

Association between Stop Bang questionnaire and Alzheimer's disease blood based biomarkers in the Brazilian Cog-Aging cohort

8929

Ana Carolina Oliveira Sinzato^{1,2}, Pedro Vitor Araujo Valadares^{1,2}, Joice Coutinho de Alvarenga^{2,3}, Giovanna Correia Pereira Moro^{1,2}, Thaise Vallesca Queiroz^{1,2}, Gabriela Tomé Oliveira Engelmann^{2,3}, Jonas Jardim de Paula^{3,4}, Marco Aurélio Fagundes Angelo¹, Anja Schneider⁵, Pamela Martino Adami⁶, Maria Carolina DALMASSO, PhD⁷, Débora Marques de Miranda^{8,3}, Marco Aurélio Romano-Silva^{8,3}, Luiz Armando Cunha de Marco^{8,3}, Bernardo de Mattos Viana^{3,4}, Alfredo Ramírez Zuniga^{6,9}, Maria Aparecida Camargos Bicalho^{3,10}.

1. Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, 2. Cog-Aging Research Group, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, 3. Molecular Medicine Postgraduate Program, School of Medicine, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, 4. Department of Psychiatry, School of Medicine, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, 5. DZNE, Germany, 6. Department of Psychiatry and Psychotherapy, University of Cologne, Cologne, Germany, 7. Neuroscience and Complex Systems Unit - CONICET, Florencio Varela, Argentina, 8. Neurotec R National Institute of Science and Technology (INCT-Neurotec R), Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, 9. German Center for Neurodegenerative Diseases (DZNE), Bonn, Germany, 10. Department of Internal Medicine, School of Medicine, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil.

Sleep apnea risk is linked to early Alzheimer's disease biomarker changes, supporting OSA as a modifiable target for dementia prevention.

BACKGROUND

Obstructive sleep apnea (OSA) is a prevalent and potentially modifiable condition associated with mechanisms that overlap with those of Alzheimer's disease (AD). The STOP-Bang questionnaire is a validated screening tool for obstructive sleep apnea risk stratification. Examining the association between OSA and AD blood-based biomarkers (BBM) may help identify modifiable risk factors. Objectives: To investigate the association between BBM and the obstructive sleep apnea risk measured by STOP-Bang questionnaire.

