

## NEW APPROACHES REGARDING THE DYNAMICS OF THE DOPING PHARMACOLOGIC AGENTS IN SPORTS

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### Abstract

The use of doping pharmacological agents is one of the major negative aspects in sports, that has to be carefully monitored. The present study reveals several important aspects regarding drug abuse among the sportsmen.

The study included 75 subjects that volunteered for this research. They were both male and female (63% males and 37% females) and associated with 12 different sports. The participants were included in the study based on their signed informed consent and their agreement to participate in the study anonymously. All participants were subjected to a survey, where they could fill personal (but anonymous) information regarding the potential use of doping substances.

Since more than 60% of the athletes accepted that they used doping drugs, and a great number of them admitted they did not know or were not sure of the biological effects of these substances, sports officials are required to offer information to every player informing them about these substances, because adequate knowledge about these drugs and their adverse effects might help them to avoid using these substances.

The major route of doping substances administration was the oral one, followed by dermic and intramuscular ones. Consequent to their administration, athletes noticed different modifications due to the side effects of abuse substances: psychological, androgenic, cardiovascular, dermatologic and muscular effects.

### Rezumat

Folosirea substanțelor farmacologice de *doping* este unul dintre principalele aspecte negative din domeniul sportiv, ce trebuie atent monitorizat. Prezentul studiu dezvăluie câteva aspecte majore ale abuzului de medicamente în rândul sportivilor.

Studiul s-a desfășurat cu participarea voluntară a 75 de sportivi, femei (37%) și bărbați (63%), practicanți a 12 discipline sportive diferite. Includerea în studiu s-a bazat pe participarea lor voluntară și anonimă, toți participanții primind o grilă de interviu pe baza căreia au oferit informații personale, în mod anonim, privind folosirea substanțelor de *doping*.

Având în vedere că peste 60% dintre sportivi au recunoscut că au utilizat medicamente în scop dopant, dar o mare parte dintre aceștia nu cunoșteau sau nu erau siguri de efectele biologice ale acestor substanțe, oficialitățile sportive ar trebui să asigure accesul fiecărui sportiv la informații privind substanțele de *doping*, acest fapt putând contribui la limitarea folosirii acestor substanțe de către sportivi.

Principala cale de administrare a substanțelor dopante a fost cea orală, fiind urmată de administrarea dermică și cea intramusculară. Ca urmare a administrării substanțelor de *doping*, sportivii au raportat prezența unor modificări la nivel psihic, cardiovascular, androgen, dermic și muscular, datorate efectelor secundare ale medicamentelor utilizate.

**Keywords:** doping pharmacological agents, drug abuse, sports

### Introduction

The abusive use of drugs among athletes is an issue of international interest. These drugs are called by experts "doping" substances as they are used for the artificial increase of athletic performance. Generally, doping substances are drugs used by people not for the therapeutic effect, but for illicit purposes, as these compounds reduce fatigue, increase the volume and the muscular strength or even reduce painful sensations [4,6,8].

Etymologically speaking, it seems that the term „doping” comes from the Dutch „to doop” as mentioned in dictionaries in the 18th century. For certain that the attempts to stimulate power, force, desire to win can be traced back up to the Romans that were organizing competitions between the gladiators and the fighters tried by all means to win. It seems that were found writings that mention that in chariot races the competitors ingested an alcoholic beverage made from honey – hydromel, to empower them and to increase aggressiveness.

About doping in today's acceptance of the word, one can talk from the 20th century. Thus, between 1900 – 1936, in Japan, sportsmen were using before competitions cardiotonics and nitrites (coronary vasodilators). The Second World War confirmed the effect of amphetamines (psychostimulants) over the nervous system – German aviators involved in bombing during night time took those pills before going on such missions in order to keep them alert and aggressive. In postwar period, when sport activities resumed their course, the use of doping substances, amphetamines, antidepressives, sympathomimetic and cardio-respiratory analeptic drugs reappeared and were the first type of substances used by sportsmen on their own initiative or under the recommendation of the staff (trainers, doctors).

