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Effect of alcohol on sports performance

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Abstract

Many athletes tend to underestimate the way in which alcohol use, even a few drinks, can nullify your hard work by erasing the effects of your workouts, reducing your endurance and compromising your mental game. The structure of the athletic season sometimes lends itself to small windows of opportunity to “party” that can contribute to nights of heavy binge drinking or over-indulgence, ending in situations of regret, blackouts, legal problems, and sometimes team and university sanctions. As an athlete, you know that achieving optimal performance involves practicing hard, hitting the weight room and being on top of your game both mentally and physically. Alcohol effects your sleep cycle by disrupting the sequence and duration of normal sleep, reducing your brain’s ability to retain information. For example, the REM stage of sleep is compromised after a night of drinking, which is vital to memory. The sleep deprivation also suppresses normal hormonal levels decreasing oxygen availability and consumption decreasing endurance.

Keywords: Alcohol, Sports performance, Athletes, Effect.

1. Introduction

Alcohol abuse may eventually impede physical performance; individuals diagnosed with alcohol dependence have displayed varying degrees of muscle damage and weakness. Furthermore, alcohol abuse is at least as prevalent in the athletic community as it is in the general population; the vast majority of athletes have begun drinking by the end of high school. As an athlete, you know that achieving optimal performance involves practicing hard, hitting the weight room and being on top of your game both mentally and physically. However, many athletes tend to underestimate the way in which alcohol use, even a few drinks, can nullify your hard work by erasing the effects of your workouts, reducing your endurance and compromising your mental game. The structure of the athletic season sometimes lends itself to small windows of opportunity to “party” that can contribute to nights of heavy binge drinking or over-indulgence, ending in situations of regret, blackouts, legal problems, and sometimes team and university sanctions. The goal of any athlete is to be at the peak of performance. Alcohol is a poor nutrient source for a pre-game meal or for hydration. Alcohol is known to slow down one’s ability to react to an opponent or object 72 hours following alcohol intake (2). Precision, equilibrium, hand-eye coordination, judgment, ability to process information, focus, stamina, strength, power, and speed are all negatively affected for many hours after blood alcohol levels return to 0.0% Proper hydration before, during, and after practice/event along with all-day hydration is critical to preventing injuries, creating an optimal environment for building muscle, losing body fat, maximizing energy levels, transporting and absorbing nutrients, and ridding the body of toxins and by-products. If an athlete is thirsty, they may have already lost 1- 2% of body weight through dehydration. Performance can be decreased up to 10-20% at this after a game if an injury is sustained because alcohol causes the blood vessels to dilate. Alcohol can also mask pain. For those who are familiar with injuries, the more swelling in an injured area, the longer it could take to recover and get back to optimal playing form. In addition, if the athlete is already taking anti-info amatory medications or pain\ relievers, drinking alcohol can increase the risks of stomach irritation and internal bleeding. Having a certain body fat to muscle mass ratio is related to athletic performance. Research has shown that increased muscle mass increases strength, power, and agility. However alcohol (ethanol) is one of the worst nutrients you can consume to improve body fat to muscle mass ratio. The carbohydrates found in alcoholic beverages are not converted into glucose and are used to make fatty acids that are stored as fat mainly in the liver. Alcohol has also been shown to increase fat composition. The body prefers to use alcohol as a fuel source when consumed. If you eat high fat foods when you consume alcohol the fat from these foods are stored as fat. Alcohol also stimulates the

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appetite and encourages extra intake of calories the body does not need.

2. Alcohol Use In Athletics

Alcohol use by athletes often starts at the junior high school level and can start even earlier. Among high school students, male athletes are more likely to not only use alcohol regularly but also to abuse alcohol. This relationship does not seem to exist at the college level. Nonetheless, alcohol consumption is high enough for alcohol to have been named the most abused drug in collegiate sport by the NCAA and in professional and Olympic sports by the NFL, NBA, and USOC.

3. Alcohol As A Nutrient

Each gram of alcohol (ethanol) provides seven kilocalories compared to nine for fat and four each for carbohydrate and protein. Other nutrients may be present, depending on the type of beverage. Beer, for example, has been seen as a good source of many nutrients and has sometimes been used in preparation for endurance events or to replenish nutrients following competition. Actually, orange juice supplies four times the potassium plus almost three times the carbohydrates, and it would take 11 beers, for example, to obtain the B-vitamin recommended daily allowance (RDA).

4. Motor Performance - Low amounts of alcohol (0.02-0.05g/dL) can result in decreased hand tremors, improved balance and throwing accuracy, and a clearer release in archery, but in slower reaction time and decreased eye-hand coordination. A moderate (0.06-0.10 g/dL) amount of alcohol negatively affects such skills.

5. Strength/Power and Short-term Performances - The effect of alcohol, in low to moderate doses, is equivocal. It can have a deleterious effect on grip strength, jump height, 200- and 400-meter run performance, and can result in faster fatigue during high-intensity exercise. Conversely, alcohol has been shown to lack an effect on strength in various muscle groups, on muscular endurance, and on 100-meter run time.

6. Aerobic Performance - Low or moderate amounts of alcohol can impair 800- and 1500-meter run times. Because of its diuretic property, it can also result in dehydration, being especially detrimental in both performance and health during prolonged exercise in hot environments.

