

Alka Beotra, Shobha Ahi, Shila Jain

Monitoring of glucocorticosteroids in out-of-competition testing to study the potential pattern of misuse

National Dope Testing Laboratory, Ministry of Youth Affairs and Sports, New Delhi, India

Abstract

The use of glucocorticosteroids (GCs) is banned in competition by World Anti Doping Agency (WADA) since 2004 and from January 2012, it has been added in the monitoring program for out-of-competition testing. The aim of the present work was to review the out of competition samples data of year 2010 and 2011 to study the potential pattern of misuse of GCs in out of competition testing. A total of 3963 samples were tested for out of competition testing during the year 2010 to 2011, out of which 76 (1.91 %) samples showed presence of GCs. Out of 76 samples, 35 (46 %) samples showed the presence of glucocorticosteroids above 30 ng/ml and 45 (54 %) showed the presence below 30 ng/ml. The declaration of use of glucocorticosteroids on doping control forms was found only in 04 samples. The percent adverse analytical finding (AAFs) of GCs reported by NDTL in 2010-11 was 0.15 %, which might have increased if the AAFs would be reported for out-of-competition testing.

Introduction

Glucocorticosteroids [GCs] are included in the prohibited list of World Anti-Doping Agency (WADA) from January 1, 2004 due to their performance-enhancing [1-2] and deleterious side effects. The prohibition is for their use during competition [3]. The use of GCs may be advantageous if used during the training period, which may be the basis to introduce monitoring of GCs in out-of-competition (OOC) samples from January 2012 [4].

The aim of the present study was to monitor the use of GCs in OOC samples received in National Dope Testing Laboratory (NDTL), India in 2010-2011 to study the potential pattern of use. The findings of the study may provide additional relevant information for banning GCs at all times (in and out-of-competition).

Experimental

Data of 3963 routine OOC samples tested at NDTL from January 2010 to December 2011 were reanalyzed for the presence of GCs. This class of drug was not the part of OOC test menu in NDTL [5]. The sample acquisition method was same for in-competition and OOC tests [5]. A separate quantitation method was set to analyze the presence or absence of GCs in the samples. The testing of GCs in OOC samples was carried in agreement with the applicable anti-doping regulations. All the chemicals and reagents were of analytical grade. The certified reference materials of corticosteroids were purchased from Sigma Aldrich, USA, National Measurement Institute, Australia and Cerilliant, USA.

The sample preparation procedure involves enzymatic hydrolysis and liquid-liquid extraction [5]. All HPLC-MS/MS experiments were performed with Agilent 1100 series coupled to API 3200 mass spectrometer. The ions for all the analytes were generated in the positive-ion mode.

Results and Discussion

Out of 3963 samples tested for OOC testing from 2010 to 2011, 76 samples (1.91%) showed presence of GCs out of which, 35 (46 %) samples showed the presence of GCs above 30 ng/ml and 45 (54 %) showed the presence below 30 ng/ml. However, 4 samples showed presence of two (2) GCs, thereby making total no. as 80 in 76 samples (Figure1). The declaration of use of GCs on doping control forms was found only in 04 samples (Figure2).

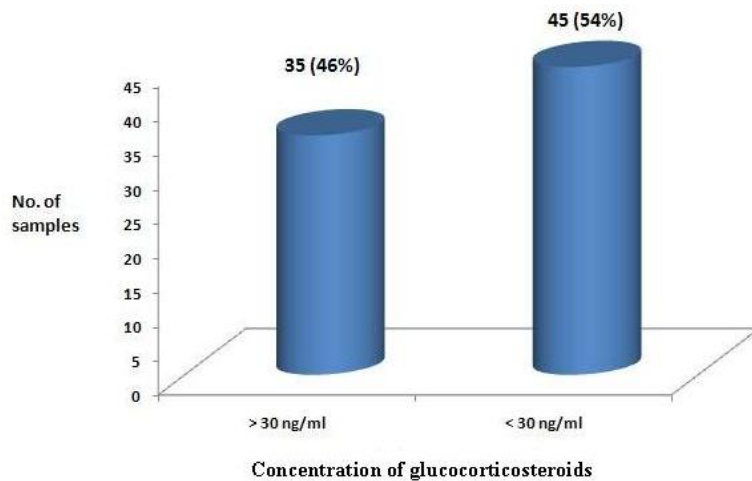


Figure 1: Presence of GCs in out-of-competition samples (2010-2011)