At first, there were no anti-doping regulations, and the lack of specialized laboratories facilitated this practice of doping without scientific guidance and full of risks. A first European action took place with the meeting that took place in Ouriage – les – Bains, France, when was issued a first definition of doping (the use of substances nor normally present in the body that could afflict the health of the individual and the ethics of sports). Also, was issued a first list of doping substances: amphetamines and antidepressives, cardio-respiratory analeptic drugs, alkaloids with stimulant action on the central nervous system. Subsequent, in the 1960s a new category of doping substances emerged: anabolic steroids (testosterone derivative) and their use started in USA, among culturists [2,3].

Due to the subsequent effect of these drugs administered abusively, the International Sports Federation introduced the compulsory anti-doping control in major sportive events. Also, at international level there is the World Anti-Doping Agency that issues the World Anti-doping Code that includes the list of prohibited substances for sportsmen during or outside competitions.

Athletes' use of illicit substances to excel in performance is a form of cheating behaviour and is high among sports competitors. There are numerous psychological factors that contribute to a player's propensity to engage in drug abuse substances, like performance enhancement, confidence, motivation, age, emotional status and the lack of social support [1,5,7].

Understanding player's attitudes and behavioural intentions towards performance enhancement is critical for developing national and international anti-doping strategies.

Therefore the aim of our study was to analyze the prevalence of drug abuse (doping) within a group of volunteers belonging to various sport centers in Romania.

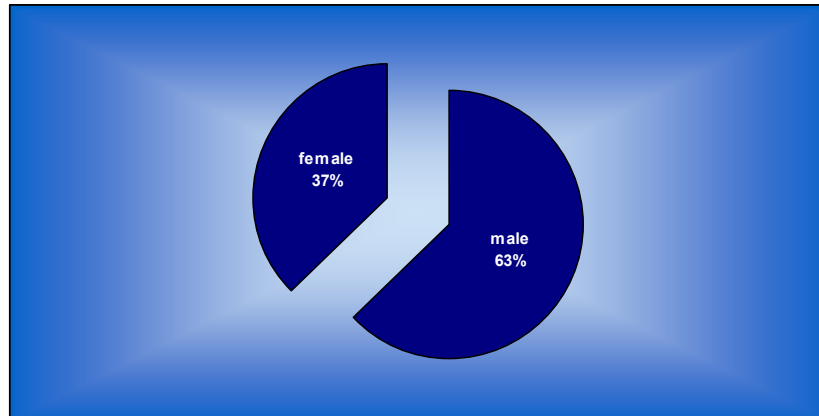
### **Materials and Methods**

The study included 75 subjects that volunteered for this research. They were both male and female and associated with different types of sports. The participants were included in the study based on their signed informed consent and their agreement to participate in the study anonymously.

All participants were subjected to a survey, where they could fill personal (but anonymous) information regarding the potential use of doping substances.

### Results and Discussion

A total of 75 athletes, 47 (63%) males and 28 (37%) females participated in the study.

