

What is teachers' knowledge about diabetes?

Jaka jest wiedza nauczycieli na temat cukrzycy

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Abstract

Diabetes mellitus type 1 (DM1) is one of the most often occurring chronic diseases in children. Young patients spend about a quarter of their lives at school. Therefore, care about a good metabolic control of disease may be partially dependent on the commitment and awareness of teachers.

The aim of the study was to evaluate teachers' knowledge concerning DM and hypoglycemia. The research was conducted among 581 teachers, with the use of authorship questionnaire containing 29 closed-ended and semi-open ended questions.

Only half of respondents knew what hypoglycemia was and could point to its symptoms. Few teachers knew how to help in case of hypoglycemia, more often they were women than men. Checking of glucose level or making injections during classes was intolerable in the opinion of 12.39% of teachers. Eating during classes was a problem for 6.89% and men tended to be more restrictive. The knowledge about ways of helping children suffering from DM was very important for 94.82% of respondents. Teachers (both men and women) who suffered from DM and/or had positive family history better estimated their knowledge. Teaching children suffering from DM1 was connected with better self-esteem of knowledge concerning the disease only in the group of men.

The knowledge of teachers concerning DM is insufficient, even among those who were teaching children suffering from DM1. The poor knowledge concerned the skills and proceeding during episodes of hypoglycemia.

Keywords: teachers, diabetes, knowledge, self-esteem, attitudes

Streszczenie

Cukrzyca typu 1 jest jedną z najczęściej występujących chorób przewlekłych u dzieci. Młodzi pacjenci spędzają około ¼ swojego życia w szkole. Wydaje się, że dobra kontrola metaboliczna choroby przynajmniej częściowo zależy od zaangażowania i świadomości nauczycieli.

Celem badania była ocena wiedzy dotyczącej cukrzycy oraz hipoglikemii wśród nauczycieli. Badanie zostało przeprowadzone wśród 581 nauczycieli przy użyciu kwestionariusza autorskiego zawierającego 29 pytań zamkniętych i półotwartych.

Jedynie połowa respondentów wiedziała czym jest hipoglikemia i potrafiła wymienić jej objawy. Mniejszość nauczycieli wiedziała w jaki sposób udzielić pomocy w przypadku niedocukrzenia, częściej kobiety niż mężczyźni. 12,39% nauczycieli stwierdziło, że kontrola poziomu glikemii i/lub wykonywanie iniekcji w czasie lekcji są niedopuszczalne. Spożywanie posiłków podczas lekcji stanowiło problem dla 6,89% badanych, częściej dla mężczyzn niż kobiet. 94,82% ankietowanych uznało, że wiedza w jaki sposób należy pomóc dziecku chorującemu na cukrzycę jest bardzo ważna. Zarówno nauczyciele, jak i nauczycielki chorujący na cukrzycę i/lub posiadający dodatnią historię rodzinną w kierunku cukrzycy lepiej oceniali swoją wiedzę na cukrzycę. Nauczanie dzieci chorujących na cukrzycę również wiązało się z wyższą oceną wiedzy na temat choroby, jednakże jedynie w grupie mężczyzn.

Wiedza nauczycieli na temat cukrzycy jest niewystarczająca, również wśród respondentów, którzy nauczali dzieci chorujące na cukrzycę. Brak wiedzy dotyczył w szczególności umiejętności i postępowania podczas epizodów hipoglikemii.

Słowa kluczowe: nauczyciele, cukrzyca, wiedza, samoocena, postawy

Introduction

Diabetes mellitus type 1 (DM1) is one of the most often occurring chronic diseases in children. According to the epidemiological results the incidence of DM1 keeps increasing [1]. In South-East Poland between 1980 and 1999 the morbidity increased significantly in the group of children under 14 years, especially in boys aged 10-14 [2]. Moreover in Poland, between 1986 and 1999 in this age group the threefold increase of new cases of DM1 was stated [3]. Also morbidity under 4 years rose at that time [2]. These data suggest that the problem of young diabetic patients is important. On the other hand DCCT study proved that adolescents had a higher risk of severe and moderate hypoglycemia and

also the HbA1c level was higher in this group [4]. Furthermore, a good metabolic control is the best method of preventing the vascular complications as well as protects the cognitive functions [5].

