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Comparison of the effectiveness of self-care educational program using animation and role-playing on quality of life in adolescents with type 1 diabetes

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Abstract:

BACKGROUND: Type 1 diabetes is a chronic disease and the number of Adolescents diagnosed with it, is at an increase. Self-care education can reduce the complications of this disease. Therefore, this research was conducted to determine and compare the effectiveness of self-care educational programs, using animation and role-playing on quality of life in Adolescents with type 1 diabetes.

MATERIALS AND METHODS: This quasi-experimental study consists of 111 Adolescents with type 1 diabetes, who visited Imam Hossein (PBUH) pediatric endocrinology clinic, Isfahan, May since August 2021, were selected through convenience sampling. The Diabetes Quality of Life for Youth scale was used, before and after the intervention. The interventions in each group were performed twice a week for 2 months. Data were analyzed through the one-way analysis of variance, Chi-square, Bonferroni *post hoc* and paired *t*-statistical tests.

RESULTS: After completing the interventions, the mean quality of life score in group 1 (animation) was significantly higher compared to that of group 2 (role-playing) (P = 0.001). In intervention group 1 (animation) and intervention group 2 (role-playing), the quality of life score and its subscales, after the completion of the research interventions had a significant increase, compared to the beginning of the study (P = 0.001).

CONCLUSION: Both animation and role-playing educational methods caused statistically significant changes in the quality of life score, and the animation educational method was more effective than role-playing. Therefore, it is suggested that managers, policymakers and health team members consider the implementation of these educational methods in the educational program of adolescents with type 1 diabetes and use these two educational methods.

Keywords:

Adolescent, animation, diabetes mellitus, quality of life, role-playing, self-care, type 1

Introduction

Type 1 diabetes is one of the types of diabetes in which the amount of insulin decreases and the diagnosed person needs to receive external insulin continuously.[1] This type of diabetes affects approximately 9 million people worldwide.[2] In Iran, the annual incidence of type 1 diabetes is estimated at 3.7 per 100,000 people.[3]

Adolescents with chronic diseases experience a bilateral crisis and may be at high risk of depression, anxiety and adjustment disorder.[4] Diabetes and its side effects affect a person's physical

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performance, mental and emotional state, and quality of life.[5] The World Health Organization defines quality of life as "an individual's perception 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".[6]

Decreasing the quality of life in patients with type 1 diabetes leads to less care, improper blood sugar control and increased risk of side effects.[7] Self-care, which is considered the most important measure to control blood sugar and prevent its side effects,[8] is defined as "caring for self when ill or positive actions and adopting behaviors to prevent illness".[9] Education is the key to success in controlling diabetes.[10]

Among the active educational methods, animation is an interesting option, which is a common multimedia technique that is used to provide instructions about abstract phenomena. This educational method provides various mechanisms to help reduce the cognitive load during the learning process.[11] Another type of active learning is the role-playing method.[12]

Role-playing is an opportunity for learning that focuses on both scientific epistemology and character. Role-playing exercises, such as imitating a social procedure, are highly recommended. Other benefits of role-playing include the ability to achieve and improve the understanding of multiple perspectives on issues at the macro and micro level and increase emotional interaction with the subjects of interest.[13]

The results of a study conducted by Ayar *et al*.,[14] showed that the web-based type 1 diabetes training program did not affect glycosylated hemoglobin levels between the three groups; the group, time and group-time interaction, but the training model effectively increased the self-efficacy and quality of life of Adolescents with type 1 diabetes. Also, Kenowitz *et al*.[15] found that self-esteem is significantly related to self-care and blood sugar control among different Adolescents with type 1 diabetes.

Examining numerous studies in Iran and other parts of the world shows the occurrence of many problems in Adolescents with type 1 diabetes, which causes a decrease in their quality of life and it's important for them to maintain and develop self-care, especially through educational programs. Adolescents with type 1 diabetes have poor management of their disease, which results in physical and psychological complications. In this regard, two educational methods of animation and role-playing have been considered for the education of Adolescents with diabetes, which can play a greater role in their learning and the durability of education. No study was found in the literature, in which the effectiveness of two educational methods was compared through animation and role-playing, and the lack of study is evident. Therefore, this research was conducted to determine and compare the effectiveness of the self-care educational program using animation and role-playing on quality of life in Adolescents with type 1 diabetes.

