

SPORTS GYNECOLOGY: A NEW WAY TO IMPROVE FEMALE ATHLETES CARE AND PERFORMANCE

GINECOLOGIA DO ESPORTE: UMA NOVA MANEIRA DE OTIMIZAR O CUIDADO E A PERFORMANCE DA MULHER ATLETA

GINECOLOGÍA DEPORTIVA: UNA NUEVA FORMA DE OPTIMIZAR ATENCIÓN Y EL RENDIMIENTO DE LA DEPORTISTA

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ABSTRACT

Introduction: Female participation in sports has reached a milestone in 1972 when a constitutional amendment was implemented to ensure equal opportunities for men and women. Since then, the percentage of participants in competitive sports has grown. In this context became necessary to understand menstrual cycle, contraceptive use, and its individual responses. **Objective:** To investigate menstrual cycle characteristics, physical and mood symptoms related to vaginal bleeding, and contraceptives used by Brazilian Olympic athletes. Also, to assess if these athletes relate that vaginal bleeding influences sportive performance, how they manage it and what can be changed to improve their health care and sportive performance. Additionally, we propose specialized female care by a gynaecologist specialized in sports medicine. **Methods:** Descriptive observational study was conducted from July to August 2016 and included 118 Brazilian Olympic female athletes, in menacme. The athletes completed a self-administered online questionnaire, adapted from Pre-Participation Gynaecological Examination of female athletes. **Results:** Participants practiced 28 different sports, mean age 27 ± 4.7 years. For 66% it was their first participation in an Olympic Game. Most used contraceptives (54%), mainly oral (61%). Most (76%) believed that vaginal bleeding influenced sports performance, and 63% preferred to compete after bleeding cessation. Fifty-eight percent would compete at preferred time of their cycle. Anxiety symptoms, bloating, increased appetite, depression, and dysmenorrhea were indicated by 52%. Among these, 49% reported that these symptoms deteriorated their sportive performance. **Conclusion:** Most in their first Olympic participation, Brazilian athletes used hormone contraceptives, mainly oral ones to manage and adapt their vaginal bleeding to the competition calendar because most of them referred those physical and mood symptoms deteriorated their sportive performance. The presence of a Sportive Gynaecologist as part of the Olympic Medical Staff highlighted the female athletes issues and helped them to improve sportive performance. **Level of Evidence IV; Cross-sectional observational study**

Keywords: Menstrual cycle; Contraception; Athletes; Sports Medicine; Gynecology.

RESUMO

Introdução: A participação feminina no esporte teve um marco importante em 1972, quando uma emenda constitucional foi implementada para garantir a igualdade de oportunidades para homens e mulheres. Desde então, o percentual de participantes em esportes competitivos tem crescido. Nesse contexto tornou-se necessário compreender sobre ciclo menstrual, uso de anticoncepcionais e suas respostas individuais. **Objetivo:** Investigar características do ciclo menstrual, sintomas físicos e de humor, queixas relacionadas ao sangramento vaginal e métodos contraceptivos usados por atletas olímpicas brasileiras. Avaliar se percebem influência do sangramento vaginal no desempenho esportivo, como elas o controlam e o que pode ser mudado para melhorar seus cuidados e desempenho esportivo. Além disso, propõe-se atendimento específico por ginecologista especializada em medicina esportiva. **Métodos:** Estudo observacional, descritivo, realizado de julho a agosto de 2016 que incluiu 118 atletas olímpicas brasileiras, na menacme. As atletas responderam a um questionário online autoaplicável e adaptado intitulado "Pre-Participation Gynaecological Examination". **Resultados:** As participantes praticavam 28 esportes diferentes, com média de idade = $27 \pm 4,7$ anos. Para 66%, foi a primeira participação em um evento olímpico. A maioria usava anticoncepcional (54%), principalmente oral (61%). A maioria (76%) acredita que o sangramento vaginal influencia o desempenho esportivo e 63% preferiam competir após o mesmo. 58% das atletas competiriam no momento preferido de seu ciclo. Sintomas de ansiedade, distensão abdominal, aumento do apetite, depressão e dismenorreia foram indicados por 52%. Entre esses, 49% deterioraram o desempenho esportivo. **Conclusão:** Em sua primeira participação olímpica, as atletas brasileiras utilizaram anticoncepcionais hormonais, principalmente orais, para controlar e adaptar o sangramento vaginal ao calendário de competição, pois a maioria referiu que os sintomas físicos e de humor prejudicaram o desempenho esportivo. A presença de uma Ginecologista Esportiva como parte da Equipe Médica Olímpica destacou os problemas das atletas femininas e as ajudou a melhorar o desempenho esportivo. **Nível de Evidência IV; Estudo Observacional.**

Descritores: Ciclo Menstrual; Contracepção; Atletas; Medicina Esportiva; Ginecologia.



