

Over-the-counter medication usage and knowledge of
anti-doping in English football league players: a
questionnaire-based study.

By

Andre Villalobos Otayza

Candidate #: CSVS0

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Project supervisor(s): Bhavesh Kumar

Courtney Kipps

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I, CSVSO, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the work.

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1. Abstract

Introduction: Professional athletes demonstrate limited understanding and awareness about using over the counter medications (OTC) and doping sanctions. This situation puts them at risk of taking banned substances. To date, there is no published literature exploring OTC usage in footballers. The aim of the study was to describe the use of OTC medication and footballer's knowledge of anti-doping in the English football league (EFL). **Methods:** a questionnaire-based, cross-sectional study was carried out on members from three professional teams in the EFL. Footballers age 17 or older were included in the study. Players decided to participate voluntarily and informed consent was uphold. Knowledge of anti-doping and usage of OTC medication was assessed with 12 and 6 close-ended questions respectively. **Results:** 57 footballers completed the questionnaire, with a mean age of 21 years. The highest level of education achievement was GCSE level in 84% of participants. OTC medication was used by 47% of players during the season. The most frequent medications used were painkillers (38%) and non-steroid anti-inflammatories (24%). Pharmacies were the most common source were players obtained OTC medications (44%). Only 32% of participants reported looking for advice prior medication use and 33% checked their ingredients prior consumption. On average, the number of anti-doping questions answered correctly was 7.7 out of 12. A moderate positive correlation coefficient ($r=0.46$, $p<0.01$) between number of correct answers in anti-doping questions and greater caution regarding OTC medicines use was found.

Conclusion: Footballers who demonstrated more anti-doping knowledge were more cautious towards OTC medication usage. Promoting knowledge by understanding the risks and doping penalties due to OTC medication use can improve the decision-making of footballers.

2. Introduction

Medication use in professional sports is significant. Studies in athletes participating in the Olympic games determined that different medications were used, including anti-inflammatory drugs (NSAIDS), analgesics, contraceptives, antiallergics, and skin ointments (1). Furthermore, athlete's rate of medication use is significantly higher than age-matched controls (2). Focusing on football, previous publications performed during the men's world cup described that up to 54% of footballers used them at least once at a rate of 0.8 substances per player/match (3). Similar results were observed in the UEFA EURO 2012 where 52% of players reported using some sort of medicine in the last three months (4). In addition, permitted medications were frequently documented in professional players participating in elite leagues, with 75% of the participants reporting NSAIDS use in the last 3 months. In relation to supplements, 82% were current users. The researchers concluded that people involved in high demanded activities are more likely to consume medications and supplements compared to non-professional athlete populations (5). Despite the existence of guidelines and recommendations towards correct medication

prescription in musculoskeletal injuries, the rates of use have not changed over time (6). A study in the 2014 Brazil World cup revealed that medication use was similar compared to the two previous editions (7). It is important to consider that reports do not take in consideration self-medication or treatment already prescribed so likely underestimate medication use (8).

Athletes using OTC medicines containing small amounts of stimulants (ephedrine) to treat minor conditions such as common colds have been implicated in serious doping penalties. In order to avoid unfair sanctions to athletes, the world anti-doping Agency (WADA) decided to introduce the term “Specified substance” to describe a prohibited substance that may be taken inadvertently (9). Therefore, players need to be aware of the ingredients prior consumption of OTC medicines,. Otherwise, it constitutes a risky practice. Despite these facts, there is insufficient literature in relation to OTC medication use in athletes. A study about OTC medication for upper respiratory tract conditions and allergies found that 76% of international athletes used OTC medication in the last 3 years (10).

Recommendations regarding OTC medication consumption state that professional players should avoid them as they may contain banned substances. Published reports stated that OTC stimulants were involved almost in 25% of the cases where further investigation was required for suspected doping (11). The WADA 2017 report described that 141 in competition and 30 out of competition urine samples went through additional investigation (0.5% of the samples collected) (12). A study that investigated educational needs in elite athletes regarding doping laws described that

4 out of 74 athletes took banned substances by accident. Lack of doping awareness and knowledge were related factors in these episodes. These results also indicated that athletes are not as well prepared as they would think in relation to accidental doping avoidance (13). In addition to medications, it has been found that dietary supplements labelled as “harmless” could also contain traces of illegal substances (14).

