



Research Article

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Mood and Coping Styles as predictors of Blood Glucose Level among Adolescents with Type 1 Diabetes

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ABSTRACT

Background : Good mood control and effective coping styles have an important effect on adolescents' control of their blood glucose level. Aim : To examine the effect of mood and coping styles as predictors of blood glucose level in adolescents with type 1 diabetes. Materials & Methods : Research design : A descriptive cross-sectional design was utilized to conduct the study. Settings : Pediatrics clinic at Zagazig University Hospitals and the health insurance clinic for diabetes located at director street in Zagazig city. Tools of data collection : A Self-Administered Questionnaire including : socio-demographic data sheet, Profile of Mood States-Adolescents (POMS-A) and The Coping Styles Questionnaire. Results : The results revealed that there was a statistically significant positive correlation between confusion and Random Blood Sugar (RBS) and between depression and HbA1c. Meanwhile, there was statistically significant negative correlation between HbA1c and avoidance coping, Detached coping and rational coping. Conclusion : The current study concluded that depressed and confused mood and coping style have a significant effect on blood glucose level among diabetic adolescents. Recommendations : The adolescents with type 1 diabetes should be given health education programs about proper coping with mood disorders throughout their daily activities.

Key words: *Type 1 Diabetes, Blood Glucose Level, Adolescents, Mood, Coping Styles.*

INTRODUCTION

Type 1 diabetes is the 7th major cause of death among adolescents worldwide. Type 1 diabetes is also called juvenile diabetes and occurs in children and adolescents. Blood glucose control is more difficult due to hormonal problems related to puberty which reduces insulin's effectiveness by about 30% to 50% [1]. Fluctuation in blood glucose level due to hormonal changes and emotions can make diabetes management difficult during adolescence [2].

The worldwide geographic variation in type 1 diabetes prevalence is remarkable. The existence of type 1 diabetes within a 20-year period has been doubled. In 2011, about 490,100 children from 0 to 14 years have type 1 diabetes [3]. In Egypt, epidemiological studies for childhood type 1 diabetes are scarce. Egypt has a prevalence of about 8/100 000 per year in adolescents under the age of 18 years [4].

Mood changes are a common experience in adolescents with type 1 diabetes. One was that negative emotions cause physical effects is by preventing adolescent from taking care of himself. Negative and stressful emotions have adverse effects on the autonomic nervous system which in turn affects blood glucose level [5]. Hormonal changes also make muscles and tissues more insulin-resistant which contribute to high blood sugar— that is, less efficient at

removing glucose from the blood stream [6]. Adolescents with diabetes face major stressors during the course of their disease. Coping strategies are of primary importance for adolescents with diabetes.

Coping refers to capability to respond properly to a psychological stressor related to a negative event. Coping styles decrease stress which help to improve blood glucose control. In general, problem-focused yield more positive outcomes than emotion-focused coping among diabetic adolescents [7].

Community health nurses have an important role and clear responsibilities during the management plan for adolescents with diabetes. It is essential to involve adolescents in all stages of management program development and implementation [8]. Health education sessions provided by community health nurses should focus on diabetes as a chronic illness that requires careful medical attention and adaptation of personal lifestyles. Coping with diabetes should include education about stress management and referral to required community resources [9].

SUBJECTS AND METHODS

Study design and settings:

A descriptive cross-sectional design was utilized by the research team. Settings for the study were the outpatient clinics in Zagazig University Hospitals at the paediatrics unit and the health insurance clinic for diabetes located in Director street in Zagazig city.

Study population:

Adolescents aged from 12-18 years with type 1 diabetes in Zagazig City. All the adolescents with type 1 diabetes were eligible to participate in our current study.

Sample size:

The study comprised of a convenient sample of 80 adolescents diagnosed with type 1 diabetes who fulfilled the following criteria:

Inclusion criteria:

1. Age: 12-18years
2. Agree to participate in the study

Exclusion criteria:

1. Adolescents receiving drugs which affect blood glucose levels such as steroids and antipsychotic drugs
2. Adolescents suffering from short- or long-term pain.

Study Tools:

The following tool was used by the researcher for data collection, namely a Self-Administered Questionnaire including the following parts: socio-demographic data sheet, Profile of Mood States-Adolescents (POMS-A), and The Coping Styles Questionnaire.

Reliability of the proposed tools was done by Cronbach's Alpha Test as the following:

	N of Items	Cronbach's Alpha
Mood scale	24	0.751
Coping scale	60	0.779

Ethical consideration:

Firstly, the Committee of Ethics at Faculty of Nursing, Zagazig University approved the research protocol. At the time of data collection, each adolescent filled an informed verbal consent after full conversation about the aim and benefits of the study. participation in the study is voluntary for adolescents with type 1 diabetes.