Materials and Methods

Study design and setting

The current research was of a quasi-experimental type, and the research population consists of all Adolescents with type 1 diabetes who had visited Imam Hossein (PBUH) pediatric endocrinology clinic, affiliated with Isfahan University of Medical Sciences, May since August 2021.

Study participants and sampling

111 Adolescents with type 1 diabetes were selected using the convenience sampling method and then, to prevent information leakage of the intervention and control groups, we ensured no contact would be made between them. In this way, the animation group was measured and evaluated in the mornings and the role-playing group in the evenings on even days and the control group on odd days. so that the participating members in both groups are not related to each other. According to the method of quasi-experimental intervention study and the non-random allocation of samples to intervention and control groups, purposefully, 40 qualified elementary people were considered as intervention group 1 (animation) and by completing and quorum Upon their arrival, 40 qualified people were included as the control group and the last 40 people who were eligible to participate in the study were included in the study as intervention group 2 (role-playing) [Figure 1].

Inclusion criteria included; At least 2 months should have passed since the diagnosis, willingness to participate in the study and being in the age group of 11 to 19 years. Exclusion criteria included; Suffering from serious and debilitating side effects caused by diabetes, suffering from another diagnosed chronic disease, suffering from a diagnosed mental illness and history of participating in similar research in the last 6 months.

$$n = \frac{2(z_{1-\alpha/2} + z_{1-\beta})^2 (s_1^2 + s_2^2)}{(\mu_1 - \mu_2)^2}$$

In this research, to estimate the required sample size, considering the parameters $\alpha = 0.05$, $1-\alpha = 0.95$, $z_{1-\frac{\alpha}{2}} = 1.96$, $\beta = 0.2$, $1-\beta = 0.8$, $z_{1-\beta} = 0.85$, and $s_1 = 8.97$, $s_2 = 9.86$, $\mu_1 = 115.94$ and $\mu_2 = 104.66$, based on a similar study[16] and placing in the formula:

