routs in which glysemic control is linked with psychological distress were considered closely. Psychological interventions may affect diabetes controllers in three ways. The first step is to help the patients to accept their disease. Second is to make them improve their self-care and self-efficacy behaviors, and third is to eliminate psychological distress which makes it much harder to control the disease (Poursharifi, 2010). It is assumed that psychological distress may lead to increased sympathetic

nervous system activity and to elevated levels of cortisol and catecholamines, which can elevate the risk of metabolic syndrome (Rosmond, 2005; Lamounier-Zepter, Ehrhart-Bornstein & Bornstein, 2006). In other words, the link between symptoms of depression and anxiety and later onset of diabetes may be an over-activity of the HPA axis resulting in elevated cortisol level that inhibits insulin function in a variety of ways (Ehlert, Gaab & Heinrichs, 2001). It is controversial that which one of anxiety or depression is more related to glycemic control and diabetes. Shaban, Fosbury, Cavan, Kerr and Skinner (2009) after controlling for demographic and medical characteristics suggested that anxiety is predictive of HbA1c not depression. Furthermore the association between anxiety and HbA1c is mediated by diabetes specific psychological distress. Thus the emotions and cognitions associated with diabetes may lead to maladaptive behaviors that result in sub-optimal control. On the other hand depression is an important factor in metabolic control and diabetes. For example, Leonard, Egede, Anouk, Grubaugh & Ellis, (2010) suggest that individuals with diabetes and depression are less likely to engage in a wide range of preventive health practices that are not specific to diabetes disease management. Another study suggested that possible mechanisms include the influence of depressive symptoms on behavioral factors, such as sedentary lifestyles, smoking, and overeating, resulting in metabolic disturbances, which may explain the onset of diabetes (Engum, 2007). Also altered activities in the hypothalamic–pituitary–adrenal (HPA) axis with cortisol elevations during depressive episodes, which affect approximately half of all patients, may increase the risk of type2 diabetes. However, Anxiety and depression as possible risk factors for diabetes could not be investigated separately, because of common co morbidity of these two (Brown, Campbell, Lehmann, Grisham & Mancill, 2001).

Our findings show that in addition to improving glycemic control and psychological well-being, Cognitive Behavioral Stress Management improves quality of life in diabetic patients. Quality of life is a subjective concept encompassing a wide range of inter-related factors, such as physical, functional, psychological and well-being, as well as religious and spiritual factors (crrer et al., 2008) and patients with diabetes have a poorer quality of life than do subjects of the same age and gender without the disease (Estebany Pena et al., 2010). It is suggested that perception of quality of life is positively correlated to the severity of general psychopathology, but not with metabolic control, evaluated by HbA1c levels (Papelbaum, Lemos, Duchesne, Kupfer, Moreira, Coutinho, 2010). So the improvement in quality of life in our study may be the result of improvement in psychological distress (i.e. decrease in depression, anxiety and stress).

In conclusion Cognitive-Behavioral Stress Management training as a simple and relatively short intervention is effective for diabetic patients. This is not an expensive intervention where as having good effects on glycemic control, psychological well-being and quality of life. So, we propose this intervention to be incorporated to usual treatment programs of diabetes.

Acknowledgements

This project was supported by Behavioral Science Research Center of Isfahan University of Medical Science. The authors wish to express their gratitude to Dr. Ladan Fata for her supervision on intervention and Ms.Fatemeh Tki the manager of Isfahan charity diabetes center for assistance with the study. We are also grateful to all patients who have taken part in this study.

References

Afzali, A., Dedavar, A., Borjali, A., & Mirzamani, M. (2007). Psychometric properties of DASS-42 as assessed in a sample of Kermanshah high school students. ***Journal of Research in Behavioral Sciences***, 5(2 (10)), 81-92.

Alam, R., Sturt, J., Lall, R., & Winkley, K. (2009). An updated meta-analysis to assess the effectiveness of psychological interventions delivered by psychological specialists and generalist clinicians on glycemic control and on psychological status. ***Journal of Patient Education and Counselin*** ,75, 25–36.

American Diabetes Association. (1999). Test of glycemia in diabetes. ***Journal of Diabetes Care***, 22,77– 9.

