

A Comparison Of Alzheimer’s Disease Neuropathology And Vascular Pathology Between Hispanic And Non-Hispanic White Populations

Jose Mojardin Moreno BS¹, Kassu Beyene PhD², Alexandra Paget-Blanc PhD², Marwan Noel Sabbagh MD^{1,2}

¹Creighton University School of Medicine – Phoenix, AZ, USA; ²Barrow Neurological Institute, Phoenix, AZ, USA

Introduction

There is some research exploring the differences in mortality, neuropathological, and vascular pathology data at autopsy between Hispanic and non-Hispanic White (NHWs) populations in the United States. Yet, it's still relatively unknown how these two populations’ pathological disease burdens vary at a larger scale.

Methods

We used the National Alzheimer’s Coordinating Center (NACC) neuropathology database and compared the prevalence of several different neuropathological signs of Alzheimer’s disease from autopsy between the two groups. The groups were assigned based on whether the donors self-identified as Hispanic or NHWs. Categories looked at include Thal phase amyloid, Braak stage for neurofibrillary tangles, neuritic plaques and several vascular pathologies (infarcts/lacunes, microinfarcts, arteriolosclerosis, cerebral amyloid angiopathy, laminar necrosis, and hemorrhages/microbleeds). There are 33,530 participants who identified as NHWs and 1,276 participants that identified as Hispanic, for a total of 34,806 participants whose neuropathological data is available.

Results

There was a statistically significant difference between Hispanics and NHWs in the percentage of the group with advanced neuropathological burden. In Thal phase for amyloid plaques, the later stages (A3) contained a higher proportion of the Hispanic group when compared to NHWs (p<0.05). This pattern is also observed in Braak staging for neurofibrillary degeneration (significant differences in stage B3; p<0.05) and density of neocortical neuritic plaques (significant differences in stage C3; p<0.05). The National Institute on Aging - Alzheimer’s Association (NIA-AA) has an ABC score that considers these three parameters, and we see a substantial increase in the “high neuropathologic change” category for Hispanics (p<0.05). When looking at the vascular pathological burdens, we find that there is no statistically significant difference between groups for infarcts/lacunes, arteriolosclerosis, laminar necrosis, nor microinfarct burden (p<0.05) and more severe cerebral amyloid angiopathy (p<0.05) than NHWs. When looking at overall vascular pathological burdens, Hispanics show a similar percentage of individuals affected, albeit with a difference of 1% more (p<0.05).

