



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (ISRA): 5.38  
IJPESH 2016; 3(6): 401-404  
© 2016 IJPESH  
www.kheljournal.com  
Received: 10-09-2016  
Accepted: 21-10-2016

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# International Journal of Physical Education, Sports and Health

## Impact of performance enhancing drugs in sports

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### Abstract

Since the beginning of sports competition, athletes have always looked for some kind of an edge over their competitors. They will do whatever it takes to be one of the elite and that includes injecting supplements into their bodies to make them bigger, stronger, and faster. Drug abuse occurs in all sports and at most levels of competition. Athletic life may lead to drug abuse for a number of reasons, including for performance enhancement, to deal with stressors, such as pressure to perform, injuries, physical pain etc. The World Anti-Doping Agency was constituted to address these issues as well as publishing a list of, banned substances in athletes. Despite continuing methodological developments to detect drug use and associated punishments for positive dope tests, there are still many athletes who choose to use performance and image enhancing drugs. This paper discusses concerns associated with the benefits and risks associated with the use of performance enhancement drugs. Since the potential side effects of doping drugs are not satisfactorily familiar to the most users, the education of athletes on the matter must be a top priority.

**Keywords:** Performance enhancing, drug abuse, athletes

### 1. Introduction

All of us know that through sports activities, we can enhance our tidal volume, vital capacity and the development of muscles, which in turn strengthens our bodies. Living in such a world with persistent changes and high pressure, playing sports like soccer, rugby, swimming, cycling will actually be considered as a resort to relaxing themselves. And having sports in this way, it can be regarded as a means of refreshing ourselves and hence increasing our working efficiency or improving our mental state. Further, sports can be a way of tempering our fighting morale and staying power. By having sport competitions with other players, we exert ourselves and above all, in the overall process, sports teach us there is a must to complete any task that you have chosen, no matter how difficult it is. "Sports have many benefits and surely it never stops", as indicated by one of the top official from America Sports Organization. However, although there are so many advantages of playing sports, there are still people cheating the games by intake of invisible bane- the drugs.

Have you encountered the restless feeling because of cheating others in games? In fact, that is the actual feeling of an athlete who wins the game by doping. Admittedly, winning in such a way will bring them the fame and fortune and people will respect him very much, if no one finds the truth. However, they won't earn the real feeling of winning but feel repentantly because they have never played the game in a fair way. Besides, once they have tried it and no one stops it, they will do it again. Then, wrong concept of playing sports will be built up in their mind and that is to win the competition by all methods. As winning the game in this way is not in a proper way, they will spoil the fairness and go against the real meanings of sports. As we all know, Olympic Games are absolutely fair and holy, letting drugs involve into it is by no means possible and palatable.

As well as the bad influences on spoiling the fairness, doping during competitions can be seriously detrimental to health. Many drugs that can be used for athletes have many side effects, especially the sports-designer drugs. They can lead to hypertension, tachycardia, stroke, seizures androgenic changes, infertility and delivery of abnormal offspring and even death, and deaths of athletes in competition because of doping are therefore very common. Worse still, those athletes who are doping will not only have the risks of death, but also badly ruin the reputation of their own countries. Perhaps you may think that it is still worth doing

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that as winning the competitions will bring you a lot of money. Nevertheless, if you can only choose from either your lives or money, what will you choose then? The use of drugs in sports with the aim of improving performance is a major problem for sports governing bodies. This however is not a new phenomenon. Drugs have been used to enhance performance since ancient times. Greek and Roman civilizations used mushrooms and herbs to improve their performance.