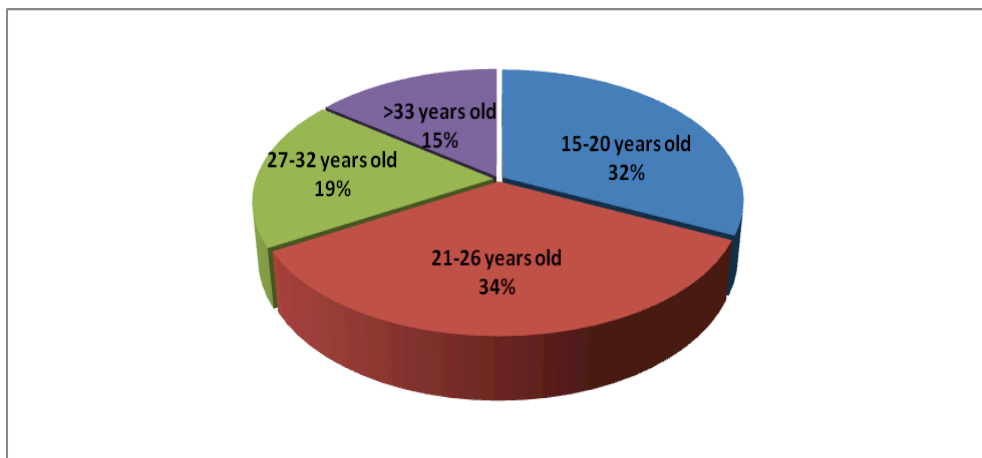


**Figure 1**

The distribution, according to their sex, of volunteers that participated in the study.

The athletes taken into study were divided, according to their age, as follows (figure 2):

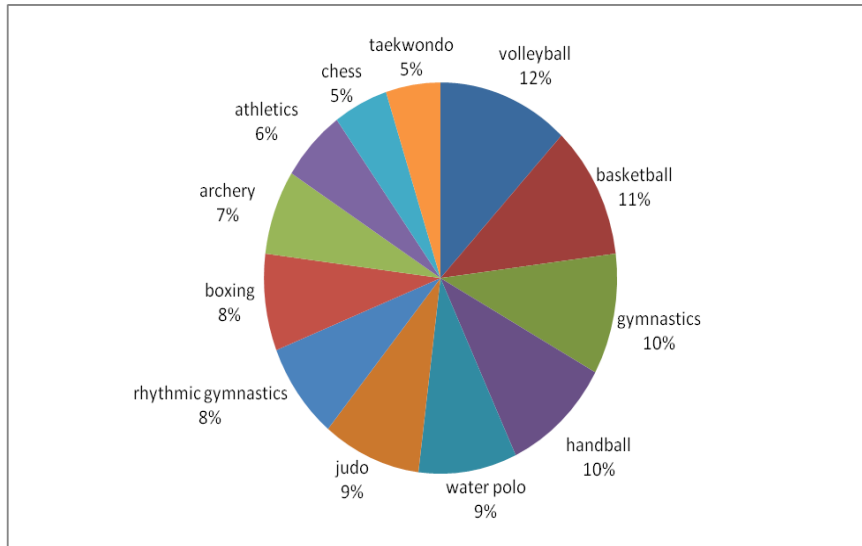
- Between 15-20 years old: 24 subjects
- Between 21-26 years old: 26 subjects
- Between 27-32 years old: 14 subjects
- Over 33 years old: 11 subjects



**Figure 2**

The distribution, according to their age, of volunteers that participated in the study.

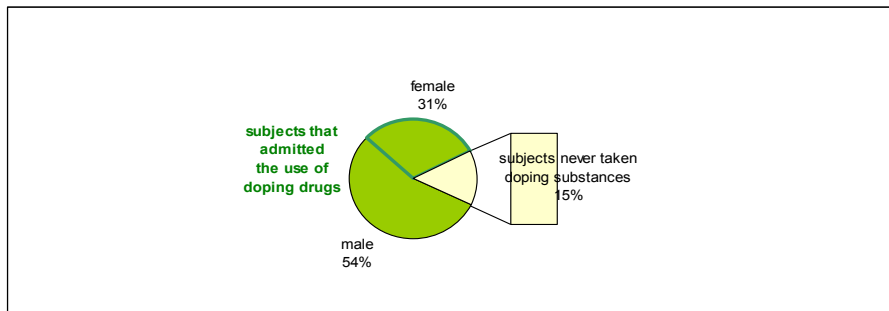
The study comprised athletes of 12 different sports as follows (figure 3): Volleyball - 9, Basketball - 9, Boxing - 6, Gymnastics - 6, Handball - 8, Judo -7, Taekwondo - 4, Water Polo - 7, Rhythmic gymnastics 6, Field archery - 5, Athletics – 4, Chess - 4.



**Figure 3**

The distribution, according to the practiced sport, of the volunteers that participated in the study.