Previous efforts to reduce medications consumption and possible health risks in athletes focused on prevention and education programmes. (15) (16). One example is the *‘eleven rules to prevent doping in football’* campaign, which objective was to increase awareness about dangers and consequences of doping (17). Despite the implementation of strategies to improve education, anti-doping knowledge showed by players and people surrounding them is insufficient. A study done in Australia demonstrated that athlete’s support personnel had gaps in knowledge, specifically family members and trainers. They concluded that educational programmes should also include them (18). In the same way, a study investigating doping knowledge in Iranian footballers and coaches showed poor understanding of the topic. Additionally, they found no significant difference of knowledge level between groups. (19). This situation suggests a bigger problem as coaches are generally approached by younger athletes for advice, as showed in a research of amateur football dynamics, that concluded coaches and team managers are essential in young athletes because they are regarded as referential figures (20). A similar research examining doping knowledge in Saudi athletes also revealed

deficient doping awareness, which was associated with low education level, age younger than 20 years, lack of punishment awareness and previous use of supplements (21). Reports that examine elite athlete's knowledge and understanding about medications found that the overall level has improved compared to preceding years, but it is still inadequate to ensure proper prevention of unintentional doping (22).

We hypothesized that players who have more knowledge about anti-doping concepts and sanctions will demonstrate more caution towards OTC medication usage. Hence, the aim of the study was to describe footballer's OTC medication usage and their current anti-doping knowledge.

3. Methods

A descriptive, questionnaire-based cross-sectional study was carried out using a convenience sample. It was presented to professional footballers of Reading football club, Brentford football club and AFC Wimbledon participating in the 2018-2019 season of the English Football League championship and League one. The sample size was determined by estimating the proportion adjusted to a confidence level of 95%, with 5% margin of error and an estimated proportion of 50% in a population of 66 players, obtaining a representative sample of 57 footballers. We considered as part of the study all the players enrolled in the mentioned teams who were 17 years old or older.

The questionnaire was developed according to principles described in previous publications (23). Close-ended questions were used (see appendix A). Background characteristics of the players including age, highest degree of education, time spent training per week were asked. Player's knowledge was assessed with 12 questions which involved correctly identifying permitted and banned medications such as paracetamol, allergy pills, stimulants (ephedrine), antibiotics and hormones (testosterone, growth hormone), awareness of the World anti-doping agency (WADA), specified and non-specified substance meaning, inadvertent doping sanctions due to OTC medication consumption and maximum length of sanction due to a doping violation. As well as this, usage of medications was evaluated with six questions that asked where do players obtain medications from, whom they approach prior to taking medications, the number of times OTC medicines were used during the season, whether they check the ingredients prior taking medications, if medications were shared with teammates and if medication was taken at the recommended dose (see appendix B). These questions were also intended to assess how cautious footballers are when using OTC medicines. A final question about player's concern about prohibited substances consumption was made using a 5-point Likert scale. An expert in anti-doping reviewed the questionnaire and a pilot test was undertaken in 22 sports health professionals to determine clarity of the questions. The questionnaire was amended considering the feedback obtained ensuring that questions were more suited to collect the information required. An online model of the questionnaire was created using google forms survey sheet. Footballers accessed

the questionnaire via QR code using their mobile phones or by using printed versions available. Data was collected between the months of April and June of 2019. An explanation of the research purpose was given to the footballers who decided to participate voluntarily.

All questionnaires sent were completely anonymous and coded with a unique number. Data was entered to Statistical package for the social science (SPSS) version 25 for analysis. To compare frequencies cross tables were used. Kolmogorov-Smirnov (KS) test to confirm normal distribution was carried out. Spearman correlation coefficient was calculated to measure the relationship between the main variables.

The present study was reviewed and approved by the Ethics Committee of University College London. The researchers meticulously followed all the ethical procedures proposed.

4. Results

A total of 57 footballers completed the questionnaires. Regarding the general characteristics of the population, all participants were males and mean age was 21 years. The most common highest education level achieved was GCSE (n=48, 84%), while the minority (n=9, 16%) had an A level degree. Respecting training hours a week, 34 players (60%) spent between 10-15 hours/week, 17 players (30%) more than 15 hours and 6 players (10%) less than 10 hours. In relation to medications, 27 players (47%) described that they used OTC medication during the season and 45 players (79%) mentioned that they used supplements. The most common medications reported were painkillers (n=33, 38%) followed by anti-inflammatories (n=21, 24%). Other medications reported are described in figure 01. The most common source where medications were obtained was pharmacies (n=25, 44%). The other common sources to get medications are described in figure 2. About anti-doping testing, 32 footballers (56%) went through at least one during their professional career. In relation to the players that declared not having previous anti-doping testing, 88% of them had twenty years or less.

