

Doping in sports

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ABSTRACT

Physical exercise and exertion impose an increased demand of nutrients and oxygen on the body. To achieve this, some sports persons resort to pills and injections as shortcuts to success. The use of drugs in sports goes back centuries, about all the way back to the very invention of the concept of sports. In sports, doping is the administrations of or used by a competing athlete of any substance foreign to the body or any physiological substance taken in abnormal quantity or taken by an abnormal route of entry into the body with the sole purpose of increasing in as artificial and unfair manner his/her performance in competition. The first recorded during death in 1886 when cyclist Linton Redrenn overdosed on tri-methyl during a race. Many sports organization have banned the use of performance-enhancing drugs and have very strict rules and penalties for people who are caught using them. In November 1999, the World Anti-doping Agency (WADA) was founded as an independent foundation with equal representatives from the Olympic Movement and Public authorities. The creation of WADA is one of the most recent and impressive examples of collaboration in international sport. “Think positive - test negative” is the message of WADA to every athlete in all sports. Gene doping, blood doping, and human growth hormone are the future challenges in the field of doping. WADA is developing the tools to detect gene doping and other doping methods of the future. With “sports medicine” coming up as an emerging field it needs to be encouraged in medical schools. Research needs to be undertaken on potential doping agents and improvement of detection techniques. Information and education should be provided to athletes as well as to the society.

Key words: Blood doping, Doping, Gene doping, Human growth hormone, World Anti-doping Agency

INTRODUCTION

The spirit of sport is the celebration of the human spirit/the body and the mind. Physical exercise and exertion impose an increased demand of nutrients and oxygen on the body. The body can meet the demand only up to a certain level beyond which exhaustion sets in. To achieve this, some sports persons resort to pills and injections as shortcuts to success, as they do not understand that good genes, scientific coaching, proper nutrition, and dedication to task are what ultimately bring them success.

HISTORY

The origin of the word “doping” has many suggestions. One is that it is derived from “dop” and alcoholic drink used as a stimulant in ceremonial

dances in the 18th century Southern Africa.^[1] Another suggestion is that the word comes from the Dutch word “doop” (a thick dipping sauce) that entered American slang to describe how robbers stupefied victims by mixing tobacco with the seeds of *Datura stramonium* known as jimsonweed, which contains a number of tropine alkaloids, causing sedation hallucinations and confusion.^[2,3] By 1889 “dope” was used in connection with the preparation of a thick, viscous preparation of opium for smoking, and during the 1890, this extended to any stupefying narcotic drug.

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as artificial and unfair manner his/her performance in competition.

The use of drugs in sports goes back centuries, about all the way back to the very invention of the concept of sports. Arthurian knights supposedly drank magical potions from the cup of Merlin. 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” to greatly increase their physical power at the risk of insanity. The ancient Olympics in Greece have been alleged to have been contaminated with forms of doping. In ancient Rome, where chariot racing had become a huge part of their culture, athletes drank herbal infusions to strengthen them before chariot races. Greek athletes used concoctions of mushroom and plant seeds, consumed dog testicles, and ate special diets of things such as dried figs to give themselves an edge over their competitors.^[4]

The first recorded death in 1886 when cyclist Linton Redrenn overdosed on tri-methyl during a race.

In 1967, another British cyclist Tommy Simpson died during a televised Tour de France race. The public outrage led the Olympic Committee to establish a special commission to study doping in sports. In 1984, one-third of the US cycling team received blood doping transfusions before LA Olympic Games, where they went on to win a record of nine medals.

Perhaps, the most sinister of all is the publication of the book “Faust’s Gold” which gave an in-depth look at the systematic doping machine implemented by the German Democratic Republic (GDR) in 1970. Many of the athletes were given performance-enhancing agents and around 142 former female athletes experienced androgenic changes. It is estimated that around 10,000 athletes were processed through the GDR doping machine.^[5]

In 1988, a famous case of illicit use of androgenic steroid in competition was Canadian. Ben Johnson’s victory in the 100 m at the 1988 summer, Olympics. He failed the drug test when stanozolol was found in his urine. He later admitted of using steroid as well as Dianabol, testosterone, cypionate, furazabol, and human growth hormone (HGH) among other things. Johnson was, therefore, stripped of his gold medal and lost his recognition of what has been a world record performance. This was in number of respects, a watershed in the history of doping in sports. This event

generated huge media coverage, and it raised public awareness about doping in sports.^[6]

Major doping scandal in the 1998 Tour de France cycle race will come to be regarded as a second watershed, both in terms of the amount of media coverage which it generated and in terms of the amount of information about the systematic organization of doping in professional cycling. Where the entire Festina team was excluded from the Tour de France following the discovery of a team car containing large amounts of various performance-enhancing drugs. The team director later admitted that some of the cyclists were routinely given banned substances.^[7]

Recently, Martina Hingis, the tennis superstar tested positive for cocaine in Wimbledon 2007. Consequently, she received a 2 years ban but decided to quit the sports altogether. She made a comeback in 2013 playing doubles; however, it was no match for her glory days.

