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## Blood doping in sports: A review

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#### Abstract

Once any starting gun is fired at an Olympic event, every split second counts to the elite athletes. And that's where blood doping come in, Particularly in endurance sports. Blood doping has recently become an integral part of elite and recreational sports. Several potential methods of blood doping have developed over the past few decades. The traditional of blood doping in modern history dates back to 1960's when a four times winner of the Tour de France cyclist was alleged with blood doping. Blood doping is defined by the world Anti doping association (WADA) as the misuse of certain techniques and/or substances to increase an athlete's red blood cell. This increase in Red Blood cell mass allows the body to transport more O<sub>2</sub> to the muscles which improves stamina. It becomes a common tool in endurance sports by the Italian, Americans, Russian, East-Germans and Finns. In fact blood transfusions become wide spread in elite endurance sports like - Marathon, Cycling particularly during 1980 to 1984 Olympic Games. There are no. of side effects occurred as a result of blood doping like kidney damage from allergic reaction, blood clots, transmission of infection disease like HIV, Hypertension, Viral Hepatitis and AIDS. It also effected mental, emotional of human being like - emotional breakdown, unusual behavior, leads to mental anorexia. Now a days there are number of blood doping techniques which are adopted by athletes which is a challenge in sports world. However it over duty to fight against blood doping and circulate prevention material, disadvantage, conduct awareness program in the country so that they can save own self of the punch of doping.

**Keywords:** Doping, forms, effects, benefits, human body

#### Introduction

Once any starting gun is fired at an Olympic event, every split second counts to the elite athletes. And that's where blood doping come in, Particularly in endurance sports. Blood doping is defined by the world Anti doping association (WADA) as the misuse of certain techniques and/or substances to increase an athlete's red blood cell. This increase in Red Blood cell mass allow the body to transport more O<sub>2</sub> to the muscles which improves stamina. It is most often used by athletes who complete in endurance sports such as cycling and cross country run. Blood doping has recently become an integral part of elite and recreational sports. Several potential methods of blood doping have developed over the past few decades.

The traditional of blood doping in modern history dates back to 1960's when a four times winner of the Tour de France cyclist was alleged with blood doping. However other endurance sports such as cross-country skiing, running cycling soon adopted a technique to improve performance that was termed as blood doping by the media in 1970's. It become a common tool in endurance sports by the Italian, American's, Russian's, East German's and Finns. Blood doping in sports is not a new practice since it has been used for more than 40 years. Studies conducted during the 1970s showed that transfusing Red Blood Cells (RBC) to an athletes led to an improved performance (Ekblom, Goldborg & Gulbring 1972, Eblom, Wilsom, & Astrand 1976) <sup>[5, 6]</sup>. In fact blood transfusions become wide spread in elite endurance sports (Marathon runners, cyclist, skiers) particularly during the 1980 and 1984 Olympic Games (Giraud Sottas, Robinson & Saugy 2010) <sup>[8]</sup>. In a remarkable case the US cycling team admitted to have used RBC transfusions and won nine medal winner during the Los angles Olympic (1984) after not having won a medal in cycling for 72 years (Morkeberg 2012). Similarly a US Nordic skier also confessed of blood doping in 1987. More recently the seven times, US winner of the tour de France during 1999-2000, confessed systematic blood doping, EPO along with banned substances. The practice become the doping method of choice in the 1990's for athletes who wished to increase artificially the RBC mass

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(Giraud *et al* 2010; Morkberg 2012; Reichel & Gneimer 2010) [5]. The use of HUEPO was suspected of having caused the death of nearly twenty European cyclist over a 4 years period (Eichner 2007) [7].

Blood doping is unacceptable on many levels. The goal of blood doping is relatively straight forward and singular to increase circulating hemoglobin levels. This increase the oxygen concentration of arterial blood & there for aerobic capacity. On the last day of the 2002 winter Olympic games in salt lake city the cross country skiers were booted out of the games for blood doping. Two of the skiers lost their medals the others were disqualified from the games. Blood doping by athletes is cheating – just like using steroids or bribing a judge.