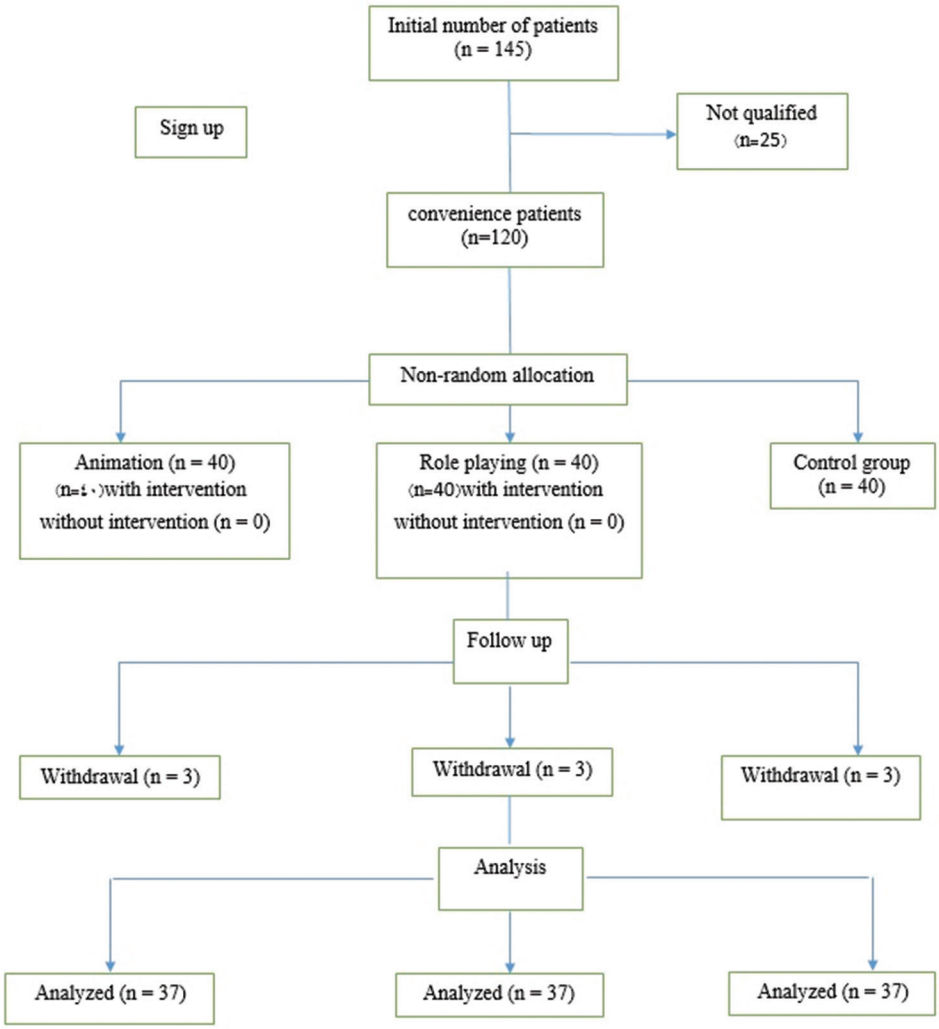

Figure 1: Consort

The number of samples in each group was calculated to be 21.92. Since there were three groups (two intervention groups and one control group) in the study and based on the necessity of increasing the sample size due to the multiple comparison phenomenon and using the sample size correction formula ($n' = \sqrt{k}n$) and also, considering 5% probability of dropping and rounding up the number, the number of 40 people in each group and a total of 120 people were included in the study.

Data collection tool and technique

In addition to demographic data, the diabetes quality of life for youth scale (DQOLY) was used. The quality of life scale for Adolescents with diabetes: The DQOLY tool was designed by Ingersoll and Marrero to measure the quality of life of Adolescents with type 1 diabetes. This tool includes subscales like; the impact of diabetes on one's life (23 questions), worries related to social and vocational issues (11 questions), satisfaction with life with diabetes (17 questions) and a statement about the perception of health. The impact of diabetes on one's life and the worries related to social and vocational issues were scored based on a five-point Likert scale (never: 0, very seldom: 1, sometimes: 2, often: 3, all the time: 4). Life satisfaction is also scored based on a five-point Likert scale (very unsatisfied: 0, somewhat unsatisfied: 1, neither: 2, somewhat satisfied: 3, very satisfied: 4). The statement about the perception of health is scored on a four-point scale (very bad: 1, bad: 2, good: 3, and excellent: 4) and finally, the scores of each of the above subscales will be calculated out of 100.[17,18] Validity and reliability of the DQOLY in the study of Safarabadi-Farahani *et al*.,[17] in all three subscales of the impact of diabetes on one's life, worries related to social and vocational issues and satisfaction with life with diabetes, were obtained as 0.78, 0.83 and 0.91, respectively. The Cronbach's alpha coefficient of this scale was checked again by the researcher, for the whole scale and each subscale of the impact of diabetes on one's life, worries related to social and vocational issues, satisfaction with life with diabetes

and health perception in the present study. they were calculated to be 0.87, 0.73, 0.90 and 0.93, respectively.

Adolescents were placed in three groups: animation, role-playing and control group. Interventions were performed individually in the animation group and groups in the role-playing group. In both groups, self-care educational content includes; Diet, drug regimen, activity regimen, and self-control [Table 1].

In the animation group, the participants did the intervention at home. In this group, self-care educational content was provided to the participating Adolescents in the form of a CD. They were asked to view this training content twice a week for 2 months and apply its contents. It was explained to the parents that Adolescents who viewed the CD less than the specified amount would be excluded from the study. Also, they were provided with a contact number, so that they can stay in contact, in case any possible problem happens in the execution of the animation. The validity of the animated film was checked using the opinions of the faculty members of medical-surgical nursing, pediatric nursing, health education, pediatric specialists, and pediatric endocrinology subspecialists. The number of times the animation was observed using the time registration table that was provided to the adolescent parents of the intervention group and was collected from them at the end of the intervention.

