

Original Article

## Investigation of the Effect of Motivational Interviewing on Self-Efficacy Levels in Adolescents with Type 1 Diabetes Mellitus

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### Abstract

**Aim:** This research aims to investigate the effect of motivational interview (MI) based diabetes self-management education (DSME) interviews on self-efficacy, healthy lifestyle behavior development and A1C in adolescents with type 1 diabetes mellitus (T1DM).

**Methods:** The research was conducted in the pre-test and post-test pattern in a single group. During the study, 66 adolescents with T1DM who were divided into six groups underwent six sessions of MI-based DSME interviews. In the study, the self-efficacy scale and healthy lifestyle behavior development scale were used before and after the MI-based DSME, and A1C measurements were made.

**Results:** There was a significant increase in the total score of MI-based self-efficacy scale and total score of healthy lifestyle behaviors development scale after DSME compared to the period before the interview. A1C value was observed to decline after the interview but this was not significant.

**Conclusion:** It was reached that MI-based DSME interviews increased self-efficacy in T1DM adolescents, and favorably promoted healthy lifestyle behaviors and decreased A1C. By using MI-based DSME in the clinical setting, nurses can change negative health behaviors of adolescents with T1DM to gain healthy behaviors and increase their self-efficacy and let them actively participate in the self-management of T1DM. Therefore, it is recommended to use MI-based DSME for fulfilling and continuing glycemic control.

**Keywords:** Type 1 Diabetes mellitus, Motivational Interviewing, Self-Efficacy, Health Promotion, Self-Management, Nursing.

### Introduction

Type 1 diabetes is the most common autoimmune disease in childhood and adolescence. Although the mechanism of formation is not known clearly, both genetic and environmental factors are important in determining an individual's risk (IDF, 2017). The incidence of T1DM has increased significantly among young people, especially in the last 25 years, 1 out of every 500 adolescents aged 12-19 have been affected. Adolescents with higher A1C means have worse glycemic control than adult

patients with DM (Stanger et al, 2013). The inability of adolescents to self-manage the disease and the psychosocial problems they experience can increase the risk of developing complications by preventing metabolic control at the desired level (Wong et al, 2013; Boztepe, 2012). Adolescents often have difficulty managing activities related to the successful self-management of T1DM and show insufficient awareness of how to make a change. Poor self-care management increases the risk of A1C

levels and long-term complications (Borus & Laffel, 2010; Luke & Richards, 2018).

Motivational interviewing is an experimentally supported practice and is a promising method that delivers effective results in a short time (Lundahl et al., 2010). MI, developed by Miller and Rollnick in 1980 as an alternative to the treatment of substance use disorders, is defined as a consultative-focused intrinsic motivation method for solving instability which increases internal sight (Miller & Rose, 2013). MI is a method that reveals the reasons for the individual's behavioural change, and suggestions for solutions are not given as long as the person is indecisive in the direction of change (Allsop, 2007). There are four basic principles of MI that must be adhered to. These are to show empathy, develop contradiction, resolve resistance, and support self-efficacy. It is especially important to strengthen individuals' belief in change by increasing their self-confidence throughout the MI (Ozdemir & Tasci, 2013). The areas where MI is applied can be sorted as smoking cessation treatment, continuity of asthma treatment, alcohol treatment, substance use disorders treatment, changing behavior of patients with diabetes, anxiety, and obesity (Schmaling, Blume & Afari, 2001; Resnicow et al., 2015; Lindson, Thompson & Begh, 2015; Bean et al., 2015; Doring et al., 2016; Ponsford et al., 2016). There is a lot of research showing that motivational conversation is a convenient and effective method, especially in the pediatric population. When looking at the studies of MI carried out within the pediatric population, their issues are seen as obesity, prevention of accidents, HIV and T1DM (Gayes & Steele, 2014) It is seen that patients with MI-applied T1DM showed the increased self-efficacy, self-care, self-management behavior and decreased A1C levels. Although there are many studies with MI on T2DM, the studies with T1DM are very limited (Jones et al., 2014) While it is observed that there were significant differences in self-efficacy, self-care and A1C levels, a small number of studies reported no significant difference in MI (Channon et al., 2007; Ismail et al., 2010; Rosenbek Minet et al., 2011; Robling et al., 2012; Wang et al., 2010).