### **Blood doping forms**

#### **Blood Doping**

Defined by WADA as the misuse of technique or Red blood cells. Blood doping is describe in two ways like:-

#### **Autologous Blood Doping**

In autologous blood doping method usually two units of athletes blood is taken some weeks prior to competition. Then the blood is frozen until one or two days before the competition when it is injected into the athlete. This is known as autologous blood doping.

#### **Homologous Blood Doping**

In Homologous blood doping is the injection of fresh blood, removed from a second person straight into the athlete. By increase the number of RBC, the oxygen carrying capacity to the muscles is increased. So the muscle endurance is increased which ultimately enhance the sports performance.

#### **The main side effect of blood doping include**

- The formation of blood clots.
- Over load of the circulatory system.
- Kidney damage from allergic reactions.
- Transmission of infectious diseases like HIV.
- Fever & Shock due to an allergic reaction.
- Kidney damage if incorrectly typed blood is used.
- Viral hepatitis and Aids.

#### **Artificial Oxygen Carriers**

Artificial O<sub>2</sub> carriers are a second method of blood doping in which some chemicals or proteins increase the ability to carry more oxygen to the muscles. They are helpful in enhancing aerobic capacity. All these techniques are prohibited.

#### **The main side effect of artificial oxygen include**

- Fever
- Reduced platelet counts
- Hypertension.
- Impaired O<sub>2</sub> delivery to issue.
- Kidney damaged
- Allergic reaction may occur
- Fever and cold
- Risk of Aids virus transmission if needless is shared.

#### **Erythropoietin**

More commonly known as EPO has been using by endurance athletes. Although used in a wide variety of sports. Erythropoietin (EPO) is naturally occurring hormone, secreted mainly by the kidney's which plays an important role

in regulations of production of RBC. The use of EPO started in the 1980's as a quicker cleaner alternative to blood doping. EPO stimulates bone marrow to produce more RBC and therefore hemoglobin higher RBC count means better O<sub>2</sub> transportation and so a higher rate of aerobic respiration.

#### **Health Risk**

If EPO levels are too high the body will produce too many RBC which can thicken the blood, leading to clotting, heart attack and stroke.

#### **Why Athlete Use Doping:**

Doping is now a global problem that follows International sporting events worldwide (David A Baron, David M Martin and S Amir Able Magd 2007) [4]. Some of the reasons why athlete/sports person would to take drugs doping to enhance his/her performance include:-

- The dominant culture that it's all about winning and being 'number one'.
- The rewards for victory are great: prestige, fame, money status future career.
- Pressure from coaches, managers or authorities.
- If I don't use other athletes will have the edge on me.
- Increase their physical strength
- Helpful to cope with anxiety and stress.
- May help to get over injuries more quickly.
- Lack of knowledge about drug side effect.

#### **How Blood Doping Works**

##### **Normal Blood**

##### **Doped Blood**

The blood of a typical adult male is made RBC (from a donor or previously removed Up of 40 to 50 % RBC which carry O<sub>2</sub> to from the athletes) or the hormone Tissues. Typical levels women are 35 to 45%. Erythropoietins (EPO) are injected. The increase in red blood cells allows muscle to work longer and harder without cramping.

#### **The Problem it works**

1. A test of skiers showed that in a 15K.m. cross country skier their time improved by 5.3% only 3 hours after the injection.
2. 3% increase of red blood count levels to move it over 50% (illegal) in the tour de France can give the athletes an advantage over the rest of the competition.

#### **Why Blood doping banned in sports**

Increase hemoglobin allow higher amount of oxygen to reach and fuel an athlete's muscles. This can improve stamina and performance particularly in long distance event such as running and cycling. Blood doping is banned by the IOC and other sports organization.

