

# T- and B-Lymphocytes levels in children with Type 1 Diabetes in association with Candida infection



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**Introduction:** Although type 1 diabetes (T1D) is most common autoimmune chronic metabolic disease in childhood, data about the role of T-Lymphocytes (T-Ly) and B-Lymphocytes (B-Ly) in children after the diabetes onset are still controversial. The impaired immune response in T1D is considered as a risk factor for candidal infections. Disorders of cell-mediated immunity in patients with T1D were already reported, but most of the studies are conducted in laboratory models and few are repeated in humans.

The **aim** of the study was to evaluate the serum levels of T- and B-Ly in children with T1D as a predisposing factor for genital candidiasis (GC)

## Material:

We studied 71 children with T1D at the age of 6 to 18 years, divided into two groups – with and without GC and 30 age-matched healthy controls.

## Methods:

A **flow-cytometry immunophenotyping** of T-Ly (CD3+), Ts (CD8+), Th (CD4+) and B-Ly (CD19+) was performed.

**Microbiological** culture of genital discharge by the patients with T1D for diagnostic of GC was made.

**Glycated hemoglobin** (HbA1c) for assessment of metabolic control of T1D was measured. HbA1c  $\leq$  7.5% was considered as a sign of good metabolic control.

**Statistical analysis** with Statgraph and SPSS software was performed and as statistical significant a P-value  $<$  0.05 was defined.

## Results:

Positive cultures for candidal infection of genitalia had 24 (33,8%) of 71 studied diabetic patients. (**Fig.1**)

Poor long term metabolic control in all researched T1D patients was found: HbA1c -  $10,09 \pm 2,28\%$ , significantly higher in the group with GC -  $11,09 \pm 2,26\%$  than those without infection -  $9,39 \pm 2,18\%$  ( $p=0,0002$ ).

## (Fig. 2)

Serum levels of CD3+, CD4+ and CD8+ in all patients with T1D were found within the lower part of the normal reference range. No statistical significance with the healthy children was established ( $p>0,05$ ). (**Tabl.1**)

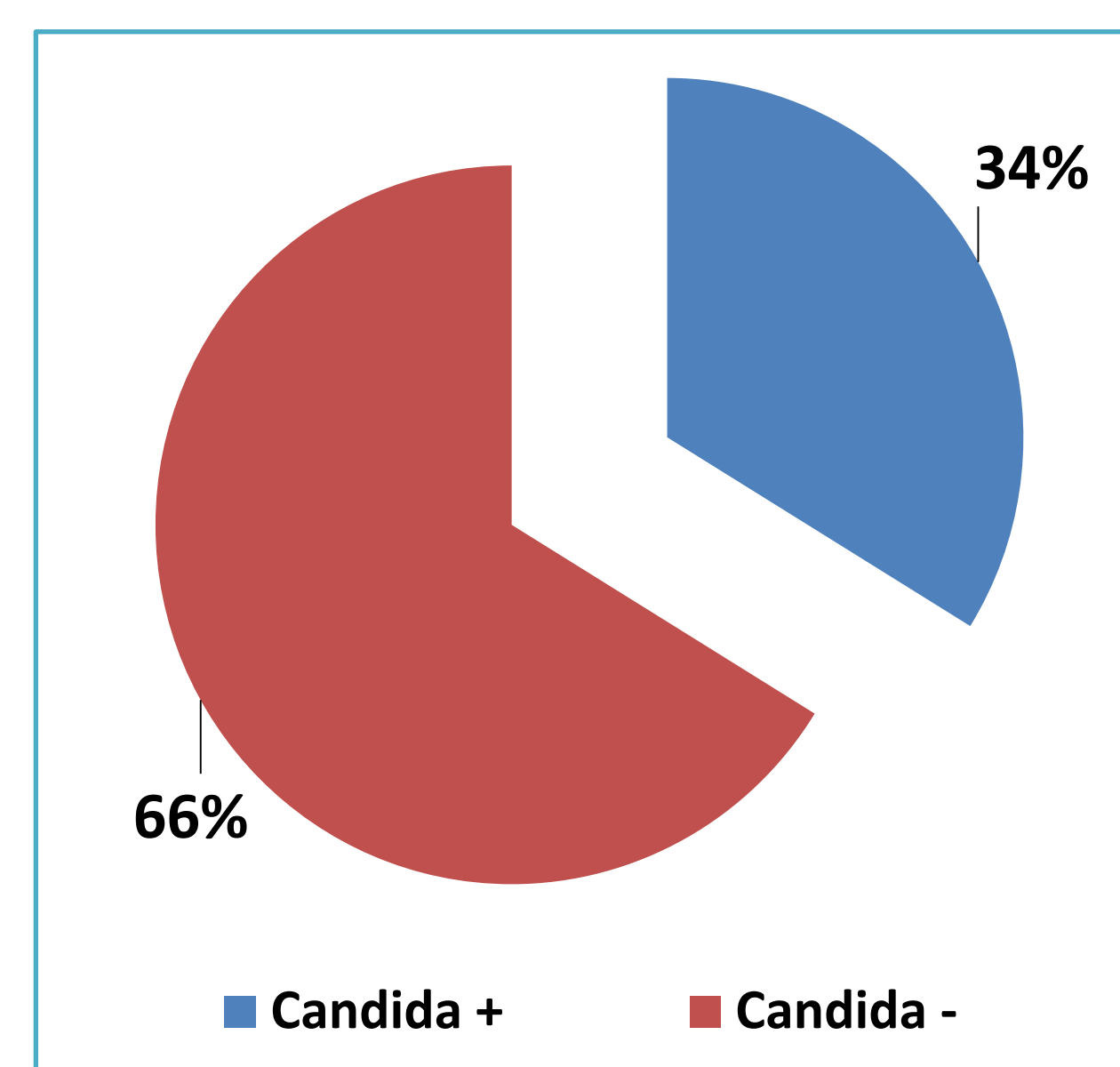
Serum levels of B-Ly 11,02% in all diabetic children were significantly lower than those in healthy controls 14,52%. ( $p=0,001$ ) (**Fig. 3**)