Nurse-led health education has become one of the most important methods in the development of patients' self-management skills (Carolan, 2014). Hollis et al. (2014) reported that the success of health education programs where

traditional methods were applied remained at fairly low levels (Hollis, Glaister & Lapsley, 2014). Therefore, effective and innovative approaches are urgently needed to support the development of patients' self-management skills. MI is a patient-focused behavior change strategy that aims to detect and reduce patient ambivalence related to health behavior changes and improve perceptions about the importance of behavior change (Miller & Rose, 2013; Christie & Channon, 2014) MI is effective in the treatment of addictions and other chronic diseases including DM (Ogel, 2009)

There are numerous studies that reveal the positive impact of motivational interviewing on diabetes self-management, self-efficacy, self-care power, and continuity of glycemic control. However, studies on patients with T1DM are very limited. The aim of this study is to examine the effects of MI-based DSME T1DM on the development of self-efficacy, healthy lifestyle behavior and A1C in adolescents.

### Objective

The aim of this study is to examine the effects of MI-based DSME T1DM on the development of self-efficacy, healthy lifestyle behavior and A1C in adolescents. The question expected to be answered in this research are as follows;

- Does motivational interview-based diabetes self-management training increase the effectiveness levels of adolescents with type 1 diabetes?
- Does motivational interview-based diabetes self-management education create behavior change in adolescents with type 1 diabetes?
- Does motivational interview-based diabetes self-management training affect HbA1c levels in adolescents with type 1 diabetes?

### Method

**Type and location of the study:** This study with the pre-test/post-test design in one group was carried out between February 2017 and July 2017 at Elazig Firat University, Medicine Faculty Hospital, Pediatric Endocrinology outpatient clinic.

**Population and sampling of the study:** The population of the study consisted of 80 T1DM outpatients in the age range of 11 to 18 years admitted to the Pediatric Endocrinology outpatient clinic of Firat University Medical

Faculty Hospital. The study aimed not to make a selection among samples but to reach the entire population. While 13 patients did not agree to participate in the study, one patient was also not included in the study because of their physical and mental disabilities, and the study was conducted with 66 patients.

#### **Inclusion criteria of the study**

- Being open to communication and collaboration
- Having the ability to read and understand verbally

#### **Exclusion criteria of the study**

- Being mentally disabled

#### **Data collection tools**

**Socio-demographic information form:** The form prepared by the researchers includes questions asking for age, gender, education status, parents' educational status, diabetes age, frequency of measuring daily blood glucose, frequency of hypoglycemia/hyperglycemia, and sibling with diabetes.

**Healthy lifestyle behaviors scale:** The healthy lifestyle behavior scale (HLBS) was developed by Walker, Sechrist and Pender (1982), and the Turkish validity and reliability of the study were conducted by Esin (1998). The scale consists of 48 items and six sub-dimensions. These sub-dimensions are self-actualization, exercise, nutrition, health responsibility, interpersonal support and stress management. High scores taken from the scale indicate positive healthy lifestyle behaviors. It was prepared as 4 point Likert scale. A minimum score of 48 and a maximum score of 192 are taken from the scale (Esin, 1999). The study reporting the Turkish validity and reliability of the scale revealed the Cronbach Alpha coefficient of the scale as 0.91, while it is 0.81 in our study.

**Self-efficacy scale:** The Turkish validity and reliability study of the self-efficacy scale (SES) (Sherer et al., 1982) was carried out by Gozum and Aksayan (1999). The scale consists of 23 items and four subscales. These subscales are the starting behavior, sustaining behavior, completing behavior, and struggling with obstacles. The score taken from the scale prepared in the 5 points Likert type may be between min 23 and max 115. High score of the scale shows that self-efficacy is also high (Gozum & Aksayan, 1999). The scale's validity

and reliability study found the Cronbach alpha coefficient as 0.81, and in our study, the Cronbach alpha coefficient of the scale is 0.80.

#### **A1C follow-up form**

It is the form in which participants' MI-based pre- and post-DSME A1C levels are recorded.

**Data Collection:** In the context of motivational interview-based DSME, 66 adolescent patients with T1DM were divided into six groups by the researchers, and education days were determined separately for each group. Each group underwent six sessions of MI-based DSME. Interviews were made by the researcher who holds the certificate on this subject. HLBS and SES were applied before the interviews, and A1C measurements of individuals were made at the same time. Throughout the interviews, the emphasis was given on practices aimed at improving adolescents' negative health behaviors and habits for diabetes and poor self-management skills. It is aimed to develop positive health behaviors and sustain them at the desired level by increasing the patients' self-efficacy by showing and deepening the contradictions of them through an empathic approach that is one of the main components of MI. Participants' self-efficacy was supported, and emphasis was made on improving diabetes self-management skills. Each interview lasted 30-45 minutes, and feedback was received at the end of each interview. A1C measurements were made with HLBS and SES following the last interviews of each group. Six patients could not be reached for interviews, and their A1C measurements could not be made. The A1C variable was analyzed for 60 patients (Figure 1).

#### **Nursing practice**

**The first interview:** In the first interview, the researcher introduced himself to patients with T1DM. Brief information about diabetes was given. According to the preliminary test, the SES and HLBS were filled by the patients, and the A1C values of the patients were measured and recorded.