Figure 01: Common OTC medication used reported by footballers participating in EFL.

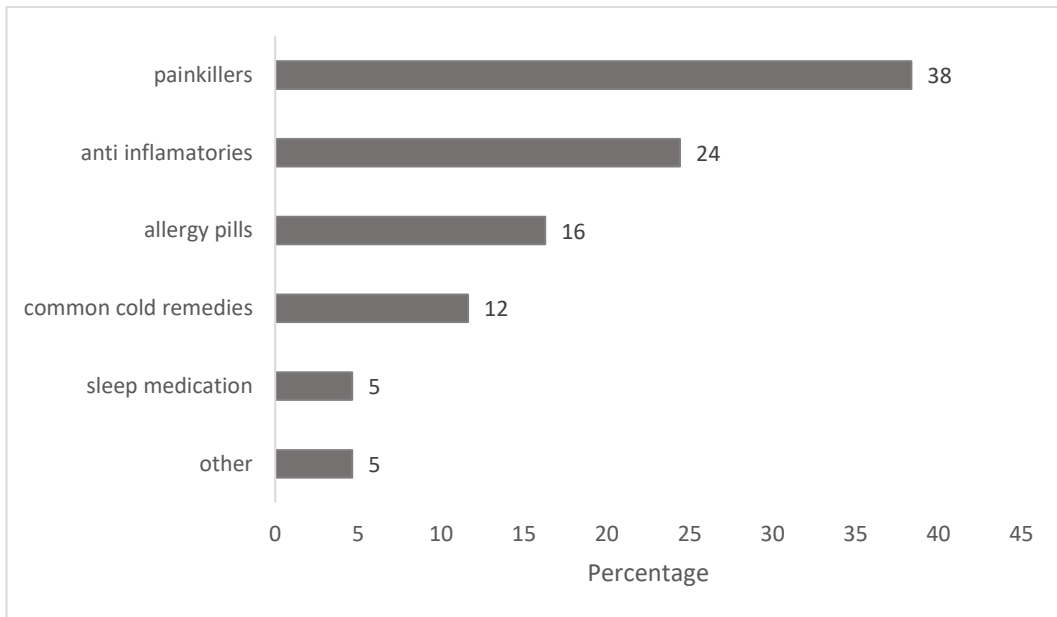
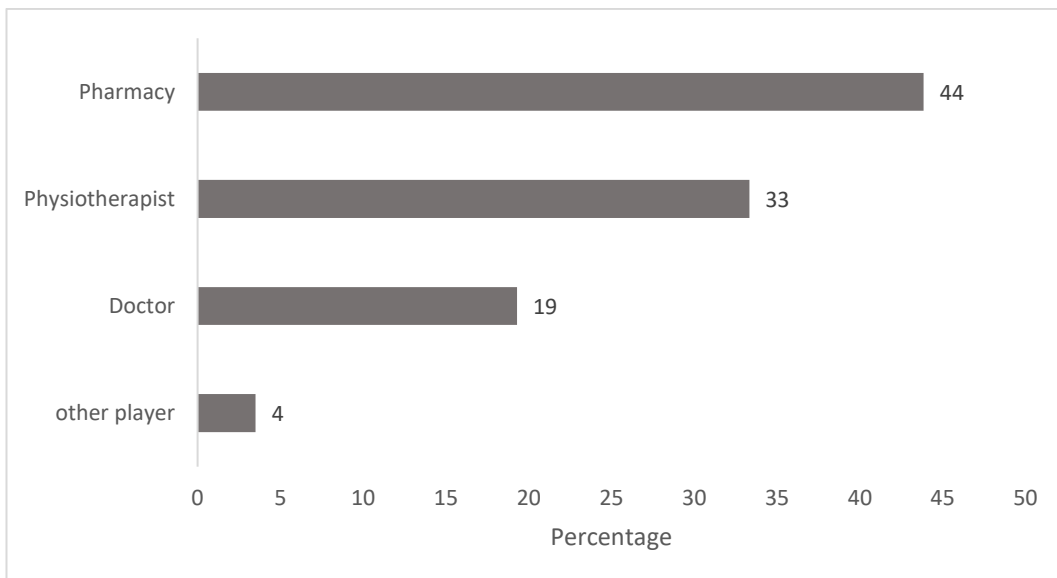


Figure 02: Common sources reported where footballers participating in EFL obtained OTC medications



Regarding OTC medication usage, only 16 players (28%) declared they have never used them, 28 players (49%) reported usage less than two times per year, 10 players (6%) more than twice per year but less than once a month and three players (5 %) more than one pill per month. When asked how frequently they seek medical advice and check ingredients prior considering medication consumption, 18 (n=32%) players mentioned that they always look for advice while 19 (n=33%) reported always checking ingredients (fig.3a-3b).