We found no significant differences between the researched T- and B-Ly levels in diabetic children with and without Candida. (**Tabl. 2**)

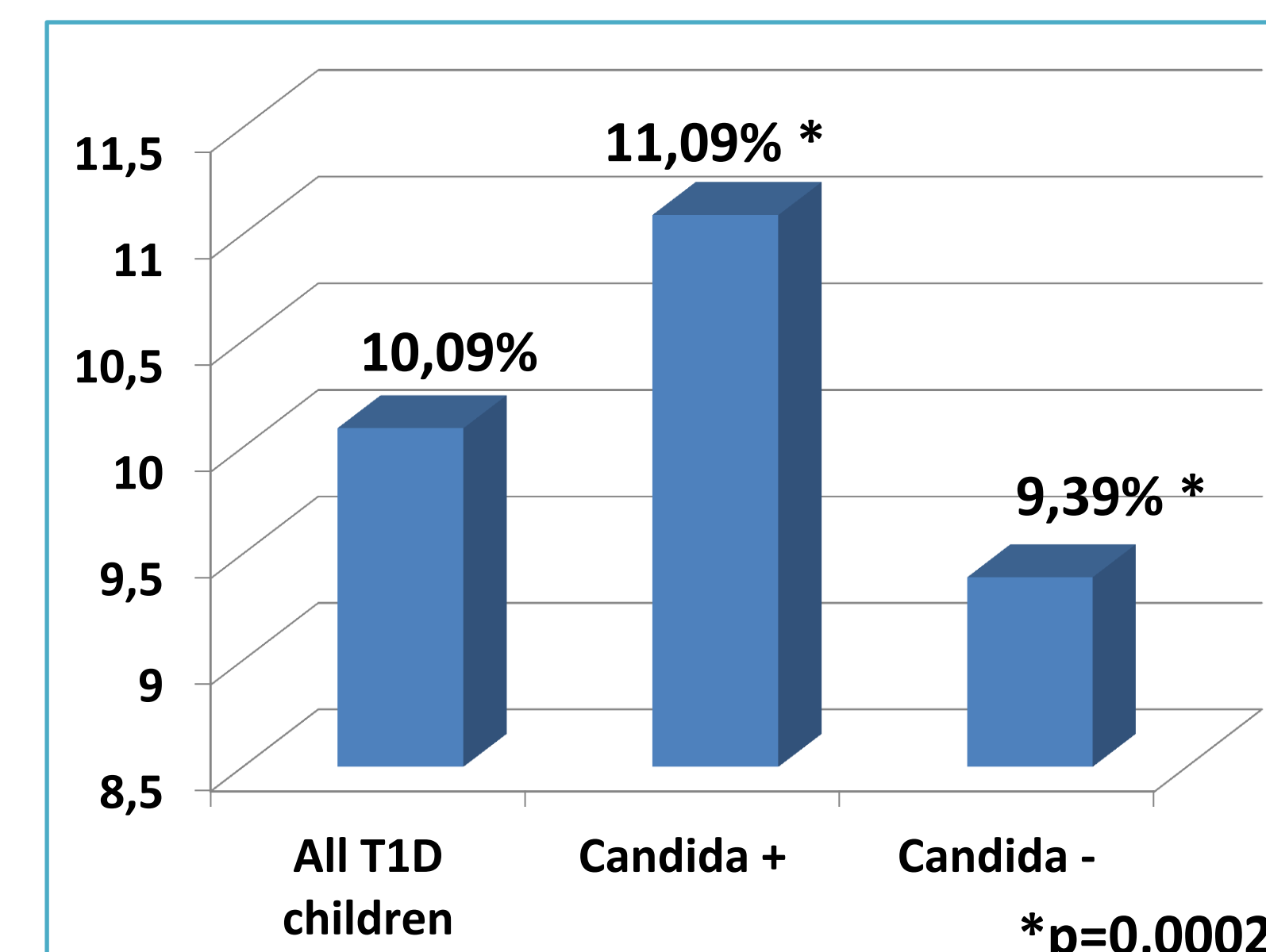
No significant correlation between the immunological parameters and metabolic control (HbA1c) was found.