In the role-playing group, the participants performed the intervention in a room, to preserve the privacy of the patients in the pediatric endocrinology clinic of Imam Hossein (PBUH). In this group, the contents of the self-care educational program were provided to the participants in the form of prepared scenarios. educational intervention was held in groups of 10 people. 30 minutes of each training session was dedicated to role-playing and the next 15 minutes to questions and answers about the subject. To carry out the intervention, the researcher first collected training content related to self-care of Adolescents with type 1 diabetes, which was done by reviewing authoritative sites, books and related articles and consulting with faculty professors. Role-playing was carried out in 9 stages[19] [Table 2]. No training was given to the control group.

Next, after the intervention, the DQOLY was again completed with the help of the researcher and the participants of the three mentioned groups. The collected data were analyzed through Chi-square, one-way analysis of variance, Bonferroni *post hoc* and paired *t*-tests.

Ethical consideration

Permission to conduct this study was obtained from the Ethics Committee of Yasuj University of Medical Sciences with IR.YUMS.REC.1400.029 code. To maintain confidentiality and privacy, participants were assured that their information was confidential and their names or addresses would not be disclosed in the research. Written consent was obtained from all participants. To adhere to the ethical considerations, the training content was also provided to the control group after the study.

Table 1: The content of the self-care educational program

Stages	Content
1st and 2nd	Diabetes and its process, prognosis, side effects of diabetes, including; Retinopathy, nephropathy, neuropathy, hypoglycemia, hyperglycemia and diabetic ketoacidosis. the effects of neglect in the treatment program, explanation about the methods to control diabetes and the importance of self-care.
3rd and 4th	Self-care behaviors for Adolescents in the field of: diet, physical activity, exercise, controlling the side effects of diabetes, the correct method of insulin injection and daily blood sugar control
5th	At this stage, the patient briefly teaches the family members what they have learned. The purpose of this stage is to increase the patient's self-confidence, which will be achieved by observing themselves provide information to their family members and get their support. To ensure the follow-up, several questions regarding the provided education, are given to the patients to complete with their family members and return to the researcher.

Table 2: The stages of role-playing

Stage	Content
1st	Determining the topic and addressing the problem (preparing or warming up the group)
2nd	Choosing actors and determining their roles
3rd	Providing facilities and scene processing
4th	Preparing the audience for observation
5th	Performing the show
6th	Discuss and evaluate the show
7th	Rerun the show
8th	Discussion and re-evaluation
9th	Generalization of experiences

Results

In this research, the complete data of 111 Adolescents with type 1 diabetes, who were diagnosed for 3 months receiving insulin shots at least 3 times a day, were analyzed. Adolescents with type 1 diabetes participating in intervention group 1 (animation) had a mean age of 13.54 ± 1.41 years and a glycosylated hemoglobin percentage of 10.30 ± 1.75. Participants in intervention group 2 (role-playing) had a mean age of 13.84 ± 1.71 years and a glycosylated hemoglobin percentage of 10.28 ± 1.60 and participants in the control group, had a mean age of 13.76 ± 1.86 years and a Glycosylation hemoglobin percentage of 10.65 ± 1.75 [Table 3].

Table 3: Comparison of demographic information of the three groups

Row	Group	Variable	Animation		Role-playing		Control		The level of significance
			Number	Percent	Number	Percent	Number	Percent	
1	Gender	Male	18	48.6	16	43.2	20	54.1	0.65*
		Female	19	51.4	21	56.8	17	45.9	
2	Level of education	Elementary	8	21.6	10	27	7	18.9	0.73*
		Junior high	24	64.9	19	51.4	24	64.9	
		High school	5	13.5	8	21.6	6	16.2	
3	Birth rank	1st born	14	37.8	12	32.4	20	54.1	0.25*
		2nd born	9	24.4	14	37.8	8	21.6	
		3rd born and so on	14	37.8	11	29.8	9	24.3	
4	Daily insulin injection	3 times	11	29.7	8	21.6	14	37.8	0.31*
		.3 times	26	70.3	29	78.4	23	62.2	
	Father's education	Dropout	16	43.2	16	43.2	13	35.1	0.27*
5		Diploma	13	35.2	12	32.4	8	21.6	
		Higher education	8	21.6	9	24.4	16	43.3	
	Mother's education	Dropout	16	43.2	14	37.8	11	29.8	0.3*
6		Diploma	11	29.8	17	45.9	13	35.1	
		Higher education	10	27	6	16.3	13	35.1	
	Family's financial situation	Poor	6	16.2	7	18.9	6	16.2	0.9*
7		Middle class	12	32.4	16	43.2	12	34.2	
		Well off	13	35.2	9	24.4	14	37.9	
		Rich	6	16.2	5	13.5	5	13.5	
8	Age: mean±SD		13.54±1.43		13.84±1.71		13.76±1.86		0.73**
9	Glycosylated hemoglobin percentage: mean±SD		10.3±1.75		10.28±1.6		10.1±65.75		0.57**