RESUMEN

Introducción: La participación femenina en deportes alcanzó un hito en 1972, cuando se implementó una reforma constitucional para garantizar igualdad de oportunidades entre hombres y mujeres. Desde entonces, el porcentaje de participantes en deportes competitivos ha crecido. En este contexto, se hizo necesario comprender el ciclo menstrual, el uso de anticonceptivos y sus respuestas individuales. Objetivo: Investigar características del ciclo menstrual, síntomas físicos, estado de ánimo, quejas relacionadas con el sangrado vaginal y los métodos anticonceptivos utilizados por atletas olímpicas brasileñas. Evaluar si estas deportistas perciben influencia del sangrado vaginal en el rendimiento deportivo, cómo lo controlan y qué se puede cambiar para mejorar. Además, ofrecemos atención especializada por una ginecóloga especialista en medicina deportiva. Métodos: Estudio observacional, descriptivo, realizado de julio a agosto de 2016, que incluyó 118 atletas olímpicas brasileñas, en menacme. Las atletas respondieron un cuestionario en línea autoadministrado y adaptado titulado "Examen ginecológico previo a la participación". Resultados: Practicaban 28 deportes diferentes, con edad media = $27 \pm 4,7$ años. Para 66%, era su primera participación en un juego olímpico. Anticonceptivos usados (54%), principalmente orales (61%). La mayoría (76%) cree que el sangrado vaginal influye en el rendimiento deportivo y 63% prefirió competir después del. El 58% de los atletas competiría en su momento preferido de su ciclo. Los síntomas de ansiedad, hinchazón, aumento del apetito, depresión y dismenorrea fueron indicados por el 52%. Entre estas, 49% deterioró su rendimiento deportivo. Conclusión: En su primera participación olímpica, las atletas brasileñas utilizaron anticonceptivos hormonales, principalmente orales, para controlar y adaptar el sangrado vaginal al calendario de competición, ya que la mayoría relató que los síntomas físicos y anímicos perjudicaban su desempeño deportivo. La presencia de una Ginecóloga Deportiva como parte del Equipo Médico Olímpico destacó los problemas de las atletas y las ayudó a mejorar su rendimiento. Nivel de Evidencia IV; Estudio Observacional.

Descriptor: Ciclo Menstrual; Contracepción; Atletas; Medicina Deportiva; Ginecología.

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INTRODUCTION

An understanding of lifelong menstrual cycle complexity, contraceptive use, and individual responses is essential to researchers and staff who care for women and, in particular, athletes. Women are affected by hormonal fluctuations in numerous ways and must be evaluated in an individualised manner.¹ Endogenous and exogenous reproductive feminine hormones change over the menstrual cycle and during the use of contraceptives.² Historically, researches in this area have focused on amenorrhea and the Female Athlete Triad, and, more recently, on the study of Relative Energy Deficiency in Sports (REDS).³ Currently, there are several studies regarding menstrual cycle and sportive performance as well as vaginal bleeding and the use of contraceptives to manage it according to training and competition schedules.^{4,5}

Physical and mood symptoms may influence women's quality of life in highly individualistic manners. A better comprehension of the menstrual cycle is essential to understand the possible negative impact on physical training as well as to encourage female athletes' participation and avoid additional disparities in gender representation.⁶ Pre-participation evaluations were typically performed by cardiologists and orthopaedic surgeons until 2007.⁷ Sports medicine has experienced recent and significant improvement as new studies of female athletes have been conducted to investigate the management of hormonal contraceptives, to track menstrual cycles, and discuss the risks of sexually transmitted infections or birth control in a sportive environment.⁸⁻¹⁰

Most female athletes are not always interviewed about the changes they go through their menstrual cycle or the ideal phase which they would choose to practice or compete. The typical multidisciplinary approaches and team physicians do not include gynaecologists and most are men.⁷ The Brazilian Olympic Committee may have been the first to offer a specialized Gynaecological approach to their female athletes as part of the official Olympic medical staff who is referred to as a sports gynaecologist.

