

4-28-2023

Alcohol and our Health

Nicholas Zotos
Duquesne University

Follow this and additional works at: <https://dsc.duq.edu/duquark>



Part of the [Physiology Commons](#)

Recommended Citation

Zotos, N. (2023). Alcohol and our Health. *D.U.Quark*, 7(1). Retrieved from <https://dsc.duq.edu/duquark/vol7/iss1/5>

This Staff Piece is brought to you for free and open access by Duquesne Scholarship Collection. It has been accepted for inclusion in D.U.Quark by an authorized editor of Duquesne Scholarship Collection. For more information, please contact beharyr@duq.edu.

Alcohol and our Health

By **Nicholas A. Zotos**

D.U. Quark 2022. Volume 7(Issue 1) pgs.60-65

Published April 29, 2023

Staff Article

According to the National Institutes of Health, approximately 49% of individuals enrolled in colleges between the ages of 18 and 21 have participated in alcohol consumption over the past month. Of these individuals, 33% have admitted to binge drinking, otherwise known as drinking in excessive amounts (1). But, what exactly is alcohol, how does it work, and how does it affect our health?

The first known evidence of alcohol dates back 13,000 years, citing its roots in ancient Israel. It is believed that the discovery of fermented drink was stumbled upon by accident as a byproduct from baking bread. The process likely involved first germinating the grain to produce malt, then heating the mash and fermenting it with yeast (2). The result was a liquid that, when consumed, grants an altered mental status of its consumer. Thus, alcohol was born.

We have come a long way since the anthropological roots of alcohol brewing. Modern technology has perfected the distillation of this liquid, turning alcohol production into a multi-billion dollar business (3). With profit comes globalization and human access to fermented beverages in almost every country on earth.

So what is the big deal? Why is alcohol so special and why is it consumed so often? The answer lies in how the beverage influences our behavior. Here is a road map to how alcohol generically affects an individual:

Someone goes out one night to drink a can of beer. Immediately, 80% of the alcohol that person drinks enters their bloodstream through the small intestine. While in your blood, the alcohol awaits degradation by the liver. While waiting patiently, the alcohol causes the blood vessels to widen, dropping the blood pressure and making the individual feel warm. In short, the drinker feels relaxed.

After circulating in the bloodstream, the alcohol reaches the brain. Once in the brain, alcohol affects a number of neurotransmitter systems, specifically the transmitters involving gamma-aminobutyric acid (GABA), glutamate, and dopamine (4).

Alcohol's effects on GABA and glutamate receptors are thought to be responsible for its sedative effects. GABA is an inhibitory neurotransmitter that reduces activity in the brain, while glutamate is an excitatory neurotransmitter that increases activity in the brain. Alcohol enhances the effects of GABA while inhibiting glutamate. This leads to a decrease in brain activity, which results in a sedative and anxiolytic effect (4).

Alcohol also affects dopamine receptors, otherwise known as the reward pathway of the brain. Dopamine is a neurotransmitter that is associated with the feeling of pleasure and reward. Alcohol increases dopamine release, which contributes to the pleasurable effects of drinking. However, it is important to note that repeated alcohol use can lead to desensitization of dopamine receptors, which can contribute to the development of alcohol dependence (5, 6) In the short term, the brain has been successfully tricked into thinking that it is having a good time. The individual starts to feel better. They may even want more.

This explains why one beer can turn into five, or even ten. With the increase of alcohol consumption comes the increase in Blood Alcohol Volume (BAV) and the exponential increase in GABA. The individual's brain begins to function at decreased capacity. The individual's ability to make complex and rational decisions slowly dwindles (5).

When too much alcohol reaches the brain, not only are the neurotransmitters affected, but key receptors in the brain are altered. Specifically, receptors in the hippocampus integral for memory become disoriented. The result is that the drinker, without a functional memory processing center, "blacks out". They may be conscious, but they will not remember anything that follows (5, 6).

If the individual continues to drink and theoretically consumes over 15 beers, the liver will start to work overtime to digest the toxins in the blood. If moderation is not exercised, the liver will not be able to work fast enough. In a last ditch effort, the body will remove the toxins forcefully and vomiting will ensue (4, 6).

This road map is not universal to all drinkers. Many individuals drink in moderation and exercise safety. However, when too much alcohol is consumed, the body's defense mechanism becomes standardized like the scenario above.

Many may read the above information and become wary of drinking alcohol. Surely a substance that can elicit such a response should be avoided at all costs. However, as with anything, the research indicates that consumption in moderation while avoiding "binge drinking" is relatively safe for most adults (7).

As for the health risks for those who drink too much, alcohol consumption has its own unique set of side effects. Alcohol disrupts the brain's communication pathways, and negatively affects the liver, pancreas, heart, and immune system. There is also a general consensus within the scientific community that, when consumed in excess for long periods of time, alcohol has carcinogenic effects that contribute to both liver and colon cancer (8 ,9). Furthermore, strong evidence indicates that heavy consumption, especially in men, decreases testosterone and negatively affects the male reproductive system (6, 8).

In short, while alcohol has been around for a long time, it may not be the best thing for an individual's health. Living a truly healthy lifestyle involves drinking in moderation, or even practicing abstinence, and recognizing the potential risks involved. For those individuals planning on engaging in alcohol consumption, please do so responsibly.

References

- (1) *College Drinking*. (n.d.). National Institute on Alcohol Abuse and Alcoholism (NIAAA).
Retrieved March 18, 2023, from
<<https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/college-drinking>>
- (2) *World's oldest brewery' found in cave in Israel, say researchers*. (2018, September 15). BBC.
Retrieved April 6, 2023, from
<<https://www.bbc.com/news/world-middle-east-45534133>>
- (3) *The Alcohol Industry in Data*. (2023, January 17). Alcohol.org. Retrieved April 6, 2023, from
<<https://alcohol.org/guides/the-alcohol-industry-in-data/>>
- (4) *GABA Receptor - StatPearls*. (2023, February 13). NCBI. Retrieved April 6, 2023, from
<<https://www.ncbi.nlm.nih.gov/books/NBK526124/>>
- (5) Cicero, T. (n.d.). *Effects of alcohol on the hypothalamic-pituitary-gonadal axis in the developing male rat*. PubMed. Retrieved March 18, 2023, from
<<https://pubmed.ncbi.nlm.nih.gov/1469619/>>
- (6) Webster, A. (2023, January 9). *College Binge Drinking & Alcohol Abuse: Risks & Impacts*. American Addiction Centers. Retrieved March 18, 2023, from
<<https://americanaddictioncenters.org/alcoholism-treatment/how-alcohol-affects-college-students>>
- (7) Luo, E. K., & Felman, A. (2018, February 22). *Moderate drinking: Women and men, alcohol limits, benefits, risks*. Medical News Today. Retrieved April 6, 2023, from

<<https://www.medicalnewstoday.com/articles/265799#benefits>>

(8) *Alcohol and the Male Reproductive System*. (n.d.). Brochures and Fact Sheets | National Institute on Alcohol Abuse and Alcoholism (NIAAA). Retrieved March 18, 2023, from

<<https://pubs.niaaa.nih.gov/publications/arh25-4/282-287.htm>>

(9) *Alcohol's Effects on the Body*. (n.d.). National Institute on Alcohol Abuse and Alcoholism (NIAAA). Retrieved March 18, 2023, from

<<https://www.niaaa.nih.gov/alcohols-effects-health/alcohols-effects-body>>

Zotos, N. (2023). Alcohol and our Health. *D.U.Quark*, Volume 7(Issue 1). Retrieved from <https://dsc.duq.edu/duquark/vol7/iss1/article9>