Statistical analysis:

SPSS 20.0 statistical program was used. We presented our data using descriptive frequencies and percentages for qualitative variables as descriptive statistics, and quantitative variables were calculated using means, standard deviations and median. chronbach' s alpha test was used to calculate the reliability.

RESULTS

Table (1): Reveals that the study sample involved 80 adolescents whose age ranged 10 to 18 years, with mean of 14.3(2.0) years. Moreover, more than half of fathers of adolescents (51.3%) had university education and of mothers (52.5%) had basic/ intermediate education.

Table 1 : Socio-demographic characteristics of adolescents in the study sample (n=80)

Socio-demographic characteristics	Frequency	Percent
Age:		
10-16	57	71.25
16-18	23	28.75
Range	10.0-18.0	
Mean±SD	14.3(2.0)	
Median	14.0	
Father education:		
None	6	7.5
Basic/intermediate	33	41.25
University	41	51.25
Father job:		
Employee	41	51.25
Worker	39	48.75
Mother education:		
None	10	12.5
Basic/intermediate	42	52.5
University	28	35.0
Mother job:		
Housewife	58	72.5
Working	22	27.5
Crowding index:		
<2	61	76.2
2+	19	23.8

Table (2) indicated that mood states are ordered in descending order as the following the frequency of fatigue and tension were more than two-thirds in the study sample (68.8%, 67.5%) respectively. The frequency of anger and depression were about two-thirds (66.3%) of the study sample. The frequency of vigour was three-fifths (60.0%) of the study sample, while the frequency of confusion was 51.3% of the study sample. On the other side, the frequency of emotional coping and rational coping was more than a quarter of the study sample (28.8%, 26.3%) respectively. The frequency of detached coping was one quarter (25.0%) of the study sample and the frequency of avoidance coping was only 1.3%.

Table 2: Mood states and coping strategies among adolescents in the study sample (n=80)

Mood states and coping strategies among adolescents in the study sample (n=80)	Frequency	Percent
High (60%+) moods:		
Anger	53	66.3
Confusion	41	51.3
Depression	53	66.3
Fatigue	55	68.8
Tension	54	67.5
Vigor	48	60.0
High (60%+) coping:		
Avoidance	1	1.3
Detached	20	25.0
Emotional	23	28.8
Rational	21	26.3

Table (3) illustrated that there was positive correlation between confusion and Random Blood Sugar (RBS) ($r=0.221$) and between depression and HbA1c ($r=0.260$). Meanwhile, there was negative correlation between HbA1c and avoidance coping ($r=-.350$), Detached coping ($r=-.342$) and rational coping ($p=-.437$).

Table3 : Correlation between glycated Hb (HbA1c) and Random Blood Sugar (RBS) levels and adolescents mood and coping scores

	Spearman's rank correlation coefficient	
	HbA1c	RBS
Mood:		
Anger	.031	.109

Confusion	.037	.221*
Depression	.260*	.133
Fatigue	.107	.210
Tension	.107	.160
Vigor	-.063	.161
Coping:		
Avoidance	-.350**	-.070
Detached	-.342**	-.280*
Emotional	-.050	-.033
Rational	-.437**	-.173

(*) Statistically significant at p<0.05

(**) Statistically significant at p<0.01

Table (4) showed that there was positive correlation between anger and emotional coping style (r = .465). Additionally, there was positive correlation between depression and emotional coping (r = .313). Meanwhile, there was correlation between tension and detached coping (r = -.224) and between tension and rational coping (r = -.266).

Table (5) indicated that duration of T1D and depressive mood were independent positive predictors of a score of HbA1c. conversely, avoidance and rational coping were independent negative predictors of the score of HbA1c.

Table (6) indicated that detached coping was the only negative predictors of the score of RBS.

Table 4 : Correlation matrix of mood and coping scaled domains scores

Mood domain	Spearman's rank correlation coefficient			
	Coping domains			
	Avoidance	Detached	Emotional	Rational
Anger	.092	-.103	.465**	.002
Confusion	.089	-.086	.138	-.064
Depression	.067	-.099	.313**	-.097
Fatigue	-.010	-.178	.170	-.103
Tension	.202	-.224*	.154	-.266*
Vigor	-.043	-.091	.023	.107