**The second interview:** In the second interview, patients with T1DM were encouraged to talk about topics such as DM and diabetes self-management. At this stage, open-ended questions were asked and patients were encouraged to speak out. The researcher who conducted the interviews tried to obtain the necessary information by minimizing the negative feelings

and thoughts of the patients by displaying a gentle and sensitive approach.

**The third interview:** The third session is about the ways to follow during the treatment to patients with T1DM. The patients' knowledge and behavior about managing DM were recorded by the researcher who conducted the interview. During this interview, the researcher continued to be sure whether patients were at the stage of being ready for change.

**The fourth interview:** The fourth session covers the evaluation of the patient's readiness for change. The patient's readiness for change was determined and evaluated according to their responses. Thus, the researcher determined the path to follow in the treatment according to the evaluations made. At the stage of readiness for change, patients' self-efficacy was supported, enabling them to enter strongly at the stage of change.

**The fifth interview:** In the fifth session, basic human-oriented consulting service skills were used. With these skills, patients were encouraged to talk about behavior changes, explain their concerns and why they needed behavior change.

**The sixth interview:** At the sixth session, the researcher who conducted the interviews aimed to increase the self-efficacy of the patients in order for their behavior changes to be sustainable. The aim of the study was to let diabetic patients gain successful self-management by using self-efficacy, which is one of the main components of MI. At the end of the interview, the post-test was realized by filling and recording the question forms and A1C. During MI sessions with patients with T1DM, discussions were made about developing a healthy lifestyle (physical activity, nutrition, etc.) as well as providing self-management of diabetes. The main components of MI, which are to show empathy, develop contradiction, resolve resistance, and support self-efficacy, were used in all interviews.

**Data analysis:** SPSS 22.0 statistical software was used to evaluate the data. Numbers and percentages were used to demonstrate sociodemographic information, while the mean, paired sample t-test and Oneway-Anova were used in scale scores and group comparisons for data analysis. The data were evaluated within 95% confidence interval, and  $p < 0.05$  was considered significant.

**Ethical principles of the study:** Prior to the study, ethical permission was obtained from the Ethics Committee of Non-Invasive studies belonging to the Faculty of Medicine of Firat University (APPROV no:2017/18). Written consent was obtained from the institution where the study was conducted and from the parents of the participants.

## Results

The mean age of 66 patients with T1DM was  $14.75 \pm 2.03$ . Also, 56.1% ( $n=37$ ) of the participants in the study were girls. When the educational levels of adolescents with T1DM were examined, it was observed that 57.6% ( $n=38$ ) continued high school education. Looking at the educational status of parents of adolescents with T1DM who participated in the study, 39.4% ( $N=26$ ) of fathers and 43.9% ( $n=29$ ) of mothers graduated from primary school. Also, 92.4% ( $n=61$ ) of the adolescents participating in the study did not have sibling with T1DM, 36.4% ( $n=24$ ) of the adolescents with T1DM were diagnosed with type 1 diabetes between the last 4-6 years, and 43.9% ( $S=29$ ) of the adolescents with T1DM let blood glucose levels measured 4-6 times per day, 84.8% ( $s=56$ ) of the participants did not have diabetes-related hospitalization in the last year, 24.2% ( $s=16$ ) experienced hypoglycemia 1-3 times totally. Also, 36.4% ( $S=24$ ) of the participants suffered hyperglycemia 10 times and above in the last one month (Table 1).

As can be seen in Table 2, according to the pre-MI findings obtained in the study, the total mean score of HLBS is  $130.5 \pm 13.8$  and the mean score after education is  $137.1 \pm 9.4$ . A significant difference was observed in the total HLBS score before and after MI ( $p < 0.05$ ). Self-realization sub-dimension score mean before MI was  $37.3 \pm 4.9$ , and after education, it was  $38.7 \pm 3.5$ . A significant difference is observed in the self-realization sub-dimension score mean ( $p < 0.05$ ) before and after education. The sub-dimension of health responsibility was  $25.9 \pm 3.7$  before MI and  $27.6 \pm 3.2$  after MI. A significant difference was observed between pre-and post-MI for the health responsibility sub-dimension score mean ( $p < 0.05$ ). The mean score of the exercise sub-dimension before the motivational interview is  $12.1 \pm 3.1$ . The mean score of the exercise sub-dimension after education was found to be  $13.4 \pm 2.2$ . There is a significant difference between pre- and post-MI in the exercise sub-

dimension score mean ( $p < 0.05$ ). The mean score of the nutrition sub-dimension before education was  $16.8 \pm 2.5$ , while it was  $17.3 \pm 1.6$  after MI. There was no significant difference between pre- and post-MI statistically ( $p > 0.05$ ). The interpersonal sub-dimension score mean was  $19.9 \pm 3.8$  before education, and it was  $20.3 \pm 2.7$  after MI. No statistically significant differences were observed between pre- and post-MI ( $p > 0.05$ ). The stress management sub-dimension score mean was  $18.3 \pm 3.0$  before education and it was  $19.6 \pm 2.3$  after education. There is a significant difference in stress management sub-dimension between pre- and post-MI ( $p < 0.05$ ) (Table 2).