OBJECTIVE

The aim of this study was to present a descriptive observation conducted by a Gynaecologist specialist in Sports Medicine, part of the

Brazilian Olympic Medical staff in Rio, 2016 and to investigate menstrual cycle features, physical and mood symptoms related to vaginal bleeding and the use of contraception methods among Brazilian Olympic athletes. And in addition, to identify if they indicate that vaginal bleeding influences sportive performance and how they manage it with the goal of improving health and sportive performance for current and future female athletes.

METHODS

Study Design

This study was approved by the Research Ethics Committee of the Federal University of São Paulo, Brazil (CAAE: 56823416.5.0000.5505, protocol: 1.615.280), and it relied on the support of the Brazilian Olympic Committee.

An observational and cross-sectional study was conducted from July to August 2016 among the female athletes who participated in the Brazilian Olympic team during the Summer Olympic Games held in Rio de Janeiro, 2016. After providing informed consent, a link to an online questionnaire was sent by email to the participants. This questionnaire asked about demographic data, sports history, and socioeconomics as well as questions about menstrual cycle, use of hormonal and barrier contraceptives, and influence of vaginal bleeding on sports performance.

Participants

All the Brazilian athletes were invited to participate in the study through an email contact from the medical team. One hundred and twenty athletes (58%) over 16 years old agreed to participate by electronically signing an online informed consent form, completed the questionnaire, and were included in the study. To this end, only women in menacme were considered; one in post menopause and one that had not yet menstruated were excluded from analyses.

The study group was comprised of a convenience sample of 118 athletes who were members of the Brazilian Olympic team during the Summer Olympic Games, held in Rio de Janeiro 2016.

Evaluation

A validated questionnaire in Brazilian Portuguese was used for the pre-participation gynaecological examination (PPGE)¹⁰ of female athletes, adapted to the online version. Demographic data (age, body weight, height, race/ethnicity, and education), sports history, gynaecological background, contraceptive use, physical and mood symptoms related to vaginal bleeding, and information regarding the influence of menstrual cycle on sports performance were collected.

Data analyses

Data were stored in a Microsoft® Excel® 2016 software spreadsheet (Microsoft Corporation, Redmond, WA, USA). Statistical analyses were performed using the statistical software Stata/SE 15.1 Windows. Absolute and relative frequency measurements were used to describe the data and categorical variables were described by numbers (n) and percentages (%). The quantitative variables were described using the mean and standard deviation (SD). Groups (sports modalities) were not compared, as the descriptive intention of the research.

RESULTS

Table 1 shows that a total of 118 athletes who practiced 28 sports modalities were included in the study. The mean age was 27 ± 4,7 years. The average age of initiation of competitive training was 13 ± 4 years. For most participants (66%) this was their first participation in the Olympic Games, which may be related to the fact that Brazil was the host country and, therefore, had guaranteed vacancies in all sports. It was also observed that for the minority (8%) their sport was their only source of income.

Athletes' gynaecological features and information related to the menstrual cycle are shown in Table 2. Notably, only 5% of them reported

Table 1. Demographic characteristic and sports history of participants.

Variables	n=118
Age, mean (DP)	27,1 (4,7)
BMI, man (DP)	22,5 (2,7)
Race/ethnicity, n (%)*	
White	64 (55,7)
Brown	28 (24,4)
Black	19 (16,5)
Indian	2 (1,7)
Asian	2 (1,7)
No answers	3
Schooling n (%)	
Elementary	7 (5,9)
High School	77 (65,3)
College education	34 (28,8)
Age at which they started sports training, mean (SD)	13,2 (4,2)
Age at which they joined National Team, mean (SD)	19,0 (3,2)
Physical training (hours/week)	11,1 (8,6)
Sports specific training (hours/week)	26,2 (10,0)
Total training (hours/week)	36,3 (14,3)
Source of income n (%)	
Sport	9 (7,6)
Sport and another source	103 (87,3)
No sport source of income	6 (5,1)
Olympic participation, n (%)	
One participation	78 (66,1)
Two participations	23 (19,5)
Three participations	11 (9,3)
Four participations	4 (3,4)
Five participations	

* Percent. SD: Standard Deviation; BMI: Body Mass Index

late menarche and 75% indicated monthly vaginal bleeding. Most of those who did not bleed monthly used hormonal contraception methods to manage their period.

Table 3 shows that 76% of the athletes believed their menstrual flow had a negative influence on their sportive performance, and 63% preferred to compete after bleeding ceased. Physical and mood symptoms are also described in Table 3 and were experienced by 52% of the athletes. Most of them (67%) indicated that they experienced all the ranked symptoms. There was a negative influence of these symptoms on sportive performance among 49% of the participants, predominantly anxiety and increased appetite.