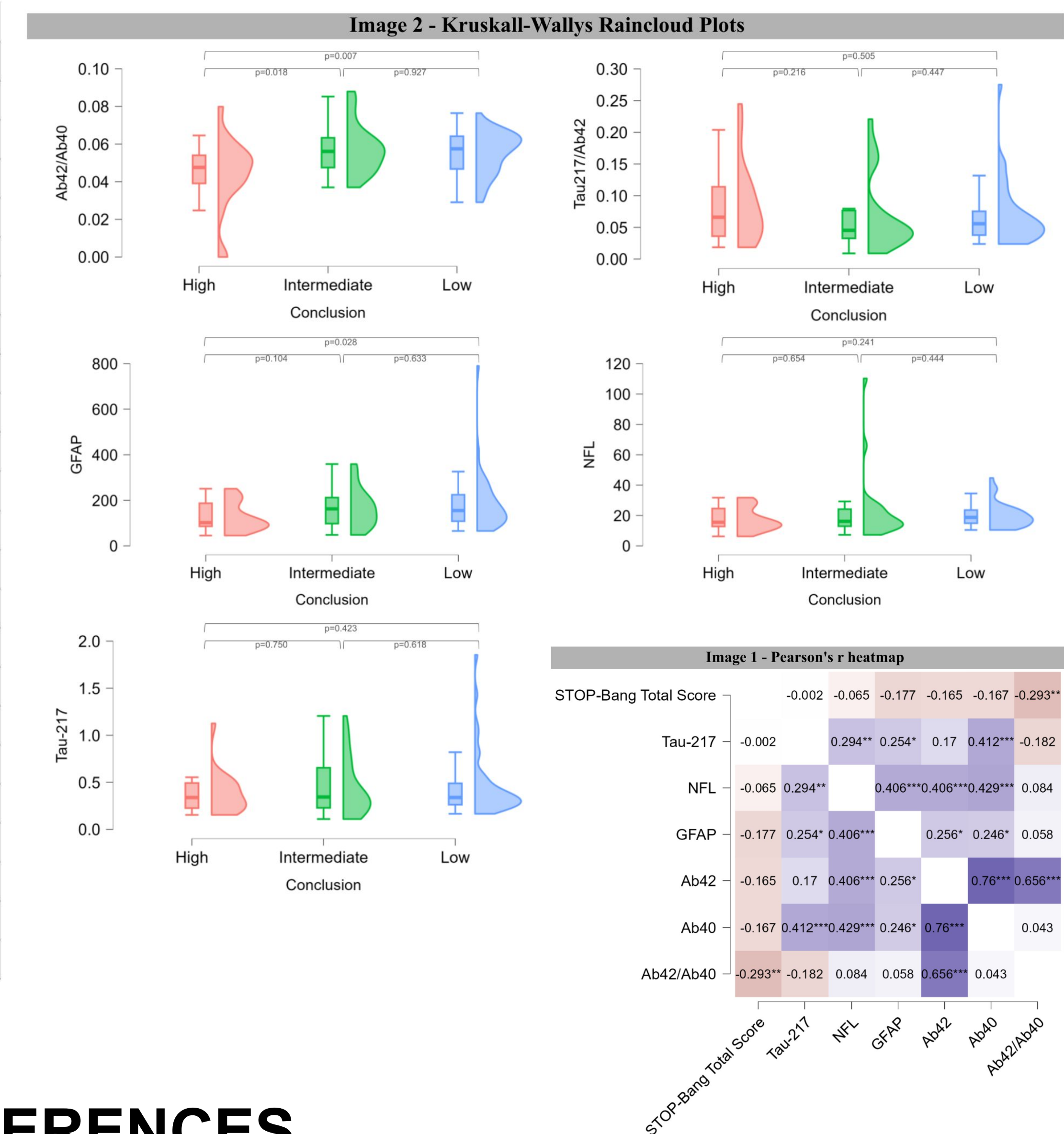
METHODS

Data from 83 participants in the Cog-Aging cohort assessed in 2024 and 2025 were included in this cross-sectional analysis. All underwent psychogeriatric assessment, STOP-Bang questionnaire administration, and blood sampling for biomarker analysis, with OSA risk classified as low, intermediate, or high. The biomarkers (A β 42, A β 40, pTau217, NfL, GFAP) were assessed using single-molecule array technology (Simoa). Pearson's correlation was performed to assess associations between STOP-Bang azores and BBM, and Kruskal-Wallis test followed by Dunn's post hoc comparisons was used to evaluate differences across OSA risk groups.

RESULTS

Participants had a mean age 75 (SD 6.44) years and 7.02 (SD 5.14) years of formal education (table1). A statistically significant negative correlation was identified only between STOP-Bang total score and A β 42/A β 40 ratio ($r=-0.293$, $p=0.008$)(figure 1). Participants were categorized into low, intermediate, and high risk of OSA based on STOP-Bang classification. Differences in BBM levels among those groups were assessed and only the A β 42/A β 40 ratio had a significant overall group effect ($H=8.023$, $df=2$, $p=0.018$). Post hoc Dunn's test revealed that individuals classified as high risk for obstructive sleep apnea had significantly lower A β 42/A β 40 ratios compared to those at low risk ($p=0.022$) and at intermediate risk ($p=0.036$)(figure 2). No significant difference was found between the low and intermediate risk groups ($p=0.927$).

Table 1: Demographic and Clinical Characteristics				
	Low Risk (N=39)	Intermediate Risk (N=25)	High Risk (N=19)	Overall (N=83)
Female, n (%)	37 (94.8%)	18 (72.0%)	7 (36.8%)	62 (74.6%)
Race				
White, n (%)	16 (41.0%)	11 (44.0%)	8 (42.1%)	35 (42.1%)
Non-white, n (%)	18 (46.1%)	11 (44.0%)	10 (52.6%)	39 (46.9%)
Missing, n (%)	5 (12.8%)	3 (12.0%)	1 (5.2%)	8 (9.6%)
Age (years), mean (SD)	75 (6.48)	76 (6.42)	75 (6.41)	75 (6.44)
Education (years), mean (SD)	7.06 (5.16)	6.87 (5.04)	7.11 (5.16)	7.02 (5.14)
HAS, n (%)	19 (48.71%)	3 (12.0%)	2 (10.52%)	24 (28.91%)
DM, n (%)	26 (66.66%)	16 (64.0%)	14 (73.68%)	56 (67.46%)
Dyslipidemia, n (%)	16 (41.02%)	9 (36.0%)	7 (36.84%)	32 (38.55%)
Depression, n (%)	13 (33.33%)	6 (24.0%)	9 (47.36%)	28 (33.73%)
Diagnosis				
CU, n (%)	16 (41.02%)	8 (32.0%)	12 (63.15%)	36 (43.37%)
MCI, n (%)	16 (41.02%)	11 (44.0%)	6 (31.57%)	33 (39.75%)
DAT, n (%)	4 (10.25%)	2 (8.0%)	1 (5.26%)	7 (8.43%)
NAD, n (%)	2 (5.12%)	1 (4.0%)	0 (0.0%)	3 (3.61%)
MD, n (%)	1 (2.56%)	1 (4.0%)	0 (0.0%)	2 (2.40%)
APOE4+, n (%)	7 (17.94%)	5 (20.0%)	6 (31.57%)	18 (21.68%)
pTau217 (pg/mL), mean (SD)	0.44 (0.31)	0.44 (0.32)	0.46 (0.34)	0.44 (0.31)
pTau217 / Ab42, mean (SD)	0.07 (0.05)	0.07 (0.05)	0.07 (0.06)	0.07 (0.05)
NfL (pg/mL), mean (SD)	20.58 (13.94)	20.63 (14.18)	19.48 (10.06)	20.50 (13.86)
GFAP (pg/mL), mean (SD)	168.87 (108.25)	169.84 (108.61)	164.84 (114.45)	168.83 (107.56)
Ab42 / Ab40, mean (SD)	0.05 (0.01)	0.05 (0.01)	0.05 (0.01)	0.05 (0.01)



CONCLUSIONS

Higher STOP-Bang defined risk of OSA was associated with lower plasma A β 42/A β 40 ratio, suggesting a link between OSA risk and early amyloid related changes. These findings suggest that OSA may represent a potentially modifiable factor in the AD continuum and highlight the relevance of accessible screening tools in population based studies.

REFERENCES

- Chung, F. et al. (2008). *Anesthesiology*, 108(5), 812–821.
- Chung, F., Abdullah, H.R. & Liao, P. (2016). *Chest*, 149(3), 631–638.
- Andrade, A.G., Bubur, O.M., Varga, A.W. & Osorio, R.S. (2018). *Journal of Alzheimer's Disease*, 64(S1), S255–S270.
- Guay-Gagnon, M. et al. (2022). *Journal of Sleep Research*, 31(5), e13589.
- Hansson, O. (2023). *Nature Medicine*, 29(7), 1696–1711.



CONTACT

ANA CAROLINA OLIVEIRA SINZATO
sinzatocarol@gmail.com

MARIA APARECIDA CAMARGOS
BICALHO
macbicalho@gmail.com