The total score means of the self-efficacy scale before MI is  $86.5 \pm 11.2$ . The total scale score of the SES after education is  $91.0 \pm 10.1$ . There is a significant difference in the total scale score before and after MI ( $p < 0.05$ ). The mean score of starting behavior sub-scale before education is  $32.0 \pm 4.3$  while it is  $32.4 \pm 4.4$  after MI. There is no significant difference in the mean score of starting behavior sub-scale before and after MI ( $p > 0.05$ ) (Table 3).

The mean score of the sustaining behavior sub-dimension before MI is  $26.4 \pm 5.1$ , and the mean score after MI is  $28.1 \pm 3.9$ . There is no significant difference in the sustaining behavior sub-dimension between pre- and post-MI ( $p < 0.05$ ). The mean score of the completing behavior sub-dimension before MI is  $18.6 \pm 3.5$  MI and it is  $19.5 \pm 2.6$  after MI. There is a significant difference in the sub-dimension of completing behavior between pre- and post-MI ( $p < 0.05$ ). The mean score of struggling with obstacles before MI is  $9.4 \pm 2.2$ , while it is  $10.8 \pm 2.1$  after MI ( $p < 0.05$ ) (Table 3).

A1C values of 6 of the 66 adolescents with Type-1 diabetes who participated in the study were missing. These adolescents with T1DM who were lacking A1C values did not participate in this assessment, so the evaluation was conducted over 60 participants. A1C means of 60 adolescents with T1DM before MI is  $8.3 \pm 2.0$ , and it was found to be  $8.0 \pm 1.7$  after MI. Although there was a decrease in A1C mean after MI, this decrease was not significant ( $p > 0.05$ ) (Table 4).

**Table 1. Participants' sociodemographic information and diabetes history**

Feature (n: 66)	n	%
<b>Age (mean <math>\pm</math> SS)</b>	$14.75 \pm 2.03$	
<b>Gender</b>	29	43.9
Male	37	56.1
Female		
<b>Education Level</b>		
Primary-School Graduate	28	42.4
High-School Graduate	38	57.6
<b>Father's Educational Level</b>		
Illiterate	2	3.0
Primary-School Graduate	26	39.4
High-School Graduate	17	25.8
University Graduate	21	31.8
<b>Mother's Educational Level</b>		
Illiterate	3	4.5
Primary-School Graduate	29	43.9
High-School Graduate	22	33.3
University Graduate	12	18.2

<b>Having a sibling with Type 1 diabetes</b>		
Yes	5	7.6
None	61	92.4
<b>Age of Diabetes</b>		
1-3 years	24	36.4
4-6 years	16	24.2
7-9 years	6	9.1
10-12 years	6	9.1
13-15 years		
<b>Blood Glucose Measurement Frequency (Per Day)</b>		
I never measure	23	34.8
1-3 times	29	43.9
4-6 times	7	10.6
7 and above		
<b>Having a hospitalization event in the past year</b>		
Yes	56	84.8
None		
<b>Having a hypoglycemia event in the last month</b>		
1-3 times	22	33.3
4-6 times	3	4.5
7-9 times	5	7.6
10 times and above	20	30.3
Never		
<b>Having a hyperglycemia event in the last month</b>		
1-3 times	13	19.7
4-6 times	10	15.2
7-9 times	24	36.4
10 times and above	6	9.1
Never		

**Table 2. Healthy Lifestyle Behavior Scale score means and p values before and after Motivational Interviewing**

Scale	Before-MI Avg±SD	After-MI Avg±SD	t-test	p
Stress management	18.3±3.0	19.6±2.3	-3.100	0.00
Self-Realization	37.3±4.9	38.7±3.5	-2.490	0.015
Health Responsibility	25.9±3.7	27.6±3.2	-3.777	0.000
Exercise	12.1±3.1	13.4±2.2	-3.906	0.000
Nutrition	16.8±2.5	17.3±1.6	-1.578	0.119
Interpersonal Relationships	19.9±3.8	20.3±2.7	-0.876	0.384
Total SYBDÖ	130.5±13.8	137.1±9.4	-4.164	0.000

