SCREENING FOR AUTONOMIC NEUROPATHY IN CHILDREN AND ADOLESCENTS WITH TYPE 1 DIABETES MELLITUS

Dimitra Kallinikou[1], Charalampos Tsentidis[1], Maria Louraki[1], Asteroula Papathanasiou[1], Christina Kanaka-Gantenbein[2], Kyriaki Karavanaki[1]

[1] Diabetes Clinic, 2nd Department of Paediatrics, University of Athens, "P.&A. Kyriakou" Children's Hospital, Athens, Greece.
[2] Diabetes Center, First Department of Paediatrics, University of Athens, "Aghia Sophia" Children's Hospital, Athens, Greece.

Introduction and objectives: Diabetic neuropathy is among the least recognized complications of diabetes, despite its significant negative impact on survival and quality of life. Characteristic neuronal alterations may occur subclinically early in the course of the disease, even in childhood. The prevalence of subclinical neuropathy in paediatric population ranges from 7.9~19% in different studies. Our objective was to study the prevalence of subclinical autonomic and peripheral neuropathy in T1D children and adolescents and its correlations with associated factors.

Methods: We evaluated 97 T1D children and adolescents (mean±SD age 12.9±2.8 years, T1D duration: 5.14±3.5years) and 80 controls (mean±SD age 11.9±2.7 years). We examined pupillary dilatation (PD) in darkness, an index of autonomic neuropathy, using a Polaroid pupillometer and vibration sensation threshold (VST), an index of peripheral neuropathy, using a Biothesiometer. Abnormal cut-off values (<5% or >95% respectively) were calculated from control values distribution (Table 1.). PD and VST were compared between patients and controls and were analyzed in relation to confounding factors.

Table 1. Normal VST and PD values, derived from normal children. Data are presented as mean(±SD), median (range)	
Mean index value	2.58 ± 0.65, 2.5 (1.37~4.5)
Mean thumb index	2.78 ± 0.77, 2.62 (1.12~5)
Mean toe value	2.65 ± 0.74, 2.78 (1~5.25)
Mean tibia value	4.49 ± 1.46, 4.25 (1.75~8.75)
PD (pupil / iris in mm X 100)%	< 62.85 %

Results: PD impairment was more frequent in the T1D group, compared to controls (Table 2.). Moreover, in the T1D group impaired VST were more frequent than in the controls in the lower (Table 3. and 4.) and upper limbs (Table 5. and 6.) respectively.

Table 2. Abnormal PD distribution in patients and controls			
population	Normal PD	Abnormal PD	total
Patients (n=)	67	31	98
proportion %	68.37%	31.63%	100
Controls (n=)	57	2	59
Proportion %	96.61%	3.39%	100
p<0.01, Fischer's exact test			

Table 3. Left lower limb abnormal VST distribution in patients and controls			
population	Normal VST	Abnormal VST	total
patients(n)	76	23	99
proportion%	76.77%	23.23%	100
controls(n)	140	10	150
proportion%	93.33%	6.67%	100
p<0.01, Fischer's exact test			

Table 4. Right lower limb abnormal VST distribution in patients and controls			
population	Normal VST	Abnormal VST	total
patients(n)	71	28	99
proportion%	71.72%	28.28%	100
controls(n)	144	6	150
proportion%	96%	4%	100
p<0.01, Fischer's exact test			

Table 5. Left upper limb abnormal VST distribution in patients and controls			
population	Normal VST	Abnormal VST	total
patients(n)	76	23	99
proportion%	76.77%	23.23%	100
controls(n)	140	10	150
proportion%	93.33%	6.67%	100
p<0.01, Fischer's exact test			

PD was associated with **age** ***(Pearson's r=0.16, p=0.038),*** **HbA1c** (***r=0.23, p=0.048)*** and **diabetes duration** ***(r=0.20, p=0.022).***
In terms of **VST,** in the whole group, **older age** ***(p<0.001)*** and **puberty** were associated with greater proportion of abnormal VSTs in the lower limbs in pubertal vs prepubertal children **(left: 17.7% vs 2.8%, *p=0.001*, right: 19.4% vs 0.0%, *p<0.001*).**

Table 6. Right upper limb abnormal VST distribution in patients and controls			
population	Normal VST	Abnormal VST	total
patients(n)	76	23	99
proportion%	76.77%	23.23%	100
controls(n)	146	4	150
proportion%	97.33%	2.67%	100
p<0.01, Fischer's exact test			

Conclusion: Impaired indices of peripheral and autonomic neuropathy are present in a significant proportion of T1D children and adolescents, although asymptomatic. Indices of diabetic neuropathy are associated with age, diabetes duration, puberty and the quality of glycaemic control.

References:
1) Schwingshandl J,Simpson JM,Donaghue K,Bonney MAS, Howard N,Silink M. Pupillary abnormalities in type I diabetes occurring during adolescence. Diabetes care 1993;16:630-3.
2) Karavanaki K, Davies G, Hunt L, Morgan M, Baum J: Pupil size in diabetes Arch Dis Child 1994;71:511-515
3) Karavanaki K, Baum J: Coexistence of impaired indices of autonomic neuropathy and diabetic nephropathy in a cohort of children with type 1 diabetes mellitus. . J Pediatr Endocrinol Metab2003;16:79-90.
4) Vinik A, Maser R, Mitchell B, Freeman R: Diabetic autonomic neuropathy. Diabetes Care 2003 26:1553-1579
5) Boysen A, Lewin M, Hecker W, Leichter H, Uhlemann F: Autonomic function testing in children and adolescents with diabetes mellitus. Pediatric diabetes 2007;8:261-264
6) Tang M, Donaghue KC, Cho YH, Craig ME. Autonomic neuropathy in young people with type 1 diabetes: a systematic review. Pediatr Diabetes.2013;14:239-248.
7)Nelson D, Mah J, Adams C, Hui S, Crawford S, Darwish H, Stephure D, Pacaud D: Comparison of conventional and non-invasive techniques for the early identification of diabetic neuropathy in children and adolescents with type 1 diabetes. Ped Diab 2006;7:305-310

Identifier: P1-220, Diabetes

55th Annual ESPE Meeting
ESPE 2016 10-12 SEPTEMBER PARIS, FRANCE

55ESPE 202--P1
Diabetes
Charalampos Tsentidis
DOI: 10.3252/pso.eu.55ESPE.2016
Poster presented at: ESPE 2016 PARIS