Anti-doping control in Brazil: results from the year of 2003 and prevention activities

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ABSTRACT

This study presents the statistics of doping control, in- and out-of-competition in Brazil during the year 2003 and also shows the preventive actions developed. We have asked four laboratories and their coordinators to inform us about the controls on Brazilian athletes performed during the year 2003. All controls were performed under the World Anti-doping Agency's (WADA) rules and regulations. Our results show that 3,797 controls were performed in this year, being 3,266 in-competition and 531 out-of-competition controls. Most of the in-competition (92.16%) and out-of-competition tests (92.47%) were performed by LAB DOP, the doping control laboratory of the Chemical Institute of the Rio de Janeiro Federal University (UFRJ), one of the South American accredited laboratories. Professional soccer was the sport where most of the in-competition controls were performed (2.975 = 91.1%), with eight positive findings and a very low percent of positives (0.27%) when compared to the international literature. Most of the out-of-competition tests were performed by the Brazilian Olympic Committee (COB), during the preparation of our athletes for participating in the XIV Pan-American Games, at the Dominican Republic (92.47%). The positive result found was 19 positive in in-competition test and six in out-of-competition test. Two equestrian athletes refused to be tested. The percentage of positive in-competition (0.58%) is lower than the international percentages described, that ranges from 1 to 2%, with the exceptions of arm-fighting (30%), Paralympics table-tennis (10%), track and field (6.15%) and cycling (4.69%). The out-of-competition tests were found to have a greater incidence of positive results in bodybuilding (33.33%), equestrian (22.22%) and boxing (7.69%). The results of swimming (2.56%), track and field (1.89%) were in agreement with international data. The preventive actions of COB, the Brazilian Soccer Confederation and LAB DOP were shown in this article, altogether with the new anti-doping law from the Brazilian Sports Ministry.

Key words: Doping control. Doping. Statistics. Brazil.

INTRODUCTION

Cases of doping have become more and more frequent in our country and worldwide. Aware of this problem, the World Anti-doping Agency (WADA) has performed important work to educate and to control elite athletes publishing annual reports with regard to the anti-doping control internationally performed[1]. However, anti-doping literature in Brazil is not extensive. Aquino Neto[2] discussed on the athlete's importance in Brazilian society and on the anti-doping control and Bento *et al.*[3] studied the recombinant erythopoietin in sports. Castro *et al.*[4] analyzed the analysis validity of the variable time in the knowledge of national athletes about doping, while Damasceno *et al.*[5] recently disserted about the positive control of the VII South-American Games. Da Silva *et al.*[6] reviewed the use of anabolizant steroids in sports and De Rose and Nóbrega[7] wrote a reviewing chapter about this thematic. Pereira *et al.*[8] mention a clostebol contamination after a sexual intercourse and, in other article[9], Carreira Filho[10] refers in his Doctorate thesis that 12.8% of adolescents from both gender use or already used chemical substances aiming at altering body weight, especially anabolic steroids. The national statistics about the use of anabolizants in bodybuilding academies, despite being scarce, clearly indicate a public health problem, once show numbers around 95%, according to publication from Da Silva and Czepielewski[11] in a pilot study performed in bodybuilding academies of the city of Porto Alegre, although the authors have not privileged bodybuilders in the pilot study of a Master Degree dissertation. Silva and Moreau[12], using the questionnaire process, found steroids in 19% of individuals who attend to large bodybuilding academies in the city of São Paulo. The justification for such low number of works probably lies on the independence of the anti-doping control programs performed by the sportive confederations and by the Olympic and Paralympic Committees (COB) and (CPB) respectively. Thus, the global comprehension of the anti-doping actions performed in our country becomes difficult.

With the objective of unifying the anti-doping control policies national and internationally, representatives from different governments including the Brazilian, met conjointly with the Olympic movement in 2003, in Denmark capital, and signed the Copenhagen Declaration, approving the World Anti-doping Agency[13]. In this occasion, both public authorities and the Olympic movement agreed in following the determinations of a same code, which goes into effect in January 1st 2004[14]. The main objective of this code was to define doping as a possibility of increasing performance artificially, being harmful to the athlete's health or antagonistic to the fair play principles, which are there defined. When two of these three situations occur the doping is confirmed. As the World Anti-doping Agency requires the implementation of specific actions, which demand organization and high costs, there is a deadline for its accomplishment. Thus, the Olympic movement, including the sportive organizations, must suit the new laws of anti-doping control until the beginning of the Athens Olympic Games in Greece (2004) while the public authorities must do it until the beginning of the Turin Winter Games in Italy (2006).