The contraceptive methods used are listed in Table 4. Predominant oral contraceptive use can be observed, in particular, combined birth control pills. Drospirenone was the most commonly used progestogen. None of the interviewed athletes referred to the use of injectable contraceptives or hormone-free intrauterine devices.

DISCUSSION

An ovulatory cycle is characterized by great hormonal variation between the follicular phase (between menstruation and ovulation) and luteinizing phase (between ovulation and menstruation).¹¹ The hormones involved affect the autonomic nervous system and metabolic functions, influencing variations in sports performance through the different phases of the menstrual cycle and during menstruation itself.¹²

Table 2. Menstrual cycle features.

Variables	n=118
Menacme, n (%)	118 (100)
Age of menarche, n (%)*	
Between 9 and 15 years old	112 (94,9)
More than 15 years old	6 (5,1)
Physical and mood symptoms	
Yes	61 (51,7)
No	57 (48,3)
Menstrual flow regularity, n (%)	
Monthly bleeding	88 (74,6)
No monthly bleeding	30 (25,4)
Reasons for not bleeding, n (%)*	
Not specific irregularity	11 (36,7)
Use of contraceptive	19 (63,3)

*Among no monthly bleeding (n=30).

Table 3. Physical and mood symptoms related to vaginal bleeding.

Variables	N=76
Negative vaginal bleeding influence, n (%)	76 (100)
Preferred period to compete, n (%)	
Before bleeding	8 (10,5)
During bleeding	4 (5,3)
After bleeding	48 (63,2)
Except during the bleeding	16 (21)
Olympic participation, n (%)	
In the preferred phase	44 (57,9)
Out of preferred phase	20 (26,3)
Do not know	12 (15,8)
Prevalence of associated symptoms*, n (%)	
Anxiety	56 (91,8)
Bloating	54 (88,5)
Increase appetite	56 (91,8)
Depression	54 (88,5)
Dysmenorrhea	33 (54,1)

* Multiple answers were allowed.

Table 4. Characteristics of hormonal contraceptives used by athletes.

Variables	n=64
Use of hormonal contraception n (%)	64 (54,2)
Type of contraception	
Oral contraceptive	39 (60,9)
Vaginal ring	14 (21,9)
Hormonal IUD	11 (17,2)
Type of Oral contraceptive*	
EE + Gestodene	12 (31,6)
EE + Desogestrel	2 (5,3)
EE + Drospirenone	16 (42,1)
EE + Levonorgestrel	2 (5,3)
EE + Cyproterone	2 (5,3)
EE + Triphasic Levonorgestrel	1 (2,6)
Just Desogestrel	3 (7,9)
Not named	1 (2,6)

*n=39 users of oral contraceptives. EE: ethinylestradiol; IUD: hormonal intrauterine device.

The inappropriate energy input is related to various outcomes, among them, i.e., postponement of menarche. Among the evaluated athletes, 5% presented late menarche (older than 15 years), and one of them had not menstruated at 16. Late menarche has a prevalence of 7% among athletes and can reach 22% among ballet dancers.³

In addition, the prevalence of menstrual disorders, such as primary or secondary amenorrhea or even oligomenorrhea, can be high among athletes.¹³ In this study, 25% of the athletes did not experience monthly cycles, compared to 50% among non-Olympian teenaged Brazilian athletes¹¹ or 69% among the sport athletes involved with weight control sports.¹⁴ Most participants who did not experience monthly bleeding used hormonal contraceptives. Those who were not using hormonal contraception require further evaluation.

Given that the questionnaire contained only one question regarding menstrual irregularity, we were unable to identify potential causes. There is currently no evidence for a simple causal relationship between athletic training on hormonal and bone disorders among female athletes.¹⁵ These abnormalities must be also related to energy deficiency or eating disorders, as well as common gynaecological causes (polycystic ovarium syndrome, prolactin increase, thyroid disorders, and pregnancy), which demand specific investigation.¹⁶

One of the main findings of this study was that 76% of the athletes believed that vaginal bleeding has an influence on sportive performance. A recent meta-analysis corroborates to this finding by stating that, during the first days of the cycle, female athletes displayed decreased performance, even though the authors warn that symptoms should be individualized during medical approach.¹⁷ Some of them wanted to compete during this time and it should be considered while planning their bleeding calendar.

