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Characterizing the contribution of alcohol use towards distinct neurocognitive profiles in individuals with cognitive impairment

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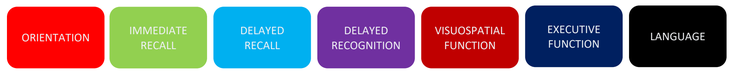
BACKGROUND

- Excessive alcohol use is a recognized modifiable risk factor for the development of dementia.
- The neuropsychological profile of cognitive impairment seen with alcohol use is heterogeneous, reflecting the direct and indirect neurocognitive effects of alcohol.
- Research is limited in comparing alcohol related cognitive impairment relative to cognitive impairment due to other etiologies.
- We sought to identify unique neuropsychological characteristics of cognitive impairment related to alcohol.

METHODS

- We used the Toronto Dementia Research Alliance (TDRA) memory clinic research database which contains demographic data, medical and psychiatric history, and cognitive test scores from the Toronto Cognitive Assessment (TorCA).
- The TorCA is a broad cognitive screening test consisting of 27 subtests covering seven cognitive domains: orientation, immediate verbal recall, delayed verbal and visual recall, delayed verbal and visual recognition, visuospatial function, working memory/executive function, and language.
- We conducted 1:1 propensity score matching to generate a matched sample of individuals with cognitive impairment, in whom alcohol was identified as a contributing factor for cognitive impairment (n=61) and an equal number of individuals without such history but with cognitive impairment.
- We compared total and subdomain TorCA scores between the two groups using linear regression while controlling for psychiatric illness (mostly depression and anxiety) and concussions as covariates.



RESULTS

- Mean age for both groups was 68.72±10.71.
- Each group had 42 males and 19 females.
- ***Total TorCA scores*** between the two groups ***were not significantly different***, on average 264.13±30.73 for the alcohol use group and 256.09±39.47 for controls (p=0.17).
- The ***alcohol group performed better*** relative to controls on the ***Language*** (76.67±10.57 vs. 70.95±14.02; p=0.007) and ***Orientation*** (11.33±1.02 vs. 10.91±1.27; p=0.04) domains.
- ***Intrusion rates*** on the CERAD Delayed Recall ***were higher (worse performance) in the alcohol use group*** (0.78±1.23) compared to in controls (0.36±0.67; p=0.03).
- There were no statistically significant differences between groups for the Immediate Recall, Delayed Recall, Delayed Recognition, Visuospatial and Executive Function domains.

Cognitive Domain	Mean (alcohol)	SD (alcohol)	Mean (no alcohol)	SD (no alcohol)	p-value
Orientation (/12)	11.33	1.02	10.91	1.27	0.03927[b]
Memory Immediate Recall (/30)	15.46	3.70	15.12	5.02	0.64752
Memory Delayed Recall (/27)	12.07	6.08	11.96	6.57	0.85735
Memory Delayed Recognition (/21)	19.00	1.85	18.79	3.10	0.56928
Visuospatial (/32)	28.86	2.50	28.82	3.25	0.88344
Working Memory/Attention/Executive Control[a]	100.55	13.80	96.83	17.32	0.16934
Language[a]	76.67	10.57	70.95	14.02	0.00742[b]
Total TorCA Score[a]	264.13	30.73	256.09	39.47	0.17228

[a]No maximum score
[b]Denotes statistically significant result (p<0.05)

Table 1. Differences in cognitive domain scores between alcohol use and non-alcohol use groups

Specific Subtest	Mean (alcohol)	SD (alcohol)	Mean (no alcohol)	SD (no alcohol)	p-value
Single Word Reading Total Score (/12)	11.75	0.93	10.61	2.85	0.00133
Semantic Fluency Total Repetitions	0.32	0.66	0.77	1.24	0.01690
Semantic Fluency Total Score	16.56	6.75	13.77	6.91	0.02159
Longest Forward Span Recalled Correctly (/9)	6.63	1.26	6.14	1.19	0.02613
CERAD Delayed Recall Total Intrusions	0.78	1.23	0.36	0.67	0.03252
Similarities: Orange - Apple	1.98	0.13	1.82	0.57	0.03755

Table 2. Statistically significant cognitive subdomain scores between alcohol use and non-alcohol use groups (p<0.05)

CONCLUSION

This exploratory investigation suggests that people with alcohol use may have unique neuropsychological characteristics. Language deficits were more prominent in cognitive impairment of other etiologies without contribution from alcohol. Higher intrusions rates in the alcohol group could reflect deficits seen in meta-cognition in those with excessive alcohol use. Limitations include a small sample size and incompletely characterized pattern of alcohol use. Future work will expand this analysis to larger, well characterized samples, and also incorporate other substances in addition to alcohol. Ultimately, understanding the impact of substance use on cognitive function can inform the development of evidence-based substance use guidelines in those at risk of cognitive impairment.

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Acknowledgements: The authors wish to acknowledge Margaret Coahran, Tom Gee, Nima Nourhaghighi, Bradley Pugh, Robby Spring, and Carmina Vica, who led the development of the electronic data capture systems, and Areti Apatsidou Claire Chan, Christina D'Ambrosio, Yating Jane Ding, Lisa Dong, Anna Malakhova and Frank Tran for their role in data collection at each of the TDRA Partner Institutions. This project has been made possible by a Brain Canada Platform Grant with the financial support of Health Canada and the TDRA partner institutions (i.e., University of Toronto, Baycrest, the Centre for Addiction and Mental Health, Sunnybrook Health Sciences Centre, and the University Health Network).
Disclosures: Dr. Morris Freedman has received funding for a research fellow from and worked as a Consultant/Advisory Board with Eli Lilly Canada. The remaining authors have nothing to disclose.