Figure 3a. Medical advice search prior OTC use in footballers participating in EFL.

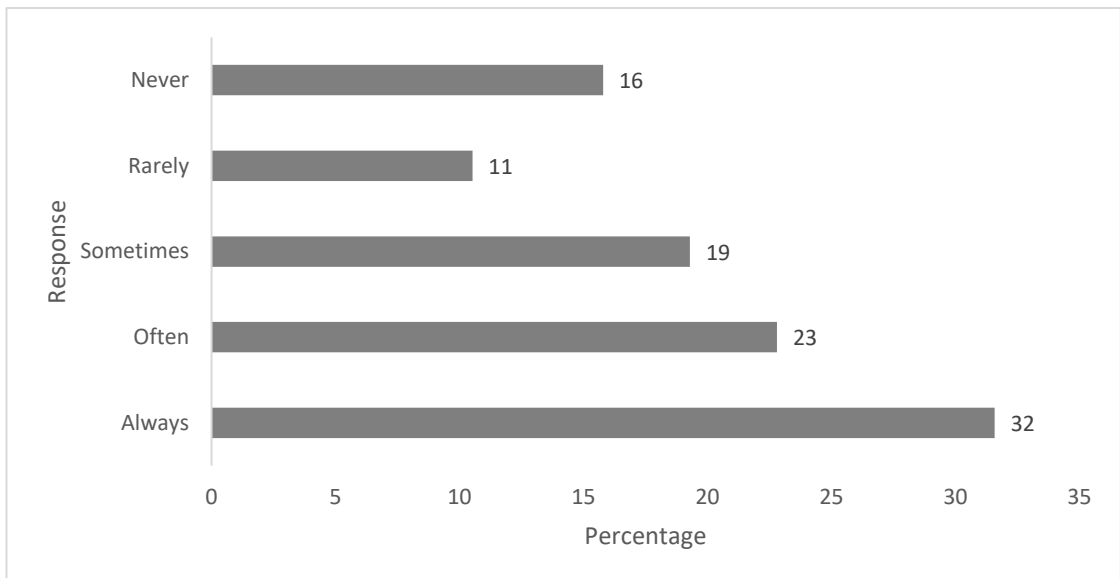
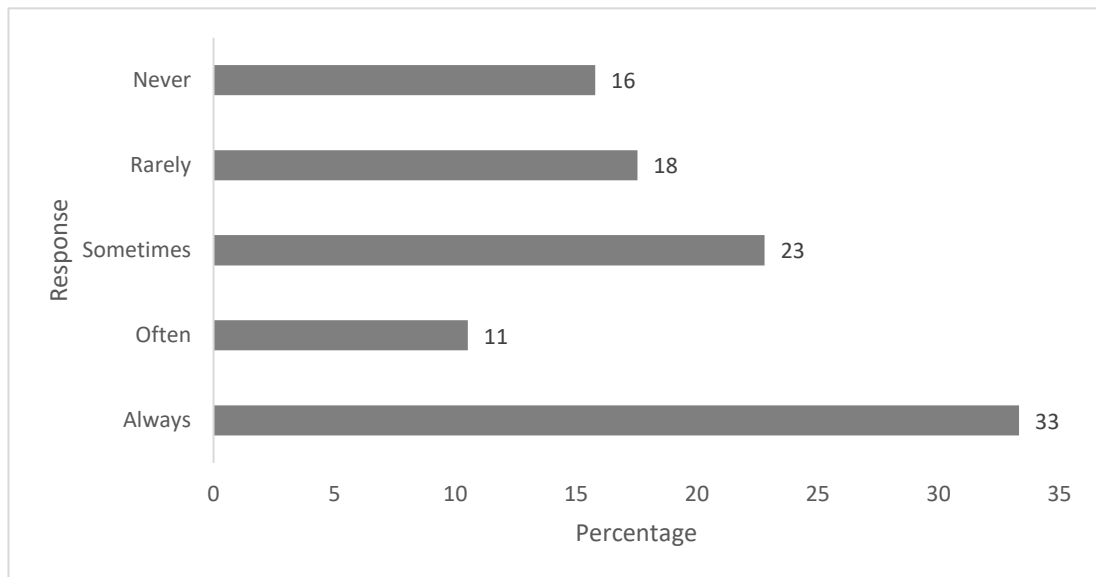


Figure 3b. Medication ingredients check prior use of OTC in footballers participating in EFL.