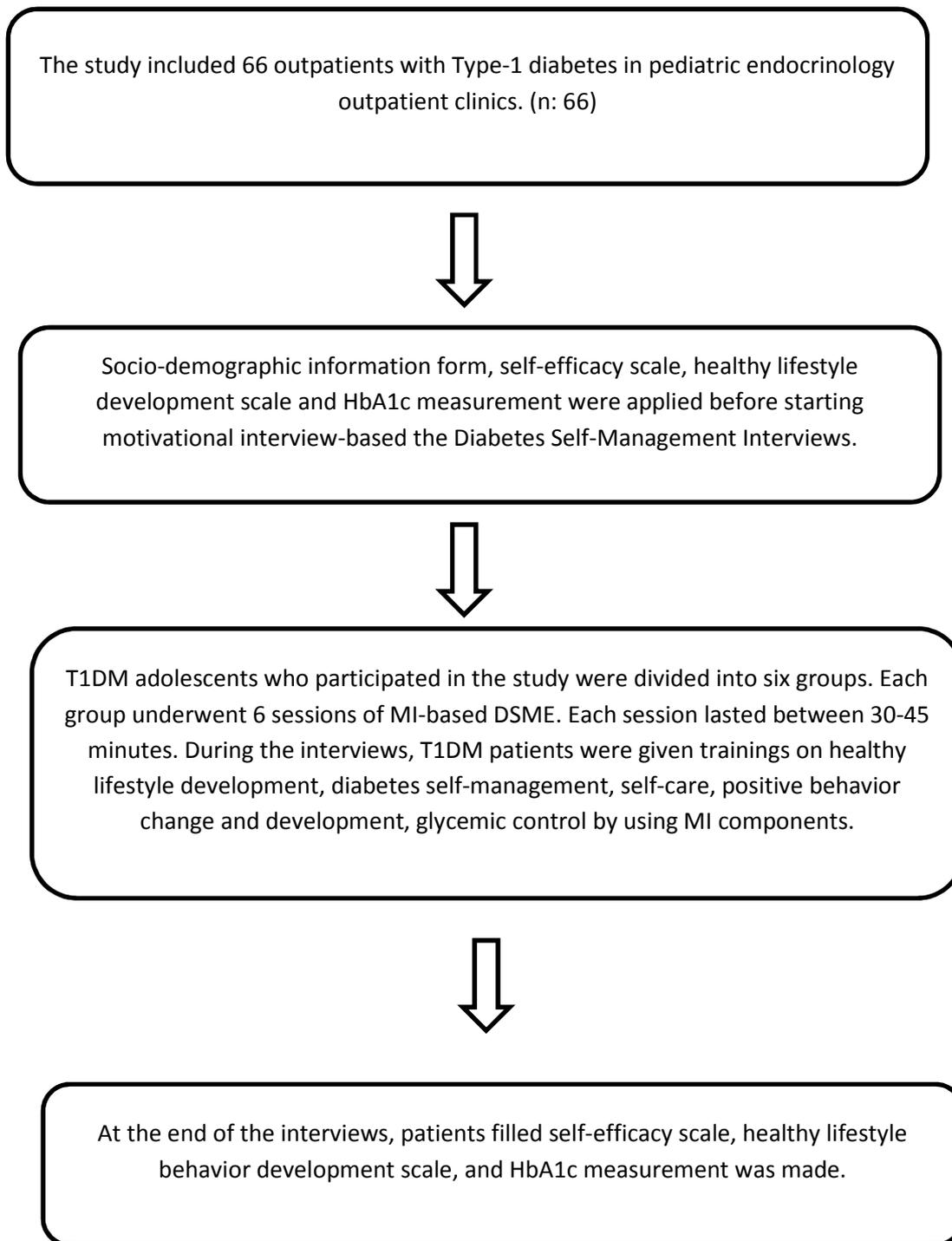
**Table 3. Self efficacy scale means and p values before and after Motivational Interviewing**

Scale	Pre-MI Mean±SD	Post-MI Mean±SD	t-test	P
Struggling with obstacles	9.4±2.2	10.8±2.1	-4.276	0.00
Starting behavior	32.0±4.3	32.4±4.4	-0.484	0.480
Continuing behavior	26.4±5.1	28.1±3.9	-1.712	0.010
Completing behavior	18.6±3.5	19.5±2.6	-0.969	0.047
Total self-efficacy	86.5±11.2	91.0±10.1	-4.575	0.004

**Table 4. A1C means and p-value before and after Motivational Interviewing**

Parameter	Pre-MI Mean±SD	Post-MI Mean±SD	t-test	p
A1C(%)*	8.3±2.0	8.0±1.7	1.388	0.170