Young patients spend about a quarter of their lives at school. Therefore, the care about a good metabolic control of the disease may partially depend on the commitment and awareness of teachers. Teaching children suffering from DM1 is connected with some special situations, which require from the teachers basic medical knowledge and understanding the essence of the disease. Predominant problems may occur during and after physical activity, trips, collaboration with pupils and their parents and acute complica-

tions, especially hypoglycemia [6]. Additionally, the lack of regulations concerning for example the administration of drugs, providing first aid or even allocating of rooms for ill pupils, complicates the care of children. As mentioned previously, this situation may influence pupils' health and metabolic control of disease. Good control of disease is also important because insufficient metabolic control may be connected with poorer knowledge and worsening of cognitive functions [7, 8]. In some studies, it was proved that the knowledge of teachers concerning DM1 was not sufficient [4].

Despite the fact that children spend so much time at school, there are only few investigations concerning the above-mentioned problem in Poland as well as in Western Europe.

The aim of the study was to evaluate teachers' knowledge concerning DM1 and hypoglycemia, their attitudes and declared skills.

Materials and methods

The research was conducted among 581 teachers using authorship questionnaire containing 29 closed-ended and semi-open ended questions. These questions concerned general knowledge about DM, hypoglycemia and the ability of helping children during this complica-

tion. In South-East Poland this type of study had not been performed so far.

The results were organized and analyzed with the use of statistical chi-squared analysis. The statistical significance value was set at the level $p < 0.05$.

Results

The investigated group comprised 581 teachers from schools in South-East Poland, 105 men (18.1%) and 476 women (81.9%). The average age was 39.88 ± 9.08 years; the average period of work at school was 15.08 ± 9.15 years. Thirty-eight per cent of respondents were teaching arts subjects, 13.25% science, 4.13% biology, 7.1% physical training; 17.56% of teachers were teaching in 1st - 3rd classes of primary school (children between 7 and 10 years old) and the rest were teaching other subjects, such as artistic subjects or religion. Teachers in primary schools accounted for 51.64% of respondents, in secondary schools -19.1%, in college - 12.74% and 16.52% in vocational schools. DM affected 25.13% of examined teachers and/or their close relatives and 27.71% were teaching at least one child suffering from DM1.

Table 1 presents the answers evaluating the knowledge on DM in the group of all teachers, broken into men and women.

Table 1. The answers evaluating knowledge of teachers concerning diabetes broken into genders

	Good answers (%)		
Question	All teachers	Male	Female
Are there different types of diabetes?	89.16	87.62	89.5
Can diabetes be treated with injections?	94.15	93.33	94.33
What is glucometer?	91.91	95.24	91.18
How do you use a glucometer?	27.19	29.52	26.68
What is hypoglycemia?	53.18	47.62	54.41
What are the symptoms of hypoglycemia?	54.22	44.76	56.3
Good answer	28.4	22.86	28.62
Perfect answer	25.82	21.9	26.68
What is the glucose level during hypoglycemia?	16.18	17.14	15.97
Did you see symptoms of hypoglycemia in pupils?	9.81	13.33	9.03
How do you help pupils with hypoglycemia?	46.81	34.29*	49.58*
		p=0.005; chi²=8.082	
What is glucagon?	19.79	21.9	19.33
When do you administer glucagon?	14.11	16.19	13.66
How do you administer glucagon?	5.34	7.62	4,83
	No / it's unacceptable answer		
Is it possible to make injections during classes?	11.02/1.38	13.33/4.76*	10.5/0.63*
		p=0.003; chi²=11.766	
Is it possible to eat during classes?	6.71/0.52	12.38/5.46*	2.86/0.0*
		p=0.00012; chi²=20.805	
	"Yes" answer		
Is knowledge about DM useful?	94.82	96.19	94.51
Do you want to have information about children's disease?	96.21	91.43*	97.27*
		p=0.0054; chi²=8.054	
Should children with diabetes be excused from physical training?	16.18	22.86*	14.71*
		p=0.04; chi²=4.215	
Should children with diabetes go to special school for ill pupils?	9.98	11.43	9,66

