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Doping and Ergogenic Aids in Sports – A Boon or Bane?

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Abstract
Sport is thought of as an activity that is governed by a set of rules and is engaged in competitively, while Doping is the idea of using banned natural or synthetic substance for the purpose of enhancing sports performance. Ergogenic aids are substances that some athletes use to improve strength and endurance. Sports go beyond a measure of athletic excellence and the winning of trophies, medals and cash awards has become a pride to the Nation and sports persons. Sports teach honest endeavor, commitment and fair play. Doping in sport is not a new phenomenon; athletes have taken performance enhancing agents since the beginning of time. The use of performance enhancing drugs is a form of cheating. Performance enhancing drugs such can be stimulants, anabolic steroids, diuretics; beta blockers etc. are harmful to the health such as Increase Heart Rate, Blood Pressure, Cardiac irregularities, Loss of Balance and co-ordination, Increase the risk of heart attacks etc. Performance bliss and sin enhancement may be attained fairly through good dietary nutrition and effective training and recovery programs. Athletes require good dietary advice from early on their career to achieve high level sports performance. Sports must be doping free and performance must be achieved through scientific sports coaching. Sports and Games must be played in fair manner.

Keywords: doping, ergogenic aids, beta-blockers, diuretics, blood doping, stimulants, anabolic steroids

Introduction

Any sport may be defined as a game of intelligence and a challenge of ideas combined with the expression of perfection of the human body and its movement. Sport is thought of as an activity that is governed by a set of rules and is engaged in competitively. Sports popularity is a worldwide phenomenon, and athletic success may lead to substantial fame and fortune. In order to be successful at the national or international level of competition, athletes must possess the genetic anthropometrical, biomechanical, physiological, and psychological characteristics appropriate for mastery of their particular sport. Moreover, they need specific coaching and training to maximize this genetic potential. Numerous specific genetic factors influence performance potential, but a major key to optimal sport performance is the proper production and control of energy. Since the advent of athletic competition, athletes have utilized a variety of methods in attempts to enhance performance as Doping and ergogenic aids.

Doping is the idea of using banned natural or synthetic substance for the purpose of enhancing performance in sports. Ergogenic aids are substances that some athletes use to improve strength and endurance. The use of performance enhancing drugs is a form of cheating that is quite wide spread and common in today's modern sports. Doping in sports refers to the use of prohibited substances that may give an athlete an artificially improvement in their natural ability over other competitors. The fundamental principles of fair play and sporting ethics are violated. High skilled athletes are not rewarded for hard work but instead those associated with banned substances are recognized for their achievements. Doping in sport is not a new phenomenon.

Doping in sport will always raise concern, as it is the integrity of the competition being questioned. As long as the importance and rewards of athletic excellence become greater there is an irresistible urge for athletes to resort to drugs to gain an edge. Amateur Athletes have the opportunity to receive college scholarships and elite athletes can earn tens of millions of dollars and many more through prize money and commercial endorsements. The lure to success is great and the temptation to gain any advantage will increasingly linger.

Ergogenic aids are substances that some athletes use to improve strength and endurance. Anabolic steroids are one type of ergogenic aid that many adults and even adolescents often employ in their efforts to improve their athletic performance and appearance. According to the American College of Sports Medicine, individuals who are experienced in weight lifting and employ the use of anabolic steroids will experience increases in strength and muscle significantly beyond those from training alone. It is this need to win and gain a competitive edge that drives athletes to seek a variety of ergogenic aids.

History

Doping: In Ancient Rome gladiators drank herbal infusions to strengthen them before chariot races and going into battle. Almost two millennia later the first documented report in the medical literature was published in 1865 in the British Medical Journal citing expulsion of a swimmer from an Amsterdam canal race, for taking an unnamed performance enhancing drugs. The first doping death occurred in 1886 in cycling. In the early 1900 the popular doping agent was a cock tail of alcohol and strychnine.

In Ancient Times, when the fittest of a nation were selected as athletes or combatants, they were fed diets and given

treatments considered beneficial. For instance, Scandinavian mythology says Berserkers could drink a mixture called "butotens", perhaps prepared from the *Amanita muscaria* mushroom, to increase their physical power a dozen times at the risk of insanity. The German missionary and Doctor Albert Schweitzer wrote of Gabon in the early 19th century: "The people of the country can, having eaten certain leaves or roots, toil vigorously all day without feeling hungry, thirsty or tired and all the time showing a happiness and gaiety.