Amsberg, S., Anderbro, T., Wredling, R., Lisspers, J., Lins, P., Adamson, U., & Johansson, U.(2009). A cognitive behavior therapy-based intervention among poorly controlled adult type 1 diabetes patients—A randomized controlled trial, ***Journal of Patient Education and Counseling***, 77, 72–80

Anderson, R. J., Freedland, K. E., Clouse, R. E., & Lustman, P. J. (2001). The prevalence of comorbid depression in adults with diabetes: A meta-analysis. ***Journal of Diabetes Care*** , 24 ,1069–1078.

Bisschop, M. I., Kriegsman, D. M. W., Beekman, A. T. F., & Deeg, D. J. H. (2004) . Chronic diseases and depression: The modifying role of psychosocial resources. ***Journal of Social Sciences and Medicine***, 59, 721–733.

Brown, E. S., Varghese, F. P., & McEwen, B. S. (2004). Association of depression with medical illness: Does cortisol play a role? ***Journal of Biological Psychiatry***, 55, 1–9.

Brown, T. A., Campbell, L. A., Lehmann, C. L., Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. ***Journal of Abnormal Psychology***, 110, 585– 99.

Crrer, C. J., Pontarolo, R., Melchiors, A. C., Rossignoli, P., Llimo, S F. F., & Radominski, R. B. (2008). Traduc¸a˜o para o portugue^s e validac¸a˜o do instrument. Diabetes Quality of Life Measure (DQOLBrasil**).** ***Arquivos Brasileiros de Fndocrinologia & Metabologia*** 52(3), 515–22.

Das-Munshi, J. , Stewart, R., Ismail, K., Bebbington, P. E., & Prince, M. J. (2007). Diabetes, common mental disorders, and disability: Findings from the UK National Psychiatric Morbidity Survey**.** ***Journal of Psychosomatic Medicine*** , 69, 543–550.

Davies, M., Dempster, M., & Malone, A. (2006). Do people with diabetes who need to talk want to talk? ***Journal of Diabetic Medicine*** , 23, 917–919.

Ehlert, U, Gaab, J, & Heinrichs, M. (2001). Psychoneuroendocrinological contributions to the etiology of depression, posttraumatic stress disorder, and stress-related bodily disorders: the role of the hypothalamus–pituitary–Adrenal axis. ***Journal of Biological Psychology***, 57, 141– 52.

Engum, A. (2007). The role of depression and anxiety in onset of diabetes in a large population-based study. ***Journal of Psychosomatic Research***, 62, 31– 38.

Esteban, Y., Pena, M. M., Hernandez Barrera, V., Fernández Cordero, X., Gil de Miguel, A., Rodríguez Pérez, M., Lopez-de Andres, A., & Jiménez-García, R. (2010). Self-perception of health status, mental health and quality of life among adults with diabetes residing in a metropolitan area. ***Journal of Diabetes & Metabolism***, 36, 305–311.

Fata, L., Bolhari, J. & Kazemzade Atufi, M. (2006). ***Stress management training for Ministry of Health and Medical Education workers***, Tehran psychiatric institute, Mental Health Research Center.

Groot de, M., Anderson, R., Freedland, K. E., Clouse, R. E., & Lustman, P. J. (2001). Association of depression and diabetes complications: a meta-analysis**.** ***Journal of Psychosomatic Medicine***, 63, 619–630.

Huang, C. J, Chiu, H .C., Lee, M. H. & Wang, S. Y. (2011). Prevalence and incidence of anxiety disorders in diabetic patients: A national population-based cohort study, ***Journal of General Hospital Psychiatry***, 33, 8–15

King, H, Aubert, R E, & Herman, W. H. (1998). Global burden of diabetes, 1995–2025. Prevalence, numerical estimates, and projections. ***Journal of Diabetes Care***, 21, 1414–31.

Lamounier-Zepter, V., Ehrhart-Bornstein, M., & Bornstein, S. R. (2006). Metabolic syndrome and the endocrine stress system. ***Journal of Hormone and Metabolic Research***, 38, 437–441.

Larijani, B., Zahedi, F., & Aghakhani, S. (2003). Epidemiology of Diabetes Mellitus in Iran. ***Shiraz E-Medical Journal***, 4, 4.

