Comparing Emotion Cognitive Regulation, Alexithymia and Neuropsychological Skills among Teenagers with Type-1 Diabetes and Healthy Ones

Fatemeh Mehrinia [a]* iD, Leyla Shokri [b] iD

[a] Department of Psychology, Islamic Azad University, Rasht Branch, Rasht, Iran.
[b] Department of Psychology, Islamic Azad University, Arak Branch, Arak, Iran.

A R T I C L E I N F O

ORIGINAL ARTICLE

*Corresponding Author:
Fatemeh Mehrinia

Email:
fatemeh.mehrinia@gmail.com

Tel: +98 9338845377

A B S T R A C T

Background: The emergence of chronic physiologic diseases in the people causes their mental health damage. Therefore, the present study aimed to compare emotion cognitive regulation, alexithymia and neuropsychological skills among teenagers with type-1 diabetes and healthy ones.

Methods: This was a causal-comparative method. The statistical population included teenagers with type-1 diabetes and healthy ones in the city of Rasht in 2016. The sample size was 100 teenagers with type-1 diabetes and 100 healthy ones who were selected through convenient sampling method. The applied questionnaires included alexithymia questionnaire, emotion cognitive regulation and neuropsychological skills questionnaire. After collecting questionnaires and extracting raw data, the data analysis was done through two-group independent sample t-test.

Results: The results of data analysis showed that there is a significant difference between emotion cognitive regulation, alexithymia and neuropsychological skills among students with type-2 diabetes and healthy ones ($p < 0.0001$) in a way that the teenagers with type-1 diabetes have lower emotion cognitive regulation and neuropsychological skills and higher alexithymia than healthy ones.

Conclusion: According to the findings, teenagers with type-1 diabetes have lower emotion cognitive regulation and neuropsychological skills and higher alexithymia due to treatment and psychological involvement in their sickness; so, there needs to use treatments related to these components such as mindfulness and acceptance and commitment treatment to improve them.

Keywords: Emotion Cognitive Regulation, Neuropsychological Skills, Alexithymia, Type-1 Diabetes

Introduction

Diabetes is of the most common diseases that its prevalence is increasing globally; especially in under developing countries according to The World Health Organization report.[1, 2] One of the diabetes forms which is most common during teenager is type-1 diabetes which was once known as insulin-dependent diabetes and the teenager diabetes. It is a chronic disease that happens when the pancreas sprinkle little insulin or doesn't at all.[3-5]

Chronic nature of diabetes and psychological damage it causes makes the person afflicted with it to bare damage from psychological processes as well as emotional processes. A vulnerable emotional component in patients afflicted with diabetes is emotion cognitive regulation.[6, 7] The emotional self-regulation process helps with normal regulation of negative emotions and stimulations.[8, 9] In general, multiple research findings suggest strong correlation between emotion regulation strategies and psychological damage and behavioral disruptions.[10-12] Flaw in emotion cognitive regulation can result in alexithymia among the teenagers afflicted with type-1 diabetes. Alexithymia is another emotional component that can lead to disruption in detecting and describing the feelings well as deterioration of emotional processes.[13] Alexithymia is disability in cognitive procession of emotional information and in emotion regulation. In other words, it refers to limited cognition of self, and others' emotional states.[14-17]

In addition, the prior studies suggest that people afflicted with diabetes have significant difference with healthy ones in operational actions;[18, 19] meaning that probably they have challenges in neuropsychological skills in general. The neuropsychological skills crystallize in operational actions in brain.[20] These actions include behaviors such as: self-observation, variation, self-initiation, scheduling, cognitive flexibility, response inhibition, stable attention, organization, and active memory.[21-23]

The current study is necessary in the sense that endangering of physical and psychological health of the teenager because of chronic diseases such as diabetes endangers their psychological health too. The teenagers usually suffer from financial outcomes of the disease, the pain, lack of knowledge about future of the disease, and society reactions to the diseases. This can lead to stress and social-psychological problems which in turn, result in decrease of the overall health of the teenagers on these grounds, detecting vulnerable psychological components of the teenagers afflicted with type-1 diabetes and implementing suitable psychological Therapy methods is inevitable. Therefore, the main concern in the current study is that whether there is among emotion cognitive regulation, alexithymia, and neuropsychological skills among the teenagers afflicted with type-1 diabetes and among those healthy.