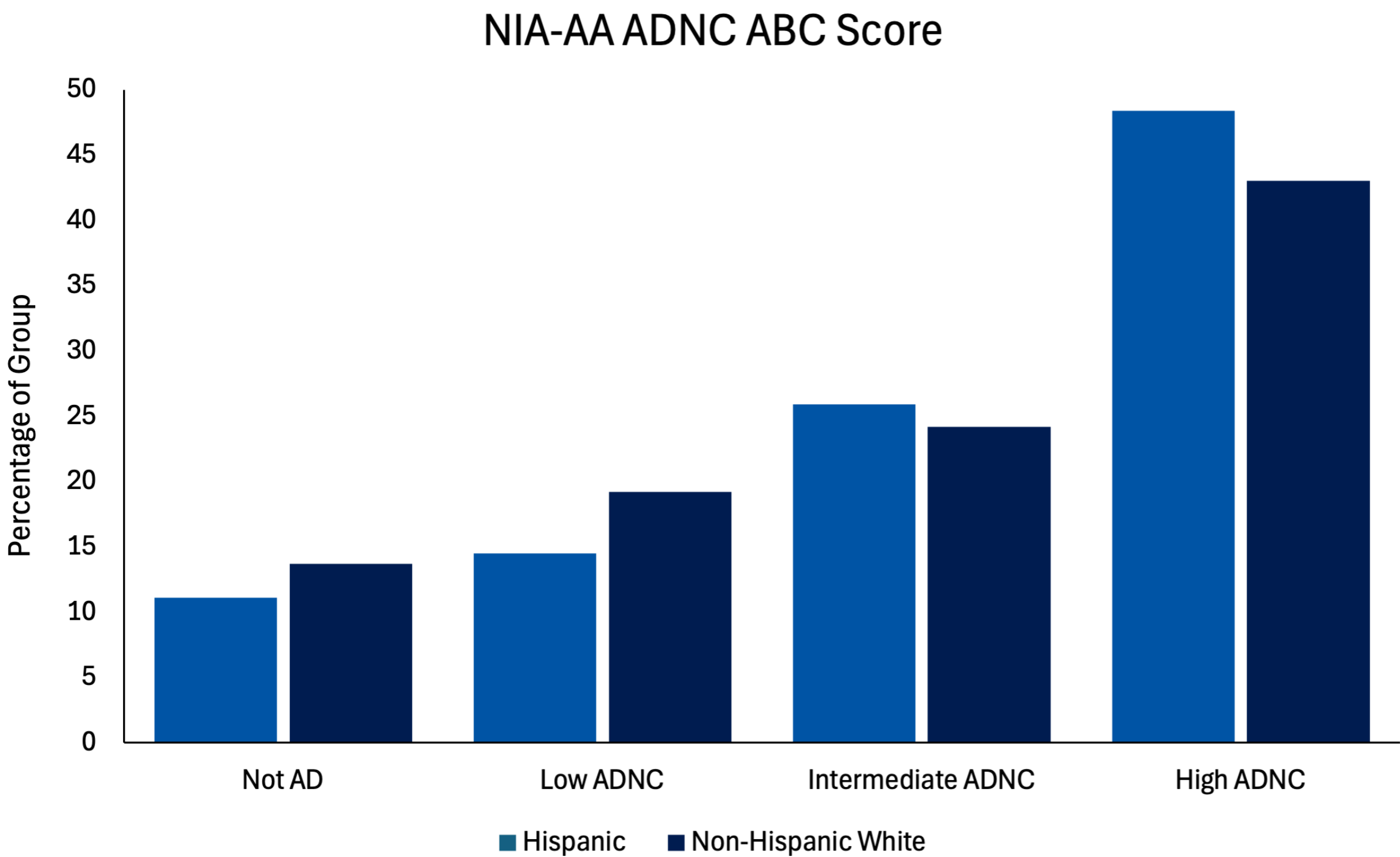


Figure 1: The National Institute on Aging - Alzheimer’s Association (NIA-AA)’s ABC score, formulated by combining the Thal phase for amyloid plaques (A score), the Braak stage for neurofibrillary degeneration (B score), and the density of neocortical neuritic plaques (C score).

Variable	Category	Hispanic	Non-Hispanic White	P-value
Sex	Female	650 (50.9)	16370 (48.8)	0.1450
	Male	626 (49.1)	17160 (51.2)	
Thal Phase for Amyloid Plaques (A Score)	Phase 0 (A0)	105 (11.1)	3511 (13.8)	0.0040
	Phase 1 (A1)	56 (5.9)	2150 (8.5)	
	Phase 2 (A1)	63 (6.7)	1514 (6.0)	
	Phase 3 (A2)	114 (12.1)	3278 (12.9)	
	Phase 4 (A3)	208 (22.1)	4993 (19.6)	
	Phase 5 (A3)	396 (42.0)	9994 (39.3)	
Braak Stage for Neurofibrillary Degeneration (B Score)	Stage 0 (B0)	42 (3.3)	1521 (4.6)	<0.0001
	Stage I (B1)	69 (4.5)	2289 (7.0)	
	Stage II (B1)	139 (11.0)	3928 (12.0)	
	Stage III (B2)	123 (9.7)	4131 (12.6)	
	Stage IV (B2)	143 (11.3)	4848 (14.8)	
	Stage V (B3)	345 (27.3)	5936 (18.1)	
Density of Neocortical Neuritic Plaques (C Score)	Stage VI (B3)	401 (31.8)	10195 (31.0)	<0.0001
	No neuritic plaques (C0)	228 (17.9)	8402 (25.1)	
	Sparse neuritic plaques (C1)	165 (12.9)	4668 (14.0)	
	Moderate neuritic plaques (C2)	272 (21.3)	6692 (20.0)	
NIA-AA Alzheimer’s Disease neuropathologic change (ABC score)	Frequent neuritic plaques (C3)	610 (47.8)	13657 (40.9)	0.0001
	High ADNC	456 (48.4)	10811 (43.0)	
	Intermediate ADNC	244 (25.9)	6071 (24.2)	
	Low ADNC	137 (14.5)	4813 (19.2)	
Infarcts/Lacunes	Not AD	105 (11.1)	3435 (13.7)	0.8531
	Yes	1068 (83.7)	27752 (83.5)	
Arteriolosclerosis	No	208 (16.3)	5499 (16.5)	0.1800
	None	211 (18.8)	5256 (17.0)	
	Mild	408 (36.4)	10934 (35.4)	
	Moderate	369 (32.9)	10487 (34.0)	
Laminar Necrosis	Severe	133 (11.9)	4174 (13.5)	0.1253
	No	1089 (98.4)	26486 (98.9)	
Hemorrhages/ Microbleeds	Yes	18 (1.6)	291 (1.1)	0.0841
	No	1168 (93.1)	30765 (94.3)	
Microinfarcts	Yes	86 (6.9)	1847 (5.7)	<0.0001
	No	1057 (82.8)	25676 (77.2)	
Cerebral Amyloid Angiopathy	Yes	219 (17.2)	7572 (22.8)	<0.0001
	None	444 (35.4)	13126 (39.5)	
	Mild	257 (20.5)	10008 (30.1)	
	Moderate	336 (26.8)	6618 (19.9)	
Ischemic, Hemorrhagic, or Vascular Pathology Present	Severe	218 (17.4)	3449 (10.4)	0.0108
	No	12 (1.0)	670 (2.0)	
≥1 Vascular Pathology Present		1246 (99.0)	32587 (98.0)	

Conclusions

The results highlight the notion that, for the observed populations at the time of death, Hispanics demonstrate a similar vascular pathology burden (ie, percentage of their own group) within the derived categories (ABC score, laminar necrosis, hemorrhages/microbleeds, *cerebral amyloid angiopathy*) while having significantly more advanced neuropathologic stages when compared to NHWs.

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