#### **Doping in India**

A zee research group analysis released in October 2012 doping is associated with performance enhancing drugs badly affecting moral ethical foundation and spirit of competitiveness in modern sports. Sports across the world including India at some or the other point have suffered from doping matter.

#### **Benefits of Blood doping**

##### **Increase Endurance**

Blood doping is very effective in increasing a person endurance level. Endurance refers to the power or capability

of doing a certain activity for longer period without getting tired. Blood doping is said to increasing overall performance.

### **Benefit Long Exercise**

Through blood doping, people who take the part in exercise such as marathon running and cross country can increase their effectiveness. The main logic behind doping is essentially improving the O<sub>2</sub> carrying capacity of blood, with additional O<sub>2</sub> being provided to muscle.

### **Improve Performance**

Blood doping offers athlete a way of easily getting a competitive edge over other athletes. They can enhance their athletic prowess and thus improves their performances.

### **Avoid O<sub>2</sub> depletion**

During exercise of high intensity, such as weight training, O<sub>2</sub> usually becomes depleted. The body therefore cannot get sufficient amount of O<sub>2</sub> for it to optionally perform. This state is known as O<sub>2</sub> debt. Which may lead to formation of lactic acid, blood doping prevent both O<sub>2</sub> depletion and also lactic acid formation. Never the less blood doping is highly risky and there is a high chance of getting heart attack and to blood clotting.

### **Blood doping effect on human body**

Blood doping has a lots of negative effect on human body which are defined under listed.

### **Mental Effect**

Blood doping leads to aggression and anxiety. The female athletes develop make characteristic and this influences their life. Anxiety can lead to murder and also force the athlete to involve himself in others illegal activities. more over blood doping leads to psychological disturbances among the athlete. Due to blood doping athletes are likely to be anti social. The athlete may behave abnormally. (Thieme & Hemmersbach 2009)<sup>[14]</sup>.

### **Emotional Effect**

Blood doping has emotional effect. research claims that blood doping result to unusual behavior among athletes. This is because drug use by the athlete result to emotional breakdown. The emotional breakdown leads to mental anorexia. Athletes are unable to eat as have unwanted thought regularly and influence their life and relationship with other people. (Burns, 2006)<sup>[2]</sup>.

### **Physical Effect**

In order to causing mental disorder and problem blood doping has physical effect. Athletes who use drugs the increase the rate of RBC in the blood which are more likely to be addicted then those who do not. The desire to win increase with time and athlete become harder and stronger than other athlete. Those athletes who take drugs in large amount and this effect the functioning of the body. (Shanahan, 1989)<sup>[13]</sup>.

### **Discussion**

The NADA/Organisation established carryout regular check up of the athletes before they participating in games/sports. The org. test the blood of athlete to determine the amount of RBC in the body. In United State the US anti doping agency is responsible for eliminating doping among athletes. It is anti doping agency that is responsible for Olympic movement in the country. The organization has establishment are aimed to

education athlete on the effect of doping on their performance & health. The WADA was developed in 1999 to monitor doping in all kinds of sports. The organization helped in the development of the world anti doping code. The world anti doping code helps harmonize doping policies used in different sports. (Bahrke 2002)<sup>[1]</sup>

The IAAF also helps to eliminating doping among players. The organizations help the governing body Track &Field athletes from using drugs. The organization has established a wide range of program to help athletes for e.g. the organization has education programmers, scientific, technical, social activities. Large % of the athlete still use blood doping. The athlete and sports heads don't adhere to rules that govern doping in their respective countries. This has led to disqualification of various athletics like Michael Phelps Who was disqualified in 2008 for blood doping.

### **Conclusion**

In conclusion blood doping has more harm than benefit to athletes. Though blood doping leads to good performance among the athlete. It has an adverse effect on their health & well being for instance it is associated with heart attack, stroke, and other diseases. It is also influence the performance of the athletes as they either disqualification. Thus sports masters and athletes should eliminate blood doping so as to eliminate cheating among the athletes.

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