**Tabl. 2 T- and B-Ly in diabetic children with and without Candida, presented as % and absolute count**

Ly	Candida <sup>-</sup> /N=47/			Candida <sup>+</sup> /N=24/			p
	Median	P <sub>25</sub>	P <sub>75</sub>	Median	P <sub>25</sub>	P <sub>75</sub>	
<b>T-Ly (CD3+)</b>							
%	<b>67,43</b>	65,16	75,36	<b>69,09</b>	65,6	75,39	<b>0,8</b>
Abs. count	<b>1656</b>	1284,5	2036,5	<b>1737,3</b>	1300,1	2096,6	<b>0,74</b>
<b>T-helpers (CD4+)</b>							
%	<b>35,6</b>	30,54	42,03	<b>34,5</b>	31,37	39,48	<b>0,43</b>
Abs. count	<b>839,7</b>	592,9	1080,8	<b>864,5</b>	674,8	1094,5	<b>0,63</b>
<b>T-suppressors (CD8+)</b>							
%	<b>30,7</b>	25,22	35,84	<b>30,5</b>	25,29	34,49	<b>0,72</b>
Abs. count	<b>743,6</b>	480,9	941,6	<b>742,9</b>	581,3	1011,2	<b>0,5</b>
<b>CD4+: CD8+ Ratio</b>							
	<b>1,27</b>	0,9	1,5	<b>1,14</b>	0,94	1,45	<b>0,55</b>
<b>B-Ly (CD19<sub>+</sub>)</b>							
%	<b>11,29%</b>	9,13	13,85	<b>10,62</b>	8,52	13,42	<b>0,39</b>
Abs. count	<b>243,65</b>	167,8	429,2	<b>268,65</b>	188,5	322,95	<b>0,99</b>