Methods

The methodology utilized in the current study is descriptive-analytical in casual-comparative form. The statistical society of this study was the teenagers afflicted with type-1 diabetes and those healthy of Rasht city in 2017. Moreover, accessible non-random sampling method is used in the current study. The reason of using this method is lack of access to the entire statistical society. 100 healthy teenagers and 100 afflicted were selected among those who refer to health centers of Rasht city. The healthy ones were selected from the high school students. Two groups were matched in gender, age, and financial conditions of the families. The reason for choosing this volume of samples was referring to scientific sources.[24] The criteria of entering the study included having developed type-1 diabetes, 12-17 age span, and informed consent with participation in the study; and the criteria for quitting the study included tense cognitive and physical disorders, unwillingness to continue

participation in the study, and incomplete filling up of the questionnaires.

The following questionnaires are used in this study:

Emotion cognitive regulation questionnaire

Including 10 questions, this questionnaire was created by Gross and John in 2003. The examinee should answer this questionnaire based on a Likert 7-degrees scale, starting from absolute disagreement up to absolute agreement. This questionnaire includes two sub-scales of renewed emotional assessment and emotional inhibition; the latter meaning negative emotional inhibition in this study. Magnitude of the points in this scale is from 10 to 70. The internal homogeneity coefficient of this questionnaire is 0.72 and 0.79 for teenager boys and girls respectively.[25] Soleymani and Habibi[26] reported the Cronbach's alpha coefficient of this study at 0.81. Moreover, Mohammadi and Moosavi[27] obtained 0.79 for the Cronbach's alpha coefficient in the emotion cognitive regulation questionnaire. The reliability of the questionnaire in the current study using the Cronbach's alpha coefficient is 0.81.

Toronto alexithymia scale

The alexithymia questionnaire is created by Bagby, Parkera & Yaylor.[28] Answers of the questions in this questionnaire scale from 1 to 5; 1 being full disagreement and 5 being full agreement. In the Persian version, the Cronbach's alpha coefficient for alexithymia is reported 0.85 which suggests suitable internal homogeneity of this scale. Shah'gholyian et al.[29] evaluated the scale in the Persian sample using the Cronbach's alpha coefficient method for the alexithymia questionnaire at 0.74. Stability of the total mark for the current study using the Cronbach's alpha coefficient is calculated 0.76.

The neuropsychological examination

This examination was created in 2004 by O'Connor in order to assess the neuropsychological skills including attention, sensory-motor function, language, executive functions, memory, learning, and recognition in four spectrums. This questionnaire is translated and standardized in Iran

by Jadidy and Aabedi[30] for which the internal stability coefficients are reported with magnitude spanning from 0.75 to 0.90, and retrial stability coefficients with an 8-weeks interval are reported from 0.60 to 0.90. the structural validity of the O'Connor neuropsychological examination using factor analysis methods is assessed for which the differential validity is strongly confirmed with statistical analysis of the questionnaire capability in distinguishing hyperactive people from the normal and other clinical classes. Structural justifiability has made this tool suitable for which stability is reported 0.72 using the Cronbach's alpha coefficient method.[30] Reliability of this questionnaire in the current study is calculated 0.73 using the Cronbach's alpha factor.

Execution method

100 teenagers were selected among those afflicted with type-1 diabetes. Next, 100 non-afflicted were chosen. Then, the questionnaires were given to these samples who were asked to fill in with enough precision. In order to regard ethical issues, those consenting to participate in the project were fully informed about it. Moreover, they were ensured of confidentiality not being asked to insert their names.

In order to analyze the data in this project, two levels of inferential statistics and descriptive statistics are used. In the descriptive statistics level, average and standard deviation; and in the inferential statistics level, the Shapiro-Wilk examination was used to check if distribution of variables is normal, the Levine test was used to check equality of variances, and the *t* test was used to examine the hypothesis of the project. The statistical results were analyzed using SPSS-23 statistical software.

Results

The findings of demographic characteristics suggest that the sample people in both afflicted and healthy teenagers were between 12 to 17 years old. These people were in between grade 6 to grade 11. Grade 10 was with the most plentitude among teenagers afflicted with type-1 diabetes while

grade 11 was with the most plentitude among those not afflicted (29.50%). Comparison the two groups (afflicted and not) in two variables of age (through variance analysis) and education level (via Kruskal–Wallis analysis) suggests that there isn't significant difference between the groups. The descriptive findings of the research are discussed in the following.

Results of table (1) suggest that average of Emotion cognitive regulation, alexithymia, and Neuropsychological skills among teenagers with and without type-1 diabetes differ. Results of Shapiro-Wilk suggest that normality difficult of data samples distribution in all of three variables in both groups is satisfied (p > 0.05) and variance homogeneity defaults are also satisfied (p > 0.05). Moreover, the inferential statistics sections in the table suggest that between the two groups is significant difference in all three variables mentioned (p < 0.001). Whereas the descriptive statistics finding suggests that the emotion cognitive regulation and neuropsychological skills is lesser in the group of the teenagers with type-1 diabetes in comparison to the other group, and alexithymia is greater than the other group.