(*) Statistically significant at p<0.05

(**) Statistically significant at p<0.01

Table 5 : Best fitting multiple linear regression model for the HbA1c

	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error				Lower	Upper
Constant	9.32	0.69		13.488	<0.001	7.94	10.69
Duration of T1D	0.14	0.04	0.32	3.408	0.001	0.06	0.22
Depressive mood	0.08	0.04	0.21	2.212	0.030	0.01	0.15
Avoidance coping	-0.10	0.04	-0.24	-2.503	0.014	-0.19	-0.02
Rational coping	-0.06	0.02	-0.27	-2.778	0.007	-0.10	-0.02

r-square=0.32

Model ANOVA: F=10.22, p<0.001

Table 6 : Best fitting multiple linear regression model for the RBS

	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error				Lower	Upper
Constant	343.52	38.87		8.837	<0.001	266.14	420.91
Detached coping	-4.54	1.70	-0.29	-2.667	0.009	-7.93	-1.15

r-square=0.07 Model ANOVA: F=7.11, p=0.009

DISCUSSION

The present study aimed at examining the effect of mood and coping styles on blood glucose level among adolescents with type 1 diabetes. The targeted population in the current study was adolescents between 12 – 18

years. This age group was selected because type 1 diabetes adolescents are at a greater risk of emotional problems which in turn affect quality of life, proper glucose metabolism and hormonal balance inside the body. As regards the frequency of mood states among the study sample, the findings indicated that there was high percentage of different mood disorders. According to the researcher's point of view, presence of chronic disease (type 1 diabetes) is strongly associated with psychological disturbances, physiological changes and social problems among adolescents in the study sample. On the same line, a study conducted by Riaz et al. (2017) in Pakistan indicated that a substantial number of adolescents in sample (42.3%) reported clinically significant level of mood disorders [10]. The study results illustrated that there was positive correlation between family education, income and mood scores among the study sample. On the same vein, Tisouli et al. (2013) in a study in Greece found that poor family education was associated with more distress which affected type 1 patients' mood and glycemic control [11]. On the contrary; Poodineh&Absalan et al. (2017) found that socioeconomic status and other family variables including parents' education was associated with mood disorder, distress and poor glycemic control only in less than one half of the study population [12].

The results of the current study revealed that about two-thirds of adolescents in the study sample complaint of depression and fatigue. This could be due to increased level of emotional burden as a result of the presence of diabetes alongside with its complications. Badescu et al. (2016) emphasized that mood problems associated with diabetes can affect the productivity of adolescents [13]. The prevalence of depression is much higher in diabetic adolescents. Similarly, a study done in Pakistan by Khan et al. (2013) indicated that among diabetic patients aged 7-15 years observed depressed mood in 33.7% patients [14]. In a similar study done in The United States by Casagrande et al. (2013) found that the majority of the participants did show depressive symptoms [15]. On the other hand, in a large-scale study done in the United States on 2672 youth with Type-I diabetes and conducted by Reynolds et al. (2011) found that minority of the sample complaint from depressed mood [16]. The percent of Anger and tension were also about two thirds in the study sample. That could be as a result of stress caused by presence of diabetes and its treatment plan. In a study conducted in The United States by Lee et al. (2015) clarified that insulin disturbances can lead to neuronal changes affecting brain and leading to nervousness [17]. On the same line, Brazeau et al. (2016) in a study in Canada found high percentage of angry mood, stigma and poor self-esteem among clients with type 1 diabetes [18]. On contrary, Bicket&Tapp, (2016) found in a study in America that the majority of diabetic adolescents showed low level of anger and anxiety [19]. The results of the current study indicated that there was statistically significant negative correlation between tension, detached and rational coping. That reflect the importance of management of stress through teaching coping styles that result from different situation which could increase tension, anxiety and poor adherence to treatment. The results of the current study were in congruence with a study of Rahnama et al. (2017) in Pakistan which found that poor coping styles were strongly related with increased frequency of tension, anger and anxiety among the study sample [20].

Regarding confusion, the current study mentioned that about one half of the study sample reported confused mood. It is well-known that high blood glucose level over prolonged period of time among type 1 diabetes patients can affect the function of the brain leading to confusion, delirium and disorientation.

On the other hand, concerning the frequency of coping styles among the study sample, findings indicated that emotional, rational coping and detached coping were about one-quarter of the study sample. These results might be due to lack of community resources available to deal with emotional disturbances lead to poor coping with diabetes among diabetic adolescents. These results were on the same line with the results found in the study of Parlidar et al. (2015) in Pakistan who found poor coping strategies among diabetic adolescents [21]. Additionally, a study conducted by Jasser et al. (2011) in Pakistan indicated that poor use of coping strategies was found among diabetic adolescents and lead to poorer quality of life and metabolic disorders [22]. On contrary, Abubakr et al. (2015) done a study in Zambia found that adolescents employed emotional coping strategies which lead to proper control of blood glucose levels which might be the result of availability of community resources in school and mass media which in turn affect adolescents' adherence to treatment plan [23].