A participant in an endurance walking race in Britain, Abraham Wood, said in 1807 that he had used laudanum, or opium, to keep him awake for 24 hours while competing against Robert Barclay Allardyce.

Ergogenic Aids: Throughout history, humans have sought after foods and potions to discover new ways of creating more powerful and fit bodies. Norse warriors would ingest hallucinogenic mushrooms to prepare for battle. Greek wrestlers would eat massive quantities of meat to build muscle. In the 1860s, swimmers in Amsterdam were considered the first to be charged with using ergogenic aids, such as drugs and nonfood substances, to gain a competitive advantage. According to Health line, throughout the 1950s and 1960s, amphetamines and anabolic steroids were used extensively. The International Olympic Committee (IOC), concerned about the trend, banned the use of these substances by Olympic athletes in the early 1960s. Two of the earliest drugs used were alcohol and caffeine, and their effectiveness as ergogenic has been investigated since the latter part of the 19th century because they were commonly used by athletes in competition to help mask or prevent fatigue. As medical science progressed, advancing the understanding of human physiology, pharmaceutical research began to produce drugs or chemicals designed to mimic the action of endogenous hormones or compounds.

Types of Doping

Major categories of drugs banned by the IOC are as follows:

1. Stimulants and related compounds: Amphetamine, Caffeine, Ephedrine, Pseudoephedrine.
2. Narcotic Analgesics and related compounds: Codeine, Morphine
3. Anabolic steroids and related compounds: Metandienone, Stanozolol, Testosterone
4. Beta blockers and related compounds: Metoprolol, Propranolol
5. Diuretics and related compounds: Acetazolamide, Furosemide
6. Peptide hormones and analogues: Human growth hormone, Corticotrophin, Erythropoietin
7. Blood doping
8. Alcohol

Types of Ergogenic Aids

An ergogenic aid is defined as any means of enhancing energy production and utilization. Ergogenic aids are generally classified into five categories:

a. Mechanical aids: such as aerodynamic devices on bicycles; Running shoes, nasal breathing strips, equipment innovations, artificial turf, etc.
b. Psychological aids: This could include hypnosis, psychotherapy, imagery, etc.
c. Physiological aids: such as "Blood doping," which is designed to increase red blood cell content; saline infusion, warm-up, clothing, etc.
d. Pharmacological aids: which includes anabolic steroids, Erythropoietin, B-blockers, antihistamines, growth hormone, anabolic-androgenic steroids, caffeine, amphetamines, ephedrine etc.
e. Nutritional aids: carbohydrate, protein, fat, caffeine, branched chain amino acids, vitamins, phosphate, fluid, electrolytes, glycerol, sports drinks, etc.

Effects of doping drugs

A number of studies have investigated the health consequences associated with these drugs and have provided strong evidence of their risks, including hepatic cellular damage, testicular atrophy, and cardiovascular disease, and psychological disturbance, musculo-Skeletal effects and even increased mortality.

a. Cardiovascular effects: Elevated blood pressure, decreased high-density lipoprotein, Erythrocytosis, Myocardial hypertrophy, Arrhythmia, Thrombosis, Decrease (25% - 27%) in HDL cholesterol & increase in diastolic Blood pressure, hypertension, and sudden cardiac death.
b. Hepatic effects: Hepatotoxicity (elevated liver function tests) / jaundice, Neoplasm.
c. Reproductive- Endocrine effects: Libido changes, Subfertility, Increased aggressiveness and sexual appetite, aberrant sexual and criminal behavior, In Males Only: Impotence with chronic or repeated use, testicular atrophy, breast enlargement, reduction of sperm production, premature baldness. In Female Only: Masculinization, excessive hair growth on the face & body, deepening of the voice, enlargement of clitoris, abnormal menstrual cycles, reduced breast size. In Children: Premature epiphyseal closure of the growth center of long bones (in adolescents), premature puberty among female child.
d. Psychological effects/Behavioral effects: Mood swings, Aggression, Mania, Depression, Withdrawal, and Dependence.
e. Dermatologic effects: Acne, Alopecia, Gynecomastia, Hursutism (male pilosis), Collagen reducing skin elasticity
f. Musculo-skeletal system effects: Muscle tightness and cramp, Stiff tender, resulting in an increased potential for muscle strains or rupture.
g. Injection associated with needle sharing: Bruising, Infection, Fibrosis, Neuro-vascular injury, Risk of acquiring AIDS, hepatitis (B, C), and other blood-borne diseases.
h. Other anabolic agents, including but not limited to: Permitted only by inhalation: Formoterol, Salbutamol, Salmeterol Terbutaline.) causes: Headache, insomnia, nausea, nervousness, tremor, muscle cramps, increased heart rate and blood pressure, asthma, as well as of death from asthma alone.
i. Long-Term Health Risks: cardiovascular system:* Left ventricular hypertrophy, Arrhythmia,* Increased risk of

myocardial infarction and sudden death, cancers, risk of mortality.

