Effect of Transition Care Educational Program on Transitional Readiness, Self-Efficacy and Quality of Life among Adolescents with Type 1 Diabetes Mellitus

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Abstract

Background: Adolescents with type 1 diabetes must make the transition to adult-oriented health care as part of their development. Transition care is a multi-year process begins early in adolescence to provide healthcare that is developmentally-appropriate for enhancing effective knowledge and self-management. **The aim of this study** was to evaluate the effect of transition care educational program on transitional readiness, self-efficacy and quality of life among adolescent with type 1 diabetes mellitus. **Design:** A quasi-experimental research design was utilized to accomplish the aim of this study. **Setting:** This study was conducted in the outpatient diabetes clinic at health insurance hospital affiliated to Egyptian Ministry of Health and population at Benha city. **Subjects:** A purposive sample of (60) adolescents with type 1diabetes mellitus were included in this study. **Four tools were used for data collection:** A structured interviewing questionnaire, transition readiness assessment tool, self-efficacy questionnaire and Pediatric quality of life inventory diabetes module. **Results:** There was a highly statistical significant difference in all mean scores of adolescents' transition readiness, self-efficacy and quality of life domains three months post-program and six months follow-up assessment compared with the pre-program phase. **Conclusion:** The transition care educational program was a good strategy in improving transition readiness, self-efficacy and quality of life among adolescents with type 1 diabetes mellitus. **Recommendation:** Continuous implementation of transitional care program for adolescents with type 1 diabetes mellitus with the importance of follow-up in order to assess its long-term effects.

Keywords: Transition care educational program, Transitional readiness, Self-efficacy, Quality of life, Adolescents, Type 1 diabetes mellitus.

Introduction

Type 1 diabetes mellitus (T1DM) is a chronic, incurable condition that is one of the most common non-communicable diseases globally. The International Diabetic Federation define the term diabetes mellitus as a group of metabolic diseases with a variety of etiologies that are characterized by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism resulting from defects in insulin secretion, insulin action, or both[1]. Type 1 diabetes mellitus represents the ending result of an autoimmune destruction of the pancreatic islet beta cells resulting in complete insulin deficiency. The cause of T1DM is unknown. However, multiple genetic and environmental risk factors appear to play a significant role in the genesis of the disease[2].

Diabetes mellitus is a serious disease found in children and adolescents, known as juvenile onset diabetes which associated with significant mortality and morbidity issues. Worldwide, around half a million children under the age of 15 years old have type 1 diabetes mellitus and more than 79,000 adolescents are diagnosed with T1DM everyday[3]. The world's greatest incidence is in Finland, where approximately 600 children and adolescents become ill each year, and the world's lowest incidence is in China. The frequency is expected to reach 285 million in the year 2025, the growing incidence of diabetes can be attributed to an increase in obesity, lack of exercise, diet high in processed sugars, and overall lack of diabetes self-care. In Egypt, the prevalence rate of type one DM in children and adolescents is 0.7/1000 and the incidence rate is 4.01/100000[4,5].

Transition is a concept that means a period between two stable states in a person's development. It is an active process that includes preparing adolescents with a chronic illness for adult care both before and after the transition. This period brings instability and vulnerability. Transition readiness has been developed for identifying and tracking critical components of health independence for clinical and research purposes. Transition is challenging for adolescents and their parents, many adolescents are unable to properly transfer to adult healthcare due to a lack of adequate support structures and education [6,7].

Adolescents with type 1 diabetes must make the transition to adult-oriented health care as part of their development. Transition care is a multi-year process that should start early in adolescence. It is goal is to provide healthcare that is coordinated and

developmentally-appropriate for enhancing effective knowledge, self-management and advocacy in order to ensure adequate readiness for meeting the demands of adult-oriented health care and to facilitate access to continuous health care into adulthood [8, 9]. Complication of ineffective transition care involving deterioration in glycemic control, decreased adherence to self-care management and increased involvement in risk-taking behaviors. These combined factors raise the risk of inadequate medical follow-up care, which leads to an increase in the incidence of acute and chronic diabetic complications, as well as hospitalizations. As a result, it is critical to construct a smooth transition process for adolescents with type 1 diabetes in order to avoid complications. [10, 11].

Self-efficacy is task and context specific judgment of an individual's ability to organize and execute courses of action [12]. Self-efficacy determines the behaviour of adolescents' patients with long-term diseases. Adolescents who have a sense of self-efficacy are more confident in disease treatment, which can benefit their physical abilities and lead to positive outcome expectations and a higher probability of achieving target metabolic control. Self-efficacy has an impact on adolescents' life

and is the key to the readiness of adolescents with a chronic condition for the transition to adult care. Adolescents who have a high level of self-efficacy are better able to cope with the obstacles of growing up and living with a chronic illness. [13,14].

Quality of life (QOL) is a multidimensional concept described by the World Health Organization as "an individual's perceptions of their position in life, in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns[15]. Adolescents with type 1 diabetes have lifestyle changes that can affect their entire family. However, management of type I DM is lifelong and challenging, considered an overwhelming demanding disease that affects their daily emotions and quality of life. As a result, QOL of diabetic adolescents must be considered, as they are required to live with and manage the disease for a lifetime [16].

Significance of the study

Adolescence is a critical transitional period from childhood into adulthood, especially for those with type 1 diabetes mellitus, because in addition to normal developmental processes, adolescents must acquire knowledge and skills to independently manage their health. In recent years, the American Diabetes Association (ADA) has

offered recommendations for health care delivery during this transitional period to improve the process of transition preparation. Despite the availability of national recommendations and resources, the problem of ineffective transition of care for adolescents with type 1 diabetes mellitus persists. However, challenges remain and evidence-based practices for preparing adolescents for adult health care are still emerging [17, 18].