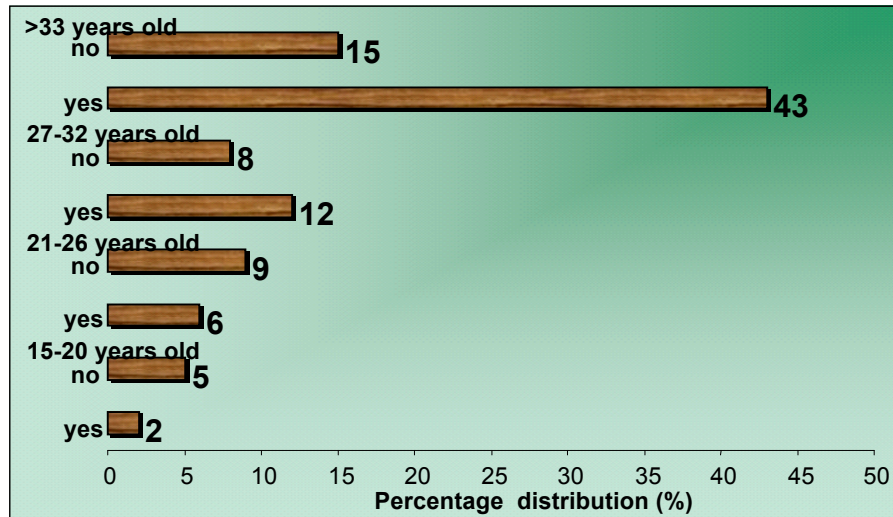
From the athletes questioned, a number of 64 (85.33%) accepted that they did take doping pharmacological substances. Within this group there were 41 males (54.66%) and 23 females (30.66%). The rest of the athletes marked that they never used doping drugs (figure 4).



**Figure 4**

The distribution of the participants in the study, according to their admission of using doping drugs

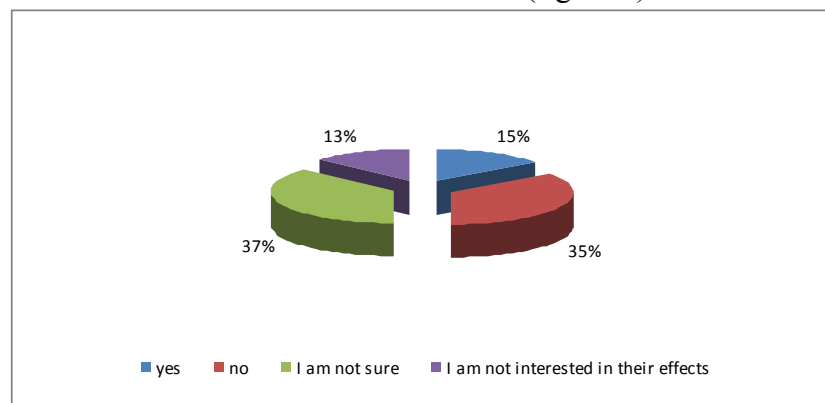
Considering their age, the majority of sportsmen that admitted having used doping pharmacological substances were over 33 years old, accounting for 43 % of the total inquired subjects. In contrast, the smallest percent of athletes that used these substances were aged 15-20 years old (2%) (figure 5).



**Figure 5**

The percentage distribution of the participants in the study, according to their admission of using doping drugs and their age

