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ORIGINAL PAPER

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The Intervention of Parents in Supporting of Diabetes Type 1 in Adolescents

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ABSTRACT

Introduction: The presence of parents is very important as it enhances the psychology of adolescents resulting to the normal course of the disease. **Aim:** Investigate the perceptions of adolescents in order to support families in the management of T1D. **Material & Methods:** It is a descriptive study and 56 patients participated. The Diabetes Social Support Questionnaire-Family Version (DSSQ-Family) and some demographic and clinical characteristics were used. The study conducted in the outpatient unit for pediatric diabetology of the 4th Department of Pediatrics in one tertiary General Hospital in a major city of Northern Greece. **Results:** Younger adolescents felt more supported by their families. Overweight adolescents experienced less support with respect to insulin injections ($p = -.333$, $r = .018$), as did the taller respondents ($p = -.323$, $r = .022$). Respondents taking more insulin units felt less supported in general ($p = -.268$, $r = .047$) and with respect to blood tests ($p = -.290$, $r = .034$). Adolescents carrying out more blood glucose measurements felt less supported concerning their meal plan ($p = -.307$, $r = .028$), which they rarely complied with ($p = -.322$, $r = .023$). **Conclusions:** The parental presence is very important enhancing a positive mindset on the part of adolescents and helps achieve the desired treatment results.

Keywords: Type 1 diabetes mellitus, self-management, mediating, adolescent, parents.

One definition of self-management given by Schilling et al. (2) is as following “self-management in children and adolescents with (T1D) is the active, daily and flexible process during children and parents share the responsibility and decision-making in order to be able to control the disease, health and wellbeing through a range of activities associated with the disease” (2).

The parental intervention in children and adolescents with (T1D) aims to care and to improve their diabetes. It has been reported that the positive reaction and involvement of parents, in problems resulting from diabetes, has improved the HbA_{1c} in 42% of patients (3). The parents’ participation has an intensive influence in patients aged 10-15 years. Furthermore, the active presence of parents in the management of diabetes improved the whole metabolic control in these individuals (4).

Teenagers usually see themselves as autonomous and capable of achieving diabetes management from an early age, as opposed to their parents’ view of their abilities (5). Similarly, regarding the management of diabetes, adolescents perceive themselves as more self-sufficient and capable (6, 7), experiencing fewer problems with diabetes than their parents (8). Adolescents report that they feel closer to their mothers, spend more time interacting with them and communicate better about diabetes management with them than with their fathers (9). Additionally, in one study, the questionnaire Diabetes Family Responsibility Questionnaire (10) answered by children/adolescents (aged 6-21) and their mothers. Regarding parents’ contribution with the management of diabetes, studies have shown that mothers struggle with teenagers more often than fathers because of they are more involved in care-giving (10). Survey results suggest that family arguments regarding the competence and independence of teenagers in treating T1DM is linked to poorer wellness and

1. INTRODUCTION

Type 1 diabetes (T1D) is one of the most common endocrine and metabolic conditions among children. The International Diabetes Federation reports that in 2015 there were 415 million adults with diabetes (1). Specifically, 608.8/1000 adults in Greece aged 20-79 have diabetes, as do 1.3/1000 children aged 0-14 years (1).

metabolic control (4, 11).

Disease management and the social adjustment in diabetes patients were studied and in general and it was found that usually one parent takes responsibility for the management of diabetes, whereas the other is hardly involved, which leads to large variations in HbA_{1c} (12).

Another study seems to suggest that by virtue of various T1D management measures such as control, diet, exercise, communication and psychological support, parents contribute to adolescents' wellness (13). They provide the basis for increasing adolescents' health and psychological adjustment (13).

In one study, La Greca et al. created "The Diabetes Social Support Interview (DSSI)". The results showed that adolescents felt supported regarding insulin injections, measurements, meals, exercise and psychological support. Also, younger adolescents, shorter disease duration and better treatment adherence were related to greater support from families (14, 15).

To the best of our knowledge, no similar studies have been carried out in Greece so far on the evaluation of parental involvement in the support and autonomy of adolescents with T1D.

The purpose of this study was to investigate the perceptions of adolescents concerning the support families in the management of T1D.

2. MATERIALS AND METHODS

Sample

It is a descriptive study and the sample consisted from adolescents with T1D. The inclusion criteria were: teenagers aged 10-19 years with T1D, duration of the disease \geq 6 months, live together with at least one family member (father, mother or guardian) and capable of reading and speaking the Greek language.

