2020

GABRA2 and Alcohol Dependence in College-Aged Students

Abaiz Chaudhri

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Introduction

Alcohol dependence is uncontrolled alcohol consumption despite consequences.

- Alcohol dependence defined in DSM-IV based on seven criteria such as tolerance and withdrawal.

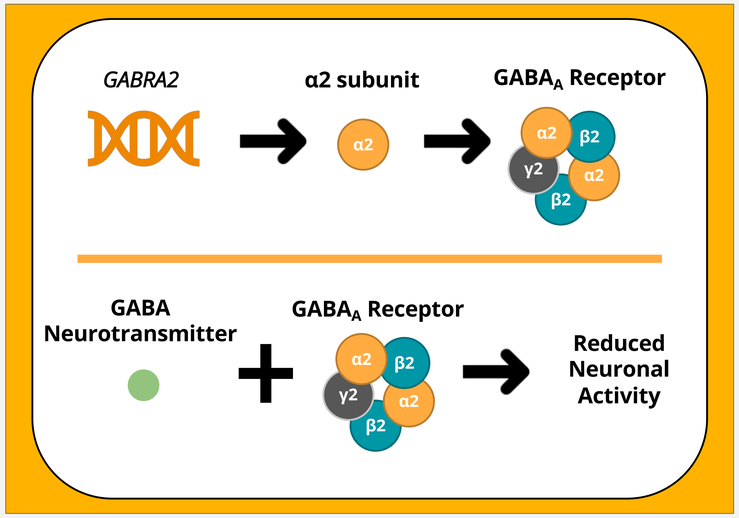
GABRA2 encodes for the α2 subunit which is one of five subunits that make up the $GABA_A$ receptor.

- GABA binds to the $GABA_A$; GABA is an inhibitory neurotransmitter that reduces neuronal activity (Roh et al., 2010).

Genetic variants (single-nucleotide polymorphisms) in the gene *GABRA2* have been shown to be associated with alcohol dependence in older adults (Trucco et al., 2014).

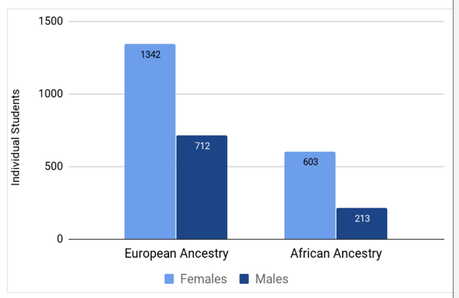
- The association is not studied nearly enough in the college-aged population, a high-risk period for the development of alcohol-related problems.
- This study uses longitudinal survey as well as genetic data, from Spit4Science, to focus on this association between alcohol dependence and the *GABRA2* gene.

Past literature emphasized that *GABRA2* shows association with alcohol dependence, so it will be <u>hypothesized</u> that *GABRA2* is associated with alcohol dependence symptoms in college-aged students, specifically those in European and African ancestry.



Methods

- Data was taken from Spit4Science, a longitudinal study at VCU
  - Surveyed during Freshman spring semester
  - The Spit4Science survey asked about 7 questions related to alcohol dependency; if individuals fit 3 or more of the criteria from DSM-IV, they were classified as alcohol dependent.
  - Participants who reported never having a drink of alcohol were set to missing
- Saliva sample was collected and DNA extracted
  - Affymetrix biobank array utilized to genotype individuals
  - 8 SNPs from *GABRA2* extracted
  - Participants from two genetically determined ancestries included:
    - 2054 Students of European Ancestry
    - 816 Students of African Ancestry
- Statistics run with PLINK
- Chi-Square tests utilized to see *GABRA2* association with alcohol dependence



Results

- **European Ancestry:** 16.75% of students were alcohol dependent
- **African Ancestry:** 9.93% of students were alcohol dependent

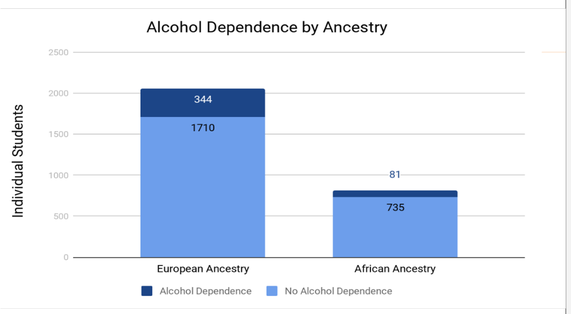


Table 1. Indicates the 8 SNPs tested for *GABRA2* as well as their location on chr. 4. A p-value less than 0.05 signifies statistically significant results.

SNP	Base Pair	European Ancestry		African Ancestry	
		x^2	p-value	x^2	p-value
rs3113346	46255176	0.6007	0.4383	2.957	0.08548
rs3822051	46256712	0.2256	0.6348	2.936	0.08664
rs2439209	46274771	0.9097	0.3402	0.8659	0.3521
rs558111	46284923	0.3076	0.5791	2.472	0.1159
rs17537359	46341106	1.515	0.2183	0.8689	0.3513
rs4695148	46345219	1.408	0.2355	0.9999	0.3173
rs116039536	46347931	0.452	0.5014	1.793	0.1805
rs16859354	46385578	0.1422	0.7061	0.1263	0.7223

- **In both ancestries, no statistically significant association was found with any of the 8 SNPs.**

Conclusion

Our study found that the 8 SNPs studied were not statistically significant.

- This is similar to Ittiwut et al. (2011), as they found no individual SNP associations to alcohol dependence
- Research by Sakai et al. (2010), tested a different SNP (rs279871) in *GABRA2* and they also did not find association between alcohol dependence and *GABRA2*.

In the college environment, the environment might be more influential on alcohol-related outcomes than genetics.

These results also looked specifically at freshmen and did not study them out longitudinally, though alcohol dependence symptoms may emerge later in their college career.

This study looked at two subgroups, European and African ancestry, so it is possible that other groups may show significant results.

This study had a primary look at the SNPs in college-aged individuals, and it can guide future researchers into looking at either of these SNPs or other SNPs on *GABRA2* so we can learn more about alcohol dependence as it relates to genetics and environment.

<u>Future Direction</u>

- Looking at other college campuses would help, as college campuses have their own atmosphere, and results could vary from one college to another.
- Studying other SNPs, ancestries, and other GABA receptors such as $GABA_B$ may yield different results.
- Additional genetic analyses such as using polygenic risk scores might be more informative

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