Lance Armstrong was world number one in 1996. In the same year, he recovered from severe testicular cancer and continued to break records and win his seventh Tour de France in 2005. After beating cancer and breaking records, he was accused of doping. On 22 Oct 2012, Lance Armstrong was stripped of his Tour de France titles since 1998.^[8,9]

Even in Asian countries such as Pakistan Shoaib Akhtar and Mohammad Asif, the Fast bowlers tested positive for the performance-enhancing drug nandrolone before Pakistan’s opening match of the champion’s trophy against Sri Lanka in 2006.

India has been making strides on the international sports scene and now has been associated with what often comes with success - A doping scandal. Indian weight lifters, Karnam Malleswari, Kunjaurani, Tejinder Singh and Edwin, were banned after they tested positive for banned drugs. Indian team players in the 4 m × 400 m relay squad that won gold at the Commonwealth and Asian Games were among eight track and field athletes banned for out of competition doping violations.

No game is spared from doping. In Kabaddi world cup 2011, India lifted the title. It was found out later that 53 players including an Indian player were tested positive for anabolic steroids.^[10]

Most recently, Pradeep Sangwan, who played for Kolkata Knight Riders in the sixth edition of the Indian Premier League in 2013, was the first Indian professional cricketer to be banned after he had tested positive for stanozolol, a prohibited steroid which was found in his urine sample.

SAVING SOUL OF SPORT

Many sports organization have banned the use of performance-enhancing drugs and have very strict rules and penalties for people who are caught using them. The International Amateur Athletic Federation now the International Association of Athletics Federation was the first international governing body of sport to take the situation seriously. In 1928, they banned participants from doping but with little in the way of testing available, and they had to rely on the word of the athlete that they were clean. It was not until 1966 the FIFA and Union Cycliste Internationale (Cycling) joined the IAAF in the fight against drugs, followed by the International Olympic Committee in 1967.^[11]

In November 1999, the World Anti-doping Agency (WADA) was founded as an independent foundation with equal representatives from the Olympic Movement and Public authorities. The creation of WADA is one of the most recent and impressive examples of collaboration in international sport.^[12]

“Think positive - test negative” is the message of WADA to every athlete in all sports. It helps nations to enhance and develop effective anti-doping programs. It works for promotion and coordination of research. Its primary interest lies in new substances and methods used by athletes and in psychological and sociological aspects of doping. Updating, modifying, and adapting the common list of prohibited substances and methods is another responsibility of WADA.

Anti-doping research contributes to the development and implementation of the efficient program for the control of doping and to provide much-needed information and education regarding doping to the concerned sports bodies as well as the public. It utilizes research, analytical services, and education to identify dangerous and banned substances in sports and help halt their use. Testing and analysis of samples are done in WADA-accredited laboratories, and the results are reviewed and notified and appropriate action taken including suspension from athletics and forfeiture of medals, points, and prizes.

BANNED DRUGS^[13]

- i. Substances and methods prohibited at all times (in and out of competition)
 - a. Anabolic androgenic steroids
 - b. Peptide hormones, growth factors, and related substances
 - c. Beta-2 agonists
 - d. Agents with anti-estrogenic activity
 - e. Diuretics and other masking agents

- f. Enhancement of oxygen transfer
- g. Chemical and physical manipulation
- h. Gene doping.
- ii. Substances and methods prohibited in competition. All the categories under Section I, plus
 - a. Stimulants
 - b. Narcotics
 - c. Cannabinoids.
- iii. Glucocorticosteroids
- iv. Substances prohibited in particular sports
 - a. Alcohol
 - b. Beta blockers.

Test methods

Under established doping control protocols, the participant will be asked to provide a urine sample which will be divided into two, each portion to be preserved within sealed container bearing the same unique identifying number and designation, respectively, as A- and B-samples. The WADA's Executive Committee and Foundation Board decided that an athlete whose A-sample has revealed the presence of a prohibited substance or method to request the analysis of his or her B-sample. The B-sample helps conform that an anti-doping rule violation has occurred and protected the rights of the athlete.^[14]

FUTURE OF DOPING

Gene doping is defined as the “non-therapeutic use of cells, genes, genetic elements, or modulation of gene expression” having the capacity to improve athletic performance.^[15] Gene doping is done using techniques developed for gene therapy. The most commonly used method is a viral vector a “delivery vehicle” that does not cause disease contains the gene of interest and can be engineered to inject this gene into a specific type of tissues. In the case of certain muscle-enhancing treatments, the virus is injected directly into the muscle tissue where it proceeds to infect the muscle cells nuclei, replication the gene, and ultimately increasing muscle mass.