In spite of the fact that transitional-care programs have grown in popularity as an increasing number of youth with chronic conditions have grown up to be empowered adolescents, only 17% of youth with special health care needs such as those with DM received appropriate transition planning support[19]. There is evidence that the process of transitioning from child to adult services is often associated with deterioration in health of adolescents with type1 diabetes[20]. Previous study among adolescents with chronic conditions and their caregivers reported the need for interventions to decrease the risks of deteriorating health status as adolescents move to adult services [21]. However, In Egypt, particularly in Benha city, no study has been conducted in diabetic outpatient clinics to determine the effect of transition

care program on health outcomes among adolescents with type 1 DM. As a result, preparing adolescents for entry into adult care settings through the implementation of these programs can reduce emergency admissions, improve self-efficacy, and promote long-term participation in high-quality diabetes care.

Operational definitions

-**Transfer**: It is an event or series of events through which adolescents with chronic medical conditions move their care from a pediatric to an adult healthcare environment[22].

-**Transitional care:** It is the provision of care that address the medical, psychosocial, and educational/vocational needs of adolescents as they move from being a dependent child towards an independent adult, with the aim of preparing adolescents to take control of their lives and health as adults [23].

Subjects and Methods

Aim of the study

This study aimed to evaluate the effect of transition care educational program on transitional readiness, self-efficacy and quality of life among adolescent with type 1 diabetes mellitus.

Research hypothesis

H₁: Adolescents' transitional readiness will be improved after implementation of transition care educational program.

H₂: Adolescents' self-efficacy will be improved after implementation of transition care educational program.

H₃: Adolescents' quality of life will be improved after implementation of transition care educational program.

H₄: There will be a significant positive correlation between transitional readiness, self-efficacy and quality of life after implementation of transition care educational program.

Research design

Quasi- experimental (one-group pre/post-follow-up test) research design was utilized to accomplish the aim of this study.

Setting

The study was conducted in the outpatient diabetes clinic at health insurance hospital affiliated to the Egyptian Ministry of Health and population at Benha city. This clinic found in the first floor. It composed of two rooms and corridor, one room for routine check-up, and another room for follow-up and health education. While, the corridor contains chairs used by adolescents as waiting area. The outpatient diabetic clinic

was serving a large number of diabetic children/ adolescents and the number of patients visiting the clinic monthly was ranged from 50 to 60.

Subjects

A purposive sample of (60) adolescents who received medical services from the previously mentioned setting were chosen after fulfilling the inclusion criteria

Inclusion criteria

-Adolescents aged 12–18 years who had type 1 diabetes mellitus.

-Adolescents agreed to participate in the study.

-Free from other chronic disease.

-Attends diabetes outpatient clinic appointments regularly.

- Able to independently fill in the questionnaire.

Exclusion criteria:

-Adolescents with severe neurocognitive and learning disabilities.

Tools of Data Collection:

Four tools were used for data collection.

Tool I: A structured interviewing questionnaire which developed by the researchers after reviewing the related and recent literatures**.** It consists of three parts:

Part (1): Characteristics of the studied adolescents: It includes age, gender,

educational grade, residence and attending previous transition care program regarding diabetes mellitus.

Part (2): Medical data of the studied adolescents: It includes duration of illness, number of insulin injection, number of hospital admission and Family history with diabetes.

Part (3): Adolescents' knowledge, it was adapted from **Jensen et al., (2017)[6] & Parfeniuk et al., (2020)[7]** to evaluate adolescents' knowledge about diabetes mellitus and transition care. It composed 32 questions distributed as following:

Part 3-A: knowledge about type 1 diabetes mellitus: It consists of 26 multiple choice and true &false questions concerning definition of diabetes (2questions), causes and risk factor (6questions), signs and symptoms (6questions), complications (4questions) treatment (2questions) and nursing management of diabetes (6questions).

Part 3-B: knowledge about transition care: It consists of 6 multiple choice questions regarding definition of transition care, appropriate time to start transition, goals, components, and barriers.

Scoring system: Adolescents' responses were scored as follow: one score for correct answers and zero score for incorrect

answers. The total score for each adolescent were calculated and converted into percent by dividing the adolescent total score by the maximum possible score. The total score for knowledge ranged from 0 to 32. The total knowledge score was categorized as the following; poor (< 60%), average (60- < 75%) and good (≥ 75%).

Tool II: Transition Readiness Assessment Questionnaire (TRAQ)

It was adopted from **Wood et al., (2014)[24]** to assess adolescent readiness for transition to adult care. It includes 20 items distributed at 5 domains as managing medications (4items), appointment keeping (7items), tracking health issues (4items), talking with healthcare providers (2items) and managing daily activities (3items). Each item scored as five-point Likert scale ranging from 1 to 5 and scored as follow:

Scoring system: The adolescents answer scored at a 5-point Likert scale in which 1 = No, I do not know how, 2 = No, but I want to learn, 3 = No, but I am learning to do this, 4 = Yes, I have started doing this and 5 = Yes, I always do this when I need to. The total score ranged from 20 to 100. Higher scores indicate high transition readiness. Therefore, the transition readiness levels were categorized as the following low

(<60%), moderate (60% - 80%) and high (≥80%).