The fight against doping includes, ideally, not only the programming of anti-doping control in-and-out of sportive competition, but especially the education and orientation of athletes with regard to this important thematic as well as the trial of athletes in adequate type and time when an adverse analytical result occurs in the laboratory. With regard to projects aimed at enlightening athletes with

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regard to doping and anti-doping, the COB has produced annually a handbook about "The use of medication in sports" including, besides a doping history and athletes' rights and duties, the name of substances and methods forbidden in sports by the WADA and a updated list of the commercial name of medications that may be used in different clinical situations[15]. This handbook was distributed to all athletes who participated in the Pan-American Games last year and will also be distributed to those who will compose the Brazilian delegation to Athens this year, besides being in full in the COB electronic page www.cob.org.br. In preventive and formation feature, all Brazilian athlete who goes out the country for international meeting is tested by the COB since 1995, year of the Mar del Plata Pan-American Games, in Argentina.

The Brazilian government, in turn, re-created the Sports National Council (CNE) in the year of 2002. The council was restructured in 2003, year that the Anti-doping Commission is established in the Sports Ministry[16]. This commission performed the first statistics about anti-doping control in the country and proposed to the CNE the publication of the Anti-doping Resolution 02/04, more suitable and in agreement with the international laws, replacing the regulation 531 of July 10th, 1985. It should be yet considered that the doping, besides being forbidden by the national and international sportive legislation, is also forbidden by the Code of ethics in medicine[17] and Sports Medicine[18].

Considering the limited number of publications on the anti-doping control and the Brazilian policy in this regard, we thought about performing this study. The objective of this work was to describe the anti-doping control performed in our country during the year of 2003 and to compare to data available in the international literature as well as to dissert on the national prevention activities. This study also provides data for further comparisons that will analyze the progress achieved in the anti-doping control performed in our country after the implementation of the World Anti-doping Agency and the new legislation of the Anti-doping Commission, serving as database for governmental, sportive, Olympic and Paralympic authorities in our country.

METHOD

For this study, we have consulted the two only anti-doping control laboratories in our country: the Doping Control Laboratory of the Rio de Janeiro Federal University, accredited since 2002 by the International Olympic Committee (IOC) and the Toxicological Analysis Laboratory of the Pharmaceutical Sciences School, University of São Paulo.

The Brazilian Aquatic Sports Confederation (CBDA) and the Brazilian Athletics Confederation (CBAt) also presented in-and-out-of-competition anti-doping control programs that eventually include erythropoietin control (EPO) that, once it is not detected in Brazil, is studied abroad in international laboratories equally accredited by the WADA such as the *INRS Santé*, Montreal, Canada and *Laboratoire National de Depistage du Dopage*, Paris, France[3].

The International Doping Test & Management (IDTM) also performs in-and-out-of-competition controls in our country for WADA and for the International Athletics Federations, Aquatic Sports (swimming, synchronized swimming, and diving), arc shooting and triathlon as well as for the ATP, sending controls to the INRS laboratory of Montreal, Canada.

Thus, this study consists of a retrospective analysis of the anti-doping controls performed in Brazil by both national and Montreal and Paris laboratories. To do so, we have requested the respective coordinators of these laboratories to inform us about the controls on Brazilian athletes performed during the year 2003, their respective sportive modalities, the collect situation (if in or out of competition) and the results obtained.

All tests included in this study were performed according to exigencies of the current Brazilian and international law, basically expressed in the World Anti-doping Agency. One urine sample of at least 75 ml is divided into two parts when collected and placed into two distinct flasks, labeled with an identical number and letters A and B with 2/3 and 1/3 from the urine total volume, respectively. This sample is thus sent by means of a safe mail service to the laboratory to be analyzed. The laboratory initially studies the first one, with about 50 ml or more. Indicated with letter A, the sample is divided into seven parts, being submitted to gaseous chromatography, mass spectrometry and immunologic trial for peptide hormones. The result is then informed in secret to the sportive authorities that requested the test[19].