Data collection

The study was conducted in the tertiary outpatient unit for pediatric diabetology of the 4th Department of Pediatrics at Papageorgiou General Hospital in Thessaloniki. Of the 57 adolescents who were asked to complete the questionnaire, 56 agreed to complete this so the response rate was 98.2%. Patients answered the questionnaire, which was accompanied by a confidential letter stating information about the purpose of the study, the anonymity and confidentiality of data and the voluntary nature of participation.

By completing the questionnaire, acceptance of the terms of participation and informed consent were confirmed. Filling out it out did not take longer than 15 minutes. Questionnaires were distributed to adolescents waiting for routine diabetes checkups at the outpatient clinic. The questionnaires were collected over a period of five months.

Tools

The questionnaire drawn up by Annette M. La Greca entitled "The Diabetes Social Support Questionnaire-Family Version (DSSQ-Family)" (16) was used for the collection of researched data. The questionnaire was translated from English to Greek (17) and permission obtained

from the author.

Data Analysis

The statistical package SPSS 17.00 was used for the statistical analysis. For the data analysis, the codification of responses and statistical methods of descriptive and inductive statistics were applied. A Kolmogorov-Smirnov test was used in order to test the normality of distribution. The reliability of the scales was checked by using the Cronbach Alpha coefficient. The Cronbach Alpha coefficients of the questionnaire scales range from 0.82 to 0.95.

The Spearman correlation coefficient was used to investigate the existence of a significant correlation between different scales and demographic/clinical characteristics.

For the not normally distributed variables nonparametric statistics such as Mann-Whitney test for two samples and Kruskal-Wallis for more than two samples were used.

3. RESULTS

There were 25 female (44.6%) and 31 male (55.4%) participants. The mean age of the patients was 14.5 ± 2.19 years. As to nationality, the vast majority of the sample were Greeks (92.9%), 5.3% Albanians and 18.8% from Georgia. Three participants (5.4%) attended 4th year of Primary School, two participants (3.6%) 5th year of Primary School, 6 participants (10.7%) 6th year of Primary School, 7 participants (12.5%) 1st year of Middle School, 9 participants (16.1%) 2nd year of Middle School, 10 participants (17.9%) 3rd year of Middle School, 7 participants (12.5%) 1st class of High School, 6 participants (10.7%) 2nd class of High School and 6 participants (10.7%) 3rd class of High School.

The average age of diagnosis was 9.5 years, the mean level of HbA_{1c} was 7.48% and the mean diabetes duration was 4.85 years. Fifty participants (89.35%) used insulin injections as insulin treatment and only 6 participants (10.7%) used insulin pump. As regards family members, the average household size (including the adolescent) was four persons. Participants measured blood glucose levels 5.6 times per day on average and the average number of insulin units was 45.3. As regards the Body Mass Index, 13 participants were underweight (23.2%), 34 healthy weight (60.7%), 8 over weight (14.3%) and only one obese (1.8%).

Table 1 shows the mean values, standard deviations and minimum/maximum values for the subscales of the questionnaire. From the table, it appears that participants had high means regarding the frequency of insulin injections, blood testing, meals and exercise plans, expressions of encour-

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std.Deviation
Insulin injection frequency	51	.50	5.00	3.3549	1.29094
Blood testing frequency	54	.79	5.00	3.5608	1.01191
Meal plan frequency	50	.85	5.00	4.0120	.88965
General items frequency	55	.60	5.00	4.1382	.94663
Meal plan emotion	51	.00	2.95	2.1941	.74630
General items emotion	55	.00	3.00	2.3455	.81872
Insulin injections emotion	50	.00	3.00	2.0520	.88161
Blood testing emotion	54	.00	3.00	2.1627	.75471
Exercise frequency	53	.00	5.00	3.0252	1.35622
Exercise emotion	50	-.67	3.00	1.6756	.92795

Table 1. Descriptive Statistics in Subscales

	r	p	N
Correlation Scales for Height			
Insulin injection emotion	-.323	.022	50
Blood testing emotion	-.338	.013	54
Correlation scales for weight			
Insulin injections emotion	-.333	.018	50
Correlation scales for insulin units			
General items emotion	-.269	.047	55
Blood testing emotion	-.290	.034	54
Correlation scales for blood testing			
Meal plan frequency	-.322	.023	50
Meal plan emotion	-.0307	.028	51

Table 2. Correlation Scales with Demographic Characteristics.
*Statistically significant results

No statistically significant difference was found between adolescents from different ethnic backgrounds with respect to subscales, but there is a statistically significant difference ($p = 0.009$) among respondents according to the school year they were currently attending, with respect to their general emotional situation.