Table 1. average and standard deviation of Emotion cognitive regulation, alexithymia, and Neuropsychological skills among teenagers with and without type-1 diabetes

Components	Teenagers with diabetes		Non-affected teenagers		The normality difficult	Inferential statistics results	
	average	Standard deviation	average	Standard deviation	Level of significance	T value	Level of significance
Emotion cognitive regulation	29.69	5.11	36.87	6.10	0.23 and 0.43	-9.01	0.0001
alexithymia	46.34	7.85	35.01	9.68	0.19 and 0.09	8.54	0.0001
Neuropsychological skills	107.20	15.51	130.55	13.43	0.36 and 0.28	-11.37	0.0001

Discussion

The current project is aimed to compare emotion cognitive regulation, alexithymia, and neuropsychological skills among the teenager with and without type-1 diabetes. The findings suggest significant difference between these variables among the two groups (p < 0.0001); meaning that the teenager with type-1 diabetes are challenged with lower emotion cognitive regulation and neuropsychological skills and higher alexithymia compared to the healthy ones.

Results of the current study along these differences comply with findings of Ghiasvaand & Ghorbany.[7] regarding defect in emotion regulation approaches in those with type-1 diabetes. As these researches have demonstrated, people with diabetes are challenged in emotional processes due to the damaging and chronic nature of this disease. In other words, diabetes can put pressures on the teenagers through disrupting fulfillment of the demands. In fact, failure to meet the demands puts various pressures on the individual. It is also worth mentioning that diabetes usually comes with emotional and psychological disorders. These problems diminish the ability of the patient in terms of self-managing the disease which in turn results in resonance of emotional and psychological problems and causes the patient to become trapped in a defective cycle.[31] This process disables the teenager with diabetes in managing emotional and behavioral challenges and weakens them in emotion cognitive regulation.

On the other hand, results of the current project regarding significant difference in alexithymia in the teenager with and without type-1 diabetes comply with findings of Bayegan et al.[32] according to which, people with diabetes are challenged with higher stress and alexithymia. In

fact, affliction with chronic effects of diabetes diminishes life quality of the person and his/her family. This disease which comes with annoying symptoms and negative perspective of the society, threatens identity of people and causes happening of negative feelings in them.[33] Moreover, people with diabetes feel defeated and frustrated and their emotional and psychological wellness is affected due to confliction with the disease.[34] This process obstacles the teenagers with diabetes in reaching emotional and cognitive procession. Failure in emotional processions, especially in emotional and social interactions, weakens the patients in suitable recognition and expression of the emotions. On this basis, the teenager with type-1 diabetes feels alexithymia more in comparison to the healthy ones.

The final finding of the project is existence of significant difference of neuropsychological skills between the teenager with, and without type-1 diabetes. This finding complies with findings of Oscar et al., [18] and Ishizawa, Kamato, and Sauto[19] regarding weakness of people afflicted with diabetes in operational functions of brain. In fact, the neuropsychological skills include capabilities that lead to approaches (future). Judgment, programming or doing cognitive homework, abstraction, problem solving, organization of chain functions based on logical strategies, metallization or behavioral changings are determined with flexibility in approaches and supervision over behavioral function.[35] Results of the previous studies suggest that forehead structures can be affected from diabetes and can be correlated with defects observed in neuropsychological skills, semantic memory, verbal fluency, and executive functionality.[36] Moreover, research findings suggest that symptoms such as: high blood pressure, frustration due to sickness and blood sugar lack of control can result in intensification of defection in neuropsychological skills in people with diabetes.[37-40]

Limitation of the research domain to teenager with type-1 diabetes of Rasht city and presence of some uncontrolled variables such as: social conditions and IQ of people participating in the project, financial state of the families, no exploitation of random sampling methods and limitation of the cognitive method (no causal inference of the findings) were natural limitation of this problem. Therefore, it is suggested to run the current project in other cities and regions with different cultures, on different diseases, controlling of the mentioned factors, random sampling method, and experimental method to extend generalizability capacity of the results.

Conclusion

Implementing the experimental method and suitable psychological interventions is to improve the emotion cognitive regulation and neuropsychological skills and reduce alexithymia through proper therapy with having given the significant difference of the mentioned variables between the teenager with and without the disease. Hence, it is advised in operational level to try to reduce cognitive and psychological damage of those with diabetes via utilizing therapies exclusive to teenager period such as teenager mindfulness therapy.

