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The Role of Formative Intervention in Diabetes in Primary and Secondary School Teachers

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Abstract: *The children with diabetes mellitus have often difficulties regarding school adaptation and integration, generated largely by the special conditions of the disease. On the other hand, how the child succeds in this adaptation, interferes with the management of chronic disease and the quality of his life.*
An important role for the child with diabetes in school is played by the head teachers.The informations about this disease and the attitude towards the children affected by this disease are important variables in this direction.
The objective of our study is improving the teachers knowledge and attitude toward diabetes in children by providing quality information and practical intervention techniques. 86 head teachers from elementary and secondary schools were interviewed regarding their knowledge about diabetes in children, and participated to a formative course about this disease. After their participation in a theoretical and practical training course, their knowledge and their attitude have been improved considerably and the follow-up evaluation (after 3 months) indicated a stability of informations and practical techniques for granting first aid, over time.
The conclusion is that formative intervention of teachers is an important step in helping children with diabetes to better school adaptation and, also in improving the quality of their life.

Keywords: *diabetes mellitus; adaptation; quality of life; formative intervention.*

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1. Introduction

The diabetes is a global problem that concerns not only medical systems and families, but societies from all the countries (International Diabetes Federation- IDF, 2019).

The pathogenesis of diabetes appears to be due to an autoimmune mechanism of beta cells destruction, as the studies demonstarted (Smeltzer & Bare, 2008, pp. 1398-1401). Even if this chronic disease is known already from a very long time and the medical technology has grown, the society is still not enough prepared to find solution for social problem regarding the children and adolescents with Insulin Dependent Diabetes mellitus (IDDM). Being a chronic disease, every new case means another life with special needs. The International Society for Pediatric and Adolescent Diabetes (ISPAD, 2000) proposed a guidelines to help health professionals in the corect care of young people with diabetes, and sustain the right to have a normal life. One of the most important arguments was that the quality of current disease management will be reflected on the adults'with IDDM future health.

The percentage of T1DM in childhood and adolescent is about 90%, of all patients with diabetes in this age group, and half of them are diagnosed before the age of 15 years (Aanstoot et al., 2007, pp.1-44; Lowes & Lyne, 2000). In general, in this age range, children live and depend in many ways on their families (Streisand & Monaghan, 2014, p.520). The management of diabetes in children, especially the adherence to treatment and quality of life are two of the goals that both clinicians and the families of children with insulin dependent diabetes (IDDM) have to take care (blood sugar level between 100-200 mg/dl, measured fourtime/day. (Desroche & Rovet, 2004) This fact is closely dependent on the neuro-cognitive, behavioral and emotional development level (Aanstoot et al., 2007). In particular, he has referred about children under 6 years of age who have difficulty recognizing the symptoms of glycemic imbalance, with negative consequences on the management of the disease (hypoglycemic coma, ketoacidosis, retinopathy, nephropathy, neuropathy, neuro-cognitive disorders, or even death). Also, all age groups are exposed to the same risk. The responsibility of the diabetes daily management belongs to the parents and consists in blood glucose measurement, insulin dosing and administration, calculation of carbohydrates in the diet, close connected with blood sugar level and insulin units administrated, and also regular physical exercises (American Diabetes Association, 2013, pp. 11-66).

Northam et al. (1996) studied how children and their parents are affected by the disease and which are the variables involved in better adapting to the disease and to treatment. Along with psychological and family factors, the social factors have an important role; those includes both health system policies, economic facilities and access to health services, as well as the general and specific attitude of society towards children and young people with diabetes. Social perception and attitude have the power to influence the feeling of self-efficacy (Hanson et al., 1990; Hilliard et al., 2011). Guthrie et al. (2003) considers that children with diabetes feels that they are different, and this observation an overlap with the perception of the people around, which deeppens the belief of non-belonging.