Tool III: Self-Efficacy Questionnaire (SEQ)

It was adopted from **Muris, (2001)**[25] to assess self-efficacy of adolescents. The instrument comprises three subscales; academic self-efficacy (Items 1, 4, 7, 10, 13, 16, 19, and 22), social self-efficacy (Items 2, 6, 8, 11, 14, 17, 20, and 23) and emotional self-efficacy (Items 3, 5, 9, 12, 15, 18, 21, and 24). Each subscale includes eight items. The instrument had 24 items in total and was scored on a 5-point Likert scale.

Scoring system: Each item was scored as follow: 1(not at all), 2(very unwell), 3(unwell), 4(well) to 5(very well), with a total possible score range from 24 –120. A high score indicates a high level of self-efficacy. Accordingly, the self-efficacy levels were categorized as the following low (<60%), moderate (60% - 80%) and high (≥80%).

Tool IV: The Pediatric Quality of Life Inventory (PedsQoL 3.0) Diabetes Module

It was multi-dimensional, diabetes-specific instrument that was developed by **Varni etal., (2003)**[26] to assess adolescents quality of life. This multidimensional instrument consists of 28-item grouped under 5 domains: diabetes symptoms (11 items),

treatment barriers (4 items), treatment adherence (7 items), worry (3 items), and communication (3 items).

Scoring system: A five-point Likert response was used for adolescent self-report from 0= never a problem, 1= almost never a problem, 2= sometimes a problem, 3= often a problem to 4= almost always a problem). Items were reverse-scored and linearly transformed to a 0–100 scale, being (0=100, 1=75, 2=50, 3=25, and 4=0). Total scores ranged from 0 to 2800. Scale scores are computed as the sum of the items divided by the number of items answered. Higher scores indicated better QoL. So, QoL levels were categorized as the following low (<60%), moderate (60% - 80%) and high (≥80%).

Methods

-An official permission was obtained by submission of formal letters from the Dean of the faculty of Nursing, Benha University to the responsible authorities of the study setting to obtain their permission for data collection.

-Ethical Considerations

The study was approved by the Ethical Committee at the faculty of Nursing, Benha University. Verbal explanation of the study' aim, and its benefits was performed by the researchers to adolescents included in the

study sample. Oral consent was taken from subjects' parents and reassured them about confidentiality and anonymity of the study. Participants were informed about their right to withdraw from the study at any time without giving any reason.

- Review of the current local and international-related literature and theoretical knowledge of various aspects of the study using books, articles and magazines for full understanding and to get acquainted with the research problem and prepare the data collection tools.

- **Validity:** All tools were translated into Arabic by the researchers, and tested for content validity by five experts (two professors of pediatric nursing, Faculty of Nursing, Benha University and three professors from Faculty of Nursing, Ain Shams University. The recommended modifications were done and the final form was ready for use.

- **Reliability:** Internal consistency of the tools were analyzed using Cronbach's alpha coefficients and the value obtained from the structured interviewing questionnaire was 0.86, 0.87 for transition readiness assessment questionnaire, 0.88 for self-efficacy scale and 0.71 for PedsQoL 3.0 diabetes module.

- **Pilot study:** A pilot study was carried out on 6 adolescents with type 1 diabetes mellitus, representing about 10% of the study sample to test the clarity and applicability of the tools of data collection and to estimate the length of time needed to fill the tools. Modifications were done and the subjects who shared in the pilot study were excluded from the main study sample.

Study framework

The framework of the study was carried out through the following four phases:

-**Assessment phase:** Once permission was granted to proceed with the study, the researchers started to prepare schedule for collection the data. The researchers visited the outpatient diabetes clinic two days a week (Sunday & Tuesday) in the morning shift from 9 am to 1 am. The researchers interview the adolescents during a routine outpatient diabetes clinic appointment in the health insurance hospital. At the beginning of the interview the researchers introduced themselves, explained the study purpose briefly and the nature of the tools used for data collection. Parents and adolescents oral consent to participate in the study was taken. Then, the researchers distributed the tools (I, II, III &IV) to all adolescents included in the study to collect baseline data. Each

adolescent filled the tools individually. The time used for finishing each tool was ranged between 15-20 minutes, according to their physical and mental readiness. Data were collected through three months, starting from July 2019 up to the end of September 2019.

-**Planning phase:** Based on the findings of the assessment phase (pre-test) and relevant review of literature the adolescents learning needs were identified, the objectives of the program were stated and the content was designed. Teaching methods were used by the researchers to attract adolescents' attention such as, modified lecture, brain storming, group discussion, demonstration, and re-demonstration. Teaching media included; power point presentation, colored handout prepared in simple Arabic language to receive the information easily. Also, the researchers offer gift card incentives for participation post-program and follow-up assessment.

-**Implementation phase:** Implementation of the educational program was carried out at the previously mentioned settings. The educational program consisted of 5consecutive sessions (two for theory &three for practical) and was implemented on a small group basis over a period of 18 weeks. These sessions were being scheduled as two

session every one week for duration of three weeks. Adolescents were divided to 6 groups and 10 adolescents will be scheduled per group and the researchers included their parents during the sessions. Each session would last approximately 60 minutes. Total duration of session was 5 hours for each group. The session content will be guided by adolescents needs. The researchers start the session with group discussion, asking and answering question. **The first session** included overview about diabetes mellitus type 1 (definition of diabetes, signs and symptoms, causes, risk factors, complication, treatment and nursing management), **the second session** involved definition of transition care, its goal, barriers and transition-related topics, such self-care behaviors (healthy eating, regular physical activity, taking medication, reducing risks, diabetes problem solving and healthy coping), managing diabetes in school and away from home, completing all follow-up appointments, communicating effectively with peers who are in the same situation & healthcare providers and future planning for occupation/career. **The third session** concerned with applying steps of insulin administration. **The fourth session** concerned with applying steps of blood-glucose monitoring and the **fifth session**

concerned with performing steps of urine analysis for sugar and ketone bodied. The program was conducted at Sunday and Tuesday from 10 am to 11am weekly and the sessions were repeated to all groups.

