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RESEARCH ARTICLE

Knowledge, attitude and perception of Malaysian pharmacy students towards doping in sports

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Abstract

Background: Doping in sports has become an increasingly prominent issue worldwide. The use of various performance-enhancing substances or methods can be detrimental to health.
Aim: The aim of this study was to measure the knowledge, attitude and perception of pharmacy students in Malaysia towards doping in sports.
Methods: This study was a cross-sectional study. Final-year pharmacy students studying in seven universities in Malaysia completed a self-administered survey. The questionnaire collected demographic data, as well as information regarding students' knowledge, attitude and perception of drugs in sport. For the students' knowledge, it was scored over the range 0–8, with higher scores indicating better knowledge.
Results: Overall, 273 respondents were included in the study. Most respondents were female, had a Cumulative Grade Points Average of 3.00–4.00, watched sports programs, played sports regularly and attended courses related to drugs in sport. Respondents had a moderate level of knowledge (median score of 5 ± 2). There was a significant difference in the level of knowledge between respondents who did and did not attend courses on drugs in sport ($p < 0.01$). Generally, respondents had negative attitudes towards statements on doping in sports. Respondents also had a good perception of the need to implement doping prevention initiatives.
Conclusion: Pharmacy students in Malaysia had a moderate level of knowledge of and negative attitudes and perceptions towards doping in sports despite not all of them being enrolled in drugs in sport courses. The pharmacy curriculum in Malaysia should incorporate courses on drugs in sport throughout undergraduate studies to better promote the development of this domain.

Keywords: doping, pharmacy students, drugs in sport.

INTRODUCTION

The use and abuse of drugs, dietary supplements and other methods that aim to enhance performance in sport has become an increasingly prominent issue worldwide. The latest 2015 Testing Figures Report by the World Anti-Doping Agency (WADA) has reported an increase of adverse analytical finding (AAF) from 1.11% in 2014 to 1.26% in 2015.[1] The increase in the AAF means that more samples were identified as containing prohibited substances or their metabolites or markers, thus reflecting an increase in doping cases.[1]

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According to the World Anti-Doping Code (WADC), doping is defined as the existence of one or more anti-doping violations, which include the presence of a prohibited substance in an athlete's sample and the action of assisting or covering up the anti-doping rule violation.[2] Doping violations can occur in one of two ways: intentional or unintentional. Unintentional doping is caused primarily by a lack of athletes' knowledge and awareness of the medicines or supplements they are taking. Although athletes should be fully responsible for any substances they are taking, healthcare professionals could help prevent incidents of inadvertent doping among athletes.[3]

Thus, healthcare professionals such as pharmacists can play an important role in the prevention of doping by educating athletes to use medicines appropriately under supervision and so avoid unintentional doping.[4] As drugs experts, pharmacists can provide evidence-

based information and counselling to athletes (from casual weekend athletes, enthusiastic gym users or even elite athletes) on the use of medicinal substances and supplements.[5] In addition, the statement of standards for the role of pharmacists in the fight against doping in sport approved by the International Pharmaceutical Federation in September 2005 outlined the recommendations for the role of pharmacists in doping control.[6]

A survey conducted in France found that community pharmacists lack the knowledge and skills needed to counsel athletes on drug use in sport.[7] Another study found that only a minority of pharmacists and general practitioners claimed that they have sufficient knowledge of drugs in sport due to a lack of specific training on doping during their university studies or in clinical practice.[8] Furthermore, surveys in Japan and Syria have found that most pharmacy students do not have sufficient opportunities to learn about drugs in sport.[3,5]

Thus, education and training during undergraduate studies can be an important way to improve pharmacy students' basic knowledge regarding doping and increase their awareness about doping issues in sport. An example of such an educational programme is the Advanced Pharmacy Practice Experience (APPE) program at the University of California. This program was found to improve pharmacy students' confidence in collecting samples for drug testing, as well as their knowledge of issues regarding drugs in sport.[9] Such training and education opportunities related to drugs in sport are limited in Malaysia – some universities offer a 'Drugs In Sport' elective for pharmacy students who would like to explore this field.

To the best of our knowledge, no study has been published evaluating the knowledge, attitude and perception of pharmacy students towards doping in sport in Malaysia. Hence, the aim of the present study was to assess the level of knowledge of pharmacy students in Malaysia on doping in sport and to determine their attitudes and perceptions towards doping in sport.

METHODS

The present cross-sectional study evaluated the knowledge, attitude and perception of pharmacy students in Malaysia towards doping in sport through self-administered questionnaires over a period of 3 months from September to November 2016. This study was approved by The National University of Malaysia Research Ethics Committee (UKM PPI/111/8/JEP-2016–354).

