*Biological Forum – An International Journal* **6**(2): 57-61(2014)

**ISSN No. (Print): 0975-1130**
**ISSN No. (Online): 2249-3239**

# Sport and Medications; Effects or Side-Effects of Generic Therapeutic Drugs

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*(Received 24 July, 2014, Accepted 05 August, 2014)*

**ABSTRACT: Almost many published articles have discussed the effects of doping drugs. Limited resources that is available on the adverse effects of medications, for common health concerns among athletes. Which of antibiotics, sedatives, antidepressants, diuretics are appropriate for athletes consume, or how much, and how to use these medicines, are not available as a comprehensive study. This article reviews common medicines that athletes use and their potential efficacy and interactions with exercise. Present review can create a background for athletes to use therapeutic drugs to consciously do serious damage not put their athletic performance. Present review can discuss on possible effect and side-effect of numerous generic medicines include CNS (central nervous system)-drugs, caffeine, diuretics, Non-steroidal anti-inflammatory drug (NSAIDs), antibiotics and generic psychiatric medication. However, this review is not a complete source for medication use in athletes.**

**Key words:** Athletic performance, diuretics, NSAIDs, Psychiatric Medication, therapeutic drugs.

## INTRODUCTION

Drugs or medications in sport may have serious side-effect on athletic performance. But mainly doping or energetic drugs are discussed or studied in researches [1, 2].

The list of doping drugs is published by World Anti-Doping Agency (WADA) [3], continuously. So athletes, coaches and researchers can investigate effects or side-effects of these drugs. In other hand Olympic comity have publications of sportspeople who have been involved in doping offences with novel doping drugs/methods [4].

Overall categorization of drugs/ medications shows four main groups used by athletes [5]:

(i) Therapeutic drugs by athletes consciously or unconsciously, are used.

(ii) **Energetic drugs:** Consciously used by athletes to enhance athletic performance.

(iii) **Psychiatric medication**: Medications to create a happy mood and preventing fatigue and mental stress are used by athletes.

(iv) **Hormones:** Peptidicor steroid hormones and their analogues, such as growth hormone.

Internet-based searches and literature reviews show numerous research works on energetic drugs, psychiatric and hormonal drugs, and their effects or side-effects on sport and athletic performance. But the published works on side-effects of therapeutic drugs is very limited, and without completive information.

Because of limitation of available source in this regard, a review on side-effect of therapeutic drugs on athletic performance can be useful for athletes. So, aim of present study is a review on these limited literatures and online sources with focus on therapeutic drugs effects on athletic health and performance.

## DRUGS AFFECTING THE CENTRAL NERVOUS SYSTEM (CNS)

These drugs increase alertness, fatigue, loss of appetite, drowsiness treating many disorders and for the treatment of hyperactivity in children is used.

Application of athletes: By athletes to increase energy levels, attention and concentration, arousal, behavioral, and are used to raise the level of consciousness.

20% are devoted to drug abuse.

Avois *et al.,* [6] reviewed CNS stimulants in sport practice. Summary of their findings [6] is presented as Table 1.

**Table1. Effect and side-effect of CNS-stimulant drugs in athletes.**

| Drug / substance | Application in sport | Effects | Side-effect |
|---|---|---|---|
| Amfetamine | Enhancing anaerobic performance | -Improve reaction time<br>-Increase muscular strength and endurance<br>-Increase acceleration<br>-Raise lactic acid levels<br>-Increase aerobic endurance capacity<br>-Stimulate metabolism by loss of body fat | -Headache<br>-Sleeplessness and anxiety<br>-health risks for amfetamine-linkeddeaths<br>-heatstroke and cardiac arrest |
| Ephedrines (Ephedra alkaloids) | increased energy, decreased time to exhaustion and potential thermogenic properties | -Increased metabolism<br>-Increased fat loss<br>-Improved muscle strength<br>-Increased time to exhaustion (when combined with caffeine) | -Hypertension<br>-Palpitations, tachycardia, or both<br>-Arrhythmia<br>-Myocardial infarction<br>-Cardiac arrest or sudden death |

References: Avois *et al.*, and Haller and Benowitz.

**CAFFEINE AND CAFFEINE-SUPPLEMENTS**

Despite considerable research in this area, the role of caffeine as a performance enhancing drug is still controversial (Fig.1) [8]. Some of the data are conflicting, which is in part due to how the experimental studies were designed and what methods were used. However, there is general agreement in a few areas [9]:

(i) Caffeine does not appear to benefit short term, high intensity exercise (eg. sprinting)

(ii) Caffeine can enhance performance in endurance sports.

Coffee and/or caffeine are often reported to be diuretics, so large quantities could lead to poor hydration status pre- or during exercise. With attention to scientific works, it cannot be true that “caffeine has considerable side-effecton athletic performance” [9-10].