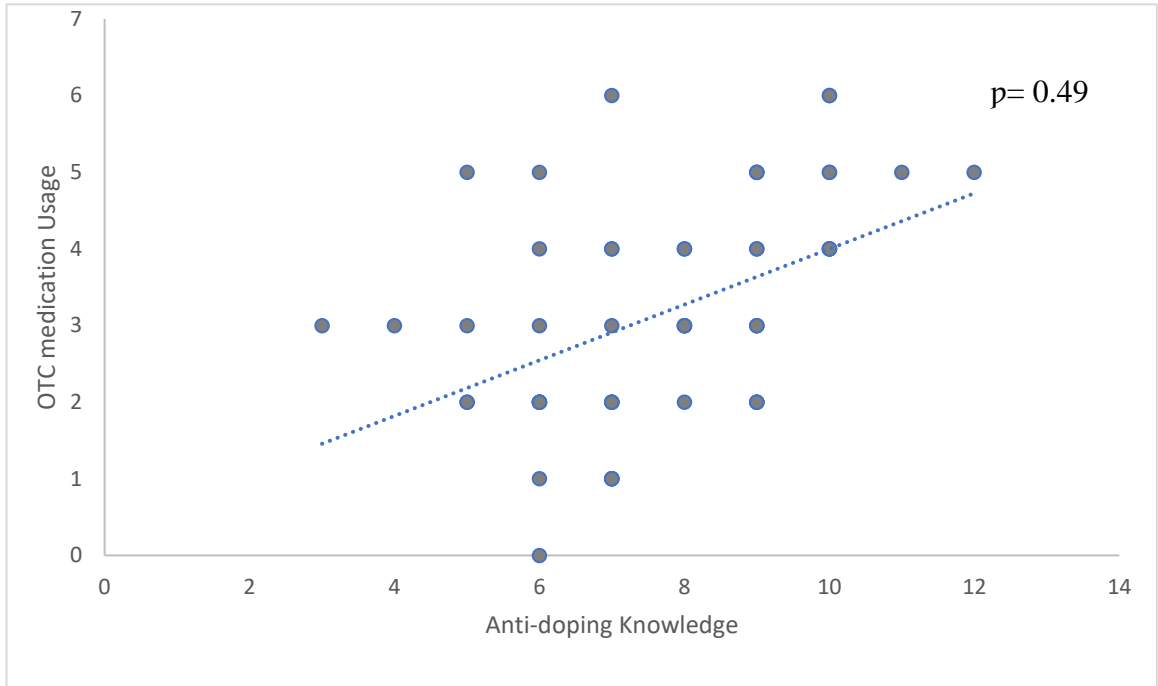
Almost every player (n=49, 86%) reported that they never take more than the recommended dose of medications. The minority remaining (n=8, 14%) mentioned that they occasionally took greater doses. In the same way, 48 players (84%) mentioned that they never shared medications with teammates while nine (16%) shared them occasionally.

The answers about medication knowledge are summarized in table 01. The average correct answers related to anti-doping knowledge was 7.7 questions out of 12 (SD +/- 1.8). On the other hand, the average number of questions correctly answered related to cautious OTC medication usage was 3.1 out of 6 (SD +/- 1.4). The KS test showed non-normal distribution for both main variables.

Table 01. Questions assessing knowledge in anti-doping.	YES	NO
Heard about specified and non-specified substances	18 (32%)	39 (68%)
A specified substance can enter the body inadvertently	35 (62%)	22 (38%)
specified substance if tested positive, allows sanction reduction	27 (47%)	30 (53%)
A non-specified substance can enter the body inadvertently	40 (70%)	17 (30%)
Non-specified substance, if tested positive, leads to serious sanction	43 (75%)	14 (27%)
Heard about world anti-doping agency prohibited list?	39 (68%)	18 (32%)
Paracetamol banned in sport	3 (5%)	54 (95%)
Allergy pills banned in sport	14 (25%)	43 (75%)
Stimulants (ephedrine) banned in sport	51 (90%)	6 (10%)
Antibiotics banned in sport	11 (19%)	46 (81%)
Hormones (growth hormone, testosterone) banned in sport	50 (88%)	7 (12%)
Know Maximum length of doping ban possible	15 (26%)	42 (74%)

The relationship between the number of correct answers in both knowledge and usage questions is illustrated in figure 04. A significant positive association between number of correct answers regarding anti-doping knowledge and greater caution towards OTC medication usage was found using Spearman correlation coefficient (p) which showed a value of 0.49 ($p < 0.01$) between variables. Finally, 11 players (20%) report they were not concerned about a positive doping test due to OTC consumption, 22 (39%) showed a neutral position and 24 players (41%) replied they were concerned about it.