Final-year pharmacy students from three public universities and four private universities were invited to participate in the study. These academic institutions were chosen using a convenience sampling method. Final-year pharmacy students were chosen as the study population because they had completed most of the courses compared with students from junior years and were likely to become a pharmacist who may deal with athletes soon. To be eligible for inclusion in this study, respondents had to be final-year pharmacy students from one of the public and private universities invited to participate in the study. Surveys that were <80% completed were excluded from analysis.

During the study period, there were 461 pharmacy students eligible for inclusion at the selected educational institutions during the period of the study. Hence, using the sample size calculation by Krejcie and Morgan,[10] a sample size of 210 respondents was required to get a 50% chance of students to show knowledge of and attitudes and practices towards doping. Students were approached at their universities during their break time in class. The study was explained to them and if they agreed to participate, they were asked to provide written informed consent and fill in the survey. Participation in the study was voluntary and no incentives were provided.

The questionnaire used in the present study was adapted from previous literature in the area.[5,11–13] The survey comprised four sections (A–D). Section A collected information about the sociodemographic background of the students and Section B evaluated their knowledge of doping. Section B tested the ability of the respondents to recognise, from a list of eight substances, those substances that are prohibited under WADA's annually renewed Prohibited List.[11] Knowledge was assessed on the basis of the marks the respondents obtained in this section, with each correct answer awarded 1 mark, whereas wrong answers or answering 'Don't know' were given a mark of 0. Respondents' scores were graded as good if the score was ≥84%, moderate if the score was in the range 61–83% and poor if the score was ≤60%.[12] In Section C, respondents were asked about their attitude to doping issues. This section required responses in the form of a Likert scale, ranging from negative responses (strongly disagree and disagree) to neutral and positive response (agree and strongly agree). Four questions were used to investigate students' views on the reason for using doping agents, while another six questions probed their attitude towards the consumption of doping agents.[5] Finally, the first five questions in Section D listed different sources of information for athletes and required students to rate the reliability of each on a scale from 1 (very unreliable) to 5 (very reliable). Another five questions investigated students' perceptions towards doping in sport; these five questions were answered using a five-point Likert scale to indicate students'

level of agreement or disagreement with the statement.[11,13]

A pilot study to evaluate the face validity and reliability of the questionnaire was conducted on 20 final year pharmacy students and two academics who are experts in the area. Following feedback from the respondents, the questionnaire was further improved. The reliability test calculated using Cronbach's α showed a result of 0.64 for Section C and 0.62 for Section D.

Data were analysed using SPSS version 23 (IBM Corp., Armonk, NY, USA). All categorical demographic data are presented as frequencies and percentages. Statistical significance for all inferential tests was set at $p < 0.05$. Chi-squared tests were used to examine the association between the demographic data and the level of knowledge, responses to statements on attitudes and responses to statements of perception. Because the observations were nominal and ordinal data, the Chi-squared test was chosen.

RESULTS

In all, 416 students were approached and, of these, 273 agreed to participate in the study, giving an overall response rate of 65.6%. Most respondents were female (76.9%), had a Cumulative Grade Points Average (CGPA) of 3.00–4.00 (74.0%), watched sports programs regularly (74.4%) and played sport in their daily activities (65.6%). Around half the respondents ($n = 126$; 46.2%) had attended a course related to drugs in sport, with 68 (52.7%) having completed the course whereas 61 (47.3%) were still in process of completing it. Most of these courses were elective (91.5%). Table 1 summarises the sociodemographic characteristics of the respondents.

Table 1 Sociodemographic characteristics of respondents ($n = 273$)

Sex	
Male	63 (23.1)
Female	210 (76.9)
Race	
Chinese	131 (48)
Malay	103 (37.7)
Indian	24 (8.8)
Others	15 (5.5)
CGPA	
<2.00	0 (0)
2.00–3.00	71 (26)
3.00–4.00	202 (74)
Watch sports programs?	
Yes	203 (74.4)
No	70 (25.6)
Play sport?	
Yes	179 (65.6)
No	94 (34.4)
Attended course related to drugs in sport?	
Yes	126 (46.2)
No	147 (53.8)
Status of the course attended (if any)	
Completed	68 (52.7)
In progress	61 (47.3)
Drugs in sport course content	
Core course	8 (6.2)
Part of course	3 (2.3)
Elective course	118 (91.5)
Credit hours	
2	121 (93.8)
3	8 (6.2)
4	0 (0)

Data are presented as *n* (%).
CPGA, Cumulative Grade Points Average.