\*n:60



**Figure1: Flow Chart of the Study**

## Discussion

It is observed that 43.9% (n=29) of adolescents with T1DM who participated in this study let their blood glucose level measured 4-6 times a day (Table 1). Anderson et al. (2002) investigated the effect of family participation in diabetes management and determined that 51% of the adolescents with T1DM who participated in the study let their blood glucose levels measured four times a day (Anderson et al., 2002). According to the ADA, individuals with T1DM should measure their blood glucose four or more times in days (Silverstein et al., 2005). Also, 7.6% (n=5) of the adolescents with T1DM who participated in this study had experienced hypoglycemia event 10 times and above in the last month, while 36.4% (n=24) had experienced hyperglycemia 10 times and above in the last month (Table 1). The causes of hypoglycemia, as seen in the literature, are stated to relate with the application of insulin in the form of multiple doses, the wrong planning of insulin, meals and physical activities, and skipping meals to protect the physical appearance that is taken into consideration heavily during adolescence, and despite this, keeping the dose of insulin the same<sup>31</sup>.

In this study, the total mean score of HLBS before MI was  $130.5 \pm 13.8$ , while the total mean score after MI was  $137.1 \pm 9.4$  (Table 2). It was observed that there was a significant difference in the total mean score of the HLBS between the pre- and post-education ( $p < 0.05$ ) (Table 2). Adolescents with T1DM who participated in this study are seen to have well mean scores of HLBS and develop a positive health behavior. However, we could find no research on healthy lifestyle behaviors made with adolescents with T1DM.

A study of 168 T1DM adolescents measured and evaluated the self-efficacy of adolescents with diabetes, which is an important dimension for the adaptation to diabetes. With the increase in self-efficacy in adolescents, their adaptation to diabetes increases (Iannotti et al., 2006). Another study on the diabetes management of adolescents with T1DM aged 11-16 years reported an increase in self-efficacy of adolescents as a result of education (Nansel et al., 2007). The findings of our study are similar to the findings of the studies that can be reached on this subject. When looking at the studies, it can be said that there is a positive relationship between the increase in self-efficacy and the self-management of

diabetes. It may be possible to talk about an increased self-efficacy in diabetes self-management in which success has been achieved with the increase in self-efficacy. One of the basic principles of MI is to promote self-efficacy in individuals and to raise the self-belief to higher levels. As stated in the study by Diallo and Weiss, MI is an effective initiative in adolescent individuals due to MI's emphatic approach and its effect on enhancing insight. In this study, self-efficacy was increased in individuals with the use of the MI technique, the effectiveness of diabetes self-management was realized, and as a result, improvements in the behavior towards diabetes and in the provision of glycemic control were gained.

Since six of the 66 T1DM adolescents did not have A1C data, only 60 adolescents' A1C data were included, and the evaluation was conducted according to this. The A1C means before MI is  $8.3 \pm 2.0$ . The A1C means after MI is  $8.0 \pm 1.7$ . A decrease in A1C mean was observed between pre- and post-MI, but this decrease did not reveal a statistically significant difference ( $p > 0.05$ ) (Table 4).

Rosenbeck et al (2011) included 349 individuals with T1DM and T2DM diagnoses in a randomized controlled trial. Those in the treatment group were given MI treatment, and the control group was given normal care. The study found that there was no significant difference in A1C levels between the two groups at the end of the 12th month (Rosenbeck-Minet et al., 2011). İsmail et al (2010) used the control and treatment group consisting of 344 T1DM patients with a mean age of 36.4 years. Also, 121 individuals in the control group underwent clinical care education interviews in three months, and the treatment group underwent four MI sessions lasting 50 minutes during two months, as well as, they took the education of the control group. At the end of the study, no significant difference in A1C levels between the two groups was observed (İsmail et al., 2010). The results of Rosenbeck et al. (2011) and İsmail et al (2010) and our study are similar. Wang et al. (2010) studied on 21 adolescents with T1DM in the treatment group and 23 adolescents with T1DM in the control group. The control group received structured diabetes education, and MI-based education was given to the treatment group. The A1C level of the treatment group increased at the end of the six months, also the control group's A1C levels decreased by

significantly at the end of the six months (Wang et al., 2010).

Channon et al (2007) studied on 38 adolescents in control and 38 adolescents in treatment groups, a total of 76 T1DMs with the mean age of 15,3. Six supportive visits were made to adolescents in the control group lasting 20 to 60 minutes for 12 months, and the adolescents in the treatment group were given four sessions of MI, each lasting 20 to 60 minutes for 12 months. The treatment group displayed a significant decrease in A1C level compared to the control group (Channon et al., 2007). There is no similarity between the results obtained in the studies of Wang et al. (2010) and Channon et al. (2007) and the results of our study.