Blood doping is the misuse of certain techniques and/or substance to increase one's red blood cells mass, which allows the body to transport more oxygen to muscles and, therefore, increases stamina and performance. Substances or methods include the use of erythropoietin (EPO), synthetic oxygen carriers such as hemoglobin-based oxygen carriers or perfluorocarbons and blood transfusions, injection of EPO increase the number of red blood cells and thus enhances oxygen carrying capacity.

Another famous hormone is HGH and given the lack of a specific test and claims of HGH performance benefits; abuse has markedly increased.

A test for EPO was introduced at the 2000 Summer Olympic Games in Sydney, and the WADA's Executive Committee concluded that urine testing is the only scientifically validated method for direct detection of recombinant EPO. Recently, the urine test used for the detection of some new erythropoiesis-stimulating agents was adopted.

The WADA is developing the tools to detect gene doping and other doping methods of the future. Smartphones may be used as medical devices in the future. It could be as simple as calling an athlete and asking them to put their finger on a device connected to their smartphone so we can draw information that could be potentially extremely useful in terms of detection.

CONCLUSION

Despite the development and research, doping in sports is on the rise in elite, amateur, and school sports. Going with the nation of "once a cheat always a cheat" an effective anti-doping program must incorporate educational components in addition to testing.

With "sports medicine" coming up as an emerging field it needs to be encouraged in medical schools. Research needs to be undertaken on potential doping agents and improvement of detection techniques. Information and education should be provided to athletes as well as to the society.

The potential benefits to society and the individual from sports will only be maximized where fair play is ensured at all costs.

REFERENCES

1. Available from: <http://www.blog.oxforddictionaries.com/2015/06/dope-etymology-history/>. [Last accessed on 2015 Nov 21].

2. Higgins AJ. From ancient Greece to modern Athens: 3000 years of doping. *J Vet Pharmacol Ther* 2006;29:4-8.
3. Ratsch C. *The Encyclopedia of Psychoactive Plants: Ethnopharmacology and its Applications*. Rochester, VT: Park Street Press; 2005. p. 144-6.
4. Barnhart I. *Chambers Dictionary of Etymology*. Edinburgh: Chambers Harrap; 2003. p. 199-200.
5. Mackay D. Lewis: Who cares I failed drug test? Available from: <http://www.guardian.co.uk/sport/2003/apr/24/athletics.duncanmackay>. [Last accessed on 2015 Nov 24].
6. Available from: <http://www.sports-reference.com/olympics/athletes/jo/ben-johnson-1.html>. [Last accessed on 2015 Nov 21].
7. Inside the Blood Doping Investigation. Available from: <http://www.spiegel.de/international/Spiegel/0.1518.425939.00.html>. [Last accessed on 2015 Nov 22].
8. Osei-Hwere EM, Armfield GG, Kinsky ES, Gerlich RN, Drumheller K. Ethical implications of Lance Armstrong's performance enhancing drug case. *J Legal Ethical Regul Issues* 2014;17:15-7.
9. Dilger A, Frick B, Tolsdorf F. Are athletes doped? Some theoretical argument and empirical evidence. *Contemp Econ Policy* 2007;25:604-15.
10. Kabaddi Doping: Indian Player Found Positive. Available from: <http://www.dayandnightnews.com/2011/11/kabaddi-doping-Indian-player-found-positive>. [Last accessed on 2015 Nov 20].
11. The Tribune – Magazine Section – Saturday Extra. Available from: <http://www.tribuneindia.com>. [Last accessed on 2015 Jul 15, Last accessed on 2015 Nov 20].
12. World Anti-doping Code, 2009. Available from: <http://www.wada-ama.org/en/world-Anti-Doping-program/sports-and-Anti-Doping-organizations/The-Code/>. [Last accessed on 2015 Nov 22].
13. The 2011 Prohibited List. The World Anti-doping Code. Available from: <http://www.wada-ama.org/Documents/World-Anti-Doping-Program/WADP-Prohibited-list/Tobeffective/WADA-prohibitedList-2011>. [Last accessed on 2015 Nov 22].
14. O' Leary J. *Drugs and Doping in Sports – Socio-Legal Perspectives*. 1st ed. London: Cavendish Publishing; 2001. p. 65-7.
15. The 2008 Prohibited List. The World Anti-Doping Code. Available from: <http://www.wada-ama.org/rtecontent/document/2008-List>. [Last accessed on 2015 Nov 22].

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