Based on the analysis, the median score for total respondents in this study was 5 (of a total of 8) with an interquartile range of ±2. Respondents were found to have a moderate knowledge of drugs in sport. More than 80% of respondents were able to recognise the status of prohibited substances, such as anabolic androgenic steroids (AAS), amphetamine, paracetamol and cannabis. However, only a minority (<50%) was able to identify the prohibition status of codeine and insulin. These responses are summarised in Table 2. A statistically significant association between level of knowledge and attendance of a course related to doping in sport ($p = 0.009$) was found. However, there was no significant association with other variables, including sex ($p = 0.746$), race ($p = 0.085$) and CGPA ($p = 0.359$). Based on these findings, the majority of students (66.7%) who had a better level of knowledge of drugs in sport had attended a course related to doping.

The most important reason from the perspective of students why athletes would use doping agents was to enhance sports performance in local and international competitions ($n = 245$; 89.7%). In addition, more than 80% of respondents also agreed that 'doping drugs are used in sports with the aim of changing body shape and building muscle mass within a short period of time'.

More than 70% of respondents thought that doping is unethical and they would not respect individuals who took doping agents. However, 4% of respondents ($n = 11$) admitted that they may consider using doping agents in the future. There was a significant association between sex and potential interest in trying doping agents in future ($p = 0.037$). Most ($n = 230$; 84.3%) reported that would advise individuals not to take doping agents. The responses regarding respondents'

Table 2 Respondents' knowledge of drug use in sport (n = 273)

Domain	Variable	Correct answer	No. respondents with correct answer (%)	No. respondents with wrong answer or not sure (%)
Knowledge of prohibited substances in sports	Which of the following substance(s) is/are listed on the WADA prohibited list? (You may choose more than one answer)			
	• Anabolic androgenic steroids	Prohibited	248 (90.8)	25 (9.2)
	• Amphetamines	Prohibited	222 (81.3)	51 (18.7)
	• Paracetamol	Not prohibited	252 (92.3)	21 (7.7)
	• Pseudoephedrine	Prohibited	152 (55.7)	121 (44.3)
	• Insulin	Prohibited	50 (18.3)	223 (81.7)
	• Cannabis	Prohibited	233 (85.3)	40 (14.7)
	• Codeine	Not prohibited	46 (16.8)	227 (83.2)
	• Caffeine	Not prohibited	165 (60.4)	108 (39.6)

WADA, World Anti-Doping Agency.

attitudes and perceptions towards drug use in sport are summarised in Table 3.

Analysis of students' opinions regarding the reliability of sources of information on the proper use of medicines and supplements in sports for athletes revealed that students believed that healthcare professionals were the most reliable source of information for athletes, followed by coaches and team managers. A low proportion of students (n = 114; 41.7%) agreed that doping is a public health problem in Malaysia, but 90.9% believed that doping prevention initiatives are important to implement and 93.5% agreed that proper awareness concerning the adverse effects of doping agents could help minimise their use.

DISCUSSION

The respondents in the present study had a moderate level of knowledge. Most of the respondents were able to identify AAS and amphetamine as prohibited substances in sports. This is comparable with the results of studies conducted in Syria and Qatar.[5,11] This is because AAS and stimulants are the top two most commonly abused substances in sport (50% and 15%, respectively) as reported by WADA in the 2015 Anti-doping Testing Figures.[1] However, most respondents did not classify insulin correctly as a prohibited substance because they did not consider that insulin has a performance-enhancing effect and can be abused by athletes.[14] This indicates that it is crucial for pharmacy students to at least know the list of prohibited substances in the WADC so that in future they are able to play a role in preventing inadvertent doping by providing reliable and correct information to athletes.

Furthermore, respondents' level of knowledge in the present study was significantly affected by attending a drugs in sport course. As noted elsewhere,[9] the greater students' exposure to this field, the better their knowledge of drugs in sport is likely to be. Thus, in line with studies conducted in Syria, Qatar and Japan, the findings of the present study support the need to incorporate and establish courses of drugs in sport in universities that currently do not offer such a course.[3,5,11] The aim of this would be to produce more pharmacists who able to provide services catering to the needs of athletes.

Most respondents agreed that doping agents are used to enhance sport performance in local and international competitions. This is because the urge to win can drive athletes towards doping.[15] Certain athletes may opt to use performance-enhancing substances to increase their chances of winning instead of competing fairly.[16] Our findings also demonstrated that most of the respondents agreed that doping agents were used to build muscle. This can be explained by previous studies suggesting that doping agents are used not only by elite athletes, but also routine gym goers.[17]

Most respondents considered that taking doping agents is unethical and they would not show respect to individuals who took doping agents. This result is in agreement with the previous study conducted among Syrian pharmacy students.[5] However, a few respondents indicated that they may consider using a doping agent in the future. It is interesting to note that most of those who would consider using doping agents were male.