Figure 04: Comparison between numbers of questions correctly answered about anti-doping knowledge and OTC medication usage.



5. Discussion

Information about prescribed medications use across football and other elite sports report is well-documented (24). On the other hand, there is little information about OTC medication consumption. A study that considered OTC medications taken by athletes participating in the 2000 Sidney Olympic Games reported a rate of 4.6 medications/supplements/OTC per athlete and that 54% of participants took medications of different types (1). The present study found 47% of the players reported OTC medication use during the current season and 72% revealed they used them at some point of their career. These finding reaffirms the high rate of medication use described in professional players. The prevalence is similar to the study about OTC medication for upper respiratory tract conditions and allergies, were 76% of international athletes and 88% of recreational used OTC medication in the last 3 years (10). Regarding doping testing, it was found that half of the participants passed through anti-doping control at least once. The results are less than previous reports in England footballers, describing 65% of players with a drug testing experience (25). Reasons for this difference are footballers participating in EFL are tested less often than in Premier league (0.54 samples/player vs one sample per player)(26) and that our study had a younger cohort of football players.

We also found that most of the OTC medications used by the players were NSAIDS and painkillers, accounting for almost two thirds of all substances. Special attention is needed regarding NSAIDS use. In FIFA world cup, medications were

used in 71% of the players and over 50% of players used NSAIDS at least once during a tournament (3). It is evident that there is an excessive consumption of NSAIDS among players. A reason explaining this scenario is that players take these kind of medications due to the common belief and use of NSAIDS as a way of pain prophylaxis when they are not fully recovered from an injury (27) .

Despite the fact that a medical team is available for the footballers, it was surprising that almost half of them (49 %) reported that they got medication in the pharmacy. Even though pharmacist can potentially represent a good source of information about medications and doping, there is still a lack of knowledge and confidence on the area (28). Only 32% of the players declared that they always ask for medical advice prior considering OTC medications use. Some similarities can be found with a research describing drug use in English professional football (25), where they described one in five footballers took supplements without the advice of a specialist. Other resemblance with the mentioned study is that despite the fact that the team doctor is the most qualified for advice, he is the least often consulted. An interpretation of this result is that doctors are not present routinely at the club. Additionally, the same study mentioned that 60% of their participants felt that it was unlikely to be drug tested in the next year, which is comparable with the present finding that 59% of the players are not concerned or have a neutral position about a positive doping test due to OTC medication consumption.

In relation to doping knowledge, a study made in Olympic athletes of different disciplines but not including football, found limited knowledge towards

OTC medication and doping. Moreover, they found poor awareness of doping violation due to OTC stimulants (11). These results correlate with the present findings where 74% of the players did not know the maximum doping possible sanction. However, 85% on average of participants correctly identified permitted substances like paracetamol, allergy pills and antibiotics and prohibited ones like hormones and stimulants. Comparable results were published in an article that evaluated anti-doping policies knowledge in Dutch athletes. They found a good understanding (7.1 on a scale of 0 to 10) regarding the prohibited list substances (29). A reason for our higher correct answer rate is that we asked for general medication terms instead of a specific name of a drug, except for paracetamol that is of widely known. About being familiar to the term WADA, we found that 68% of participants claimed they knew it. Nevertheless, in a recent study made in Spanish football players of different categories, only 5% knew the meaning of the acronym. This study also found a poor level of knowledge in footballers of all categories (30). Therefore, there is still a disagreement in literature about anti-doping knowledge that can be explained by the absence of consensus on how to evaluate it accurately.

It was found that identifying appropriately more statements about anti-doping knowledge was associated to more caution towards OTC medication use. These results are analogous to a research that found that avoidance of OTC medication consumption in athletes is explained in part by the awareness of health risks and performance enhancing effects. Similar results were demonstrated by a study made in Norwegian elite athletes, which showed an unwillingness to use performance-

enhancing drugs (31). We did not find significance when associated with age, education level, time training or drug tested before. The limited sample of this study could be an explanation for not finding age difference which is reported in other studies (11).