*Chi square test. **one-way analysis of variance test

To analyze the inferential findings and choose the appropriate statistical test for inter-group and intra-group comparison, the compliance of the quantitative variables of the study with normal distribution was investigated using the Kolmogorov-Smirnov test, which had a greater level of significance (0.05). According to this, they had a normal distribution. Therefore, parametric tests were used for inter-group and intra-group comparisons of prediction variables to separate the studied groups.

Based on the results of the one-way analysis of variance, no statistically significant difference was observed in the overall mean score of the quality of life and its subscales, before the intervention ($P > 0.05$). In the inter-group comparison, a statistically significant difference was observed in the overall mean score of the quality of life and its subscales, after the completion of the interventions, based on the results of the one-way analysis of variance test ($P = 0.001$). Intra-group comparison of the overall mean score of quality of life and its subscales was also done for each group separately. The results of the *t*-pair test showed that in both intervention groups, the overall mean score of the quality of life and its subscales, before and after the intervention, had a statistically significant difference ($P = 0.001$) [Table 4].

The results of the Bonferroni test indicate that the changes in the overall mean score of the quality of life in intervention group 1 (animation), compared to this score in intervention group 2 (role-playing), had a significant difference of 27.19 ($P = 0.001$). However, this score in the subscales of the impact of diabetes on one's life and the perception of health in intervention group 1 (animation), compared to this score in intervention group 2 (role-playing), is not statistically significant. ($P > 0.05$) [Table 5].

Discussion

This research was conducted to compare the effectiveness of self-care educational program using animation and role-playing on quality of life in Adolescents with type 1 diabetes.

The findings of this study showed that after the completion of the research interventions, the dependent variable of quality of life and its subscales had statistically significant differences between the studied groups. Also, the statistical changes in the quality of life score were more in the animation group than in the role-playing group. Hassan and Ahmed Qalawa showed that a self-management program is necessary to improve self-care activities in Adolescents with sickle cell disease.[20] However, Haase *et al*.[21] found that self-care and communication intervention increased parents' self-awareness and confidence in a short time. The findings of these researches are in line with the results of the present study, maybe because it is similar in the variable and sample size, but different in terms of the intervention protocol.

Table 4: Comparison of the mean score of life, its subscales and standard deviation in the 3 different groups

Group	Variable	Animation mean±SD	Role-playing mean±SD	Control mean±SD	The level of significance (between groups)*
Overall quality of life score	Before the intervention	134.17±35.95	136.16±29.12	129.18±56.48	0.24
	After the intervention	238.21±86.9	211.18±66.21	132.19±49.61	0.001
	Level of significant (Intergroup)**	0.001	0.001	0.5	-
Impact of diabetes on one's life	Before the intervention	25.3±68.73	27.2±15.82	26.3±29.33	0.16
	After the intervention	46.8±62.99	43.2±69.46	27.3±29.58	0.001
	Level of significant (Intergroup)**	0.001	0.001	0.09	-
Worries related to social and vocational issues	Before the intervention	29.3±55.47	27.4±58.19	28.5±50.51	0.17
	After the intervention	59.5±21.64	45.3±70.50	28.4±62.13	0.001
	Level of significant (Intergroup)**	0.01	0.001	0.27	-
Satisfaction with life with diabetes	Before the intervention	28.2±94.73	28.3±70.76	27.3±74.26	0.26
	After the intervention	59.5±18.74	46.3±15.30	28.4±74.24	0.001
	Level of significant (Intergroup)**	0.001	0.01	0.27	-
Perception of health	Before the intervention	50.17±19.93	52.16±87.82	47.17±03.28	0.35
	After the intervention	73.17±84.89	76.16±14.09	47.17±84.93	0.001
	Level of significant (Intergroup)**	0.001	0.001	0.84	-

