Review Article

Drug abuse in sports and doping

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Abstract

Drug is defined as a substance that alters the physiological processes of the body which is used for the diagnosis, prevention and treatment of disease. Abuse denotes injudicious or irrational application. The use of performance-enhancing drugs is probably the major problem facing sport today. Despite intense efforts by sporting bodies and the medical professionals to eliminate the problem, drug taking to enhance sport performance remains widespread. No player should gain an unfair advantage over other players by using an unethical substance or method. The use of drugs may also be extremely dangerous to the health of players. Drug testing programs have been established by amateur and professional sports authorities to promote a safe and fair competitive environment. Clinicians who treat athletes should be familiar with the commonly abused substances and doping methods.

Key words: Drug abuse, doping, sports

Introduction

Drug is defined as a substance that alters the physiological processes of the body which is used for the diagnosis, prevention and treatment of disease

Abuse denotes injudicious or irrational application

Doping is defined as the use by an athlete or player of prohibited substances or methods in order to enhance his/her sport performance.

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The use of performance-enhancing drugs is probably the major problem facing sport today.[1] Despite intense efforts by sporting bodies and the medical professionals to eliminate the problem, drug taking to enhance sport performance remains widespread. Doping is against "the spirit of the game"

Why is doping prohibited?

Doping is prohibited because it is fundamentally contrary to the spirit of sport. No player should gain an unfair advantage over other players by using an unethical substance or method. The use of drugs may also be extremely dangerous to the health of players.[2]

Historical Background

"The use of drugs to enhance performance in sports has certainly occurred since the time of the original Olympic Games [from 776 to 393 BC]. The origin of the word 'doping' is attributed to the Dutch word 'doop,' which is a viscous opium juice, the drug of choice of the ancient Greeks.[3]

- Ancient Greek athletes are known to have used special diets and stimulating potions to fortify themselves.[4]
- Strychnine, Caffeine, Cocaine, and Alcohol were often used by cyclists and other endurance athletes in the 19th century.[4]
- Reports of Doping were common in the 19th century. The first reported drug-related death occurred in 1896 when an English cyclist died of an overdose of 'trimethyl.'[5,6]
- Thomas Hicks ran to victory in the Olympic Marathon of 1904 in Saint Louis with the help of raw egg, injections of Strychnine, and doses of Brandy administered to him during the race.[4]
- The origins of current epidemic of drug use among athletes can be traced back to the introduction of various substances during World War II.
- Amphetamines were introduced to the US troops to help keep them awake at the battlefront. Following the War, some athletes began to use amphetamines.[7]
- It was alleged that the Soviet athletes used anabolic steroids in 1952 Olympics in Helsinki.[8]
- The use of anabolic steroids, specially by power athletes, became widespread in the late 1960 and 1970.[9]

At the 1988 Seoul Olympics, the Positive test results for anabolic steroids on 100 m winner Ben Johnson focused world attention on the continuing problem of drug abuse in sports and resulted in renewed international attempts to stamp out the use of performance-enhancing drugs in sport.

Why Athletes Take Drugs?

Unfortunately, there has been little research into this question but there are a number of possible reasons[10]:

- Knowledge or belief that their competitors are taking drugs
- A determination to do anything possible to attain success
- Direct or indirect pressure from coaches, parents or peers
- Pressure from government and/or authorities themselves (e.g. Eastern Block countries during the 1960s to 1990s)
- Lack of access to legal and natural methods to enhance performance (e.g. nutrition, psychology, recovery)
- Community attitudes and expectations regarding success and performance
- Financial rewards
- Influence from the media in facilitating these expectations and rewards

It is likely that a combination of the above factors is present in most athletes who take drugs

Drugs Used in Sports[11]

- Stimulants
- Beta-2 Agonists
- Beta-2 Antagonists
- Narcotics
- Diuretics
- Other Substances
- Peptide Hormones and Analogues
- Anabolic-androgenic Agents

Stimulants

The term stimulant applies to prescription, non-prescription and dietary supplements that produce both psychological and physical stimulation. They include: amphetamines, phenylpropanolamine, ephedrine, caffeine

Phenylpropanolamine

Effect on Performance: Phenylpropanolamine is a non-prescription sympathomimetic agent that was commonly used for weight loss.[16]

Adverse effects include:[17,18]

- Hypertension
- Reflex bradycardia
- Stroke

Amphetamines

Effect on Performance : Amphetamines have been shown to increase athletic performance in strength exercises (3-4%) and endurance (1.5%) in a dose of 14 mg/70kg body weight. It can increase alertness and aggressiveness and reduce fatigue.[12,13]

Adverse effects include :[12,14,15]

- Confusion
- Headache
- Insomnia
- Tremor
- Tolerance
- malnutrition
- Restlessness
- Withdrawal symptoms
- Anxiety
- Hypertension
- Tachyarrhythmia
- Psychiatric disturbances

Ephedrine

Effect on Performance: [19]

Ephedrine has a thermogenic (heat producing and weight loss) effect on the body at low doses. Ephedrine (75-150 mg) has been shown to enhance athletic performance to the same degree as amphetamine (15-30 mg).