In order to combat the rise of drug taking and doping in sports the IOC created WADA in 1999, as a result of the 'Declaration of Lausanne'. The formation of WADA intended to centralize drug testing procedures and also to tighten up on drug control in all sports events in all countries, in fact nearly 600 sports organizations have signed up to the world anti-doping code of 2004. Furthermore, the UNESCO International Convention against Doping in Sport was implemented in 2007 and was unanimously signed up to by 191 governments; this was the first global treaty against doping in sport, and enables governments to align policies with the WADA code. WADA's formation resulted in a stark increase in positive drug tests in the 2000 Olympic Games and the 2002 Winter Olympics - eleven positive tests at the 2000 summer Olympics in Sydney compared to the two positive tests at the 1996 Atlanta games and five in Barcelona 1992 proves this. Also 26 athletes were found to have taken illegal substances in Athens 2004, and in Beijing 2008 where the slogan was "Zero Tolerance for Doping" 48 athletes were found guilty of drug use, showing that although there is a big problem, WADA's influence has helped to make the games fairer and cleaner. Moreover, since its formation in 1999, more elite athletes are being found to have taken illegal substances, or have been found guilty of suspected use of drugs. This includes professional footballer Rio Ferdinand of Manchester United and England in 2003, and promising British sprinter Dwain Chambers who equaled Linford Christie's British and European record of 9.87secs, also in 2003. The fact that more and more elite athletes are being caught to have partaken in the use of drugs shows that both the 600 organizations who support the WADA code and the 191 governments supporting the UNESCO International Convention against Doping in Sport have really started to take doping seriously and have shown a clear determination to rid the sporting world of cheating with the aid of drugs.

## 2. WADA Prohibited Substances List

The prohibited substances list is a list of all drugs, supplements and other substances and methods which are banned from use in sports. WADA (World Anti-Doping Agency) is responsible for maintaining and updating this list.

### 2.1 Diuretics

Diuretics (sometimes called water pills) are drugs including Frusemide, Chlorothiazide and Hydrochlorothiazide. Their purpose is to remove excess water from the body although each type of diuretic does this in a different way.

### 2.2 Amphetamines

Amphetamines are stimulants which act on the central nervous system to delay fatigue and increase alertness.

### 2.3 ACTH

Adrenocorticotrophic hormone is a polypeptide hormone produced by the pituitary gland. It is sometimes also known as Corticotrophin or Adrenocorticotrophin. ACTH stimulates the release of corticosteroids, glucocorticoids and steroid hormones (or androgens) from the adrenal glands.

### 2.4 Human Growth Hormone (HGH)

Human Growth hormone (HGH) is also sometimes known as somatotrophic hormone or somatotropin. It is produced by the pituitary gland and is essential for normal growth and development. HGH is anabolic, meaning it accelerates protein synthesis and also aids the metabolism (breaking down) of fat stores.

### 2.5 Narcotics

Narcotics are derived from the opium poppy and include the commonly known painkillers morphine, diamorphine and pethidine.

### 2.6 Caffeine

Caffeine is a naturally occurring substance, found in over 60 different plants and is a stimulant and mild diuretic. It is the most commonly used drug in the world as it is found in coffee, tea, chocolate (and chocolate based drinks) and many carbonated and energy drinks.

### 2.7 Ephedra

Ephedra is a shrub, native to northern areas of China and Mongolia and found mainly in dry desert-like conditions. It has traditionally been used in weight loss supplements, although has been removed from the market in the USA since 2004 over growing health concerns. There are various species of Ephedra, with some being more potent and containing higher volumes of ephedrine alkaloids (which produces the pharmaceutical effect).

### 2.8 Erythropoietin (EPO)

Erythropoietin (often shortened to EPO) is a naturally occurring hormone, secreted by the kidneys, whose function is to regulate red blood cell production. The use of EPO started in the 1980's as a quicker, cleaner alternative to blood doping.

### 2.9 Beta-2-Agonists

Beta-2-Agonists are dilators which cause dilation (widening) of vessels by relaxing the smooth muscle surrounding them.

#### 2.10 Anabolic Steroids

Sometimes also known as Anabolic androgenic steroids (AAS's), these are derivatives of the hormone testosterone. There are two types of AAS: Exogenous: Synthetic versions of testosterone. Common examples include Nandrolone and Danazol.