Figure 1 presents the self-evaluation of knowledge concerning DM

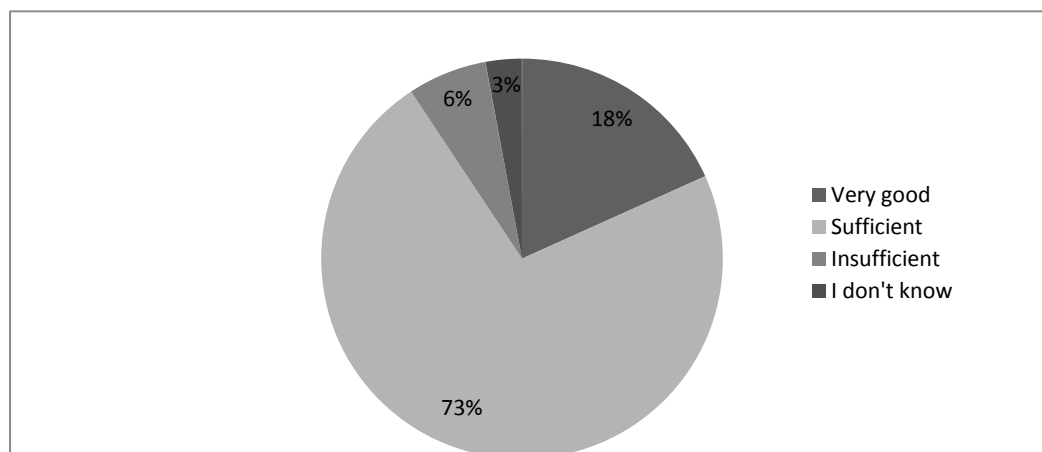


Table 2. Answers evaluating knowledge on diabetes of teachers who were/ were not teaching children suffering from diabetes

	Good answers (%)						
Question	All teachers	Teaching		Teaching - Females		Teaching – Males	
		No	Yes	No 72.06%	Yes 27.94%	No 72.38%	Yes 27.62%
Are there different types of diabetes?	89.16	88.7	91.93	88.34	92.42	86.84	89.66
Can diabetes be treated with injections?	94.15	94.03	94.41	94.17	94.7	93.42	93.1
What is glucometer?	91.91	89.98	96.89	88.92	96.97	94.74	96.55
How do you use glucometer?	27.19	p=0.023;chi²=7.575		p=0.0205; chi²=7.772		25.00	41.38
		23.39	36.65	23.03	35.61		
		p=0.002;chi²=13.006		p=0.0054;chi²=10.458			
What is hypoglycemia?	53.18	49.64	62.73	51.9	61.36	39.47	68.97
		p=0.0104;chi²=9.143				p=0.0068;chi²=7.319	
		54.22	52.74	58.38	55.68	58.34	39.48
		p=0.053; chi²=9.341		p=0.0436; chi²=9.820			
Good answer	28.4	30.07	24.22	32.36	22.73	19.74	31.03
Perfect answer	25.82	22.67	34.16	23.32	35.61	19.74	27.59
What is the glucose level during hypoglycemia?	16.18	15.75	17.39	16.33	15.15	13.16	27.59
Did you see symptoms of hypoglycemia in pupils?	9.81	3.58	26.09	2.62	25.76	7.89	27.59
		p<0.0001;chi²=66.696		p=0.0000;chi²=62.175		p= 0.008; chi²=7.044	
How do you help pupil with hypoglycemia?	46.81	44.39	53.42	48.10	53.79	27.63	51.72
						p=0.020; chi²=5.408	
What is glucagon?	19.79	14.8	32.92	13.70	34.09	19.74	27.59
		p<0.0001;chi²=24.307		p=0.0000;chi²=25.652			
When do you administer glucagon?	14.11	10.98	22.36	10.20	22.73	14.47	20.69
		p=0.0018;chi²=12.595		p=0.0016;chi²=12.837			
How do you administer glucagon?	5.34	3.34	10.56	2.92	9.89	5.26	13.79
		p=0.0024;chi²=12.053		p=0.0067;chi²=10.014			
		No / it is unacceptable answer					
Is it possible to make injections during classes?	11.02/1.38	11.69/1.67	9.32/0.62	11.37/0.58	8.33/0.76	13.16/6.58	13.79/0.0
Is it possible to eat during classes	6.71/0.52	7.64/0.72	4.35/0.0	6.71/0.0	2.27/0.0	11.84/3.95	13.79/0.0
		Yes answer					
Is the knowledge about DM useful?	94.82	94.26	94.25	94.15	95.42	94.74	100
Do you want to have information about children's disease?	96.21	96.42	95.65	96.5	99.24	96.05	79.31
						p=0.0061;chi²=7.508	
Should children with diabetes be exempted from physical training?	16.18	16.71	14.91	14.87	14.39	25.00	17.24
Should children with diabetes go to special school for ill pupils?	9.98	10.26	9.32	9.91	9.09	11.84	10.34