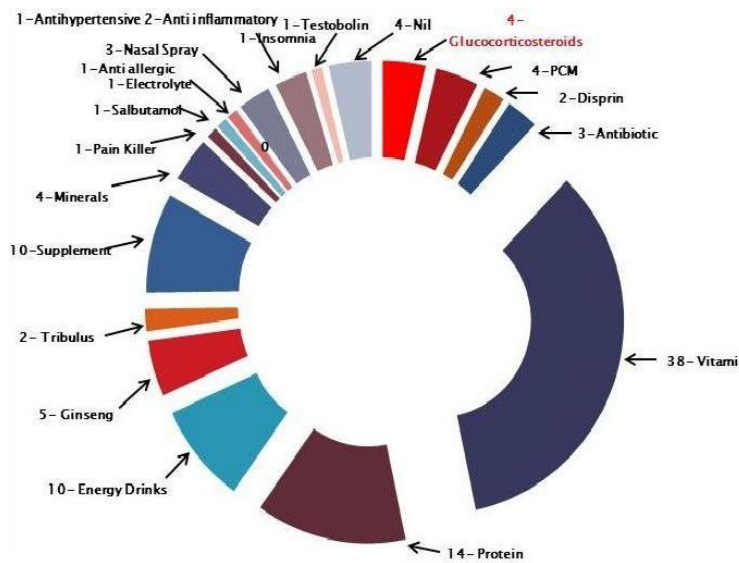


Figure 2: Declaration of use of GCs on doping control forms

The drug wise distribution of GCs is shown in Figure 3a&b whereas; discipline wise distribution of GCs is shown in Figure 4a&b. The most prevalent GCs used were methylprednisolone, prednisolone/prednisone, betamethasone /dexamethasone and budesonide.

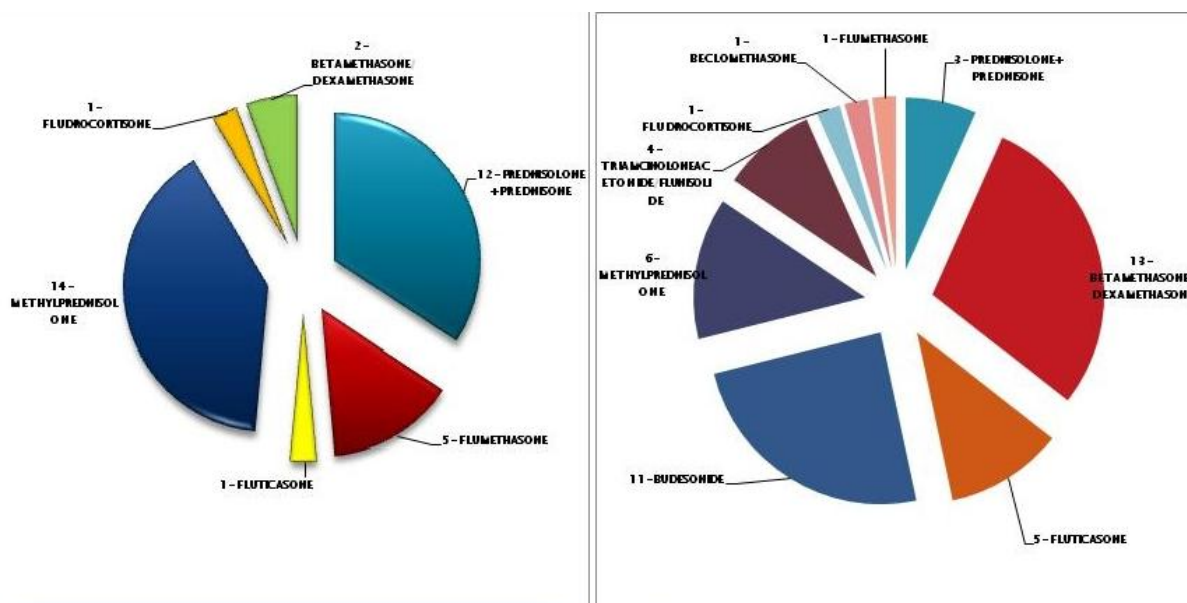


Figure 3: (a) Drug wise distribution of GCs (2010-2011) (>30ng/ml), (b) Drug wise distribution of GCs (2010-2011) (<30 ng/ml)