When we look at the literature on the effect of motivational interviewing on A1C level in patients with T1DM, it is seen that the studies are relatively few compared to the studies on T2DM (Jones et al., 2014). In addition to the studies reporting that MI is effective in reaching the desired levels of A1C level, some studies indicate that it is not effective. In this study, the A1C mean of adolescents with T1DM showed a decrease in the post-education period, but this decrease did not make any significant difference (Table 4). Even if DM management is carried out effectively, the provision of metabolic control is also affected by both hormones and psychosocial changes in the transition to adolescence (Silverstein, 2015). These conditions are thought to be effective in not obtaining a significant difference in A1C level after MI.

**Conclusion and Recommendations:** MI-based DSME was found to support self-efficacy in the self-management of diabetes in adolescents with T1DM and is effective in changing negative behaviors, maintaining metabolic control, and keeping them at the requested levels. Nurses are health workers who are prominent in communication with the community. Nurses are advised to use MI-based DSME in ensuring self-efficacy in issues such as self-care, self-management, abandoning negative health behaviors and maintaining glycemic control. Nurses can prevent complications and improve quality of life by using MI-based DSME in adolescents with T1DM.

## References

Allsop, S. (2007). What is this thing called motivational interviewing?. *Addiction*, 102(3):343-45.

- Anderson, B. J., Vangsness, L., Connell, A., Butler, D., Goebel-Fabbri, A., & Laffel, L. M. B. (2002). Family conflict, adherence, and glycaemic control in youth with short duration type 1 diabetes. *Diabetic medicine*, 19(8), 635-642.
- Bean, M. K., Powell, P., Quinoy, A., Ingersoll, K., Wickham III, E. P., & Mazzeo, S. E. (2015). Motivational interviewing targeting diet and physical activity improves adherence to paediatric obesity treatment: results from the MI Values randomized controlled trial. *Pediatric obesity*, 10(2), 118-125.
- Borus, J. S., & Laffel, L. (2010). Adherence challenges in the management of type 1 diabetes in adolescents: prevention and intervention. *Current opinion in pediatrics*, 22(4), 405.
- Boztepe, O. G. D. H. (2012). A risky period in the management of type 1 diabetes: Adolescence. *Hacettepe University Nursing Faculty Journal*, 19 (1), 82-89. (In Turkish)
- Carolan, M. (2014). Diabetes nurse educators' experiences of providing care for women, with gestational diabetes mellitus, from disadvantaged backgrounds. *Journal of clinical nursing*, 23(9-10), 1374-1384.
- Channon, S. J., Huws-Thomas, M. V., Rollnick, S., Hood, K., Cannings-John, R. L., Rogers, C., & Gregory, J. W. (2007). A multicenter randomized controlled trial of motivational interviewing in teenagers with diabetes. *Diabetes care*, 30(6), 1390-1395.
- Christie, D., & Channon, S. (2014). The potential for motivational interviewing to improve outcomes in the management of diabetes and obesity in paediatric and adult populations: a clinical review. *Diabetes, Obesity and Metabolism*, 16(5), 381-387.
- Dilallo, J.J., & Weiss, G. (2009). Motivational interviewing and adolescent psychopharmacology. *Journal of the American Academy of Child & Adolescent Psychiatry*.
- Doring, N., Ghaderi, A., Bohman, B., Heitmann, B. L., Larsson, C., Berglind, D., ... & Tynelius, P. (2016). Motivational interviewing to prevent childhood obesity: a cluster RCT. *Pediatrics*, 137(5), e20153104.
- Esin, N. (1999). Adapting the healthy lifestyle behaviors scale to Turkish. *Nursing Bulletin*, 12 (45), 87-95. (In Turkish)
- Gayes, L. A., & Steele, R. G. (2014). A meta-analysis of motivational interviewing interventions for pediatric health behavior change. *Journal of consulting and clinical psychology*, 82(3), 521.
- Gozum, S., & Aksayan, S. (1999). Reliability and validity of the Turkish form of the self-efficacy scale. *Anatolian Journal of Nursing and Health Sciences*, 2 (1). (In Turkish)
- Hollis, M., Glaister, K., & Anne Lapsley, J. (2014). Do practice nurses have the knowledge to provide