Concerning relations between adolescents' control of HbA1c and their mood, the results of the current study demonstrated that there was statistically significant positive relation between depressed mood and HbA1c control. These results might be due to negative emotions such as depressed mood can cause physical effects and prevent adolescent from taking care of himself. On the same line, Badescu et al. (2016) emphasized that diabetic patients can suffer from extreme consequences as a result of depressed mood [13]. A higher rate of depressed mood is found among diabetic people than the general population as found by Teixeira et al. (2015) in Spain [24]. On the same

vein, in a study conducted in Ethiopia by Mossie et al. (2017) found that depressed mood among diabetic patients with type 1 lead to poor blood glucose readings among the sample [25]. Additionally, a study conducted in India by Khandelwal et al. (2016) found that high prevalence of depression among type 1 diabetes patient lead to poorer HbA1c control (above7.5) [26]. Additionally, a study conducted by Khater et al. (2017) in Egypt found that prolonged periods of depressed mood lead poor outcomes in diabetes control especially blood glucose readings [27]. On the same line, Joyce et al., (2010) In The United States reported that higher levels of depressed mood and HbA1c were positively correlated [28].

On the other hand, a study of Svanum et al. (2015) in The United States and found no statistically significant relation between depressed mood and HbA1c control among the study sample [29]. Additionally, a study conducted by Dogra et al., (2017) in South India found that Multilevel analyses [30]. There was no such relationship between depressed mood and HbA1c control. In another study conducted by Kahn et al. (2011) in Chicago in the United States found no significant relation between depressed mood and blood glucose measures among the study sample [31]. That would be the result of other covariates such as education, type and duration of diabetes which would affect diabetes control regardless of mood changes.

The results have demonstrated that there was statistically significant relation between fatigue and Random Blood Sugar (RBS). Similarly, a study conducted in the United States by Hughes et al., 2012 found that fatigue can affect proper adherence to treatment plan [32]. On contrary, a study conducted in Sweden by Lasselin et al. (2012) found that fatigue had no effect on blood glucose control among type 1 clients [33]. That might be the result of proper treatment plan and good lifestyle as a result of proper health education about diabetes management.

The study findings also indicated that there was positive correlation between confusion and Random Blood Sugar (RBS). This reflects the effect of confused mood on adolescent adherence to treatment plan which lead to poorer glycemic control. On the same line, a study conducted in India by Sahoo et al. (2016) found a statistically significant relation between confusion and blood glucose control among diabetic patients [34]. On contrary, Balhara, (2011) found in the United states that there was no relation found between diabetes and other psychotic disorders as confusion [35].

Additionally, the study findings also indicated that vigor and Random Blood Sugar were related statistically. Vigor refers to being active bodily or mental strength or force. The adolescents are characterized by being physically active which is considered as a normal characteristic of that transitional period and requires additional attention to make sure that their treatment plan is suitable to their lifestyle. According to the researcher point of view, being physically and mentally active can help the adolescent to deal better with different situations related to disease management, leading to better resilience and better adherence to his treatment plan which in turn lead to better glycemic control. In congruence with these results, Stilanou&kelnar, (2009) found in a study in The UK that adolescents being physically active had better will to adhere to insulin therapy which lead to better glycemic control [36]. The results of the current study indicated that there was statistically significant negative correlation between tension and detached coping and between tension and rational coping. The results of the current study were in congruence with a study in USA conducted by Wadsworth, (2015) which found that poor coping styles were strongly related with increased frequency of tension, anger and anxiety among the study sample [37]. On contrary, the results of the current study indicated that in multivariate analysis, avoidance and rational coping styles were statistically negative predictors of HbA1c while detached coping was statistically negative predictor of random blood sugar (RBS) reading. According to the researcher point of view good coping with stressful situations facing adolescents in home and school can lead to poor adherence to treatment plan of diabetes. On the same vein, Dyke et al. (2013) found in a study in The United States that poor coping with daily stressors among diabetic patients lead to poorer adherence to treatment and poor glycemic control [38]. On contrary, Jasser et al. (2017) found in a study in Pakistan that Coping was not a significant predictor of glycemic control [2].

CONCLUSION

The study results indicate that depressed mood and coping styles have significant effect on blood glucose level among diabetic adolescents. The scores of confusion, depression and random Blood Sugar (RBS) are positively correlated, while there were statistically significant negative correlation between HbA1c and avoidance coping, Detached coping and rational coping.

RECOMMENDATIONS

In the light of the main study findings, the following recommendations is proposed: The adolescents with type 1 diabetes should be given health education program about proper management of mood disorders throughout their daily activities through teaching relaxation techniques, meditation and proper time management. Secondly, the adolescents with type 1 diabetes should be given educational programs in proper use of coping styles to cope with psychological burden related to diabetes.

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Conflicts of interest

There are no conflicts of interest

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