In the last decade, has been highlighted the need for good practices that facilitate the integration in the mass schools children with different medical conditions or/and disabilities and increase their social insertion. The objective of The Organisation for Economic Co-operation and Development (OECD, 2006) is to facilitate equal rights for all the children and same opportunities to education. This rights are also provided in the Romanian education law number 84/1995.

Since the onset of the disease, children and their parents are facing challenges related to accepting the disease and adapting to the new condition, without giving up the old life either. When the children have to go to school, the most important concern of them, but especially of their parents is hypoglycemia (Herbert et al., 2015; Linda et al., 2015). This situation is characterized by an excessive decrease in glycemic value of 60-70 mg/dL and has symptoms as sweating, hunger, pale skin, irritability, shakiness, irregular heartbeat. Sometimes the symptoms include confusion, visual disturbance or loss of consciousness (Smeltzer et al., 2008, p. 1432). The immediate intervention is important by taking sugar or, in case of severe hypoglicaemia, medication (glucagon) (ADA, 2013). Parents' fear is in relation with the quality of life, and, most of the time, it is fueled by awareness of the limited condition that the school is prepared to respond to the real needs of children with diabetes.

The identified problems for which the research was carried out were that many children with IDDM encounter difficulties and barriers at school to test their blood sugar, to administer insulin under hygienic conditions, to correct hypoglycemia during class hours, to have help from the assistant or school doctor, under the conditions of autonomy insufficiently developed, to participate in sports activities and trips, all these with negative consequences on the management of the disease and the quality of life. On the other hand, diabetes is often the theme of bullying in children in schools.

2. Material and method

Our research is a descriptive study on the impact of teachers' education on diabetes in children through a basic theoretical and practical course, provided by a specialist. Sample, (N=86) was taken from accessible teachers from elementary and secondary schools from Mures County, who agree to participate to our study. The inclusion criterion was to work as a teacher in elementary or secondary school. The participants offered consent and no personally identifiable data was collected or published. There were no material benefits or conflict assigned for the participants. The risk factor that was considered was to have reduced response rates, or no sincerely answers. Research hypothesis: Through the participation of primary and secondary school teachers in a training course, they will improve their knowledge about IDDM and acquire a positive attitude towards children affected by this chronic disease.

Objective:

- To evaluate the teachers knowledge / conceptions of about the disease and illness in IDDM
- To evaluate the knowledge about diet in insulin-dependent diabetes
- To evaluate practical recognition and intervention skills in case of hypoglycemia, hyperglycemia
- To evaluate the teachers involvement / responsibility in supporting children with IDDM
- To increase the degree of teachers involvement and responsibility towards students with IDDM

A semi structured interview consisting of 18 structured questions and one question with open answer was applied, to evaluate the level of teachers' knowledge and attitude towards diabetes in children (pupils) (*T1*) (Figure 1.).

All teachers participated in 3 sessions of a 2-hour training course (1 session/month) designed and coordinated by a specialist in diabetes.

Follow-up: One month after the last session, a retest was performed, using the same questions to verify the knowledge acquired through learning (course), as well as the attitude towards children with IDDM and their special condition and the stability of informations. (*T2).*

Figure 1. Issues pursued in the interview's questions
Source: authors'own contribution

1) The cause of diabetes in children	10) Children's participation in trips /camps
2) The role of insulin attention	11) The ability of children with IDDM to focus
3) Diet in IDDM diabetes	12) Blood glucose measurement
4) Intervention in hypoglycemia	13) Sports and physical activity
5) Carbohydrates	14) The role of emotional balance
6) Intervention in hyperglycemia	15) Informing others about diagnosis
7) Carbohydrate intake after insulin	16) The importance of knowing about IDDM
8) The symptoms of hypoglycemia	17) Child's behavioral at school
9) The symptoms of hyperglycemia	18) Child with IDDM in class

Four variants of helpful answers were made available to teachers in order to facilitate the participation and the quantitative and qualitative processing and discussion of the results.