Conflicts of Interest

In this study, was not reported any potential conflicts of interest by the authors.

Authors' Contribution

Conceptualization, F.M. and L.Sh.; Methodology, L.Sh.; Formal Analysis, F.M.; Investigation, L.Sh.; Data Curation, L.Sh.; Writing – Original Draft, F.M. and L.Sh.; Writing – Review and Editing, F.M; Resources, F.M.; Supervision, F.M.

All authors read and approved the final manuscript and are responsible for any question related to article.

References

1. Wang C, Li L, Wang L, Ping Z, Flory MT, et al. Evaluating the risk of type 2 diabetes mellitus

using artificial neural network: an effective classification approach. Diabetes research and Clinical Practice. 2013; 100(1):111-118.

2. Baquedano IR, Santos MA, Martins TA, Zanetti ML. Self-care of patients with diabetes mellitus cared for at an emergency service in Mexico. Revista latino-americana de enfermagem. 2010; 18(6):1195-1202.

3. Hordern MD, Dunstan DW, Prins JB, Baker MK, Singh MA, et al. Exercise Prescription for Patients with Type 2 Diabetes and Pre-diabetes: a Position Statement from Exercise and Sport Science Australia. Journal of Science and Medicine in Sport. 2012; 15(1): 25-31

4. Sato E, Ohsawa IS, Kataoka J, Miwa MI, Tsukagoshi FU, et al. Socio-psychological problems of patients with late teenager onset type 1 diabetes-analysis by qualitative research. Nagoya journal of medical science. 2003; 66(1/2): 21-30.

5. Mishalia M, Omer H, Heymann AD. The importance of measuring self-efficacy in patients with diabetes. Family Practice. 2011; 28(1): 82-87.

6. Mahmoud Alilou M, Asbaghi M, Narimani M, Agamohammadzadeh N. Relationship between personality characteristics with self-care behavior and consequences of treatment in patients with Diabetes. Iranian Journal of Psychiatric Nursing. 2014; 2(3): 77-85. [Persian]

7. Ghiasvand M, Ghorbani M. Effectiveness of Emotion Regulation Training in Improving Emotion Regulation Strategies and Control Glycemic in Type 2 Diabetes Patients. Iranian Journal of Endocrinology and Metabolism. 2015; 17(4): 299-307. [Persian]

8. Hasani J, Shahmoradifar T. Effectiveness of Process Emotion Regulation Strategy Training in Difficulties in Emotion Regulation. Journal of Military Medicine. 2016; 18(1): 339-346. [Persian]

9. Rottenberg J, Gross JJ. When emotion goes wrong: realizing the promise of affective science. Clinical Psychology: Science and practice. 2007; 10(2): 227-232.

10. Garnefski N, Teerds J, Kraaij V, Legerstee J, Van den Kommer T. Cognitive emotion regulation strategies and depressive symptoms: differences between males and females. Personality and individual differences. 2004; 36(2): 267-276.

11. Kraaij V, Van Emmerik A, Garnefski N, Schroevers MJ, Lo-Fo- Wong D, et al. Effects of a cognitive behavioral self-help program and a computerized structured writing intervention on depressed mood for HIV-infected people: a pilot randomized controlled trial. Patient Education and Counseling. 2010; 80(2): 200-204.

12. Mikulincer M, Shaver PR. Attachment orientations and emotion regulation. Current Opinion in Psychology. 2019; 25: 6-10.

13. Picardi A, Toni A, Caroppo A. Stability of alexithymia and its relationships with the big five factors, temperament, character and attachment style. Psychotherapy and Psychosomatics. 2005; 74(6): 371-378.

14. Thorberg FA, Young RM. Sullivan KA, Lyvers M. Parental bonding and alexithymia: A meta analysis. European Psychiatry. 2011; 26(3): 187-193.

15. Shimura A, Takaesu Y, Nakai Y, Murakoshi A, Ono Y, et al. Childhood parental bonding affects adulthood trait anxiety through self-esteem. Comprehensive Psychiatry. 2017; 74: 15-20.

16. Khalid A, Qadir F, Chan SW, Schwannauer M. Parental bonding and teenagers' depressive and anxious symptoms in Pakistan. Journal of Affective Disorders. 2018; 228: 60-67.

17. Swart M, Kortekaas R, Aleman A. Dealing with feelings: Characterizations of trait alexithymia on emotion regulation strategies and cognitive–emotional processing. Plos one. 2009; 4(6): e5751.

