INVESTIGATIONAL STUDY OF THE IMPACT OF DIABETES ON COGNITIVE FUNCTION

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Introduction

Modern research studies reveal a negative impact of diabetes on cognitive function(1-3). Nonetheless, little is known about the risk factors that are involved in this disturbance.

The present study aimed to examine the associations among cognitive/emotional functions and a number of metabolic factors associated with diabetes, in order to identify a possible link between cognitive decline and diabetes

Materials and Methods

A cross-sectional study was designed and conducted. The sample consisted of patients from the outpatient diabetes clinic (First department of internal medicine AHEPA Hospital) and the local center of Alzheimer and Dementia.

In total one hundred and thirty-five (n=135) patients (diabetics and non diabetics) were investigated. Only subjects with mild cognitive impairment or mild dementia were recruited in this study, with those suffering from heavy dementia being excluded. A wide range of metabolic factors were investigated as well as cognitive function using cognitive screening tests (fig.1)

Results

In the group of diabetic patients a significant higher cognitive impairment, assessed with MOCA test, was revealed (fig. 2). Cognitive function was not associated with the duration of diabetes and metabolic deregulation, as assessed by HbA1c. A significant mild positive correlation between total cholesterol (r=0,273, p=0,042) and triglycerides (r=0,271, p=0,042) with cognitive function was found in the group of diabetic patients. A similar correlation between HDL and ADCS-ADL was present in the group of non diabetic patients (r=0,329, p=0,02). A mild positive correlation between waist circumference and cognitive function (ADCS-ADL test) was found in the group of diabetic patients (r=0,289, p=0,036). Peripheral neuropathy, as assessed with biothesiometry, showed strong negative correlation with cognitive function (fig. 3).

Non diabetic patients- Sample charactercteristics		
N=63 (17♂ 46♀)		
Age	69,470	±8,663
BMI	28,894	(6,6)
WC	97,642	±12,324
SBP	130,00	(22,5)
DBP	80,00	(15)
Glu	91	(13)
HbA1c	5,7	(0,5)
GFRepi	77,820	±17,356
Urine albumin 24h specimen	60,473	±80,147
Chol	97,170	±31,213
LDL	11,085	±27,217
HDL	60,800	±18,457
TRG	108	(90)
Isoprostane 8	0,92	(0,79)
Tests of Cognitive Function		
MMSE	28	(3)
MOCA	25	(7)
IADL	8	(0)
CDR	0,5	(0,5)
HAMILTON	5	(6)
ADCS-ADL	72	(14)

Diabetic patients- Sample characteristics		
N=72(30♂ 42♀)		
Age	70,930	±7,529
BMI	30,269	±5,454
WC	102,667	±13,062
SBP	140	(25)
DBP	80	(10)
Glu	108	(85)
HbA1c	7,2	(2)
GFRepi	79	(27)
Urine Albumine 24h specimen	140,675	±59,543
Chol	179	(37,5)
LDL	106,374	±35,885
HDL	48	(16)
TRG	146,19	±69,036
Isoprostane 8	0,92	(0,67)
Tests of Congnitive Function		
MMSE	28	(3)
MOCA	23	(8)
IADL	8	(0)
CDR	0	(1)
HAMILTON	4	(6)
ADCS-ADL	74	(7)

Figure 1. Metabolic characteristics and results of cognitive function tests in non diabetic and diabetic patients

Tools of Cognitive Function Assessment	Statistical significance	Diabetics		Non diabetics	
MMSE	p=0,563	28	(3)	28	(3)
IADL	p =0,770	8	(0)	8	(0)
CDR	p =0,219	0	(1)	0,5	(0,5)
HAMILTON	p =0,380	4	(6)	5	(6)
ADCS-ADL	p =0,080	74	(6,8)	72	(14)
MOCA	p =0,011*	23	(8)	25	(7)

Figure 2. Comparison of cognitive function between the two groups

Diabetic patients	HAMILTON	MMSE	MOCA	IADL	CDR	ADCS-ADL
BIOS RF	r_s=0,125 p=0,562	**r_s =-0,444 p=0,003***	r_s= -0,282 p=0,182	r_s=-0,143 p=0,504	r_s= 0,027 p=0,899	r_s= -0,235 p=0,269
BIOS LF	r_s= 0,081 p =0,707	**r_s =-0,688 p =0,0001**	**r_s =-0,524 p=0,009***	r_s= 0,069 p =0,749	r_s= 0,153 p =0,475	r_s= -0,343 p =0,101

Figure 3. Negative correlation between cognitive function and peripheral neuropathy assessed with biothesiometry

Conclusion

It seems that metabolic abnormalities that accompany diabetes mellitus may provide a great amount of risk factors responsible for mild cognitive impairment and dementia.

References

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ECE 2016 503-EP
Diabetes complications
Athanasios Mousiolis
Poster presented at: ECE2016 28 – 31 May 2016 MUNICH, GERMANY 18th EUROPEAN CONGRESS OF ENDOCRINOLOGY
PosterSessionOnline.com