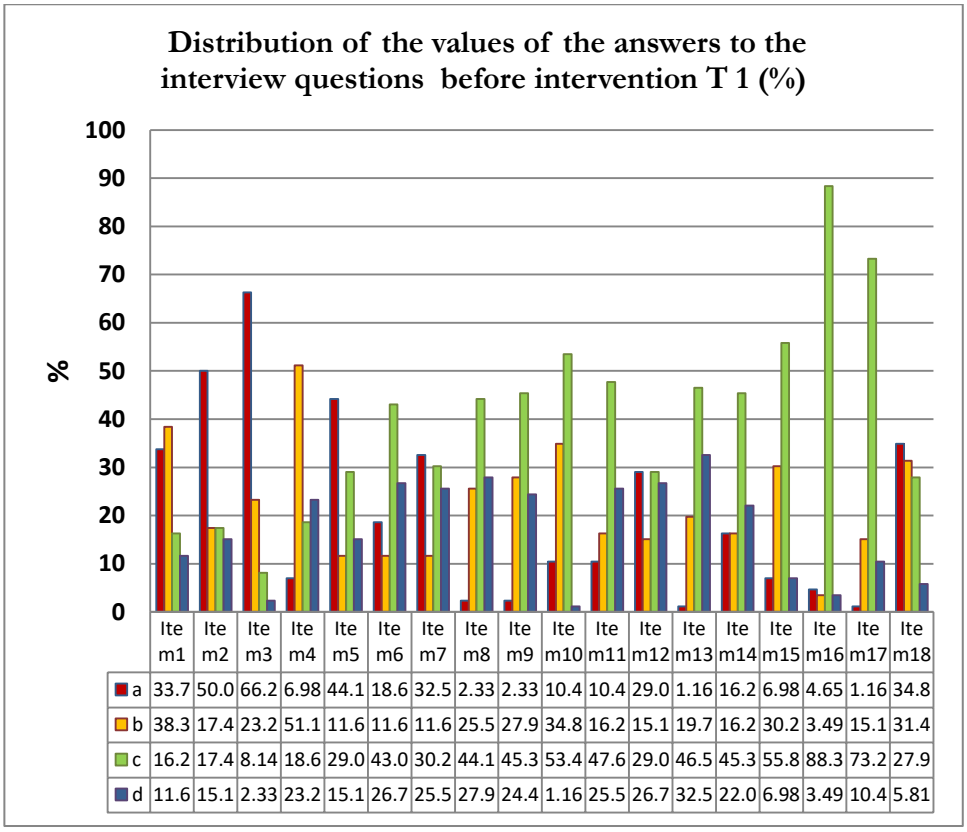
The answer were grouped in „a", „b"- „ wrong answers", „c"- good answer and „ d"-„ I don't know"/ „ I refuse to answer".

3. Results

Before intervention (T1) (Figure 2), the percentage of those who had erroneous knowledge about the *cause of diabetes* were 72%; *the role of insulin* was known only by 17.4 % of total of teacher (N=86). 66% thought that children with diabetes *cannot eat normal food*, just like other people, and 23.2 % thought that they were forbidden to eat *carbohydrates*. About the attitude to have when a child has *hypoglycemia*, 51.1 % decided to„ call child's parents to decide what to do ", and 23,2 % „don't know what to do". 44.1 % affirmed that„ there are just one type of *carbohydrates*. The question nr.7 investigates *teachers' attitude* regarding„ when and if the child did eat after insulin administration"; 32.5 % believes that children with diabetes don't have to be observed, 11.6% doesn't consider to be their responsibility and 25.5 doesn't know. Almost double was the percentage of teacher who doesn't know or not enough about *symptoms of hypoglycemia*. 27.9 % confused the symptoms of hypoglycemia with those of *hyperglycemia*. 45.2 % doesn't consider that a child with diabetes can go in a *school trip*, unless accompanied by his parents (10.4%). 26.6% doesn't believes that *hypo-/ hyper-glycemia could influence the ability to focus attention*. 44,1 % claim that blood *glucose measurement* have to be done just in the morning or when taking insulin, and only 46 % believes that a child with diabetes can do *physical exercises*. Regarding the *relationship between emotional balance and glycemia*, 32.4 thought that„ there is no relation between

them". Only 55.8 % affirmed that other teacher and classmates have to *know about the diagnosis* if a child has diabetes.