-**Evaluation phase:** The adolescents were evaluated by using same of pretest tools that conducted after three months and six months follow-up assessment which coincide with routine clinic visits.

-**Statistical Analysis:** Data were presented using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Friedman test used to compare means pre, post and follow-up. Reliability of the structured interviewing questionnaire was done using Cronbach's Alpha. In addition, correlation coefficient (r) test was used to estimate the close association between variables. P-values which were less than 0.05, 0.001 were considered as statistically significant and highly significant respectively.

Results

Table 1 presented that slightly more than half (51.7%) of adolescents were in the age group of 16 years and more, with a mean of 16 ± 1.7 years old. Nearly two thirds (65%) of adolescents were female and more than three quarters (76.7%) of them were in secondary school. Regarding to the adolescence's residence, two-thirds (66.7%) of them were from urban area and most of them (96.7%) did not attend any previous transition care program regarding diabetes mellitus.

Table (2) proved that the majority of adolescents (83.3%) had type 1 diabetes mellitus from 5 years and more with the mean duration of 5.4±3.2 years and more than half (60%) of them had insulin injection twice a day. More than three quarters (76.7%) of them had twice time of hospital admission and more than two thirds (70. 8%) of them had family history of diabetes mellitus from the 1st degree.

Figure (1) illustrated that nearly two thirds (65%) of adolescents had poor knowledge in the pre-program phase. While, more than two thirds and two thirds (71.7% & 66.7%) of them had good knowledge 3 months post-program and 6 months follow-up assessment respectively.

Table (3) revealed that the highest mean score (6.7±28.8) of adolescents transition readiness was talking with healthcare providers pre-program phase. In addition, this table proved that there was a highly

statistical significant difference in all mean score of transition readiness domains 3 months post-program and 6 months follow-up assessment compared with the pre-program phase (p=0.000).

Figure (2) showed that majority (83.3%) of adolescents had low transition readiness in the pre-program phase. Moreover, majority and three quarters (81.7% & 75%) of them had high transition readiness 3 months post-program and 6 months follow-up assessment respectively.

Table (4) indicated that there was a highly statistical significant difference in all mean score of self-efficacy domains 3 months post-program and 6 months follow-up assessment compared with the pre-program phase (p=0.000).

Figure (3) showed that majority (80%) of adolescents had low self-efficacy in the pre-program. on the other hand, slightly more than three quarters and more than two thirds (76.6% & 71.7%) of them had high self-efficacy 3 months post-program and 6 months follow-up assessment respectively.

Table (5) demonstrated that there was a highly statistical significant difference in all mean score of quality of life domains 3 months post-program and 6 months follow-up assessment compared to the pre-program phase (p=0.000).

Figure (4) indicated that three quarters (75%) of adolescents had low quality of life in the pre-program. While, more than two thirds and nearly two thirds (70% & 65%) of them had high quality of life after 3 months and 6 months follow-up assessment respectively.

Table (6) displayed that there was a highly statistical significant positive correlation between the total transition readiness and total self-efficacy 3 months post-program and 6 months follow-up assessment (p=000). Again, this table showed that there was a highly statistical significant positive correlation between total self-efficacy and total quality of life 3 months post-program and 6 months follow-up assessment (p=000). Contrary, no significant correlation found between total transition readiness and total quality of life after 3 months and 6 months follow-up assessment.

Table (1): Distribution of Studied Adolescent According to their Characteristics (n=60).

Adolescents' characteristics	Study sample n=60	
	No	**%**
Age in years:		
- 12 <14	12	20.0
- 14 <16	17	28.3
- ≥ 16	31	51.7
Mean ±SD: 16 ± 1.7		
Gender:		
- Male	21	35.0
- Female	39	65.0
Educational Grade		
- Primary school	6	10.0
- Preparatory school	8	13.3
- Secondary school	46	76.7
Residence:		
- Rural	40	66.7
- Urban	20	33.3
Attending previous transition care program regarding diabetes mellitus.		
- Yes	2	3.3
- No	58	96.7

Table (2): Distribution of Studied Adolescent According to their Medical Data (n=60).

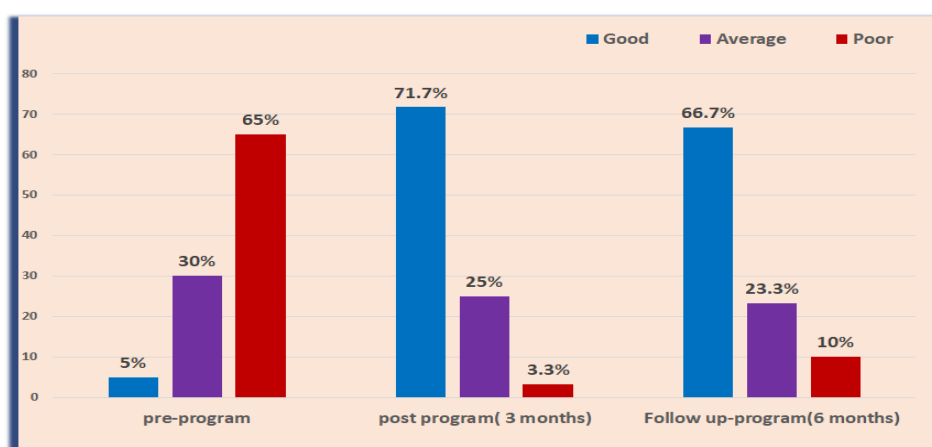| Medical data	Study sample n=60	
	No	%
Duration of illness / years		
- < 5	10	16.7
- ≥ 5	50	83.3
Mean ±SD: 5.4±3.2		
Number of insulin injection:		
- One	24	40.0
- Two	36	60.0
Number of hospital admission		
- Once	6	10.0
- Twice	46	76.7
- Three or more	8	13.3
Family history with diabetes		
- Yes	48	80.0
- No	12	20.0
- If yes, it's relation: (n=48)		
1st degree	34	70.8
2nd degree	14	29.2

Figure (1): Comparison of the Studied Adolescents' Knowledge Levels thorough the Educational Program Phases (n= 60).