Table 3 Respondents' attitudes towards and perception of drug use in sport (n = 273)

Domains	Variables	Disagree	Neutral	Agree
Reasons athletes use doping agents	Change body shape and build muscle mass within a short period of time	31 (11.4)	23 (8.4)	219 (80.2)
	Enhance sport performance in local and international competitions	15 (5.5)	13 (4.8)	245 (89.7)
	Pick the easy option because they do not want to make sufficient efforts to achieve the desired physical capabilities	32 (11.7)	64 (23.4)	177 (64.9)
	Merely imitate others	107 (39.2)	98 (35.9)	68 (24.9)
Attitude towards the consumption of doping agents	Taking a doping agent is an ethical behaviour	193 (70.7)	28 (10.3)	52 (19)
	I respect individuals who take doping agents	224 (82.1)	36 (13.2)	13 (4.8)
	Taking a doping agent can harm the user's health	28 (10.3)	28 (10.3)	217 (79.5)
	Taking a doping agent for only a short period is not harmful	128 (46.9)	103 (37.7)	42 (15.4)
	I may consider using a doping drug (sometime in the future)	230 (84.2)	32 (11.7)	11 (4)
	I advise individuals not to take doping agents	23 (8.4)	20 (7.3)	230 (84.3)
Perception of doping issues	Doping is a public health problem in Malaysia	41 (15.0)	118 (43.2)	114 (41.7)
	Most sports records have been broken by athletes who were involved in doping	88 (32.2)	93 (34.1)	92 (33.7)
	Most of the great champions in sports resort to doping	115 (42.1)	90 (33.0)	68 (24.9)
	Doping prevention initiatives are important to implement	4 (1.5)	21 (7.7)	248 (90.9)
	Proper awareness concerning adverse effects of doping agents can help minimise their use	4 (1.5)	14 (5.1)	255 (93.5)

Data are presented as n (%).

This is in line with previous studies that showed that males accepted the use of doping agents more than females and expressed a more permissive attitude towards the use of performance-enhancing agents.[18]

Most respondents were willing to advise individuals not to take doping agents, which indicates that pharmacy students in Malaysia are ready to play their role in educating athletes about the harms of doping. In the present study, the pharmacy students rated healthcare professionals as the most reliable source of information for athletes. This finding may be due to all respondents being from a pharmacy course and therefore knowing that healthcare professionals have trusted and reliable knowledge on drug use in sport compared with others. This also highlights the necessity to equip pharmacy students with sufficient knowledge on drugs in sport.

However, only half the respondents considered doping to be a public health problem. This contrasts with the finding in a study of working pharmacists that found that most pharmacists considered doping to be a public health problem.[19] This difference could be due primarily to differences in the experience of the respondents. The respondents in the present study were students and they may not have working experience with athletes who request information about doping agents.

Moreover, the respondents were aware that doping prevention initiatives are important and most of them thought that proper awareness concerning the adverse effects of doping substances could help minimise use. These findings are in line with those of Awaisu *et al.*,[11] who found that most students in their 2014 study agreed that proper awareness concerning adverse effects could help decrease the use of doping agents. It is important for pharmacy students to be aware that anti-doping campaigns are important for the sports society because doping affects not only elite athletes, but also young, budding athletes who are training hard for their professional career.[20] Learning about the adverse effects of doping may help prevent athletes from using doping agents. Therefore, the role of the pharmacist in the prevention of doping is undeniable. However, because sport pharmacy is still an emerging field for pharmacists in Malaysia, more training and educational packages should be available for pharmacy students and working pharmacists to explore and enhance their knowledge in this particular field.

This present study has a few limitations. First, the results of the knowledge part need to be assessed with caution because the data were obtained using a self-administered questionnaire and the respondents could have availed themselves of the appropriate literature. However, in line with ethical conduct, the possibility of this is extremely unlikely. In addition, the study was only performed in seven universities in Malaysia and may not represent the overall pharmacy student population in Malaysia. Thus, the results obtained in the study may not be generalisable.

The present study showed that pharmacy students in Malaysia generally have a moderate level of knowledge about drug use in sport. The level of knowledge was significantly associated with students attending courses on doping in sport, and the students had positive attitudes towards anti-doping in sports. Students also considered that it is important to implement doping prevention initiatives and showed interest in taking part in doping prevention. In addition, the findings provide evidence that attending a course on doping in sport is essential to improve students' knowledge of drug use in sport. Therefore, authorities should consider adding 'drugs in sport'-related courses to the curriculum of pharmacy courses in order to produce future sports pharmacists who are qualified to counsel and educate athletes about drug use in sports.

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Conflict of interests statement

The authors declare they have no conflicts of interest.

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