7. Performance During Hangover

Any lingering effect of alcohol would especially hinder physical conditioning progress. According to current research, the effect during a hangover seems to be undecided, with no effect on several performance variables, but a decline in total work output during high-intensity cycling. Furthermore, handgrip muscular endurance has been shown to suffer a delayed decline on the second morning following intoxication.

8. Performance With Chronic Alcohol Use

Chronic alcohol abuse may be detrimental to athletic performance secondarily to many of the sequelae that can develop. Alcohol affects the body's every system, linking it to several pathologies, including liver cirrhosis, ulcers, heart disease, diabetes, myopathy, bone disorders, and mental disorders. The following implications may especially interest the athletic individual. Alcohol can result in

nutritional deficiencies from alterations in nutrient intake, digestion, absorption, metabolism, physiological effects, turnover, and excretion of nutrients. Myopathy (muscle damage, wasting, and weakness) can occur in various muscles, including the heart, often compounded by alcohol-caused neuropathies. Also, the hormonal environment can change, making it less conducive to increasing muscle mass and strength.

9. Alcohol and Athletes

9.1 How Alcohol Affects Muscle Development and Recovery

Few athletes realize that consuming alcohol after a workout, practice, or competition can cancel out any physiological gains you may have received from the activity. Not only does long-term alcohol use diminish protein synthesis resulting in a decrease in muscle build-up, but even short-term alcohol use can impede muscle growth. In order to build bigger and stronger muscles, your body needs sleep to repair itself after a workout. Because of alcohol's effect on sleep, your body is deprived of a chemical called human growth hormone or HGH. HGH is part of the normal muscle building and repair process and the body's way of telling itself your muscle needs to grow bigger and stronger. Alcohol however can decrease the secretion of HGH by as much as 70%. When alcohol is in your body, it triggers the production of a substance in your liver that is directly toxic to testosterone. Testosterone is essential for the development and recovery of your muscles. As alcohol is absorbed through your stomach and small intestine and into your cells, it can disrupt the water balance in muscle cells, altering their ability to produce adenosine triphosphate (ATP), which is your muscles' source of energy. ATP provides the fuel necessary for your muscles to contract. Speeding the recovery of sore muscles and injuries is integral to optimal performance. On occasion when an athlete is injured and can't perform them may see this as an opportunity to use alcohol. Alcohol is a toxin that travels through your bloodstream to every organ and tissue in your body, causing dehydration and slowing your body's ability to heal itself.

9.2 How Alcohol Affects Your Ability to Learn New Plays and Strategies

For most athletes, preparation, learning plays and strategies is essential to peak performance. Use of alcohol can have negative effects on this process. When alcohol is in your system your brain's ability to learn and store information is inhibited due to compromising the hippocampus, a structure deep in the brain vital to the formation of new memories. Forming memories is a very complex process and many of your memories are solidified when you are not thinking of the information, such as during sleep. Alcohol effects your sleep cycle by disrupting the sequence and duration of normal sleep, reducing your brain's ability to retain information. For example, the REM stage of sleep is compromised after a night of drinking, which is vital to memory. The sleep deprivation also suppresses normal hormonal levels decreasing oxygen availability and consumption decreasing endurance.

- Consuming five or more alcoholic beverages in one night can affect brain and body activities for up to three days

- Two consecutive nights of drinking five or more alcoholic beverages can affect brain and body activities for up to five days.
- Attention span is shorter for periods up to forty-eight hours after drinking.
- Even small amounts of alcohol BAC of .03 can persist for a substantial period of time after the acute effects of alcohol impairment disappear.

9.3 How Alcohol Affects Nutrition and Endurance

Ever feel tired and unmotivated after a night of drinking or even a day or two later? Alcohol holds very little nutritional value. The relatively high calories in alcohol are not available to your muscles. The body treats alcohol as fat, converting alcohol sugars into fatty acids. When alcohol is oxidized by dehydrogenate (the enzyme that breaks down alcohol) it produces an elevation of NADH reducing the production of ATP (which is the muscles source of energy), resulting in lack of energy and loss of endurance. Because women have very little of the enzyme dehydrogenate, females experience the primary effect of higher intoxication even when drinking the same amount with a male their same size.

Alcohol use inhibits absorption of important nutrients such as thiamin, vitamin B12, folic acid, and zinc. What do you need these nutrients for?

- Thiamin (B1) is involved in the metabolism of proteins and fat, the formation of hemoglobin, and it metabolizes carbohydrates.
- Vitamin B12 is essential to maintain healthy red blood and nerve cells.
- Folic acid is part of a coenzyme involved in the formation of new cells.
- Zinc is essential to your energy metabolic processes. The depletion of zinc can have an effect on reducing endurance.

10. Conclusion

The effects of alcohol can depend on the amount consumed, the environmental context, and on the individual. Daily consumption of up to four drinks may have a protective effect on the cardiovascular system. Nonetheless, people most commonly drink for alcohol's anxiolytic (stress-reducing) property. Conversely, alcohol has a wide spectrum of negative effects, from societal to physiological, accounting for approximately 100,000 deaths yearly in the United States. From a physiological perspective, two situations draw special attention for the fitness-oriented individual who consumes alcohol. Acutely, alcohol can cause negative effects on motor skills and physical performance.

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