Table (3): Mean Scores of Diabetic Adolescents' Readiness for Transition thorough the Educational Program Phases (n= 60).

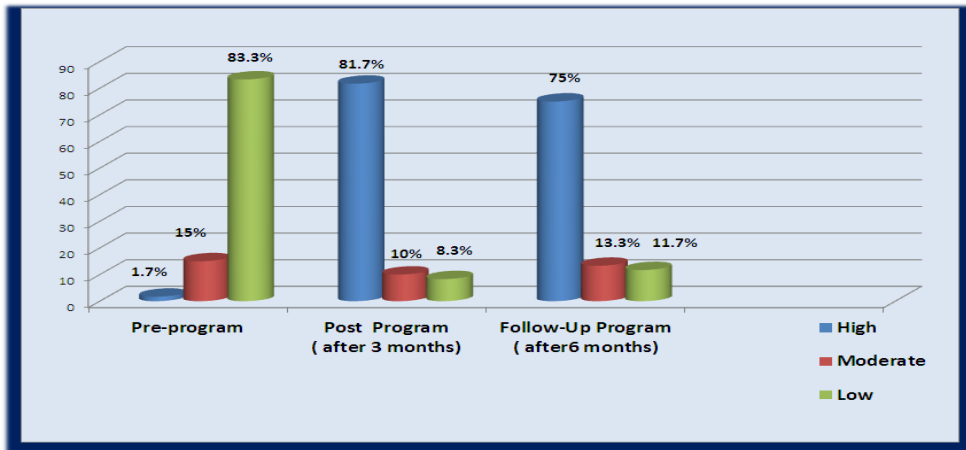| Adolescent readiness for transition	Maximum Score	Pre-program	Post- program (After 3 months)	Follow up program (After 6 months)	Friedman Test	P -value
		X±SD	X±SD	X±SD		
Managing medications	20	5.3±10.4	17.6±9.9	16.4±8.7	6.475	.000**
Appointment keeping	35	5.5±10.9	28.8±11.2	24.2±11.8	5.923	.000**
Tracking health issues	20	2.9±9.6	15.5±10.7	10.2±7.8	6.886	.000**
Talking with healthcare providers	10	6.7±28.8	9.2±24.3	9.1±27.4	6.417	.000**
Managing daily activities	15	6.0±10.5	11.6±11.2	10.1±13.3	5.083	.000**
Total	100	24.4±10.0	84.7±12.5	70.0±11.7	9.061	.000**

**highly significant at P<0.001

Figure (2): Comparison of the Studied Adolescents' Readiness for Transition Levels through the Educational Program Phases (n=60).

Table (4): Mean Scores of Diabetics Adolescents' Self-efficacy thorough the Educational Program Phases (n= 60)

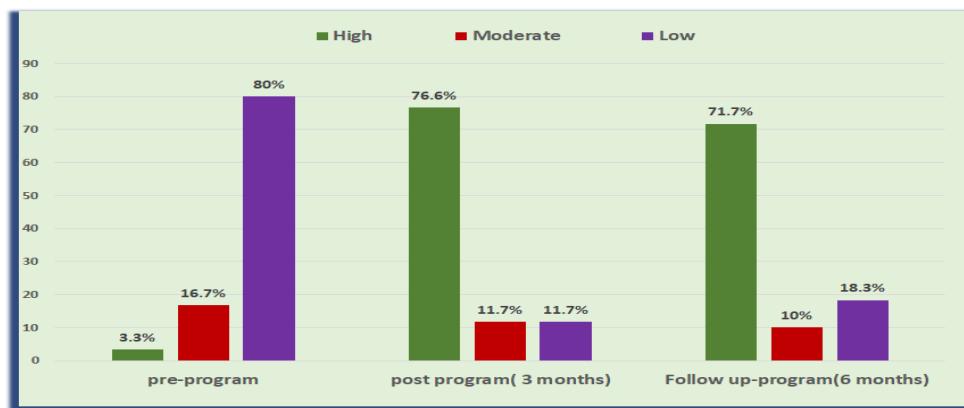| Adolescent self-efficacy domains	Maximum Score	Pre-program	Post program (After 3 months)	Follow up program (After 6 months)	Friedman Test	P – value
		X±SD	X±SD	X±SD		
Academic self-efficacy	40	7.7±10.9	34.8±11.2	29.2±11.8	11.945	.000**
Social self-efficacy	40	11.9±9.6	36.5±10.7	31.1±7.8	11.020	.000**
Emotional self-efficacy	40	15.5±8.3	38. 9±9.6	37.0± 18.7	14.75	.000**
Total	120	35.1±10.0	110.2±11.2	97.3±14.8	15.91	.000**

**highly significant at P<0.001

Figure (3): Comparison of the Studied Adolescent's Self-efficacy Levels through the Educational Program Phases (n=60).