Some important limitations must be considered. First, there is no consensus on a measurement tool to assess anti-doping knowledge and medication use. Therefore, it is difficult to compare results between studies. In the same way, we had to compare different sports disciplines due to the insufficient literature focusing on football. Secondly, self-reported questionnaires contributes with limited evidence as they measure what people say rather than what they actually do (32). A more reliable method to assess anti-doping are interviews, as found in a study which compared them to anonymous questionnaires and detected that athletes confessed banned drugs use 4 times more at interviews (33). Finally, the study sample of 57 players was small and the findings described could be affected, assuming a stronger relationship that a real one (34).

6. Conclusion

The study demonstrated that OTC medication use among football players is high. Knowledge of anti-doping, even though better than previous reports, still needs to improve. We found that increasing knowledge and understanding of the potential risks and doping penalties due to OTC medication consumption could improve decisions regarding OTC medications usage. This study reaffirms that footballers report a high consumption of NSAIDS and painkillers without prescription. This fact must be taken into special consideration because the rate of medications consumption is probably higher than published. No research that we are aware of has assessed the association between anti-doping knowledge and OTC medication usage presented. Our findings support the idea of an educational approach to prevent doping violations. Further research focusing on factors that influence footballer's decisions about medications usage as well as pertinent strategies to promote knowledge in order to avoid possible doping sanctions are necessary to create a doping-free culture.

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8. Appendices

Appendix A: Questionnaire Justification

General Questions	Justification
Age	Younger athletes demonstrate less knowledge compared to older ones. However, difference is not marked (11).
Highest degree of education	Lack of doping knowledge is related to low educational level (21).
Time spent training	Athletes can consume more medications to be able to participate in demanding trainings or matches (27).
Medications taken without prescription	Reported medication use among athletes is high, however there is not sufficient data related to OTC medication (3).
Drug tested before	Knowledge in anti-doping is low considering that 65% of elite athletes had been tested (25).

Question number and statement	Justification	Area evaluating
13) Heard about specified and non-specified substance before	The minority of athletes understand the term specified substance (11).	Knowledge of anti-doping in relation to specified and non-specified substance list concepts
14.1) Specified substances if tested positive allows sanction reduction		
14.2) Specified substance can enter the body inadvertently		
14.3) A non-specified substance can enter the body inadvertently		
14.4) non-specified substance if tested positive leads to serious sanction		
15) Heard About World Anti-doping agency	94% of football players don't know the meaning of the acronym WADA (30).	Knowledge of anti-doping in relation to awareness of international organizations
16.1) Banned substances in sport: Paracetamol	Athletes use NSAIDs, analgesics, antibiotics, antiallergics more commonly than age match controls (2). There is poor knowledge on the status of selected prohibited substances (11).	Knowledge of anti-doping in relation to Prohibited list
16.2) Banned substances in sport: Allergy pills		
16.3) Banned substances in sport: stimulants (ephedrine)		
16.4) Banned substances in sport: Antibiotics		
16.5) Banned substances in sport: Hormones (testosterone, growth hormone)		
22) Maximum doping sanction	Half of the athletes know maximum doping sanction after first doping violation (11).	Knowledge of anti-doping in relation to awareness of sanctions

Question number and statement	Justification	Area evaluating
11) Sources to obtain non-prescription medication	one in five footballers report taking supplements without the advice of a specialist (25).	Over-the-counter medication usage
17) Seek of medical advice before taking non-prescription medications	Few percentage of players look for a doctor advice prior taking supplements(25).	
18) How often do you use non-prescription medications	Self-medication is not included in the published reports (8).	
19) Check the ingredients of medication before use	OTC medication may contain prohibited substances (10).	
20) Share medication with teammates	Decisions to take medications are influenced by the assumption that others are also taking them (22).	
21) Ever take more than recommended dose of medications	Poor awareness regarding doping penalties and sanctions (11).	

Appendix B: Questionnaire

Medication, Supplement Use and Doping Knowledge – Questionnaire

*Required

1. Age *

2. Since what age have you been playing football at a high level? *

High level: First team or Youth team

3. Gender *

Mark only one oval.

- Male
 Female

4. Highest level of Education *

Mark only one oval.

- GCSE
 A Level
 University Undergraduate Degree
 University Postgraduate Degree

5. League *

Mark only one oval.

- Professional
 Amateur
 Youth / Academy

6. Position *

Mark only one oval.