*One-way analysis of variance test. **Paired *t*-test

Table 5: Pair-by-pair comparison of mean difference (*Post Hoc*) of quality of life scores and its subscales, after intervention in study groups

Variable	Compared groups (I-J)	Mean difference	The level of significance
Overall quality of life score	Animation (J) – Role-playing (I)	27.19	0.001
	Control (J) – Animation (I)	106.37	0.001
	Control (J) – Role-playing (I)	79.18	0.001
Impact of diabetes on one's life	Animation (J) – Role-playing (I)	2.94	0.09
	Control (J) – Animation (I)	19.33	0.001
	Control (J) – Role-playing (I)	16.39	0.001
Worries related to social and vocational issues	Animation (J) – Role-playing (I)	13.51	0.001
	Control (J) – Animation (I)	30.59	0.001
	Control (J) – Role-playing (I)	17.08	0.001
Satisfaction with life with diabetes	Animation (J) – Role-playing (I)	13.04	0.001
	Control (J) – Animation (I)	30.45	0.001
	Control (J) – Role-playing (I)	17.41	0.001
Perception of health	Animation (J) – Role-playing (I)	-2.30	0.99
	Control (J) – Animation (I)	26.00	0.001
	Control (J) – Role-playing (I)	28.30	0.001

**Post hoc* Bonferroni test

Animated films are easier to access and sometimes, cheaper and take more time from Adolescents. They employ visual inception, which is a stronger method and helps people achieve their goals faster. However, role-playing is easier to perform and very enjoyable, since it uses practical methods and can be highly effective. Therefore, it may be considered one of the reasons for the superiority of this educational method over role-playing. In this regard, Yusri *et al*.[22] showed that two-dimensional animation is very useful in providing information about self-care and health for the general public on infectious diseases. The findings of this research are in line with the results of the current study. The reason for this consistency may lie in the type of study and closeness of the execution period, but the difference is like the target group and sample size.

The findings of this study showed that in intervention group 1 (animation), the quality of life and its subscales had a significant increase, compared to the beginning of the study. Yaz and Yilmaz[23] showed that educational animation has an effect on reducing preoperative fear and postoperative pain in Pediatrics. The findings of this research are consistent with the results of the present study and the reason for this consistency, may lie in the closeness of the execution period and the existence of valid tools, but the difference is like the target group and the sample size.

In intervention group 2 (role-playing), the quality of life and its subscales have been significantly increased, after the completion of the research interventions. Wathaniyah *et al*.[24] found that group counseling, which separately uses role-playing and behavioral training techniques,

has effectively reduced students' aggressive behavior. The findings of this research are in line with the results of the present study and the reason may be the duration of the intervention and the number of sessions. Although the results of the intervention are similar, its protocol is different.

The role-playing method depicts the daily behavior of a person. This method can help increase the understanding of an event so that people can respond to it more efficiently, improve their creativity and evaluate the view of others in interpreting the events.[25] In this regard, Yanti and Juniartha showed that in nurses, learning by giving lectures and role-playing, was effective in improving patients' safety standards, their knowledge and attitude were increased and their behavior toward patients was improved.[26] The findings of this research are in line with the results of the present study, although the results of the intervention are similar, they are different in terms of the nature of the group and the variables.