Table (5): Mean Scores of Diabetic Adolescents' Quality of Life thorough the Educational Program Phases (n= 60).

| Pediatric quality of Life domains	Pre-program	Post- program (After 3 months)	Follow up program (After 6 months)	Friedman Test	P - value
	X±SD	X±SD	X±SD		
Diabetes symptoms	62.1 ±15.7	87.6 ± 12.3	77.8 ± 3.8	14.75	.000**
Treatment barriers	59.9 ± 20.5	83.2 ± 20.9	76.7 ± 4.6	7.614	.000**
Treatment adherence	60.1 ± 3.0	80.8 ± 15.5	74.7 ± 17.1	5.617	.000**
Worry	58.4 ± 24.2	79.4 ± 14.6	73.7 ± 20.9	7.861	.000**
Communication	61.9 ± 25.9	82.2 ± 2.77	77.7 ± 25.8	9.144	.000**

**highly significant at P<0.001
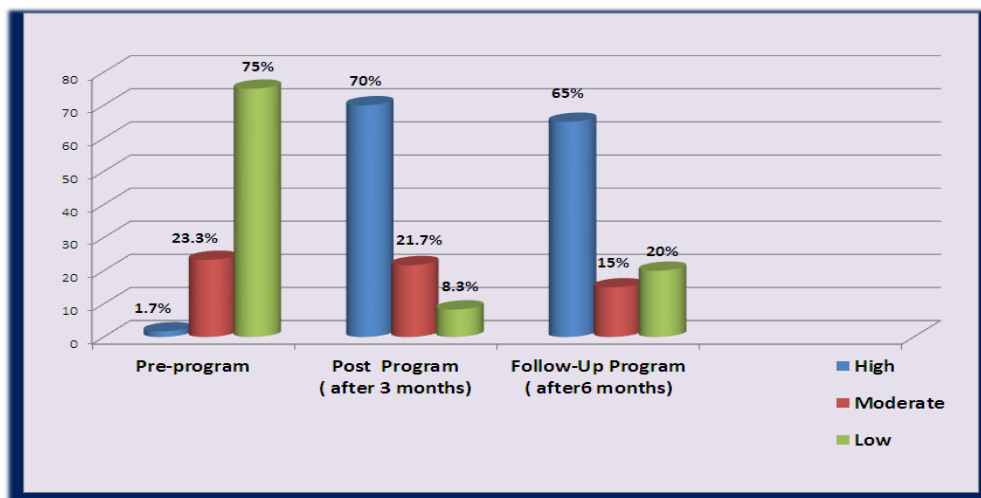
Figure (4): Comparison of the Diabetes Adolescents' Quality of Life Levels thorough the Educational Program Phases (n=60).

Table (6): Correlation Matrix between Total Adolescents 'Transitional Readiness, Total Self- efficacy, and Total Quality of Life Post-Program and Follow-up Assessment (n=60).

Items		Transitional readiness Post-program	Self-efficacy Post-program	Quality of life Post-program	Transitional readiness Follow-up	Self-efficacy Follow-up	Quality of life Follow-up
Transitional readiness Post-program	r		.692	.016			
	P-value		.000**	.923			
Self-efficacy Post-program	r	.692		.840			
	P-value	.000**		.000**			
Quality of life Post-program	r	.016	.840				
	P-value	.923	.000**				
Transitional readiness Follow-up	r					.737	.304
	P-value					.000**	.570
Self-efficacy Follow-up	r				.737		.590
	P-value				.000**		.000**
Quality of life Follow-up	r				.304	.590	
	P-value				.570	.000**	

** Correlation is significant at the 0.01 level (2-tailed).

Discussion

Type 1 diabetes has a tremendous impact on all aspect of an adolescent's life. Adolescence is a period during which adult behaviors are set, and thus affords a wide scope of opportunity to promote healthy behaviors which has an impact on the health burden of tomorrow's adults. During this developmental period, adolescent patients experience significant changes in living situation, education and health care delivery including transferring from pediatric to adult health care. The integration of the core principles of adolescent medicine with self-management of chronic conditions, plus appropriate health service structures and healthcare providers training, are considered imperative for effective transitional care **(Sawyer 2012)[27]**.

The present study aim was to evaluate the effect of transition care educational program on transitional readiness, self-efficacy and quality of life among adolescent with type 1diabetes mellitus**.**

The current study finding revealed that nearly two thirds of studied adolescents were female. This finding comes in agreement with what was reported by the **American Diabetes Association, (2013)[28]** that diabetes was common among females than males. This finding is in accordance with the

study conducted in Turkish by **Ozturk etal., (2017)[29]** who determined psychometric properties of a Turkish version of the diabetes management self-efficacy scale in 203 adolescents with type 1 diabetes mellitus and found that 66.7% of the adolescents were girls.

The finding of the current study showed that two thirds of adolescents living in the urban areas, this may because of the highest percentage of the adolescents visiting the outpatient diabetic clinic are from the Benha city. This finding is slightly consistent with **Hassan etal., (2019)[5]** who assess the prevalence of diabetes mellitus among school-age children and found that 50% of studied children were living in urban areas and 50% in rural areas. Contrary, this finding is contradicted with **Niba etal., (2017)[30]** who conducted a cross-sectional study in Cameroon on 76 children/adolescents with type 1 diabetes and found that nearly two third of participants from rural areas. This contradiction is attributed to that Cameroon is considered as one of the developing countries.