### 2.11 Cocaine

Cocaine is a stimulant which is more commonly used as a recreational drug for performance enhancement. Cocaine produces feelings of euphoria and wellbeing, which are usually followed by feelings of anxiety and depression when the effects of the drug wear off.

### 2.12 Tetrahydrogestrinone (THG)

Tetrahydrogestrinone (THG) is what's known as a designer steroid. In this case the steroid has been manipulated in a lab so that it is not detected by normal steroid testing procedures. After its discovery in 2003 a highly sensitive test has been developed to detect its presence in urine samples.

#### 2.13 Insulin-like Growth Factor (IGF-1)

Insulin-like growth factor is the most predominant somatomedin or growth factor hormone, with a very similar structure to insulin although it is released by the liver. It plays an important role in growth and development in children and is thought to have anabolic effects in adults.

### 2.14 Cannabinoids / Cannabis

Cannabinoids are a compound contained in the Marijuana plant and its products. The cannabinoid compound contains a substance called THC which has psychoactive properties. Due to the fast absorption rate of THC by the lungs, cannabinoids have a rapid onset, with the effect on the central nervous system being obvious within 20 minutes with duration lasting 4-6 hours.

### 2.15 Glucocorticosteroids

Glucocorticosteroids are anti-inflammatory steroid hormones produced in the adrenal glands. Examples are Hydrocortisone, Prednisolone and Prednisone.

#### 3. Effects of performance enhancing drugs in sports

In the world of sports there is much competition. There is so much that many sport players try to cheat their way through by using performance enhancing drugs. The players use steroids, human growth hormones and many more. Here is my quick pros and cons list of PEDs drug categories.

### 3.1 Anabolic agents

Exogenous Anabolic Androgenic Steroids (AAS)

Examples: Androstendiol, Testosterone

Pros: Increases endurance, fat loss, muscle recovery, increases strength and muscular size. Helps to treat anemia, asthma, bone pain, muscle loss and helps balance other hormones.

Cons: May cause menstrual cycle irregularities, aggressiveness, baldness, brain tissue damage, breast enlargement, fever, hypertension, liver dysfunction, muscle pain, nausea, sexual appetite increase and vomiting.

#### 3.2 Hormones and chemically related substances

Examples: Erythropoietin (EPO), Growth Hormone (HGH)

Pros: Endurance enhancement during exercise efforts, faster muscle recovery, used to treat anemia of kidney failure, HIV and certain cancers.

Cons: Death, clots known as deep vein thrombosis in the lower legs, heart attack, hyper viscosity (thickening) of blood, heart attack (myocardial infarction), stroke, thrombosis and pulmonary embolism.

### 3.3 Beta-2 Agonists

Examples: All beta-2-agonists excluding Formoterol, Salbutamol, Salmeterol, etc.

Pros: Improves aerobic exercise performance, enhances muscle growth and fat reduction, used medically for asthma and COPD (chronic obstructive pulmonary diseases).

Cons: Anxiety, heart arrhythmias, dizziness, headache, insomnia, mood disorders, muscle cramps, nausea, palpitations, tachycardia, sweating and tremors (usually of the hands).

### 3.4 Hormone antagonists and hormone modulators

Examples: Aromatase inhibitors including Aminoglutethimide, Tamoxifen, Clomiphene

Pros: Enhancing muscle buildup and dramatically slows muscle breakdown (anabolic), increases muscle strength, used medically for breast cancer and infertility in females.

Cons: Abdominal pain or discomfort, can cause certain cancers, hot flushes, slurring of speech, reduction of libido

### 3.5 Diuretics and other masking drug agents

Examples: Acetazolamide, Amiloride  
Pros: Helps to hide banned substances, dramatically improves urine excretion reducing the concentration and therefore the detection of banned substances, promotes weight loss, used to treat heart

failure and hypertension (high blood pressure).