Leonard, E., Egede, M. S., Anouk, L., & Grubaugh, Ellis, C. (2010). The effect of major depression on preventive care and quality of life among adults with diabetes. ***Journal of General Hospital Psychiatry***, 32, 563–569

Lloyd, A., Sawyer, W., & Hpkinson, P. (2001). Impact of long–term complications on quality of life in patients with type2 diabetes not using insulin. ***Journal of Value Health***, 4(5), 392–400.

Lustman, P. J., Anderson, R. J., Freedland, K. E., Groot de, M., Carney, R. M., & Clouse, R. E. (2000). Depression and poor glycemic control: a meta-analytic review of the literature, ***Journal of Diabetes Care***, 23 , 934–942.

Nasiri, H. (2006). ***Stability and reliability of Iranian brief form of WHO Quality of Life Questioner***. Presented in third conference of students mental health, Tehran, Iran University of Science and Technology.

Papelbaum, M., Lemos, H. M., Duchesne, M., Kupfer, R., Moreira, R. O., & Coutinho, W. F. (2010). The association between quality of life, depressive symptoms and glycemic control in a group of type2. ***Journal of Diabetes Research and Clinical Practice***, 89, 227–230

Peyrot, M., Rubin, R. R. (1997). Levels and risks of depression and anxiety symptomatology among diabetic adults, ***Journal of Diabetes Care*** ,20 , 585–590.

Peyrot, M.,. Rubin, R. R, Lauritzen, T., Snoek, F. J., Matthews, D. R., & Skovlund, S. E. (2005). Psychosocial problems and barriers to improved diabetes management: results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) Study. ***Journal of Diabetic Medicine*** ,22 (10) ,1379–1385.

Peyrot, M., & Rubin, R. R. (2007). Behavioral and psychosocial interventions in diabetes: A conceptual review. ***Journal of Diabetes Care***, 30,2433–40.

Poursharifi, H., Babapour, J., Zamani, R., Besharat, M. A., Mehryar, A. M., 7 Rajab, A. (2010). The effectiveness of motivational interviewing in improving health outcomes in adults with type2 diabetes, ***Journal of Procedia Social and Behavioral Sciences*** ,5, 1580–1584

Roeloffs, C. A.,Wells, K. B., Ziedonis, D., Tang, L., & Unutzer, J. (2002). Problem substance use among depressed patients in managed primary care. ***Journal of Psychosomatics,*** 43, 405–412.

Rosmond, R.(2005). Role of stress in the pathogenesis of the metabolic syndrome. ***Journal of Psychoneuroendocrinology***, 30, 1–10.

Shaban, C., Fosbury, J. A., Cavan, D. A., Kerr, D., & Skinner, T. C. (2009). The relationship between generic and diabetes specific psychological factors and glycaemic control in adults with type 1 diabetes. ***Journal of Diabetes Research and Clinical Practice***, 85, e26-e29.

Snoek, F. J., Nicols, C. W., Ven, V. D., & Lubach, C. (1999). Cognitive behavioral group training for poorly controlled type 1 diabetes pPatients: A psychoeducational approach. ***Journal of Diabetes Spectrum***, 12, 3, 147

Stratton, I. M., Adler, A. I., Neil, H. A. W., Matthews, D. R., Manley, S. E., Cull, C. A., Hadden. D., Turner, R. C., & Holman, R. R. (2000). Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): Prospective observational study. ***British Medical Journal***, 321, 405–12.

Tossani, E., Cassano, P., & Fava, M. (2005). Depression and renal disease. ***Semin Arthritis Rheum***

UK Prospective Diabetes Study Group. (1998). Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type2 diabetes (UKPDS 33). ***Lancet***, 352:837–53

Welschen, L. M., Oppen, P., Dekker, J. M., Bouter, L. M., Stalman, W. A., & Nijpels, G. (2007). The effectiveness of adding cognitive behavioral therapy aimed at changing lifestyle to managed diabetes care for patient with type2 diabetes: Design of a randomized controlled trial. ***BMC Public Health***, 7, p74

Zhang, C. X., Chen, Y. M., & Chen, W. Q. (2008). Association of psychosocial factors with anxiety and depressive symptoms in Chinese patients with type2 diabetes. ***Journal of Diabetes Research and Clinical Practice***, 79, 523–530