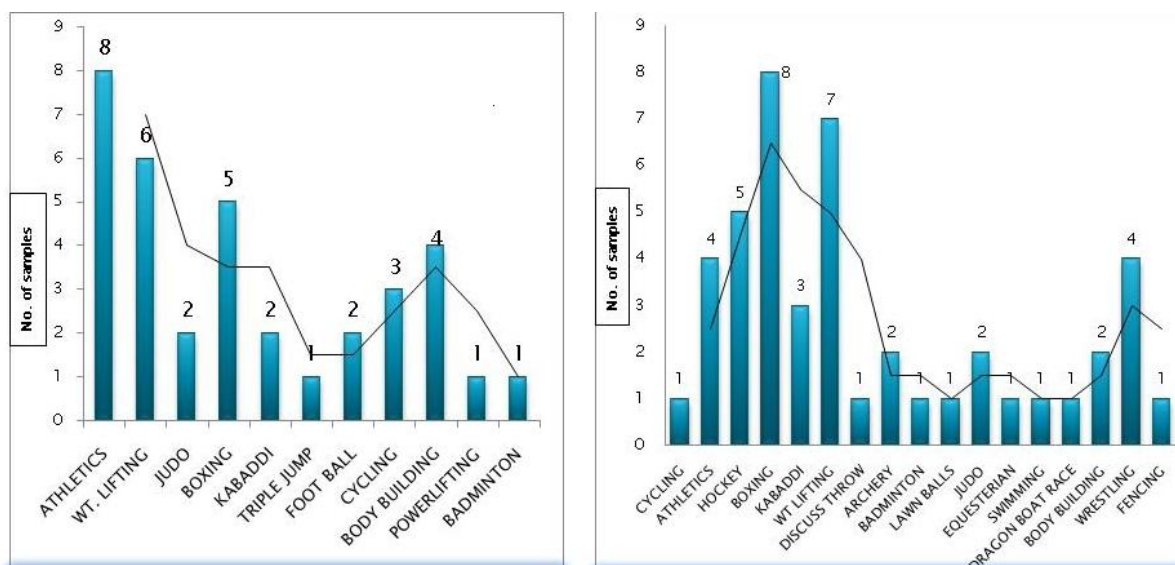


Figure 4: (a) Discipline wise distribution of GCs (>30ng/ml), (b) Discipline wise distribution of GCs (<30 ng/ml)

The result reveals that the percent adverse analytical finding (AAFs) for GCs may rise if urine samples will be tested during training period. Further work is in progress to continue with the monitoring of GCs in OOC samples which would facilitate pattern of use of GCs in sports during training period. The percent AAFs of GCs at NDTL in 2010-11 was 0.15 %, which might have increased if, the AAFs would have been reported for OOC testing. The evaluation of percent positive of glucocorticosteroids for 2010-2011 in NDTL, India reveals higher percentage of GCs use in OOC samples (0.88 %) than in-competition samples (0.21 %), which may not be coincidental and needs monitoring as proposed by WADA. It cannot be ruled out that the increased use of GCs as per present finding may be for therapeutic purpose. Hence, monitoring of more number of samples is required to arrive at the clear pattern of results for use or abuse of GCs in sports. The results of monitoring may necessitate prohibiting systemic use of glucocorticosteroids at all times (in & out-of-competition).

Conclusions

The results of present preliminary work show that, the GCs are also used during the training period in sports. The use of GCs for therapeutic/performance enhancement cannot be established with the present work. It is essentially required to have larger number of sample data to arrive at a decision to ban GCs at all times in sports. The complete study is being published elsewhere.

References

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