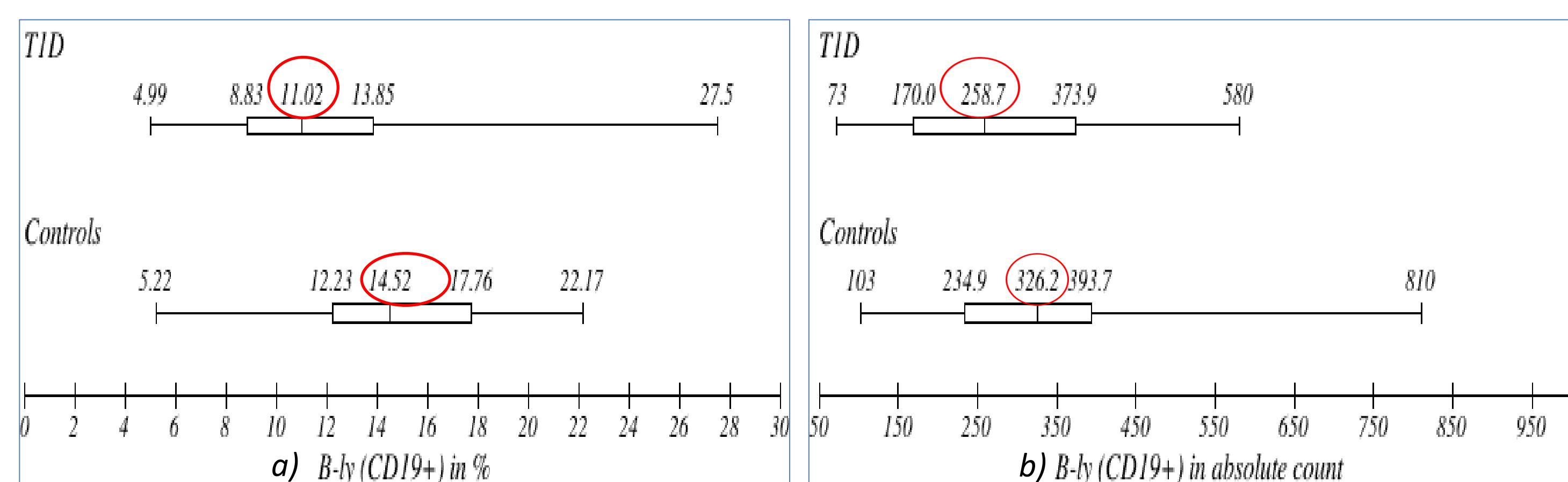
**Fig. 1 Children with T1D and Candida infection**



**Fig.2 Mean level of HbA1c in Candida+ and Candida- diabetic children**

**Tabl. 1 T-Ly in children with T1D and control group, presented as % and absolute count**

Ly	Children with T1D /N=71/			Control group /N=30/			p
	Median	P <sub>25</sub>	P <sub>75</sub>	Median	P <sub>25</sub>	P <sub>75</sub>	
<b>T-Ly (CD3+)</b>							
%	<b>69,43</b>	65,17	75,36	<b>68,54</b>	64,3	70,1	<b>0,07</b>
Abs. count	<b>1672</b>	1284,5	2036,6	<b>1544</b>	1203,6	1662	<b>0,1</b>
<b>T-helpers (CD4+)</b>							
%	<b>35,1</b>	31,1	41,1	<b>36,6</b>	34,89	39,01	<b>0,29</b>
Abs. count	<b>839,7</b>	656,7	1080,8	<b>829,2</b>	693,1	963,2	<b>0,6</b>
<b>T-suppressors (CD8+)</b>							
%	<b>30,3</b>	25,2	35,1	<b>29,3</b>	26,5	31,2	<b>0,1</b>
Abs. count	<b>743,6</b>	512	974,9	<b>653,3</b>	526,7	792,2	<b>0,07</b>
<b>CD4+: CD8+ Ratio</b>							
	<b>1,23</b>	0,9	1,5	<b>1,24</b>	1,16	1,42	<b>0,3</b>



**Fig. 3 B-Ly in children with T1D and control group, presented as a) % and b) absolute count (p=0,0001)**

## Discussion:

Our results consider poor long term metabolic control as a risk factor for genital candidiasis in children with T1D, which is consistent with literature data.

There are controversial data in the literature behalf of the cell-mediated immunological parameters in diabetic patients. The mean levels of the evaluated T-Ly in our patients were distributed within the lower part of the normal limits. Serum levels of B-Ly in all diabetic children were significantly lower than those in healthy controls

Although non significant, our results consider a trend of mild depression of T- and B-lymphocytes levels in the diabetic children with candidal infection. This trend requires confirmation by further larger researches.

**Conclusion:** In the children with T1D with poor long term metabolic control T-Ly levels were distributed at the lower reference range and B-Ly were decreased. No significant differences in association with Candida infection was found.

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