Among our population, 63% of the athletes preferred to compete after vaginal bleeding ceased. During this phase of the menstrual cycle, oestrogen is the predominant hormone. It is associated with anabolic effects, improved mood, heightened awareness, and improved recovery.¹⁸ These observations are confirmed by studies conducted with professionals who provide care for the Chelsea female football team and the world champion American women's soccer team.¹⁹

Negative aspects related to vaginal bleeding have been indicated in various previous studies. Bruinvels et al.,²⁰ reported that 51% of the athletes indicated that their training and performance were affected by their menstrual cycle, specifically hypermenorrhea. Chantler et al.,²¹ described the relationship between dysmenorrhea and decreases in sportive performance. This was also mentioned by 54% of Brazilian athletes in the current study.

Numerous symptoms are experienced by women during the phase prior to vaginal bleeding, including abdominal and low back pain, cramps, headache, or migraine.⁴ In addition, psychological symptoms such as alarm, loss of concentration and motivation, anxiety, or irritability can also be present.²² Fifty-two percent of the athletes in the current study presented with physical or mood symptoms. Among these, 49% reported that these symptoms disturbed sports performance.

In a study conducted among rugby players, the percentage was even higher, with 93% indicating negative symptoms related to their menstrual cycle.²³ This higher finding can be related to the lower frequency of oral contraceptive use, which can minimize premenstrual symptoms.

Martin et al.,⁴ reported that 77% of elite athletes (n=430) who did not use hormonal contraception experienced negative effects during the menstrual cycle, including pain (abdominal or low back), cramps (abdominal / not specific), and headache/migraine. In addition, Bruinvels et al.,²⁰ identified that half of British elite runners and rowers (n=90) thought that their menstrual cycle negatively impacted their training and sports performance in some way.

The use of hormonal contraceptives ceases the hormonal⁸ oscillations, provides greater predictability for vaginal bleeding, facilitates family planning, can minimise and manipulate vaginal bleeding and alleviates physical²⁴ and mood²⁵ symptoms. These medications can also be used to manipulate the course of a menstrual cycle to allow athletes to dictate the timing of their menstrual bleeding to suit their competition schedule.²⁶ Most of the Brazilian athletes (58%) in our analyses already use this tool and were able to manipulate their cycle so that competition in the Games would fall at their preferred point in their cycle.

Barrier method (condom) use was denied by 34% of participants, and irregular use was reported by 16%. Studies have demonstrated that athletes are susceptible to underestimating risks of and are more likely to engage in unprotected sex.²⁷ The prevalence of sexually transmissible infections among Brazilian athletes of a similar age to this study population was previously described as 48%, with 44% related to papillomavirus.²⁸ Information regarding safe sex practices and the risks associated with unprotected sex should be incorporated as one aspect of female athletes' health care.

Most participants (54%) used some form of hormonal contraception, mainly oral (61%), most of which (92%) contained oestrogen and progesterone (combined methods). In an Australian study revealed that 49,5% of their athletes also used the same type of method, mostly oral combined contraceptives (68%) and, like the current results, the extended use of the combined pill to minimise the severity of premenstrual tension, decrease menstrual flow, and the possibility of manipulating the timing of bleeding.⁴ As already mentioned here, the previous study also highlighted the importance of individual follow-ups.

A recent meta-analysis also indicated the need to individualise symptom evaluation and the influence of the contraceptives on performance. Although those authors observed that contraceptive use could lead to a small decrease in performance, they considered these findings inconclusive due to the low quality of the selected studies and that an individualised prescription should always be proposed.²⁹

Programs providing information about female physiology are essential for female athletes and the professionals involved in their care, as previously demonstrated in another study conducted among Brazilian athletes. Most (87%) were disinclined to express their menstrual cycle-related symptoms to their coaches. In addition, an Australian study demonstrated that knowledge regarding menstrual cycle and contraceptives was very low among athletes;³⁰ only 8,5% reached a score ≥ 10 , of a total of 14 possible points, emphasizing the need for improved education on this topic. Educating female athletes and

their staff as well as health professionals who work with them would enhance both health care for and performance of female athletes in all sports.²³

A gynaecologist is a very capable professional to deal with all the variables mentioned in this paper. Our findings in concert with previous results suggest that female athletes would benefit more from care provided by a sports gynaecologist than a team physician for concerns regarding menstrual cycle, contraceptive issues such as birth control and sexually transmissible infections.

We recommend that anyone who provides a single “Yes” for any of the questions listed in Figure 1 discuss their individual specific needs with a specialised professional, perhaps a Sports Gynaecologist.