Concerning the mean duration of type 1 diabetes mellitus among the studied adolescents, the current study result revealed that the mean duration of the disease was

5.4±3.2 years. This finding is agreed with the study done in Kuwait by **Abdul-Rasoul etal., (2013)**[31] who assessed quality of life of children and adolescents with type 1 diabetes and found that the mean duration of type 1 diabetes for adolescents was 5.37 ± 2.8 years. In contrast, this finding is incongruent with **Cho & Kim, (2021)**[32] who carried out a cross-sectional descriptive study among 111 participants with type 1 DM and found that the mean duration of type 1 diabetes mellitus was 10.27±4.2 years. Also, the present study finding revealed that more than two thirds of the studied adolescents had positive family history of diabetes mellitus from the 1st degree. This could be explained by the family history of diabetes was a predisposing factor associated with the occurrence of diabetes. This finding comes in agreement with **Krischer etal., (2017)**[33] who stated that risk of developing type 1 diabetes is 8–15-fold higher in first-degree relatives.

The current study finding showed that most of the studied adolescents did not attend any previous transition care educational program. This finding might be due to the healthcare providers especially nurses don't value the need for discussion of specific transition topics with adolescents and their parents. This finding is similar with the study carried out in US by **Lebrun-Harris etal., (2018)**[19] who assessed transition planning among US youth with and without special health care needs and found that the vast majority of US youth are not receiving transition preparation program. The present study result indicated that nearly two thirds of the studied adolescents had poor level of knowledge pre-transition educational program. This result could be attributed to most of the studied adolescents did not attend any previous transition care educational program and lack of administrative support to conduct this program in the outpatient clinic. This finding suggests a need for an intensive promotion of transition care education for adolescents with type 1 diabetes in the outpatient clinic. This finding is consistent with the study done in Egypt by **Abolwafa etal., (2017)**[34] who studied the effect of educational program on improving knowledge and practice for 50 adolescences with type 1 diabetes and reported low mean score of overall knowledge among diabetic adolescents at the pre-test phase. While, this finding disagreed with the study conducted in Portugal by **Flora and Gameiro, (2016)**[35] who evaluated self-care and knowledge of adolescents with type 1

diabetes mellitus and found that the adolescents has a good level of knowledge regarding diabetes at the baseline assessment.

In this study, the current finding demonstrated that more than two thirds and two thirds of the studied adolescents had good level of knowledge three months post-program and six months follow-up assessment. The researchers rationalize this result as adolescents were eager to learn more about their illness and how to manage it properly, in addition to the simple transition program sessions and the use of different approach of active learning during the implementation of the program such as group discussions. This finding is in accordance with **Tobin, (2015)**[36] who assessed the transitional care of patients with type 1 and 2 diabetes at Southern California and demonstrated that there was a significantly higher mean score of overall knowledge after three months of transitional care program implementation compared to the pre-program ones. Again, this finding is supported by **Mackie etal., (2014)**[37] who assessed healthcare transition for youth with chronic disease and reported that there is a significant improvement of knowledge scores for the intervention group at one and six months after transition intervention.

Surprisingly, the present study finding showed that the highest mean score of transition readiness among the adolescents was related to talking with healthcare-providers pre-transition educational program. In other words, adolescents with diabetes mellitus perceive themselves as more capable to express their feelings to physicians or nurses and to answer their questions. This finding is similar with the study by **Lapp and Chase, (2018)**[38] who assessed readiness to transition to adult healthcare among adolescents with chronic disease and reported that communication with healthcare providers was the domain with the highest mean score at the baseline assessment.

The current study finding revealed that the majority of studied adolescents had low transition readiness level pre-transition educational program. This could be explained by the desire of adolescents to act independently during transition period allow them to be engaged in mismanagement behaviors as unhealthy diet, missing blood tests, missing insulin shots and this may result in problems in the management of chronic conditions and decreasing their readiness for transition to adult care. This finding is in agreement with **Chan etal., (2019)**[39] who measured the transition

readiness of 95 adolescents with type 1 diabetes and found that the adolescents had low transition readiness level at the baseline assessment. Contrary, this finding disagreed with **Alwadiy etal., (2021)**[40] who investigated the association of self-efficacy and transition readiness in 74 adolescents with type 1 diabetes and found that less than half of them were transition-ready to adult care at the baseline assessment.

The present study finding indicated that the majority and three quarters of the studied adolescents achieved higher transition readiness three months post-program and six months follow-up assessment. This could be attributed to the transition care program help in increasing adolescents' capability regarding self-care management and thus enhancing their self-efficacy which is considered an important factor in increasing readiness for transition to adult care. This finding is in accordance with the study by **Gabriel et al., (2017)**[41] who evaluated the outcome evidence for structured pediatric to adult health care transition interventions and reported that readiness for transition to adult care was significantly improved after structured transition interventions at 12months follow-up and the most common positive outcomes were increased visit attendance and less time between the last

pediatric care visit and the initial adult care visit. Again, this finding is supported with **Hankins etal., (2012)**[42] who found higher rates of successful transfer and higher rates of attendance in adult clinics among adolescents who participate in the transition programs than those who did not participate in the programs at three and 24months after exit from pediatric care.

The current study finding showed that the majority of studied adolescents have low self-efficacy level pre-transition educational program. This could be due to the adolescents are still developing many of the skills necessary for independent diabetes management, and recognizing the need for ongoing family support to ensure successful management. This finding is in harmony with **Gutierrez-Colina etal., (2020)**[43] who assessed 44 young adult with type 1 diabetes preparing to transition to adult care and found that young adults had lower self-efficacy at the baseline assessment. On the other hand, this finding is contradicted with **Survonen etal., (2019)**[44] who examined psychosocial self-efficacy in 189 adolescents with type 1 diabetes and stated that the adolescents self-efficacy level was good at the baseline assessment.