18. Schuur M, Henneman P, Van Swieten JC, Munshi M, Grand L, et al. Insulin-resistance and metabolic syndrome are related to executive function in women in a large family-based study. European journal of epidemiology. 2010; 25(8): 561-568.

19. Ishizawa KT, Kumano H, Sato A, Sakura H, Iwamoto Y. Decreased response inhibition in middle-aged male patients with type 2 diabetes. Bio Psychosocial medicine. 2010; 4(1): 1-10.

20. Locascio G, Mahone EM, Eason SH, Cuttin LE. Executive dysfunction among children with reading comprehension deficits. Journal of learning disabilities. 2010; 43(5): 441-454.

21. Semrud-clikeman M, Ellison PA. Child neuropsychology: Assessment and intervention for neurodevelopment disorders. New York: Springer. 2007.

22. Smith E. Comparing behavior and neuropsychological functioning using NEPSY and BASC-2 scores in a mixed clinical sample. [Doctoral dissertation]. America: Texas Woman's University. 2010.

23. Nyroos M, Wiklund-Hornqvist C, Lofgren K. Executive function skills and their importance in education: Swedish student teachers' perceptions. Thinking Skills and Creativity. 2018; 27: 1-12.

24. Delavare A. Research Methodology in Psychology and Educational Sciences, Tehran: Virayesh Publication. 2009. [Persian]

25. Gross JJ, John OP. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. Journal of Personality and Social Psychology. 2003; 85(2): 348-362.

26. Soleimani A, Habibi Y. Soleimani A. The Relationship between Emotion Regulation and Resilience with Psychological Well-Being in Students. School Psychology Journal. 2015; 3 (4): 51-72. [Persian]

27. Mohammadi H, Mosavi V. Comparison of Emotional Regulation and Self-Control in Children with and without Attention Deficit/Hyperactivity Disorder. Quarterly Journal of Child Mental Health. 2015; 2(2): 21-33. [Persian]

28. Bagby RM, Parker JD, Taylor GJ. The twenty-item Toronto Alexithymia scale-I: item selection and cross-validation of the factor structure. Journal of Psychosomatic Research, 1994; 38(1): 23-32.

29. Shahgholian M, Moradi E, Kafee M. Relationship between alexithymia with students' emotion and general health styles. Iranian Journal of Psychiatry and Clinical Psychology. 2007; 13(3): 238-248. [Persian]

30. Jadidi M, Abedi A. Adaptation and standardization of O'Conner Neuropsychological Questionnaire in 5-14-year-old children in Isfahan. Journal of Modern Educational Approaches. 2011; 3 (1): 19-30. [Persian]

31. Yoo JS, Lee SJ, Lee SJ, Lee HC, Kim MJ. The effect of a comprehensive lifestyle modification program on glycolic control and body composition in patients with type 2 diabetes. Asian Nursing Research. 2007; 1(2):106-115.

32. Baigan K, Khoshkonesh A, Habibi AM, Fallahzade H. Effectiveness of dialectical behavioral group therapy in alexithymia, stress, and diabetes symptoms among type 2 diabetes patients . Journal Diabetes Nurse. 2016; 4 (3): 8-18. [Persian]

33. Funnell MM, Anderson RM. Empowerment and Self-Management of Diabetes. Clinical Diabetes. 2004; 22(3): 123-127.

34. Polonsky WH. Emotional and quality-of-life aspects of diabetes management. Current diabetes reports. 2002; 2(2): 153-159.

35. Lezak MD, Howieson DB, Lorin DW, Fischer JS. Neuropsychological assessment. 4th ed. New York: Oxford University Press; 2004.

36. Wahlin A, Nilsson E, Fastbom J. Cognitive performance in very old diabetic persons: The impact of semantic structure, preclinical dementia, and impending death. Neuropsychology. 2002; 16(2): 208-216.

37. McFall GP, Geall BP, Fischer AL. Testing Covariates of Type 2 Diabetes-Cognition Associations in Older Adults: Moderating or Mediating Effects?. Neuropsychology. 2010; 24(5): 547-62.

38. Marazziti D, Consoli G, Picchetti M, Carlini M, Faravelli L. Cognitive impairment in major depression. European journal of pharmacology. 2010; 626(1): 83-86.

39. Kumer R, Looi JCL, Raphael B. Type 2 diabetes mellitus, cognition and brain in aging: A brief review. Indian journal of psychiatry. 2009; 51: 35- 38.

40. Cox DJ, Kovatchev BP, Gonder-Frederick LA, Summers KH, McCall A, et al. Relationships between hyperglycemia and cognitive performance among adults with type 1 and Type 2 Diabetes. Diabetes Care. 2005; 28(1): 71-77.