There is a statistically significant difference between the students of different ages. Specifically, second year middle school students felt more supported by their families in respect of questions expressing interest by comparison to students attending the third year of middle school ($p = 0.004$) and the first year of high school ($p = 0.003$). Students attending the third year of high school felt more supported by their family in general questions of interest by comparison to the students of the third year of middle school ($p = 0.003$) and the first year of high school ($p = 0.004$), and finally students in the fourth year of primary school felt more supported by their families with respect to general issues of encourage-

Support and encouragement emotion (General items)

School year	N	M.O	T.A	Std. Error Mean	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
2 nd year of middle School	8	2.8750	.21213	.07500	8.500	63.500	-2.862	.004	.003
3 rd year of middle School	10	1.8800	1.09626	.34667					
2 nd year of middle School	8	2.8750	.21213	.07500	3.000	31.000	-2.968	.003	.002
1 st year of High School	7	2.0857	.57570	.21759					
3 rd year of middle School	10	1.8800	1.09626	.34667	3.000	58.000	-2.998	.003	.002
3 rd year of High School	6	2.9333	.10328	.04216					
1 st year of High School	7	2.0857	.57570	.21759	1.000	29.000	-2.918	.004	.002
3 rd year of High School	6	2.9333	.10328	.04216					
1 st year of High School	7	2.0857	.57570	.21759	1.000	29.000	-2.178	.029	.033
4 th year of Primary School	3	2.8667	.23094	.13333					

Table 3. Mann-Whitney for students about support and encouragement emotion

agement and interest (mean 3-4.1) and exhibit lower means when responding to questions involving their feelings about the subscales.

The statistical analysis showed that there is a statistically significant negative correlation between height and feeling for blood testing ($p = 0.013$) and insulin injections ($p = 0.022$). The taller respondents felt less supported by their family as shown in Table 2, which shows correlations with statistically significant results among different demographic characteristics and subscales of the questionnaire.

Overweight and obese participants felt less supported by their family with respect to the insulin injections ($p = 0.018$). Adolescents who injected more insulin units felt less supported by their families as regards questions expressing encouragement and support ($p = 0.047$) and blood testing ($p = 0.034$). Participants who carried out more blood glucose measurements felt less supported by their family regarding meal plans ($p = 0.028$) and complied with them less often ($p = 0.023$) (Table 2).

The statistical analysis showed that there was a statistically significant difference between boys and girls with respect to exercise. Specifically, the replies from the boys showed that exercised more than the girls, and this difference is statistically significant ($p = 0.036$).

ment and interest compared to the students of the 1st year of high school ($p = 0.029$). All these differences are statistically significant (Table 3).

No statistically significant difference between the answers of participants who belong to a different age group and have a different indication of BMI in all subscales. No statistically significant difference was found between the responses of adolescents who took insulin differently (pump or not) and in subscales.

No statistically significant differences found between blood glucose measurements of adolescents who belong to a different age group ($p = 0.860$).

Similar are the results obtained from the investigation of statistically significant difference between means of responses of participants to questions which were related to whether family members helped adolescents with T1D with insulin injections. This result is not statistically significant ($p = 0.393$).

4. DISCUSSION

The present study was conducted in order to cover a part of the gap that exists in the literature and to highlight the need for autonomy of adolescents and their perception of parents' involvement in care-giving.

The study showed that adolescents who received more insulin units felt less supported by family members as regards the interest and encourage questions about blood testing. Noteworthy similar findings such as the above mentioned not found in the literature review.

The body mass index of the participants was within normal range in contrast with a study, which reports abnormal BMI in youngsters with T1D (18). Furthermore, the same study reported that overweight and obese adolescents felt less supported by their family. This difference is probably due to the time limit to prepare a healthy meal, the minimum preferences of children in food, the higher cost of healthy food and peer group influence/pressure (18).

From the literature is known that the active presence of parents in the T1D management is associated with an improved metabolic control, expressed as low HbA_{1c} levels (19, 20), in our study this finding was confirmed since the participants reported familial support.

According our results adolescents presented a high mean regarding the frequency of insulin injections, blood testing, meal plan, exercise plan and in general encouraging questions and interest.

However, lower means of responses regarding their feelings about the subscales was found, and this could be interpreted that they feel less supported by their family. Moreover, this finding is in agreement with the data reported by La Greca & Bearman (16), which showed that less psychologically supported teens reported more family conflicts. A statistically significant negative correlation between height and feeling for blood testing and insulin injections was found and that means that taller participants felt less sponsored by their family. Similar findings were not found in the literature and this is a matter of further investigation.