Figure 2.
Source: authors'own contribution



	Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18
a	33.7	50.0	66.2	6.98	44.1	18.6	32.5	2.33	2.33	10.4	10.4	29.0	1.16	16.2	6.98	4.65	1.16	34.8
b	38.3	17.4	23.2	51.1	11.6	11.6	11.6	25.5	27.9	34.8	16.2	15.1	19.7	16.2	30.2	3.49	15.1	31.4
c	16.2	17.4	8.14	18.6	29.0	43.0	30.2	44.1	45.3	53.4	47.6	29.0	46.5	45.3	55.8	88.3	73.2	27.9
d	11.6	15.1	2.33	23.2	15.1	26.7	25.5	27.9	24.4	1.16	25.5	26.7	32.5	22.0	6.98	3.49	10.4	5.81

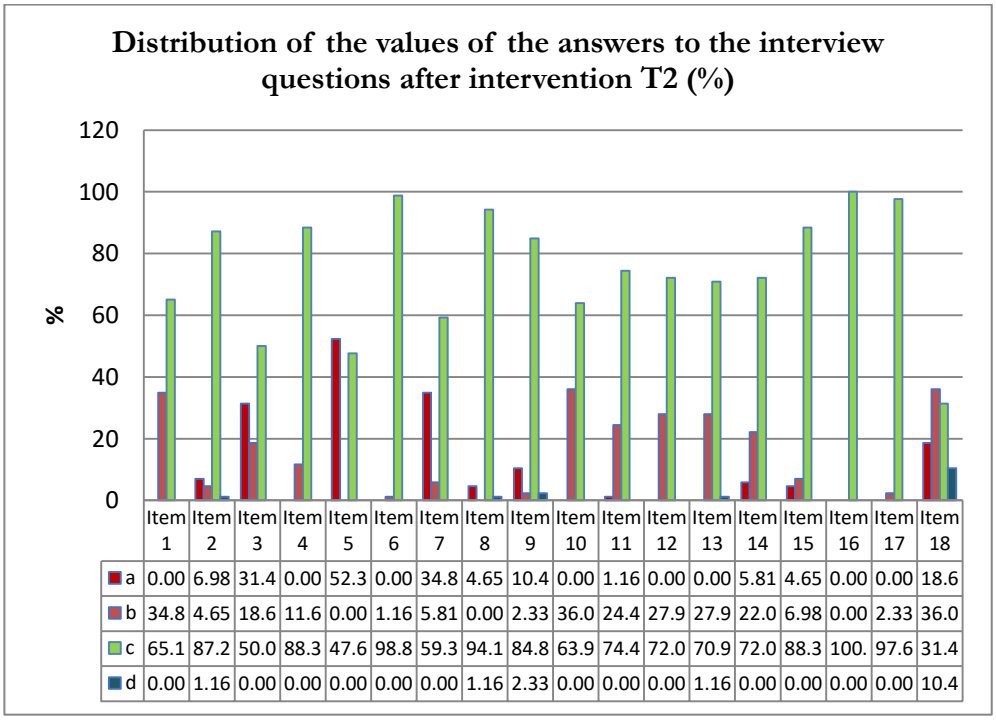
Legend:

1) The cause of diabetes in children
2) The role of insulin
3) Diet in IDDM diabetes
4) Intervention in hypoglycemia
5) Carbohydrates
6) Intervention in hyperglycemia
7) Carbohydrate intake after insulin
8) The symptoms of hypoglycemia
9) The symptoms of hyperglycemia
10) Children's participation in trips/ camps
11) The ability of children to focus attention
12) Blood glucose measurement
13) Sports and physical activity
14) The role of emotional balance
15) Informing others about diagnosis
16) The importance of knowing about IDDM
17) Child's behavioral at school
18) Child with IDDM in class

After the 3 session of course (two theoretical courses, and one consisting in practical applications), the teachers were interviewed again (T2), using the same semi-structured interview.