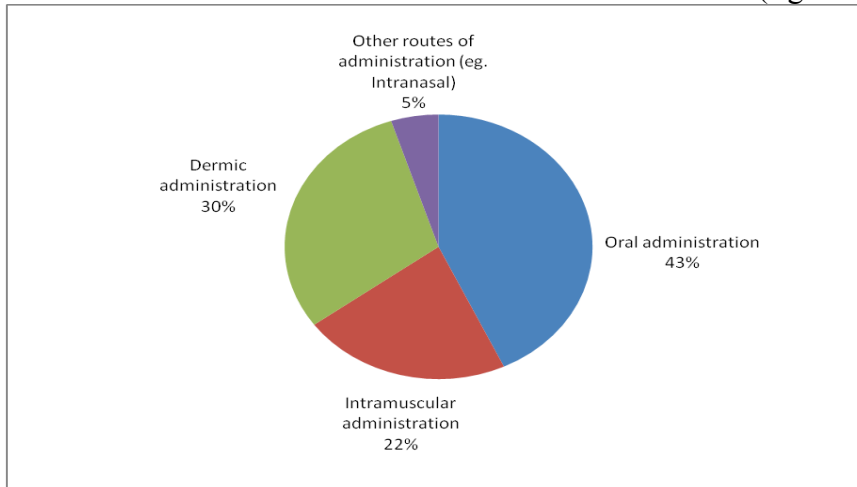
When asked whether they knew the possible biological effects after the administration of doping drugs, 37 % of the respondents admitted they were not sure of the effects, 13 % were not interested in the consequences, while 35 % were not aware of the side effects (figure 6).



**Figure 6**

The percentage distribution of the participants in the study, according to the awareness regarding the biological effects of doping drugs

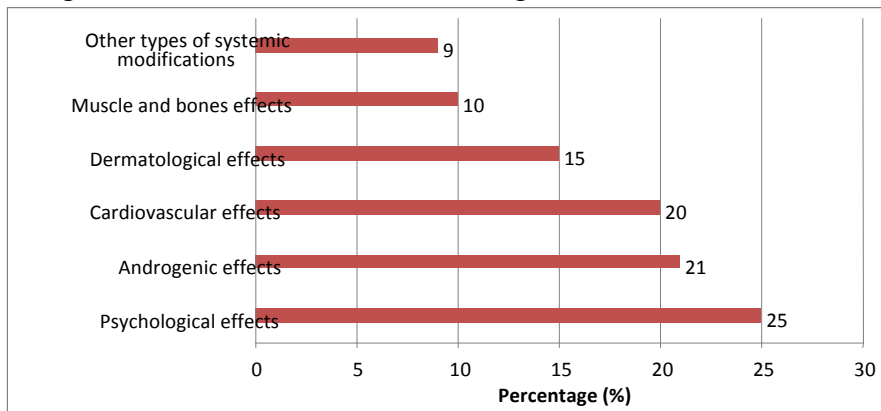
Inquired about the pharmacological formulation of the doping substances, the majority of athletes responded they used oral administered forms (43%), while 22% used intramuscular formulations, 30% dermal administered substances and 5% other routes of administration (figure 7).



**Figure 7**

The percentage distribution of the participants in the study, according to the used route of administration for doping drugs

The effects or modifications noticed by the study participants throughout the organism and even on their behaviour after the administration of doping drugs were assessed by the inquiry form (figure 8). The psychological effects were the most frequently registered (25%), followed by androgenic (21%) and cardiovascular (20%) effects. Other changes were observed at the dermatological and musculoskeletal level.