General knowledge concerning DM was not sufficient. Only half of respondents knew what hypoglycemia was and was able to point to its symptoms. Few teachers knew how to help in case of hypoglycemia, more often they were women than men. Some teachers (12.39%) stated that checking glucose level or making injections during classes was intolerable. Eating during classes was a problem for 6.89% of teachers and men tended to be more restrictive. In the opinion of 16.18% of teachers, children with DM should be exempted from physical training and 9.98% considered they had to attend special school for ill pupils. As many as 94.82% of respondents considered the knowledge of how to help children suffering from DM1 very important in their work and 96.21% of them wanted to have information about their pupils' disease. There was no statistical significance between the group having individual experience with DM and without it.

We compared the knowledge and the declared skills between groups of teachers who were/ were not teaching children with DM1. Thus, the general knowledge was comparable in those two groups but the declared skills and the knowledge of symptoms and proceeding during hypoglycemia were better in the group of respondents who were teaching children with DM1. Table 2 presents the results evaluating the knowledge on DM in a group of teachers who were/were not teaching children suffering from DM1 and division on gender.

We also analyzed data with respect to presence of DM in the group of respondents or their families. Teachers who suffered from DM and/or had close relatives affected by DM, had better declared skills, and also had greater knowledge concerning proceeding during hypoglycemia. The results are presented in Table 3.

Table 3. Answers evaluating the knowledge on diabetes among teachers who suffer from diabetes and/or had positive family history