Effects of Ergogenic Aids: Many ergogenic aids have negative side effects and can be very dangerous. Understanding of the risks and benefits before using an ergogenic aid is important.

1. Blood doping: complications such as death from thrombosis, hypertension and seizures. Allergic reaction, acute hemolytic reactions with kidney damage, fever and jaundice, Transmission of infectious diseases, Overload of the circulatory system & blood clots, Metabolic shock.
2. Artificial Oxygen Carriers and Plasma Expanders: Vary significantly and can be extremely serious, as it is difficult to measure correct doses, fever, reduced platelet count, hypertension, Vasoconstriction, kidney damage and iron overload.
3. Gene Doping: Gene therapy can be quite dangerous.
4. Nutritional Supplements: The field of nutritional supplementation for ergogenic benefit is complex, constantly changing, and poorly studied [1]. Copper: benefit is antioxidant protection. Excessive supplementation can cause gastrointestinal distress, nausea, vomiting, diarrhea, intravascular hemolysis [2]. Zinc: Supplements of 25-50 mg/day may interfere with the absorption of iron and copper. Higher dose may cause nausea and vomiting [3]. Magnesium: Excessive intake led to gastrointestinal upset, nausea, vomiting and diarrhea and Interference with the absorption of calcium [4]. B-complex and Multivitamins: Vitamin A, D, B3, and B6 can be toxic at excessive doses [5]. Vitamin C: Primary adverse effect is its competition for copper bioavailability, Risk of Renal calculi due to urine acidification [6]. Calcium: Calcium interferes with the absorption of Zinc and Iron. Develop renal calculi at high dose [7]. Iron: Excessive Iron intake lead to hepatic damage and cirrhosis, Hemochromatosis, Gastrointestinal upset, constipation, black stools which may be confused with gastrointestinal bleeding [8]. Chromium: Chromium interferes with iron metabolism and zinc absorption and complications, including hypertension, stroke, and death, even at lower doses [9]. Selenium: Supplementation greater than 100 ug/day can cause nausea and vomiting, abdominal pain, and fatigue.
5. Beta-blockers: cause insomnia, nightmares, depression syndrome, sexual difficulties as impotence and weakened Erection, Hypoglycemia, Troubles with digestion, Asthenia, Cramps, circulation problems in the extremities upon exposure to cold, Mood alterations (depressive tendencies) and changes in the libido, Cardiac insufficiency, Cardiac rhythm problems.

Athletes obtain banned drugs?

Athletes may obtain banned medicines from physicians, pharmacists, retail outlets, health and lifestyle magazines, gymnasiums, coaches, family members, fellow athletes, the internet and the black market. Banned drugs, including anabolic steroids, are widely advertised in lifestyle magazines and gymnasiums and there are no controls on mail order and internet sales.

Conclusion

The conclusion is clear: one should never use medication or pharmacologically active substances without appropriate advice from a physician. If the medical drugs available today are very potent and effective in treating disease, they also strongly affect healthy individuals which may be tempted to use them, even though there is absolutely no therapeutic need. One must never forget that the side effects of a drug are always present but that the beneficial effects are felt only in case of a disease that has to be treated. The magnitude of the side effects is of course dependent on the amount of the drug that is consumed. Unfortunately, this amount is often excessive. The athlete that relies on doping is under pressure to obtain quick results. Naturally, there is a strong temptation to increase the doses to really push one's luck. We wish to emphasize yet another point: it is necessary to check the purity of all substances of uncertain origin. Some products on the black market are grossly mislabeled and preparations for injection are often contaminated with bacteria or even viruses. In such cases, there is a significant risk to develop a serious condition and put a definitive end to one's athletic career. Clearly, the game of doping is not worth playing.

The rising trends of drug addiction throughout the world are indeed alarming and needs the urgent attention of the authorities, voluntary organizations, religious and educational institutions.

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