- Goalkeeper
- Defender
- Midfielder
- Attacker

7. How much time do you spend playing/training per week? *

Mark only one oval.

- Less than 10 hours
- Between 10-15 hours
- More than 15 hours

8. Mark Yes or No in the following questions *

Mark only one oval per row.

	Yes	No
Have you taken medications that are not prescribed by a Doctor?	<input type="radio"/>	<input type="radio"/>
Have you ever been drug tested within football?	<input type="radio"/>	<input type="radio"/>
Have you heard about the anti-doping testing programme in football?	<input type="radio"/>	<input type="radio"/>
Have you used any health or nutritional supplements	<input type="radio"/>	<input type="radio"/>

Non-prescription/over the counter medications (OTC)

9. Which of the following medications do you sometimes take without prescription? *

Choose more than one if needed and proceed to question 11. If you don't take medications, please proceed to question 10.

Tick all that apply.

- Anti-inflammatories
- Common cold remedies
- Allergy pills (antihistamines)
- Painkillers
- Sleep medication
- Others
- I don't take medications without prescription

10. If you don't use non-prescription medication, please indicate the reason

Tick all that apply

.

- I don't need them
- They have side effects
- I don't know about them
- I am concerned about a positive test
- I only ever take what my doctor or club gives me

11. Where do you usually obtain non-prescription medication? *

Mark only one oval.

- Pharmacy
- Other(player/friend)
- Coach
- Doctor
- Physiotherapist

12. What do you believe is the purpose of anti-doping monitor programme?

Tick all that apply.

- Test for potentially harmful substances
- To identify patterns of substance use and misuse in sports
- To identify use of new substances used by athletes
- To test for banned substances to eradicate its use

13. Have you heard the term "specified and non-specified" substance before? *

Mark only one oval.

- Yes
- No

14. Mark Yes or No in relation to specified and non-specified substances *

Guess the answer if you don't know.

Mark only one oval per row.

	Yes	No
There are some specified substances that, if tested positive, allows sanction reduction	<input type="radio"/>	<input type="radio"/>
A specified substance can enter the body inadvertently	<input type="radio"/>	<input type="radio"/>
A non-specified substance can enter the body inadvertently	<input type="radio"/>	<input type="radio"/>
There are some non-specified substances that, if tested positive, leads to a serious sanction	<input type="radio"/>	<input type="radio"/>

15. Have you heard of the world anti-doping agency prohibited list? *

Mark only one oval.

- Yes
 No

16. Which of the following substance(s) do you know is/are banned in sport?

Guess the answer if you don't know.

Mark only one oval per row.

	Yes	No
Paracetamol	<input type="radio"/>	<input type="radio"/>
Allergy pills	<input type="radio"/>	<input type="radio"/>
Stimulants (ephedrine)	<input type="radio"/>	<input type="radio"/>
Antibiotics	<input type="radio"/>	<input type="radio"/>
Hormones (testosterone, growth hormone)	<input type="radio"/>	<input type="radio"/>

17. Do you seek medical advice before taking non-prescription medication? *

Mark only one oval.

	1	2	3	4	5	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Always

18. How often do you use non-prescription medication? *

Mark only one oval.

- Never
 Rarely (1 or 2 times a year)
 Sometimes (less than 1 a month)
 Frequently (more than 1 a month)

19. Do you check the ingredients of your medication before use? *

Mark only one oval.

1 2 3 4 5

Never Always

20. Do you ever share your medication with your teammates? *

Mark only one oval.

- Never
- Occasionally (one or twice I can recall)
- Sometimes (several times)

21. Do you ever take non-prescription medications in greater than the recommended dose? *

Mark only one oval.

- Never
- Occasionally (one or twice I can recall)
- Sometimes (several times)

22. What is the maximum length of time a doping ban can be imposed for? *

23. I feel concerned that non-prescribed medications might contained banned substances. *

*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

Appendix C: Correct Answer Sheet

1. Answers considered correct for questions about anti-doping knowledge

Knowledge Questions	Correct answer
13	Yes
14.1	Yes
14.2	Yes
14.3	No
14.4	Yes
15	Yes
16.1	No
16.2	No
16.3	Yes
16.4	No
16.5	Yes
23	2 years or Lifetime

2. Answers considered correct for questions about awareness of OTC medication usage

Usage Questions	Correct answer
11	Doctor or physio
17	5 (always)
18	1 (Never)
19	5 (always)
20	1 (Never)
21	1 (Never)