Adverse effects include:[20]

- Hypertension
- Tachyarrhythmias

Caffeine

Effect on Performance:[12,21,22,23]

Caffeine is a central nervous system stimulant. In addition, it has a diuretic effect . Some products combine aspirin and caffeine, which theoretically enhances thermogenesis.

Adverse effects include:[12]

Dehydration in hot conditions

insomnia, tremors, nervousness, restlessness, tachycardia, and palpitations

Narcotics

Effect on Performance:

Act on the central nervous system to reduce amount of pain felt from injury or illness. Potential benefits to athletes from narcotics included euphoria and increased pain threshold.[24]

They include: Codeine, morphine and pethidine.

Adverse effects include:[25]

- False feeling of invincibility
- Illusions of athletic prowess beyond inherent ability
- Failure to recognize injury
- Physical and psychological dependence.

Anabolic-Androgenic Steroids

Effect on Performance:

Anabolic-androgenic steroids are the most widely detected performance enhancing drugs in sports.[26] These agents are misused to make a competitor larger and stronger in attempts to increase strength, power and endurance.[27]

They include:

- Androstenediol
- Androstenedione
- Danazol
- Oxandrolone
- Stanozolol
- Nandrolone
- Testosterone
- DHEA

Adverse effects include:[28,29,30,31,32,33,34]

- Increased aggression
- Premature heart disease
- Increase the risk of Liver damage
- Kidney damage
- Development of breast
- Premature baldness

Beta-2 Agonists

Effect on Performance:

Beta-2 agonists have both stimulant effects and potential anabolic effects. They have become increasingly popular with Olympic athletes claiming that they have asthma or exercise induced-asthma.[11,35,36,37]

They include:

- Salbutamol
- Terbutaline
- Clenbuterol

Adverse effects include: Tachycardia, tremor, sweats agitation

Beta-2 Antagonists

Effect on Performance:

Beta-blockers are used to improve performance in anaerobic events that require steadiness and control, such as in shooting and archery.[14,38]

They include:

- Propranolol
- Atenolol
- Oxyprenolol

Adverse effects include: Fatigue, lethargy, bradycardia, hypotension, impotence, bronchospasm

Diuretics

Used in sport for two main reasons:[14,39]

- To lose weight quickly in sports which have weight categories
- To reduce the concentration of other banned substances.

They include:

- Bendrofluazide
- Frusemide
- Hydrochlorothiazide
- Triameterine
- Spironolactone

Adverse Effects:[40] Electrolyte imbalances, muscle cramps, dehydration leading to faintness and dizziness , volume depletion, headache, nausea.

Peptide Hormones and Analogues

Peptide hormones "carry messages" around the body to increase growth, influence sexual general behavior and to control pain.

Analogues are synthetic drugs which have similar effects to natural substances.

Competitors misuse these agents: [41,42,43,44,45,46]

- To stimulate production of naturally occurring steroids
- To build up muscles
- To mend and improve body tissue
- To improve body's ability to carry oxygen.

They include:

- Chorionic Gonadotropin (hCG)
- Insulin-like Growth Factor (IGF-1)
- Pituitary and synthetic gonadotropins (LH)
- Insulin
- Corticotropins (ACTH)
- Growth hormone (GH)
- Erythropoietin (EPO)

Adverse effects include:

- Acromegaly
- Gigantism
- Metabolic and endocrine disorders

Other Substances

Additional classes of substances that are used in certain circumstances include:

- Ethanol[47]
- Cannabinoids[48]
- Local anesthetics[49]
- Blood doping[50]
- Plasma expanders[51]
- Substances to mask other banned substances[52]

It is unlikely that athletes will stop using drugs or doping methods to try and gain a competitive edge. Drug testing programs have been established by amateur and professional sports authorities to promote a safe and fair competitive environment. Clinicians who treat athletes should be familiar with the commonly abused substances and doping methods.

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