Cons: Can cause dramatic drops in blood pressure, death, cramps, dizziness, dehydration, headaches, heart failure, muscle cramps, nausea, potassium depletion, overall fluid volume depletion in the body.

### 3.6 Stimulants

Examples: Adrafinil, Adrenaline

Pros: Increases generalized aggressiveness, stimulates overall mental alertness, increases competitiveness and competitive response (reaction time), reduces fatigue and promotes weight loss. Used medically to treat allergies, asthma, ADHD (attention deficit disorder), headache, nasal congestion and the common cold.

Cons: Addictive, aggressiveness, anxiety and hyperalertness, heart arrhythmias, brain hemorrhage (bleeding), confusion, dehydration, death, hand tremors, heart attack, heat stroke, insomnia, stroke, sweating, weight loss and tremor.

### 3.7 Narcotics

Examples: Buprenorphine, Dextromoramide

Pros: May promote a generalized feeling of invincibility, acts as a pain killer, increases overall pain threshold, and creates a sensation of euphoria. Used medically to treat pain from a variety of sources.

Cons: Addictive, can cause coordination and balance difficulties, death, reduced ability to concentrate, increases injury risk, nausea, respiratory depression, vomiting and sleepiness.

### 3.8 Cannabinoids

Examples: Cannabinoids (i.e., Marijuana, Hashish)

Pros: Creates a sensation of euphoria and is a sedative. Used medically for pain in cancer patients.

Cons: Addictive, can cause anxiety, apathy, stimulate appetite, bronchitis, cancer of the mouth, throat, lung and tongue, loss of concentration, drowsiness, heart rate increases, hallucinations, dry mouth, reflex loss and weight gain, panic and paranoid attacks/thinking, loss of motivation, mood swings and learning impairment.

### 3.9 Glucocorticosteroids

Examples: Glucocorticosteroids

Pros: Act as anti-inflammatory agents and used medically for asthma, arthritis, inflamed tissues such as nerves, tendons, cartilage and muscles and used for allergies.

Cons: Can cause fluid retention, hyperglycemia (raise blood sugar levels), mood alteration, musculoskeletal dysfunction and disease, immune alterations and increase risk of systemic infections.

### 3.10 Alcohol

Example: Ethanol

Pros: Anti-anxiety effect enhances/maximizing the effects of other medications taken simultaneously.

Cons: Addictive, can cause B-vitamin losses and permanent central and peripheral nervous system problems including dementia and neuropathy (nerve problems). May also cause liver failure, cirrhosis, death, depression, incontinence, double vision and heart disease.

### 3.11 Beta-Blockers

Examples: Acebutolol and Alprenolol

Pros: Reduces muscle tremors that would otherwise negatively impact precision sport skills, sedative effects.

Cons: Lowers blood pressure, reduces heart rate, reduces performance capacity (particularly in endurance sporting events), causes sleep disturbances and fatigue.

### **3.12 Banned approaches**

Examples: blood doping methods, tampering physically or chemically with samples and gene doping

Pros: Enhances general sports performance and enhances the ability to perform at higher altitudes.

Cons: Can cause autoimmune allergic reactions if incorrect blood type is used, death, blood poisoning, reduces cardiac output, may promote infectious disease transfer, hypertension, promotes clot formation and stroke, iron overload (hemosiderosis), kidney damage, reduces platelet count, can cause sexual dysfunction and transient fevers.

## **4. Conclusion**

In conclusion, the use of performance enhance drugs by some professional athletes is undeniable, many athletes are taking drugs to enhance their performance and there are many ways to go about to prevent that. Sports cannot stand with drugs since doping will affect the fairness and the health states of athletes. Once others find that they use drugs to achieve their goals, no one will be proud of them and even look upon them. Only by playing sports without drugs, athletes can enjoy the fun of sports and create a fantastic competition for the one who are sitting on the audience stage. You have to take the first initiative and tell your friends and families about the harmful effects of performance enhancing drugs. If we all do that we can make the future of sports almost drug free. It all depends on you!

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