Question	All teachers	Suffered/positive family history		Suffered/positive family history – Females		Suffered/positive family history – Males	
		No	Yes	No	Yes	No	Yes
Are there different types of diabetes?	89.16	87.82	93.15	87.57	95.08	88.89	83.33
Can diabetes be treated with injections?	94.15	95.17	91.1	95.2	91.8	95.06	87.5
				p=0.0196; chi²=5.445			
What is glucometer?	91.91	90.57	95.89	89.83	95.08	93.83	100
		(p=0.0415; chi²=4.154)					
How is glucometer used?	27.19	17.93	54.79	16.67	55.74	23.46	50.0
		(p=0.0000; chi²=75.02631)		p=0.0000; chi²=70.803		p=0.012; chi²=6.269	
What is hypoglycemia?	53.18	45.75	75.34	46.89	76.23	40.74	70.83
		(p=0.0000; chi²=38.45364)		p=0.0000; chi²=31.480		p=0.009; chi²=6.722	
What are the symptoms of hypoglycemia?	54.22	47.59	73.98	49.16	77.05	40.74	58.33
		(p=0.0000; chi²=35.63094)		(p=0.0000; chi²=25.652)			
Good answer	28.4	26.9	32.88	27.97	34.43	22.22	25.0
Perfect answer	25.82	20.69	41.1	21.19	42.62	18.52	33.33
What is the glucose level during hypoglycemia?	16.18	11.49	30.14	11.58	28.69	11.11	37.5
		(p=0.0000; chi²=28.01435)		p=0.0001; chi²=19.789		p=0.003; chi²=9.077	
Did you see symptoms of hypoglycemia in pupils?	9.81	8.97	12.33	7.63	13.11	14.81	8.33
How do you help pupil during hypoglycemia?	46.81	40.69	65.07	43.22	68.03	29.63	50.0
		(p=0.0000; chi²=26.09257)		p=0.0000; chi²=22.345			
What is glucagon?	19.79	17.01	28.08	16.38	27.87	19.75	29.17
		(p=0.0037; chi²=8.438873)		p=0.0056; chi²=7.675			
When do you administer glucagon?	14.11	11.26	22.6	11.02	21.31	12.35	29.17
		(p=0.0007; chi²=11.593)		p=0.0043; chi²=8.155		p=0.049; chi²=3.861	
How do you administer glucagon?	5.34	4.37	8.22	3.67	8.2	7.41	8.33
				p=0.0445; chi²=4.039			
	No / it's unacceptable answer						
Is it possible to make injections during classes?	11.02/1.38	11.49/1.61	9.59/0.68	10.45/0.85	10.66/0.0	16.05/4.94	4.17/4.17
Is it possible to eat during classes?	6.71/0.52	6.44/0.46	7.53/0.68	5.08/0.0	6.56/0.0	12.35/2.47	12.5/4.17
	Yes answer						
Is knowledge about DM useful?	94.82	94.47	95.86	94.33	95.04	95.06	100
Would you like to have information about children's disease?	96.21	95.86	97.26	97.18	97.54	90.12	95.83
Should children with diabetes be exempted from physical training?	16.18	16.78	14.38	14.97	13.93	24.69	16.67
Should children with diabetes go to special school for ill pupils?	9.98	10.57	8.2	10.17	8.2	12.35	8.33

Teaching children suffering from DM1 was connected with better self-evaluation of knowledge concerning the disease in the group of men (Table 4).

Table 4. Self-evaluation of knowledge of teachers teaching diabetic pupils

	Answers (%)						
Self-evaluation of knowledge	All teachers	Not teaching			Teaching		
		All	M	F	All	M	F
			p=0.0203; chi²=9.806			p=0.0203; chi²=9.806	
Very good	18.24	16.95	11.84	18.08	21.74	27.59	20.45
Sufficient	72.46	73.99	80.26	72.59	68.32	58.62	70.45
Insufficient	6.37	6.92	7.89	6.71	4.97	6.9	4.55
I don't know	2.93	2.15	0.0	2.62	4.97	6.9	4.55

Teachers who suffered from DM and/or had positive family history better estimated their knowledge, both men and women (Table 5).

Table 5. Self-evaluation of knowledge of teachers who suffered from diabetes and/or had positive family history

	Answers (%)						
Self-evaluation of knowledge	All teachers	Didn't suffer/ no family history			Suffer and/or positive family history		
		(p<0.001; chi²=31.184)					
		ALL	M	F	ALL	M	F
			p=0.00001; chi²=34.058				
Very good	18.24	14.94	16.05	14.69	28.08	16.67	30.33
Sufficient	72.46	77.47	74.07	78.25	57.53	75.0	54.1
Insufficient	6.37	5.98	8.64	5.37	7.53	4.17	8.2
I don't know	2.93	1.61	1.23	1.69	6.85	4.17	7.38