Asadi *et al*.[27] showed role-playing training did not affect the social skills of students with mild intellectual disability. The findings of this research are not consistent with the results of the present study, the reason for this difference may be the small number of samples in this study. The type of measurement tool and the method of implementing the intervention are other reasons for the discrepancy between the two studies. However, Nasr-Esfahani showed that the role-playing method leads to the improvement of students' performance in advanced cardiopulmonary resuscitation. Therefore, this method can help teachers in planning to modify educational programs in the apprenticeship and internship period and improve students' advanced cardiopulmonary resuscitation management skills.[28]

Limitation and recommendation

Factors such as; Non-cooperation of type 1 diabetes patients due to the critical conditions caused by the covid-19 pandemic, patients being at risk of covid-19 infection, the self-reporting of patients due to mental-psychological problems and having economic, cultural, social and religious differences of the participants are among the limitations of this study. Another limitation of this study was the intervention in only one center. According to the findings of this study, it is suggested to conduct another study to compare the effectiveness of the self-care educational program using animation and role-playing on self-efficacy in Adolescents with type 1 diabetes.

Conclusion

According to the findings of this study, it can be concluded that the implementation of the intervention by two educational methods, animation and role-playing, caused statistically significant changes in the quality of life score. The statistical changes in the quality of life score was higher in the animation group than in the role-playing group. Therefore, it can be concluded that the implementation of two educational methods, animation and role-playing, has a significant effect on improving the quality of life of Adolescents with type 1 diabetes. Improving the quality of life of these patients will make them enjoy better physical and mental health and reduce their stress and anxiety of them. Therefore, it is suggested that managers, policymakers and health team members consider the implementation of these educational methods in the educational program of adolescents with type 1 diabetes and use these two educational methods.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Alvarado-Martel D, Ruiz Fernández MA, Cuadrado Vigaray M, Carrillo A, Boronat M, Expósito Montesdeoca A, *et al*. ViDa1: The development and validation of a new questionnaire for measuring health-related quality of life in patients with type 1 diabetes. Front Psychol 2017;8:904. doi: 10.3389/fpsyg.2017.00904.
2. Catchpole A, Zabriskie BN, Bassett P, Embley B, White D, Gale SD, *et al*. Association between toxoplasma gondii infection and type-1 diabetes mellitus: A systematic review and meta-analysis. Int J Environ Res Public Health 2023;20:4436. doi: 10.3390/ijerph20054436.
3. Ghorbani R, Foroutan M, Kassaeian SS, Sadat Kia N, Gholizade Bajandi B, Haji Ghanbari A, *et al*. Evaluation of