In case the presence of forbidden substance or method or its metabolic markers is found, the athlete is informed by means of his entity and expresses the right to use or not the second part of the sample indicated with letter B with 25 ml or more. If positive, the sample B will be analyzed through the same technique in the presence of the athlete or his representative as well as in the presence of his International Federation. One result is considered as adverse when the athlete abdicates the right of analysis of sample B or when this analysis also reveals the presence of forbidden substance or method or its metabolic markers[19].

It is important to remind that the laboratorial analysis performed in competitions is more complete than that performed in out-of-competition controls. While the in-competition analysis researches all forbidden substances and methods, the out-of-competition controls only involve the research for anabolizants, diuretic substances and peptide hormones, besides the forbidden methods. In its out-of-competition controls, the COB includes the benzoylecgonine (cocaine) and the THC (cannabis) due to the relative frequency of their use in sports and the importance of the athlete's image for collectivity.

It is worthy emphasizing that the athlete's identity is not informed to the laboratory when the urine sample is sent to analysis. Thus, the present study does not break the athlete's anonymity and as it is retrospective, does not indicate the need of signing the consent form. On the other hand, most anti-doping control forms present an item informing athletes about the possibility of using the results for research purposes, as long as his identity is preserved.

The analysis of the data obtained was performed in this study through descriptive statistics including total and percentile number of controls, sportive modality, positivity percentile and type of forbidden substance found. With regard to the description of educational programs aimed at athletes concerning the doping control, we will describe here the experience of some authors of this work, collected along their participation in the IOC's medical commissions, the COB's Pan-American Sportive Organization (ODEPA) and in national sportive confederations.

RESULTS

3,797 anti-doping controls were performed during the year of 2003, being 3,266 in national competitions and 531 out-of-national competitions without previous notice. Most in-competition tests were performed in professional soccer official games, 2,975 controls in a percentile of 91.1% of the total tests. This sport was the one presenting the highest number of positive findings (n = 8) with a positivity percentile of 0.27%.

Proportionally to the number of tests performed, the arm fighting presented the highest number of positive results (30%) with paralympics table-tennis (10%), track and field (6.1%) and cycling (4.1%) presenting a percentile equally high. The total number of positive tests was 19 and the positivity average found was of 0.58%.

The results obtained for tests performed during competition are expressed in table 1 with total number, percentile, number of positive findings and positivity percentile.

TABLE 1
In-competition anti-doping controls performed in 2003

Sports modality	Total	%	Positives	% of positives
Track and field	86	1.99	4	6.15
Cycling	51	1.96	3	4.69
Fencing	6	0.18	0	0.00
Soccer	2,925	91.1	8	0.27
Handball	13	0.4	0	0.00
Arm fighting	10	0.31	3	30.00
Power lifting	6	0.18	0	0.00
Water polo	12	0.37	0	0.00
Tennis	16	0.49	0	0.00
Table tennis (PO)	10	0.31	1	10.00
Triathlon	6	0.15	0	0.00
Volleyball	84	2.57	0	0.00
Total	3,278	100	19	0.58

(PO) = Paralympic athlete

The forbidden substances found in these tests are presented in table 2, classified by sportive modality.

TABLE 2
Substances found in in-competition anti-doping controls

Nun.	Substance	Classification	Sports modality
1	Benzoylecgonine	Stimulant	Soccer
2	Benzoylecgonine	Stimulant	Soccer
3	Furosemide	Diuretic	Soccer
4	Petidin	Narcotic	Soccer
5	Chlortalidone	Diuretic	Soccer
6	Nandrolone	Anabolic	Soccer
7	Clostebol	Anabolic	Soccer
8	Testosterone/Epitestosterone	Anabolic	Soccer
9	Benzoylecgonine	Stimulant	Arm fighting
10	Benzoylecgonine	Stimulant	Arm fighting
11	Boldenone	Anabolic	Arm fighting
12	Amphepramone	Stimulant	Cycling
13	Amphepramone	Stimulant	Cycling
14	Nandrolone	Anabolic	Cycling
15	Norandrosterone	Anabolic	Track and field
16	Methyltestosterone	Anabolic	Track and field
17	Nandrolone	Anabolic	Track and field
18	Erythropoietin	Peptide hormone	Track and field
19	THC	Cannabinoid	Table tennis (PO)

(PO) = Paralympic athlete

In 2003, the XIV Pan-American Games were performed in Santo Domingo, Dominican Republic. Our athletes' preparation involved the performance of out-of-competition anti-doping controls in a suppressive way in almost all athletes classified for the event. Among all Brazilian delegation, only a few athletes living abroad or those classified at the eve of the beginning of Games, as the case of the Basketball Brazilian Team, were not submitted to anti-doping control tests. Furthermore, some athletes were studied out-of-competition by their national and international federations. Data related to these controls, besides data from other out-of-competition controls are expressed in table 3 with total, percentiles, positives and positivity percentiles.