The results were grouped in figure 3. The results at this stage indicates that the percentage of good answers increased significantly in almost all questions, except for items 16,10,18, problems regarding the teachers' attachment attitude towards the problems of children with IDDM , respectively the confidence that they perceive with the management of crises situations in diabetes (hypoglycemia /hyperglycemia). Also, the percentage of those who refused to answer or stated that they„ did not know" was very low after intervention.

Figure 3.
Source: authors'own contribution



	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16	Item 17	Item 18
a	0.00	6.98	31.4	0.00	52.3	0.00	34.8	4.65	10.4	0.00	1.16	0.00	0.00	5.81	4.65	0.00	0.00	18.6
b	34.8	4.65	18.6	11.6	0.00	1.16	5.81	0.00	2.33	36.0	24.4	27.9	27.9	22.0	6.98	0.00	2.33	36.0
c	65.1	87.2	50.0	88.3	47.6	98.8	59.3	94.1	84.8	63.9	74.4	72.0	70.9	72.0	88.3	100.	97.6	31.4
d	0.00	1.16	0.00	0.00	0.00	0.00	0.00	1.16	2.33	0.00	0.00	0.00	1.16	0.00	0.00	0.00	0.00	10.4

Legend:
1) The cause of diabetes in children
2) The role of insulin
3) Diet in IDDM diabetes
4) Intervention in hypoglycemia
5) Carbohydrates
10) Children's participation in trips/ camps
11) The ability of children to focus attention
12) Blood glucose measurement
13) Sports and physical activity
14) The role of emotional balance

6) Intervention in hyperglycemia
7) Carbohydrate intake after insulin
8) The symptoms of hypoglycemia
9) The symptoms of hyperglycemia
15) Informing others about diagnosis
16) The importance of knowing about IDDM
17) Child's behavioral at school
18) Child with IDDM in class

There are a lot of differences between the teachers' answers from the first interview (T2) and the second one (T2), presented in Figure 4. The values of,, good answers" were increased significantly. The differences, in descending order, could be better observed in Figure 5. On the first place are the *knowledge about insulin*, followed by *interventions and symptoms in case of hypoglycemia and hyperglycemia*, *blood glucose measurement* and what the children with IDDM could eat, *carbohydrate intake after insulin*. These items are specifically important for defining the ability to intervene in glycemic management. *The ability to focus attention* and understand *the relationship between emotion and glycemia balance,* and *how behavior could be influenced* by all this variables, are important in define the relationship between teachers and children with IDDM, and in teachers' intervention rate in crises.

Figure 4. The percentage off the correct answers before and after the intervention
Source: authors'own contribution

