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Introduction

Multiple risk factors are associated with Vascular Dementia (VaD), but the individual contribution of each to disease onset and progression is unclear. We examined the relationship between diabetes mellitus type 2 (DM) and the clinical variables associated with VaD.

Methods

- Subjects (N=63)** were recruited from The Michael E DeBakey Veteran's Affairs Medical Center Cognitive Disorders Clinic. All patients had a diagnosis of possible/ probable VaD according to NINDS-AIREN criteria. 29 patients had a prior diagnosis of DM and the remaining 34 did not have DM.
- Cognition** was assessed using the Mini Mental Status Examination (MMSE). Scores of 10-24 were required at baseline and subjects needed at least 3 follow-up evaluations.
- Rate of MMSE decline** was calculated as the difference between MMSE scores at the first and the last visits divided by the time that elapsed.
- Neuropsychiatric Symptoms** were coded as on the Neuropsychiatric Inventory (NPI)
- Pearson Chi square test and Student's t test were used for univariate analysis and Logistic regression for multivariate analysis.

Results

Baseline Characteristics of VaD Patients with and without DM

Mean (SD) N (%)	DM+ (N=29)	DM- (N=34)	p value
Age in years	77.0(7.11%)	79.7(8.38%)	0.18
Non-Caucasian	15 (51.7%)	9 (26.5%)	0.04
Stroke	9 (32.1%)	15 (44.1%)	0.43
Hypertension	25 (86.2%)	26 (76.5%)	0.36
Dyslipidemia	21 (72.4%)	21 (61.8%)	0.43
Current smokers	7 (24.1%)	6 (17.6%)	0.55
IHD	13 (44.8%)	11 (32.4%)	0.44
Valvular disease	1 (3.45%)	0 (0%)	0.46
Atrial fibrillation	1 (3.45%)	3 (8.82%)	0.62
CHF	7 (24.1%)	1 (2.94%)	0.02
Alcoholics	3 (10.3%)	6 (17.6%)	0.49

Univariate analysis comparing clinical outcomes in VaD patients with and without DM

Mean(SD) N (%)	Before matching DM+ (N=29)	DM- (N=34)	p value
Age of onset	71.9(6.54)	77.1(6.84)	0.02
MMSE decline/year	3.60(1.82)	2.40(1.41)	0.03
One or more neuropsychiatric symptoms	18 (62.1%)	3(12.5%)	0.00

Multivariate association between risk factors and rate of yearly decline in MMSE

Variables	Regression co-efficient (95% CI)	p value
Stroke	-0.00(-1.01,0.99)	0.98
Hypertension	-0.19(-2.14,0.49)	0.21
Dyslipidemia	0.17(-0.42,1.69)	0.23
Current Smoker	-0.04(-1.37,1.02)	0.77
IHD	0.04(-0.93,1.22)	0.79
Valvular disease	-0.13(-5.84,2.36)	0.40
Atrial fibrillation	-0.06(-2.33,1.53)	0.68
CHF	-0.06(-1.91,1.32)	0.72
Alcohol abuse	0.10(-0.84,1.86)	0.45
DM	0.33(0.12,2.21)	0.03

Multivariate association between risk factors and age of onset of VaD

Variables	Regression co-efficient (95% CI)	p value
Stroke	-0.37(-8.56,-1.37)	0.00
Hypertension	0.15(-1.96,7.07)	0.26
Dyslipidemia	-0.13(-5.45,1.81)	0.32
Current Smoker	-0.09(-5.58,2.67)	0.48
IHD	-0.03(-4.14,3.30)	0.82
Valvular disease	-0.09(-18.9,8.17)	0.49
Atrial fibrillation	0.01(-7.36,7.88)	0.95
CHF	-0.00(-5.56,5.50)	0.99
Alcohol abuse	0.02(-4.36,4.96)	0.89
DM	-0.42(-9.18,-2.10)	0.00

Summary

- VaD patients with DM had
- earlier onset of VaD (71.9 ± 6.54 vs. 77.2 ± 6.03 , $p < 0.001$)
 - faster rate of decline per year on the MMSE (3.60 ± 1.82 vs. 2.54 ± 1.60 points, $p = 0.02$), and
 - a greater incidence of neuropsychiatric symptoms (62% vs. 21%, $p = 0.02$).

Conclusions

- DM may be associated with a greater clinical deterioration of VaD
- It is critical to ascertain whether better glycemic control would mitigate the harmful effects of DM on VaD because of the great number of patients who simultaneously have both disorders
- Studies with larger sample size and HbA1C correlations are needed to validate our findings.