Discussion

Our study presents Polish teachers' attitudes and knowledge concerning DM. The general knowledge is not sufficient, similarly to declared skills. Despite the fact that most of teachers had elementary knowledge concerning DM, their detailed knowledge was insufficient to assist children with managing their disease. Teachers estimated that their poorest skills concerned checking blood glucose concentration or administration of glucagon. A positive fact is that respondents, who were teaching patients with DM1, had greater knowledge and declared better skills. The gained experience concerned the symptoms of hypoglycemia and proceeding in case of its occurrence. This relationship was noticeable especially in the group of women. It is worth emphasizing that teachers suffering from DM and/or having positive family history had the greatest knowledge and declared the best skills. In this group of teachers, the highest proportion knew about the disease of their pupils. It seems that on the one hand teaching children suffering from DM1 and/or having relatives with DM entails the interest in the disease. On the other hand, self-experience of teachers is connected with better knowledge. Amazing is the fact that teachers suffering from DM or having relatives with DM assessed their competences worse, despite they had the best knowledge and declared better skills. In case of teachers who were teaching children with DM, the self-esteem was better in comparison to the rest of respondents. However, we proved that neither teaching children with DM1 nor suffering from DM and/or having positive family history had any impact on the attitudes

of teachers concerning eating and making injections during classes. Interestingly, teachers suffering from DM and/or having relatives with DM represented the same opinion concerning the exclusion of children with DM and wanted to place them at special schools for ill pupils.

According to Amillategui et al., about 61-65% of children with DM1 need to monitor the glucose level but only 9-12% require insulin injections at school [9]. It is most important to avoid hypoglycemia during the classes. In our group, less than 10% of teachers noted the symptoms of hypoglycemia in their pupils. These results are similar to those obtained by Spanish investigators, where only 8% of teachers observed those symptoms, despite a quarter of children had the hypoglycemic episodes. Only half of our respondents could point to more than 3 symptoms of hypoglycemia and only a quarter of them answered perfectly. It seems that a big group of teachers might have seen the symptoms of hypoglycemia in their pupils but they did not have sufficient knowledge to diagnose it. Children should have a possibility of monitoring the glucose level in all situations, even during classes. It minimizes the risk of hypoglycemia and also improves the educational benefits [10]. According to Schmidt, skills of children become better with age, so in a group of older pupils self-control may be improved if the blood glucose level is strictly controlled [11]. Younger children (between 6 and 10) usually need some help with the management of their disease [12], so teachers should have elementary knowledge concerning insulin action and administration, physical activity and diet. There-

fore, especially in the highest classes of primary school and in secondary schools, children may be responsible for their illness and are more independent in management of DM1 [12]. In the light of the data, it is very strange that even more than 12 % of teachers, especially men, think that checking glucose level is not possible during their classes. In our opinion this attitude is caused by lack of knowledge how glucose control is important for those ill. The same situation is a case of eating during classes. Therefore, our investigation confirms that teachers have an inadequate understanding of DM [10, 13]. Also, they are not aware how important a proper DM control for reduction of risk of complications is [14]. On the other hand, no strict control of the disease increases the risk of hypoglycemia [15]. Following other authors, we believe that each pupil should be permitted to control blood glucose concentration during classes and eat meals if the glucose level decreases [14].

More than 16% of respondents, especially men, considered that children with DM1 should be excluded from physical training and we did not find the difference concerning this opinion between teachers who were/were not teaching pupils suffering from DM1. Moreover, also 14.4% of teachers suffering from DM and/or having close relatives with DM stated that those children should be excluded from physical activity. This is strange the more that those teachers know how important physical activity in DM treatment is. Aman et al., proved that despite physical activity was not associated with metabolic control and the number of episodes of hypoglycemia, it had the positive impact on quality of life and psychological health [16, 17]. In our opinion teachers' anxiety connected with physical training is also caused by the lack of knowledge and maybe the fear of hypoglycemia.

In our study about 96% of teachers wanted to have information about children's disease and this result is convergent to other investigations [9]. Probably it is caused by the intention of supplementing the information about disease and perhaps the desire to have some information from adults about all acute states in course of this disease.

Conclusions

Summing up the knowledge of teachers concerning DM is insufficient, even in the group of teachers who were teaching children suffering from DM1. The poorer knowledge concerned the skills and proceeding during episodes of hypoglycemia. A special educational program should be developed and the knowledge of teachers should be verified especially in case when they teach children suffering from diabetes. We believe that such lectures for the teachers would enjoy interest. It seems that special programs for each pupil should be created to keep safety and good metabolic control of disease but also for the comfort of teachers.

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