The forbidden substances found in these tests are presented in table 4, classified by sportive modality.

Both equestrian cases were considered as positive because athletes refused to be tested, reason why we have only listed substances found in four of the cases. Other five adverse analytical results that did not resulted in positive controls by being properly justified by athletes were also detected by LAB DOP in out-of-competition tests: one case of salbutamol, for asthma treatment and two cases of diuretic agents for hypertension treatment in sports presenting no weight category. Two other cases of adverse analytical results for testosterone/epitestosterone (T/E) ratio occurred in canoeing, not confirmed by further laboratorial and clinical controls, according to the rule.

TABLE 3
Out-of-competition anti-doping controls performed in 2003

Sports modality	Total	%	Positives	% of positives
Track and field	53	9.96	1	1.8
Badminton	6	1.12	0	0
Basketball	14	2.63	0	0
Baseball	18	3.38	0	0
Bowling	4	0.75	0	0
Boxing	13	2.44	1	7.6
Canoeing	13	2.44	0	0
Cycling	8	1.50	0	0
Fencing	15	2.81	0	0
Equestrian	6	1.12	2	22.2
Water skiing	4	0.75	0	0
Bodybuilding	3	0.56	1	33.33
Soccer	22	4.13	0	0
Artistic gymnastics	12	2.25	0	0
Rhythmic gymnastics	7	1.32	0	0
Handball	32	6.01	0	0
Hokey	10	1.87	0	0
Judo	24	4.51	0	0
Karate	4	0.75	0	0
Weight lifting	7	1.32	0	0
Wrestling	2	0.38	0	0
Wrestling freestyle	4	0.75	0	0
Synchronized swimming	10	1.87	0	0
Swimming	39	7.33	1	2.6
Skating	2	0.37	0	0
Pentathlon	3	0.56	0	0
Water polo	32	6.01	0	0
Rowing	24	4.51	0	0
Diving	3	0.56	0	0
Squash	6	1.12	0	0
Taekwondo	6	1.12	0	0
Tennis	6	1.12	0	0
Table tennis	8	1.50	0	0
Shooting	32	6.01	0	0
Arc shooting	1	0.18	0	0
Triathlon	13	2.44	0	0
Sailing	12	2.25	0	0
Volleyball	42	7.89	0	0
Sand volleyball	12	2.25	0	0
Total	532	100.0	6	1.13

TABLE 4
Substances found in out-of-competition anti-doping controls

Number	Substance	Sports modality
1	Clostebol	Track and field
2	Norandrosterone	Boxing
3	Stanozolol	Swimming
4	THC	Bodybuilding

TABLE 5
Anti-doping control statistics available in literature

Collect place and period	Controls	Positives (%)
26 laboratories from several countries (2002)	131,373	1.80 and 0.90
Israel (1993-1998)	273	2.70
Czechoslovakia (1997)	843	1.70
Norway (1977-1995)	12,870	1.20

TABLE 6
In-competition controls performed by the laboratories studied

Laboratory	Number of tests	Percentile (%)
Lab Dop UFRJ	3,010	91.8
Lab Tox USP	173	5.2
INRS Montreal	91	2.7
LDD Paris	4	0.1
Total	3,278	100.00

DISCUSSION

The total number of tests performed apparently seems to be above the number performed in 2002, although no publication with this regard can be found. Such fact, based on the authors' perception, is mostly due to the performance of out-of-competition controls in the Brazilian delegation that participated in the XIV Pan-American Games 2003.

In in-competition tests performed, an almost dependence on the professional soccer, which performed most tests (91.1% of the controls) is verified, from a total of 2,975 tests performed with positivity percentile of 0.27%, far lower than the international percentile, which is around 0.45% in competitions of this modality. This international percentile is related to the year of 2002, when 131,373 controls were analyzed in 26 international laboratories[20]. Other publications presented by the international literature indicate higher percentiles, although with a lower casuistic[21-23].