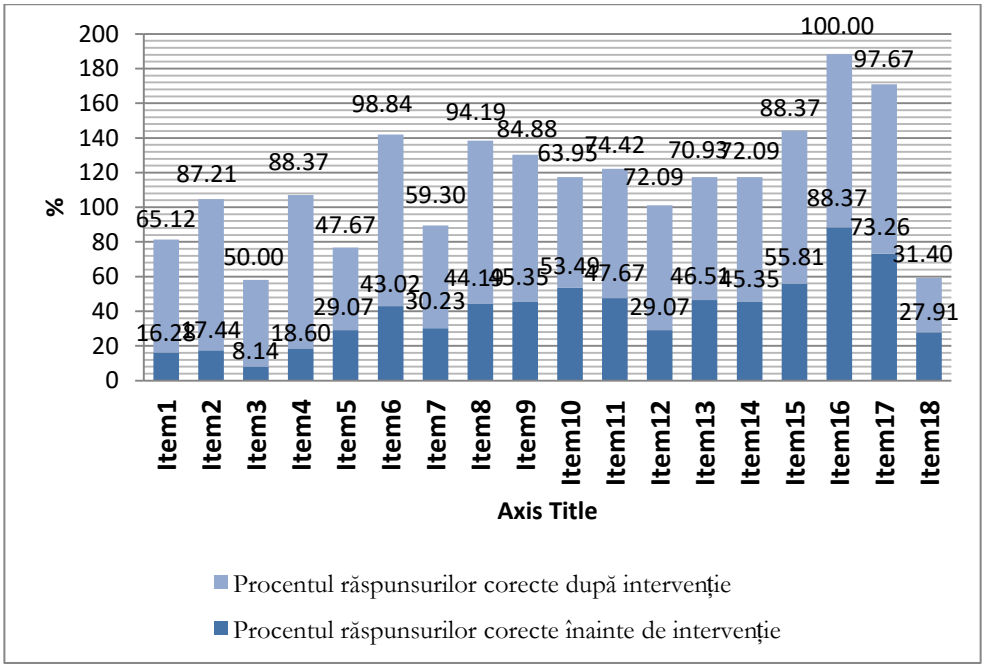
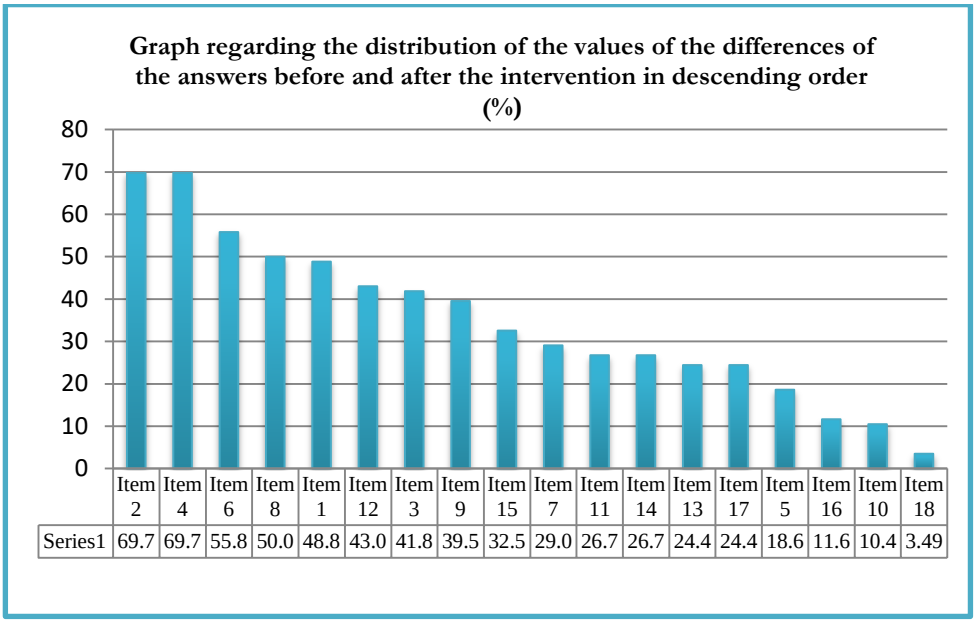


Figure 5.
Source: authors'own contribution



Legend:
2)The role of insulin
4)Intervention in hypoglycemia
6)Intervention in hyperglycemia
8)The symptoms of hypoglycemia
1)The cause of diabetes in children
12)Blood glucose measurement
3)Diet in IDDM diabetes
9)The symptoms of hyperglycemia
15) Informing others about diagnosis
7) Carbohydrate intake after insulin
11) The ability to focus attention
14) The role of emotional balance
13) Sports and physical activity
17) Child's behavioral at school
5) Simple Carbohydrates -examples
16)The importance of informations about DM

To find out the number of subjects who have changed their opinions / knowledge about the diabetes mellitus tip 1 (IDDM) after the participation in the course / intervention, and if this change is statistically significant we applied and processed the McNemar Test.