The Brazilian Olympic Committee is probably the first in the world to offer a specialized Gynaecological approach to their female athletes as part of the official Olympic medical staff. It offers a prospective way of changing and improving female health care and sportive performance for their athletes.

There is a limitation to this study in so much as the questionnaire was answered by the athletes remotely (online), and therefore, the researcher was unable to confirm ambiguous or missing responses.

CONCLUSION

Most of the female Brazilian athletes were participating in their first Olympic Games used hormonal contraceptives, mainly oral ones. In addition, they planned and scheduled their times of vaginal bleeding according to the competition schedule because most of them indicated that physical and mood symptoms could deteriorate sportive performance, especially in terms of anxiety and increased appetite. The presence of a Sportive Gynaecologist as part of the Olympic Medical Staff highlighted the female athletes issues, permitted the athletes to be comfortable to talk about menstrual cycle/vaginal bleeding concerns and helped them to improve health care and sportive performance.

All authors declare no potential conflict of interest related to this article

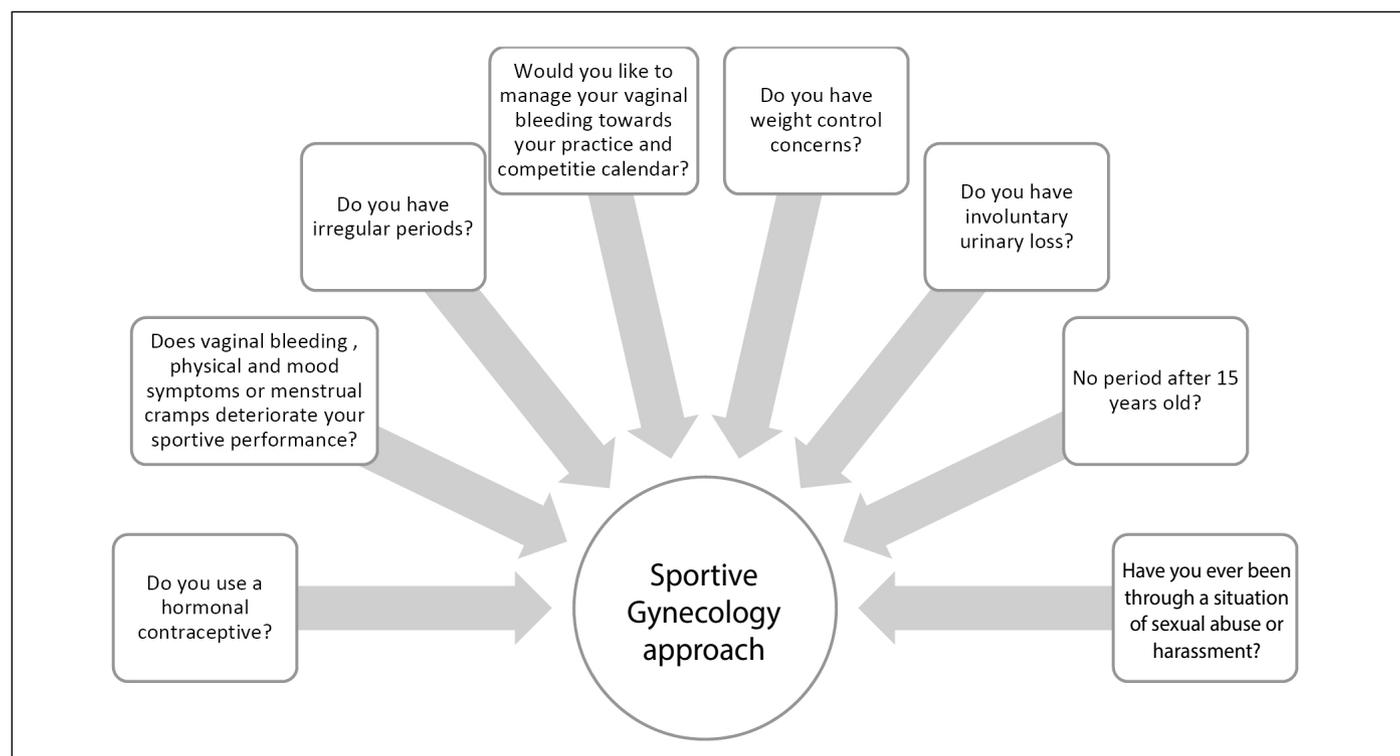


Figure 1. Proposed questions to select athletes for a Sportive Gynaecological approach.

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