quality of life and depression in family caregivers of patients with type 1 diabetes in Iran: A case–control study. SAGE Open Med 2023;11:1-10. doi: 10.1177/20503121221146055.
4. Hockenberry MJ, Wilson D, Rodgers CC. Wong's Essentials of Pediatric Nursing-E-Book. 11th ed. St. Louis, Missouri. Elsevier Health Sciences; 2021.
5. Altınok A, Marakoğlu K, Kargın NÇ. Evaluation of quality of life and depression levels in individuals with type 2 diabetes. J Family Med Prim Care 2016;5:302-8.
6. Moussa S, Malaeb D, Barakat M, Sawma T, Obeid S, Hallit S. Association between experiences in life and quality of life among Lebanese University students in a collapsing country: The moderating role of religious coping and positivity. Healthcare 2023;11:149. doi: 10.3390/healthcare11010149.
7. Frøisland DH, Graue M, Markestad T, Skrivarhaug T, Wentzel-Larsen T, Dahl-Jørgensen K. Health-related quality of life among N orwegian children and adolescents with type 1 diabetes on intensive insulin treatment: A population-based study. Acta Paediatr 2013;102:889-95.
8. Gao J, Wang J, Zheng P, Haardörfer R, Kegler MC, Zhu Y, *et al*. Effects of self-care, self-efficacy, social support on glycemic control in adults with type 2 diabetes. BMC Fam Pract 2013;14:1-6. doi: 10.1186/1471-2296-14-66.
9. Town R, Hayes D, March A, Fonagy P, Stapley E. Self-management, self-care, and self-help in adolescents with emotional problems: A scoping review. Eur Child Adolesc Psychiatry 2023:1-28. doi: 10.1007/s00787-022-02134-z.
10. Lange K, Swift P, Pańkowska E, Danne T. Diabetes education in children and adolescents. Pediatr Diabetes 2014;15(Suppl 20):77-85.
11. Aysolmaz B, Reijers HA. Animation as a dynamic visualization technique for improving process model comprehension. Inf Manag 2021;58:103478. doi: 10.1016/j.im.2021.103478.
12. Barrera F, Venegas-Muggli JI, Nuñez O. The impact of role-playing simulation activities on higher education students' academic results. Innov Educ Teach Int 2021;58:305-15.
13. Sagmeister KJ, Schinagl CW, Kapelari S, Vrabl P. Students' experiences of working with a socio-scientific issues-based curriculum unit using role-playing to negotiate antibiotic resistance. Front Microbiol 2020;11:577501. doi: 10.3389/fmicb.2020.577501.
14. Ayar D, Ozturk C, Bektas M, Bober E, Grey M. The effect of metabolic control, self-efficacy, and quality of life on emotional eating in the adolescents with type 1 diabetes mellitus. Int J Diabetes Dev Ctries 2020;40:449-54.
15. Kenowitz J, Hoogendoorn C, Commissariat P, Gonzalez J. Diabetes-specific self-esteem, self-care and glycaemic control among adolescents with type 1 diabetes. Diabetic Med 2020;37:760-7.
16. Sargazi Shad T, Kermansaravi F, Navidian A. Evaluation of self-efficacy and some related factors in adolescents with type I diabetes referred to diabetes clinic of Hazrat Ali Asghar Zahedi 2016. J Diabetes Nurs 2017;5:187-98.
17. Safarabadi-Farahani T, Ali-Akbar M, Safarabadi-Farahani A, Haghani H. Quality of life in young people with type 1 diabetes in relation to age and gender. Iran J Nurs 2011;23:73-9.
18. Kermansaravi F, Navidian A, Ansarymoghadam A. Quality of life in type 1 diabetic adolescents in Zahedan (2011). Iran J Endocrinol Metab 2012;13:651-7.
19. Dorri S, Ashghali Farahani M, Maserat E, Haghani H. Comparison of role play and conventional training methods on long-term learning of nursing students. Dev Strateg Med Educ 2020;7:61-77.
20. Hassan K, AhmedQalawa SA. Impact of educational program for adolescents and young adults with sickle cell diseases on their knowledge, perception, and self-care. Indian J Public Health Res Dev 2021;12:310-8.
21. Haase JE, Stegenga K, Robb SL, Hooke MC, Burns DS, Monahan PO, *et al*. Randomized clinical trial of a self-care and communication intervention for parents of adolescent/young adults undergoing high-risk cancer treatment: A report from the children's oncology group. Cancer Nurs 2022;45:316-31.
22. Yusri NFIM, Noor MB, Jaafar R. 2D Animation PSA: Hygiene self-care from infectious of various human contracted diseases. J Comput Technol Creative Content (JTec) 2021;6:27-31.
23. Yaz ŞB, Yilmaz HB. The effects of designing an educational animation movie in virtual reality on preoperative fear and postoperative pain in pediatric patients: A randomized controlled trial. J Perianesth Nurs 2022;37:357-64.
24. Wathaniyah N, Japar M, Awalya A. The effectiveness of group counseling using role playing and behavioral rehearsal techniques to reduce students' aggressive behavior. Jurnal Bimbingan Konseling (JBK) 2022;11:76-81.
25. Mansir F, Tumin T, Purnomo H. Role playing learning method in the subject of Aqidah Akhlak at Madrasa. Nazhruna: Jurnal Pendidikan Islam 2020;3:191-201.
26. Yanti ED, Juniartha IGN. The effectiveness of learning by lecture and role playing methods on nurses' practice of patient safety standards. Jurnal Keperawatan 2021;13:227-34.
27. Asadi R, Nesaeian A, Pezeshk S, Hashemiazar J, Sarami G, Sina M. The effect of role playing training on social skills in student with mild intellectual Disability. Psychol Except Individuals 2015;5:136-55.
28. Nasr-Esfahani M, Yazdannik A, Mohamadiriz S. Development of nursing students' performance in advanced cardiopulmonary resuscitation through role-playing learning model. J Educ Health Promot 2019;8:151. doi: 10.4103/jehp.jehp_125_18.