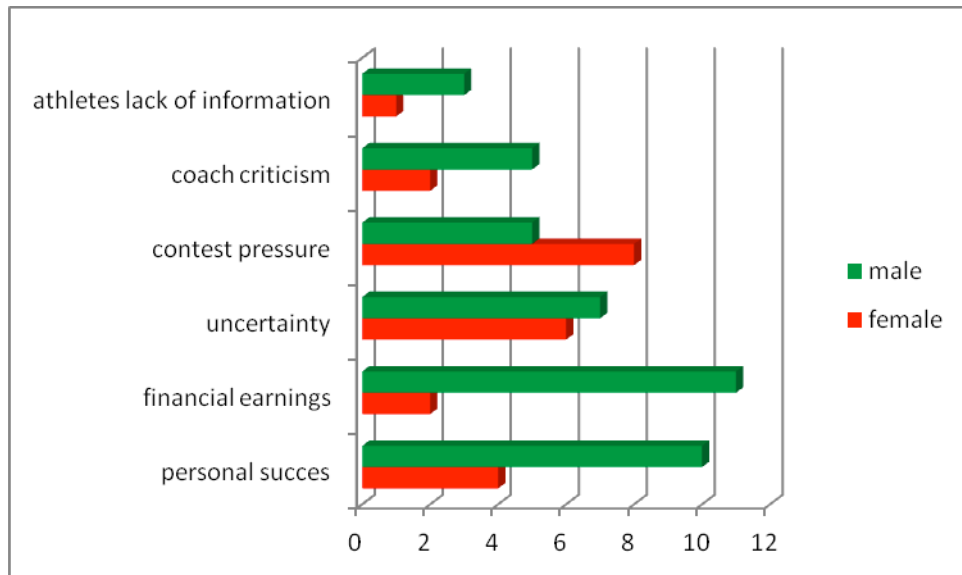
**Figure 8**

Registered effects after doping substances administration

Regarding the factors/ causes that led the players toward using drugs abuse substances, the most claimed triggers were the personal success, financial earnings and the uncertainty consequent to/associated with competition (figure 9, table I).

**Table I**  
Causes leading the sportsmen toward using drugs abuse substances

DOPING CAUSES	MALE	FEMALE
Personal success	10	4
Financial earnings	11	2
Uncertainty	7	6
Contest pressure	5	8
Coach criticism	5	2
Athletes lack of information	3	1



**Figure 9**

Factors leading the players toward using drugs abuse substances

### Conclusions

The use of doping pharmacological agents is one of the major negative aspects in sports, that has to be carefully monitored. The present study reveals several important aspects regarding drug abuse among the sportsmen.



Since more than 60% of the athletes accepted that they used doping drugs, and a great number of them admitted they did not know or were not sure of the biological effects of these substances, sports officials are required to offer information to every player informing them about these substances, because adequate knowledge about these drugs and their adverse effects might help them to avoid using these substances.

The major route of doping substances administration was the oral one, followed by dermic and intramuscular ones. Consequent to their administration, athletes noticed different modifications due to the side effects of abuse substances: psychological, androgenic, cardiovascular, dermatologic and muscular effects.

Psychological and social factors may contribute to the athletes' desire to use doping substances. These factors include the desire to enhance performance, the eventual criticism by coaches, the high concern of athletes on their personal standards and the lack of self confidence. The general psychology of the sportsmen is that in their activity only performance matters, no matter how they achieve it. Inadequate knowledge of doping substances and their adverse effect could also contribute to the use of these substances by athletes.

In conclusion, information and psychological factors are very important in player's decision towards using doping substances, so proper counselling and sufficient information is required from the supporting team, including the doctors, psychologists, and even pharmacists involved in the sportsmen education, shaping and training.

#### References

1. Bahrke MS, Yesalis CE, Kopstein AN. Risk factors associated with anabolic-androgenic steroid use among adolescents. *Sports Med.* 2000, 29, 397–405.
2. Barroso O, Schamasch P, Rabin O. Detection of GH abuse in sport: Past, present and future. *Growth Horm IGF Res.* 2009, 19(4), 369-74.
3. Bloodworth A, McNamee M. Clean Olympians? Doping and anti-doping: the views of talented young British athletes. *Int J Drug Policy.* 2010, 21(4), 276-82.
4. Doping in sports and its spread to at-risk populations: an international review. Baron DA, Martin DM, Abol Magd S. *World Psychiatry.* 2007, 6(2), 118-23.
5. Irving LI, Wall M, Jeumark-Sztainer D. Steroid use of adolescents: findings from project EAT. *J Adolesc Health.* 2002, 30, 243–252.
6. Kutcher EC, Lund BC, Pery PJ. Anabolic steroids: a review for the clinician. *Sports Med.* 2002, 32, 285–296.
7. Miller KE, Hoffman JH, Barnes GM, Adolescent anabolic steroid use, gender, physical activity and other problem behaviors. *Substance Use and Misuse.* 2005, 40, 1637–1657.
8. Sonksen PH. Insulin, growth hormone and sport. *J Endocrinol.* 2001, 170, 13–25.

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