In each table (according to item no.) The number of subjects who changed their opinion / knowledge appears, in the sense that they initially gave incorrect answers (a, b, d) and after the course they opted for the correct answer (c).

The table below shows the total number of subjects who participated in the intervention (N = 86), the chi-square value for each comparison and the related value of the significance level (Sig.). Because the values are less than 0.05 in almost every situation (except items 10 and 18), it turns out that

the data obtained are statistically significant (Figure 6.), which confirms the hypothesis that through the participation of primary and secondary school teachers in a training course, they will improve their knowledge about IDDM and acquire an active and positive attitude towards children affected by this chronic disease.

Figure 6.
Source: authors'own contribution

Test Statistics[a]																
	(1)T1&T2	(3) T1&T2	(4) T1&T2	(5) T1& T2	(7) T1 & T2	(8) T1 &T2	(9) T1& T2	(10) T1& T2	(11) T1& T2	(12) T1& T2&	(13) T1 &T2	(14) T1 & T2	(15) T1 & T2	(16) T1 & T2	(17) T1 & T2	(18)T1 &T2
N	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86
Chi-Square[b]	38,205	32,237	58,017		19,862	41,023	30,250	1,939		35,027		16,690	24,300			1,241
Asymp. Sig.	,000	,000	,000		,000	,000	,000	,164		,000		,000	,000			,265
Exact Sig. (2-tailed)				,002[c]					,000[c]		,000[c]			,002[c]	,000[c]	
a. McNemar Test																
b. Continuity Corrected																
c. Binomial distribution used.																

4. Discutions

There were important changes in teachers knowledge about diabetes in children, after they have participate to the course, *learn* about interventions in case of hypo-or hyperglycemia, and *experimented* how to make their intervention in critical moments;

They had, also, the possibilities to ask questions and receive professional answers to unclear issues, express their fears and inabilities, describe school issues and how prepared they are to receive and to help a child with diabetes in school. The insignificant difference observed in both

item 10 and item 18, suggests the persistence of a concern related to the management of a child (pupil) with diabetes.

They justify this fear through as an important responsibility, associated with problems in the Romanian Education System, such as the obligation to serve more schools in the same didactic norm (same day, many times), lot of „papers" (bureaucratization), complicated curriculum, to many children in every class, insufficient medical staff, school structures with inadequate spaces.

The primary and secundary school teachers declared that they have to cope with lot of problems and challenges in daily work, by organizing and teaching curricular activities, because overcrowded classes, busy curriculum in all subjects. In the primary and secondary school in Romania, the emphasis is on the acquisition of information and less on the curricular adaptation for special needs, or formation of life skills in children.

Our study does not intend to burden the teachers with other responsabilites, but to highlight the importance of continuing education in order to better integrate the children with IDDM in schools.

5. Conclusions

There are many problems that concern both families of children with diabetes, and the school teachers, too. The children and their families are concerned about the difficulties of managing the disease, but also about the social barriers that make it difficult to achieve goals and meet personal needs, respect for the right to harmonious development and personal succes. The difficulties related to the insertion in the school and its adaptation to the special needs of some children are often translated by lack of communication, marginalization, absenteeism.

In this context, it is important to train teachers not only to improve knowledge and acquire higher degrees in education, but above to acquire knowledge and practical skills to facilitate the acces of all children to education and social integration. Also the confidence of children with diabetes to ask for help when they need and, in the same time, to live a normal life in their age group are two important goals of autonomy training in children with chronic disease. The teacher attitude could be a possitive model for children development relationships.

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