The average positive percentile of in-competition controls was low if compared to the international literature: 0.58% against 1.80 on average. Now, the positive percentile of out-of-competition controls may still be considered as in the normality upper limit, if we consider data obtained by the IOC, which establishes this percentile in 0.90%. Bodybuilding, equestrian, boxing, swimming and track and field presented percentiles above the average, eventually caused by the low number of controls performed.

Most substances found in in-competition tests were anabolic agents (anabolic steroids) (n = 8), and the others were: stimulants (n = 6), diuretic agents (n = 2), peptide hormones (n = 1), cannabinoids (n = 1) and narcotics (n = 1). Drugs considered as "social use", due to new detection techniques may be observed for as long as one week through urine analysis, also forbidden by the Brazilian Civil Legislation such as the benzoylecgonine (cocaine) and the THC (cannabis), performed almost one third of the drugs found in competitions. In this context, the fact that the only positive case in bodybuilding not have been due to the use of anabolizants attracts attention, once it is known that the use of anabolizants artificially improves performance in this modality, but else due to the use of THC, what once again emphasizes the problem of the use of "social drugs" by athletes.

Since 2002, Brazil holds the technology for the detection of erythropoietin (EPO) in urine in the sample collecting, although a selection is performed from blood tests (hematocrit, hemoglobin and reticulocytes), according to norms of the IAAF. So far, the authors have verified two positive cases for the use of this substance, both evidenced by the CBAt in street running.

In the year of 2002, the South-American Games took place in four state capitals in our country and nine positive results were found (3.3%), three of them in Brazilian athletes, fact of great relevance in the media and probably influencing the low number found in 2003[5].

The out-of-competition tests were almost all performed by the Brazilian Olympic Committee (92.4%). Although the average positive values had been of 1.1%, those found in bodybuilding (33.33%), equestrian (22.2%), boxing (7.6%) and swimming (2.5%) were higher than the international reference. In out-of-competition tests, anabolic (anabolic steroids) (n = 3) and cannabinoid (n = 1) agents were found. Certainly, the low number of tests in some modalities generated high positivity percentiles, what influenced the final percentile.

It is worthy emphasizing that no Brazilian athlete was positive in the Pan-American games or in the Olympic Games due to the excellent prevention work developed by the COB's medical team.

The Brazilian Soccer Confederation (CBF), in turn, gathers its doping control physicians and the physicians from the professional soccer teams in Rio de Janeiro every two years to speak about doping prevention, while LAB DOP from UFRJ frequently performs meetings on the subject with national Confederations and Federations. The Brazilian Sports Ministry, through the Sports National Council (CNE) and the Anti-doping Commission (CCD) has updated the Brazilian law, searching to make it suitable with the WADA Anti-doping Code.

A significant percentile of in-competition tests (92.1%) is performed in the LAB DOP of the Chemistry Institute - UFRJ, which is the only laboratory accredited in Brazil by the WADA. The others are performed in the Toxicology Laboratory – USP in São Paulo (5.3%) or abroad, in the INRS in Montreal, Canada (2.4%) and in the LDD in Paris, France (0.1%).

The out-of-competition tests are almost all performed in the LAB DOP (92.4%) and the rest performed in the INRS in Montreal, Canada (7,5%).

CONCLUSION

Most in-competition anti-doping tests performed in Brazil are requested by the professional soccer. Now, the out-of-competition tests are mostly performed by the Brazilian Olympic Committee. The in-competition controls show low positivity percentile, while the out-of-competition tests present a slightly high average percentile, but still in agreement with the international literature.

The LAB DOP of the Chemistry Institute – UFRJ performs most tests in Brazil, and the others are performed by the University of São Paulo, Montreal and Paris. Considering that, according to the statistics mentioned, the main international anti-doping laboratories perform between 8.000 to 10.000 tests a year on average; our country needs to grow significantly in this area of vital importance for an ethic sports.

The use of anabolizants seems to be a practice that starts in high schools, following by bodybuilding academies and finally reflecting in the professional sports, although in lower percentiles if compared to the international reality. Due to the prevention activities of the Brazilian Sports Ministry, COB, CBF and LAB DOP of the UFRJ, the Brazilian Athletes have not presented positive anti-doping controls for forbidden substances and methods in Pan-American and Olympic Games.

These data certainly cannot be used in order to analyze statistics from other countries, but they may serve for comparative studies between these statistics and those from Brazil in the year of 2003 mentioned in the present study.

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