- diabetes self-management education? *Contemporary nurse*, 46(2), 234-241.
- Iannotti, R. J., Schneider, S., Nansel, T. R., Haynie, D. L., Plotnick, L. P., Clark, L. M., ... & Simons-Morton, B. (2006). Self-efficacy, outcome expectations, and diabetes self-management in adolescents with type 1 diabetes. *Journal of Developmental & Behavioral Pediatrics*, 27(2), 98-105.
- International Society for Pediatric and Adolescent Diabetes, International Diabetes Federation (2007). Pocketbook for management of diabetes in childhood and adolescence in under-resourced countries. 2nd ed. Brussels, Belgium.
- Ismail, K., Maissi, E., Thomas, S., Chalder, T., Schmidt, U., Bartlett, J., ... & Treasure, J. (2010). A randomised controlled trial of cognitive behaviour therapy and motivational interviewing for people with type I diabetes mellitus with persistent sub-optimal glycaemic control: A Diabetes and Psychological Therapies (ADaPT) study. *Health technology assessment (Winchester, England)*, 14(22), 1-+.
- Jones, A., Gladstone, B. P., Lübeck, M., Lindekilde, N., Upton, D., & Vach, W. (2014). Motivational interventions in the management of HbA1c levels: a systematic review and meta-analysis. *Primary care diabetes*, 8(2), 91-100.
- Lindson-Hawley, N., Thompson, T. P., & Begh, R. (2015). Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews*, (3).
- Luke, S. L., & Richards, L. (2018). Motivational Interviewing: A Tool to Open Dialogue With Teens With Type 1 Diabetes Mellitus. *Journal of pediatric nursing*, 40, 89.
- Lundahl, B. W., Kunz, C., Brownell, C., Tollefson, D., & Burke, B. L. (2010). A meta-analysis of motivational interviewing: Twenty-five years of empirical studies. *Research on social work practice*, 20(2), 137-160.
- Miller, W. R., & Rose, G. S. (2015). Motivational interviewing and decisional balance: contrasting responses to client ambivalence. *Behavioural and cognitive psychotherapy*, 43(2), 129-141.
- Minet, L. R., Wagner, L., Lønvig, E. M., Hjelmberg, J., & Henriksen, J. E. (2011). The effect of motivational interviewing on glycaemic control and perceived competence of diabetes self-management in patients with type 1 and type 2 diabetes mellitus after attending a group education programme: a randomised controlled trial. *Diabetologia*, 54(7), 1620-1629.
- Nansel, T. R., Iannotti, R. J., Simons-Morton, B. G., Cox, C., Plotnick, L. P., Clark, L. M., & Zeitoff, L. (2007). Diabetes personal trainer outcomes: short-term and 1-year outcomes of a diabetes personal trainer intervention among youth with type 1 diabetes. *Diabetes care*, 30(10), 2471-2477.
- Ogel, K. (2009). Motivasyonel görüşme tekniği. *Türkiye Klinikleri Journal of Psychiatry-Special Topics*, 2(2), 41-44.
- Ozdemir, H., & Tasci, S. (2013). Motivasyonel görüşme tekniği ve hemşirelikte kullanımı-The application of motivational interviewing technique in nursing. *ERÜ Sağlık Bilimleri Fakültesi Dergisi*, 1(1), 41-47.
- Perry, S. E., Hockenberry, M. J., Lowdermilk, D. L., & Wilson, D. (2013). *Maternal child nursing care*. Elsevier Health Sciences.
- Ponsford, J., Lee, N. K., Wong, D., McKay, A., Haines, K., Alway, Y., ... & O'Donnell, M. L. (2016). Efficacy of motivational interviewing and cognitive behavioral therapy for anxiety and depression symptoms following traumatic brain injury. *Psychological medicine*, 46(5), 1079-1090.
- Resnicow, K., McMaster, F., Bocian, A., Harris, D., Zhou, Y., Snetselaar, L., ... & Hollinger, D. (2015). Motivational interviewing and dietary counseling for obesity in primary care: an RCT. *Pediatrics*, 135(4), 649-657.
- Robling, M., McNamara, R., Bennert, K., Butler, C. C., Channon, S., Cohen, D., ... & Longo, M. (2012). The effect of the Talking Diabetes consulting skills intervention on glycaemic control and quality of life in children with type 1 diabetes: cluster randomised controlled trial (DEPICTED study). *Bmj*, 344, e2359.
- Schmalings, K. B., Blume, A. W., & Afari, N. (2001). A randomized controlled pilot study of motivational interviewing to change attitudes about adherence to medications for asthma. *Journal of Clinical Psychology in Medical Settings*, 8(3), 167-172.
- Silverstein, J., Klingensmith, G., Copeland, K., Plotnick, L., Kaufman, F., Laffel, L., ... & Clark, N. (2005). Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association. *Diabetes care*, 28(1), 186-212.
- Stanger, C., Ryan, S. R., Delhey, L. M., Thrailkill, K., Li, Z., Li, Z., & Budney, A. J. (2013). A multicomponent motivational intervention to improve adherence among adolescents with poorly controlled type 1 diabetes: a pilot study. *Journal of pediatric psychology*, 38(6), 629-637.
- Wang, Y. C., Stewart, S. M., Mackenzie, M., Nakonezny, P. A., Edwards, D., & White, P. C. (2010). A randomized controlled trial comparing motivational interviewing in education to structured diabetes education in teens with type 1 diabetes. *Diabetes care*, 33(8), 1741-1743.