The participants in the present study who made more blood glucose measurements felt less supported by their family regarding meal plan and applied it rarely. These results are in contrast with another study (13), which reported that parents through interventions for the managing of T1D such as disease control, meal and exercise have improved adolescents' health and teenagers, despite the pressure of parents, they felt supported.

Generally, parental involvement in diabetes management has a significant impact. Researchers found that communication with the intent to solve problems was associated with better adherence to treatment. Higher levels of parental participation, such as stating opinions, making suggestions and giving positive feedback, were associated with better glycemic control (21).

There was no statistically significant difference on individual scales between the answers of participants coming from a different origin. A similar study was not found in order to correlate the results and a further investigation on this parameter is required. Instead, there was a statistically significant difference between adolescents who attend a different school class as regards emotion, which is confirmed by another research (15).

Specifically, adolescents attending the 2nd class of Gymnasium felt more sponsored by their family compared to students of 3rd class of Gymnasium and this difference was statistically significant. The same results were confirmed by

other researches (15, 16), which reported that the youngest aged patients felt more sponsored by the family compared with older aged patients.

Also, respondents attending the second year of middle school felt more supported by their families as regards general questions of encouragement and interest compared to adolescents in the first year of high school. Similar studies confirmed these results, showing that younger patients received higher support rates from their families (16).

Students in the fourth year of primary school felt more supported than students in the first year of high school regarding general interest and encouraging questions, and this difference was statistically significant. Overall, younger participants felt more supported by their families with respect to general questions of encouragement and interest, compared to older adolescents. This result was confirmed by similar research studies (15, 16). Conversely, adolescents attending the 3rd class of High School felt most supported than students in 3rd class of Gymnasium and students of 3rd class of High School felt more sponsored than students of 1st class of High School. In this comparison, of the older and younger adolescents it is the older group, which felt more supported.

The participants in our study measured their blood glucose levels themselves with the mean of 5.6 times per day; however, in another study children 6-18 years of age from Serbia revealed that not all participants measured blood glucose levels at school by them self but they expect a family member to come to school for that. This showed that children do not have autonomy features, as the parents are the ones who manage diabetes (22). This difference may be due to the different culture and the parent role in the family.

5. CONCLUSION

Some limitations in the present study should be mentioned. The period in which the sample collection was performed was relatively short. The sample was from one hospital and one care clinic so consistently the results cannot be generalized. More research is needed to include more patients and Greek regions in order to make safe conclusions.

In conclusion, the present study showed that teenagers with T1D felt less supported compared with younger aged people. This finding could be explained by the fact that adolescence is a difficult period per se and the care of diabetes, which was until now a common parent-teen responsibility should be transited gradually from parents to adolescents. The parents' support is one way to facilitate this transmission of control and management of diabetes and it was found that the increased parental support for autonomy can facilitate the teenager to take responsibilities for diabetes care (23).

Younger adolescents perceive that they receive higher levels of support from family members. The frequent "tweaks" with a purpose to insulin injections effect and reduce the feeling of supporting in adolescents. Overweight adolescents and adolescents who received a large amount of insulin spoke of a lower level of support from their parents. The parents' presence is very important and the metabolic control improves when their contribution is positive.

The findings of our study may be useful to health professionals in order to help their young T1D patients to manage their disease as well as to support and advice the family.

Further research will be a challenge and an opportunity to improve both the metabolic control and the psychology of T1D adolescents that has a significant impact on their lives in their social environment including family.

- **Authorship statement:** All listed authors meet the authorship criteria and are in agreement with the content of the manuscript.
- **Ethical Considerations:** Permission was granted by the Scientific Ethics Committee of the Alexander Technological Educational Institution of Thessaloniki for the realization of this research study. Additionally, the Personal Data Protection Authority and the Administration of the 3rd Health Region of Macedonia granted permission to conduct the research.
- **Disclosures:** I affirm that all the authors have seen and agreed to the submission of paper and their inclusion of names as co-authors. All authors declare any financial support or relationship that may pose conflict of interest as a Conflict of Interest Statement in the Disclosure section of our manuscript.
- **Implications and Contribution:** The results of the current research contribute to inform the health professionals who are helpers in education and management of the disease to adolescents and their parents. The presence of parents is very important as it reinforces the psychology of adolescents and metabolic control is better with their positive contribution.

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