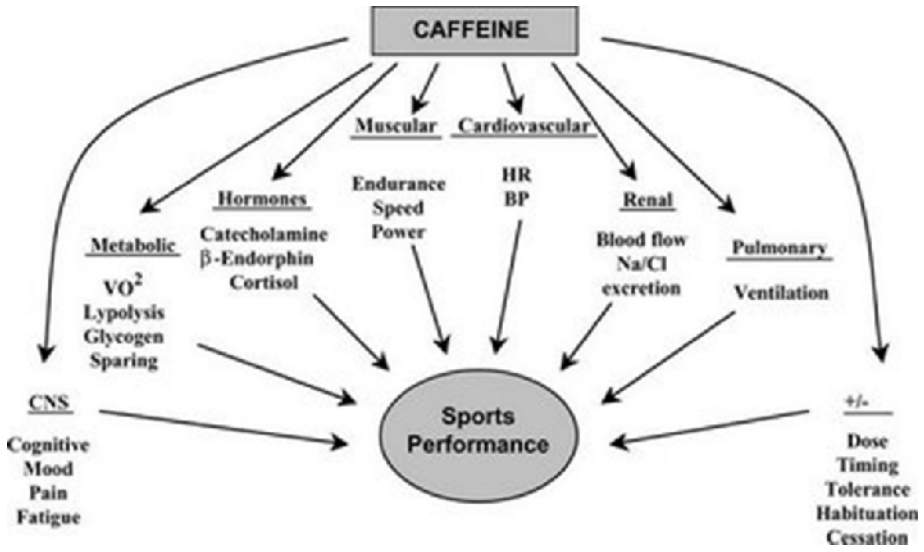


**Fig. 1.** Possible effects of caffeine’s on enhancing sports performance, Source: Rizzo (2007) [8].

## DIURETIC DRUGS

The drugs include a wide class of chemical compounds that can increase urination. These drugs uses in glaucoma (glaucoma eye), acute congestion, pulmonary edema, elevated blood calcium, acute renal failure, increased blood uric acid, high blood pressure, congestive heart failure and diabetes insipidus (Table 2).

**Table 2. Effect and side-effect of diuretic drugs in athletes.**

| Application in sport | Effects | Side-effect |
|---|---|---|
| -Rapid weight loss<br>-Diluting urine is | -Increase kidney excretion by decreasing kidney resorption of sodium<br>-Excretion of potassium and bicarbonate may also occur<br>-Used for variety of cardiovascular and respiratory conditions<br>-In sports, misused for weight loss and decreasing concentration in urine | -Dehydration<br>-Muscle cramps<br>-Exhaustion<br>-Dizziness<br>-Potassium deficiency<br>-Heart arrhythmias<br>-Drop in blood pressure<br>-Heatstroke<br>-Death |

*References: Tebyan cultural and information institute [6] and Johnson [11]

## NSAIDs

Since athletes will relieve the pain, so they (NSAIDs) can be used beyond the usual requirements [12]. Currently, endurance athletes before and during the competition and strive to compete at the highest intensity and the longest time taking ibuprofen and other NSAIDs, while the experts do not recommend taking this medicine [12-13]. These include aspirin, ibuprofen, Advil and Motrin, naproxen sodium and Orudis KT [14-15];

Taking NSAIDS (simple mechanism): Inhibition of prostaglandin synthesis 'Prevent from feeling pain.

All of these drugs block prostaglandins, ones that cause pain as well as those that protect the stomach lining [15]. Taking NSAIDs can sometimes cause stomach upset or GI bleeding. Risk of stomach irritation or gastrointestinal bleeding with long-term use of NSAIDs increases [12, 15]. Several studies have found actual performance benefit ibuprofen, and warn that these drugs may mask pain and this can lead to increased risk of injury [15].

Recommendations for using NSAIDs in athletes, reviewed by Alaranta *et al.,* [12]:

-Used only for a couple of days in case of acute injuries.

-Avoid mixing different kinds of NSAIDs, because of possible gastrointestinal unfavorable effects.

-Paracetamol (acetaminophen) is generic and safer NSAIDs for use in sport medicine.

- Non-oral uses of NSAIDs (cream, gels,) can decreases systamatic adverse effects.

-Long-term use of NSAIDs can inhibit normal hypertrophic response to resistance training.

In summary, NSAIDs use by endurance athletes has an impact on performance, but muscle damage or soreness may be not understood.It is reasonable to assume that taking NSAIDs have a positive effect on athletic performance. In fact, its use may cause serious health risk to some endurance athletes [15].

## ANTIBIOTICS

Antibiotics are commonly uses in sport medicine. Heavy training athletes are in exposure to viral or bacterial infections [12, 16], so oral antibiotics seem a good selection in these athletes [12, 17]. Investigations show that elite athletes use of antibiotics 2.fold more than n=general population of same age [12, 17]. In addition to antibiotic resistance high consumption of drugs, may be cause of posiible gastrointestinal upset and diarrhea [12, 18] and negatively affects athletic performance. Also tendon injuries can be raised from unsuitable use of some antibiotics such as floroquinolones [12, 19].

Based on published reviews [12, 17, 18], using antibiotics in suitable dosages have not serious adverse effect on athletes performance. Clinical studies show that intravenous antibiotic therapy can improve spiromtry of children with cystic fibrosis [20].

## PSYCHIATRIC MEDICATION

Antidepressant, mood stabilizers, anxiety medicines, ADHD medications are common psychiatric medications [21]. Side effects of these group of drugs is summarizes in Table 3.

**Table 3. Possible effect or side-effect of psychiatric medication in athletes.**

| Drugs | Effects | Side-effect |
|---|---|---|
| Antidepressants | Sleepiness - weight gain - possible activating | Low performance because of sleepless |
| Mood stabilizers | Treat bipolar disorder | Can be dangerous when used with anti-inflammatories such as ibuprofen |
| Anxiety medicines | Anxiety | Possible sleepiness and problems with coordination and balance |
| ADHD Medications | Treat ADHD and performance-enhancing | Unknown, but generally banned in college and professional sports |

*References: American Psychiatric Association [21].

## RECOMMENDATIONS

Present review summarized findings of past reviews and research work on side effects of common medications in athletes and sport medicine. Although present review is not complete reference for athletes, but we have attempt summarized key point of limited published studies about side effect of therapeutic (and non-doping) drugs in athletes. Finally we can suggest further completive studies in this regard. Also, writing a completive hand book on side effect of therapeutic drugs in sport can be useful.

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