The current study results illustrated that more than three quarters and more than two thirds of the studied adolescents had higher self-efficacy level three months post-program and six months follow-up assessment. This could be possible due to the extensive knowledge and support provided by the transition program which helps adolescents face challenging situations that is important in the self-management of chronic disease and this contributed to higher self-efficacy level. This finding is congruent with the study conducted by **Huang etal., (2014)[45]** who evaluated the effect of a technology program on transition to adult care among adolescents with chronic disease and reported that more than three quarters of adolescents had higher self-efficacy scores and confidence in managing their own health and health care in the intervention group at both two month and eight-month follow-ups. In support of this finding, the study of **Hejazi, etal., (2019)[46]** who assessed the impact of education based on self-efficacy theory on health literacy, self-efficacy and self-care behaviors in 70 patients with diabetes and found that the experimental group showed a higher total mean scores of self-efficacy after implementation of the educational intervention.

Interestingly, the present study finding showed that three quarters of the studied adolescents perceived their quality as low pre-transition educational program. This might due to the adolescents difficulties faced in everyday life and the inability to cope with the disease. This finding is parallel with the study conducted in Egypt by **Bassam, (2019)[47]** who assessed the relationship between compliance and quality of life among adolescents with diabetes mellitus type 1and found that the studied adolescents perceived their quality as low at the baseline assessment. Additionally, this finding is in accordance with **Cramm etal., (2013)[48]** who investigated quality of life of adolescents with diabetes over time and found that Adolescents perceived low quality of life over time at the baseline assessment. While, this finding is incongruent with **Ozazicioglu etal., (2017)[49]** who determined quality of life of children and adolescents with type 1 diabetes and reported that adolescents perceived quality of life as good level.

Moreover, after implementation of the transition care educational program, the current study finding illustrated that more than two thirds and nearly two thirds of the studied adolescents perceived their quality of

life as high three months post-program and six months follow-up assessment. This could be attributed to that the transition educational program helps in increasing adolescents' capabilities to manage the disease independently and improving their ability to cope with stressful life events. This finding is in agreement with **Naylor et al., (2013)[50]** who evaluated transitional care as a modality to improve patient health status and quality of life post-hospitalizations and showed that transitional care program is beneficial in improving quality of life post 2 months of intervention.

Self-efficacy is associated with the beliefs of an individual about their ability to produce certain outcomes **(Bandura, 2012)[51].** The present study finding indicated that there is a significant positive correlation between total self-efficacy and total readiness for transition to the adult care three months post-program and six months follow-up assessment. This means that adolescents with type 1DM who had a high level of self-efficacy had higher readiness for transition to adult care. This finding is consistent with the findings of previous studies conducted by **Carlsen et al., (2017)[52] and Varty & Popejoy, (2020)[53]** who examining readiness for the transition to adult care and self-efficacy among adolescents with

chronic diseases and found a significant positive association between total self-efficacy with total readiness for transition to adult care. This finding suggests that self-efficacy should be considered as an important factor in the planning of preparatory transition programs for adolescents with type 1 DM.

However, the present study finding showed that, there is a significant correlation between total self-efficacy and total quality of life three months post-program and six months follow-up assessment. This finding is in agreement with **Cho & Kim, (2021)[32]** who reported that quality of life was positively correlated with self-efficacy for diabetes self-management. Again the study of **Uzark et al., (2019)[54]** who investigated quality of life and readiness for the transition to adult care among adolescents with a chronic disease and determined that adolescents' self-efficacy level were positively associated with their quality of life. From the researchers points' of view, this result indicated that the self-efficacy has a significant effect on quality of life among diabetic adolescents and an adolescent's quality of life is associated with skills for disease self-management during the preparation for the transition to adult care.

As regards the correlations between quality of life and transition readiness three months post-program and six months follow-up assessment. The present study result showed that there is no significant correlation between total quality of life and total readiness for the transition to adult care. This finding is in accordance with a previous study by **Gangemi etal., (2020)**[55] who evaluated quality of life and transition readiness among adolescents with chronic diseases and found no significant correlation between total readiness for the transition to adult care and quality of life. In contrast, this finding is inconsistent with previous study **by Sheng, etal., (2018)**[56] who assessed transition readiness and quality of life of Chinese adolescents with chronic diseases and identified a positive association between total readiness for transition and quality of life**.**

Conclusion:

It can be concluded that the research hypotheses were achieved and the transition care educational program was a good strategy in improving transition readiness, self-efficacy and quality of life among adolescents with type 1 diabetes mellitus. Likewise**,** there were a significant positive correlation between total transitional readiness with total self-efficacy and total self-efficacy with total quality of life three months post-program and six months follow-up assessment**.**

Recommendations:

In the light of the findings of the current study, the following recommendations are suggested:

1. Continuous implementation of transitional care program for adolescents with type 1 diabetes mellitus with the importance of follow-up in order to assess its long-term effects.

2. Integrate transitional care education sessions into routine clinic visits for adolescents with type 1 diabetes mellitus.

3. Nurses who deal with diabetic adolescents should incorporate the transitional care education into their daily practice to achieve positive health outcomes.

4. Encourage diabetic adolescents to discuss their concerns with health care providers, their family and peers to facilitate their readiness for transition to adult care.

5. Self-efficacy and quality of life levels should be taken into account when planning preparation programs for transition to adult care for diabetic adolescents.

Further Research

1. Assessing the relationship between compliance and readiness for transition to

adult care among adolescents with type 1 diabetes mellitus.

2. Conducting more prospective researches to evaluate factors affecting the transition readiness among adolescents with type 1 diabetes mellitus.

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