Menstrual Cycle

for Female Athletes

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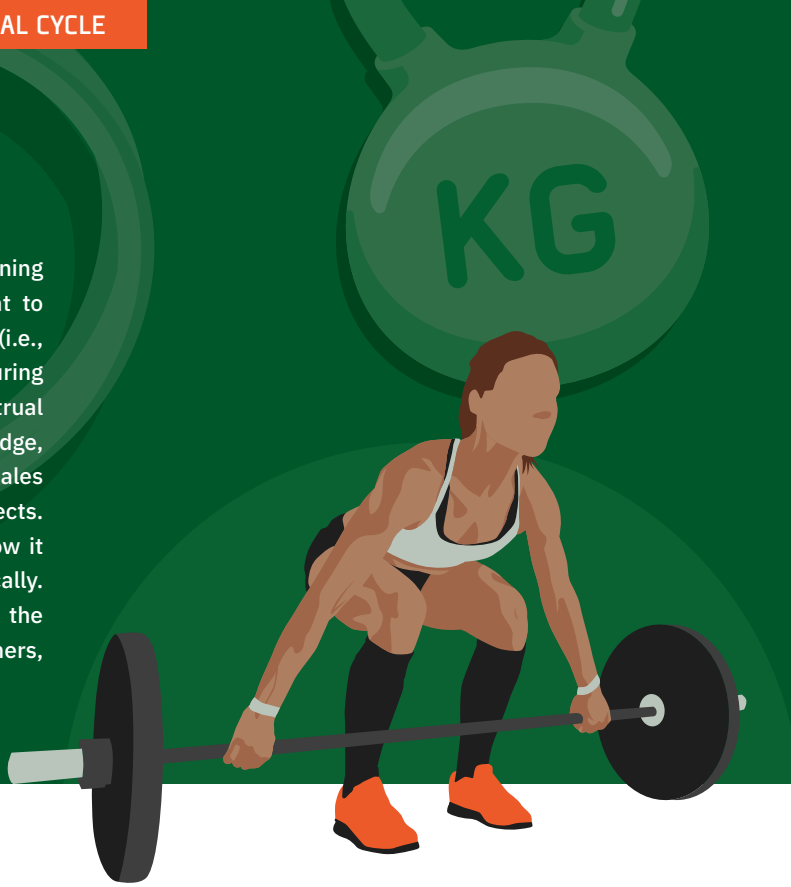
Introduction

The word 'menstrual' comes from the Latin word 'mensis' – meaning 'month'. When talking about the menstrual cycle, it is important to note that this is not just the days when an athlete is menstruating (i.e., bleeding), but it is a whole cycle (typically one month in duration) during which there are fluctuations in female sex hormones. The menstrual cycle is a biopsychosocial phenomenon meaning that the knowledge, attitudes and beliefs of the menstrual cycle will influence how females experience and interpret the biological changes, symptoms and effects. The following information will discuss the menstrual cycle and how it may (or may not) affect female athletes both emotionally and physically. We hope this information will encourage comfort in discussing the menstrual cycle between female athletes, coaches, practitioners, medical staff, and others.



What is the menstrual cycle?

The menstrual cycle is the time between the first day of bleeding (known as a period, or menstruation) and the day before the next period. On average, the duration of a typical menstrual cycle is 28 days, however it differs between individuals, and can range from 21 to 35 days. Cycle duration can also vary from month to month within the same individual. Each period has an average length of 2-7 days.

Females have approximately 480 periods during their lifetime

Primarily, the menstrual cycle is controlled by the brain which initiates fluctuations of female sex hormones throughout the cycle. There are changes in two main female sex hormones, known as estrogen and progesterone. In brief, estrogen repairs, thickens and maintains the lining of the uterus, and progesterone maintains the lining of the uterus during the latter part of the menstrual cycle. Two other hormones which play a key role in the menstrual cycle are the follicle stimulating hormone (FSH) and luteinizing hormone (LH). FSH stimulates the growth and development of follicles in the ovary, which in turn produce estrogen. LH surges in the middle of a menstrual cycle, and triggers ovulation.

Ovulation is when an egg is released from the ovaries. It usually occurs around the middle of the menstrual cycle, however, it is difficult to know the exact day due to varying cycle lengths. The egg normally lives for 12-24 hours after release, and if not fertilised in this time it will die. Following ovulation, LH aids the production of progesterone.

The menstrual cycle can be split into three different phases

1 **Follicular phase** (beginning of the cycle)

2 **Ovulatory phase** (middle of the cycle)

3 **Luteal phase** (latter part of the cycle)

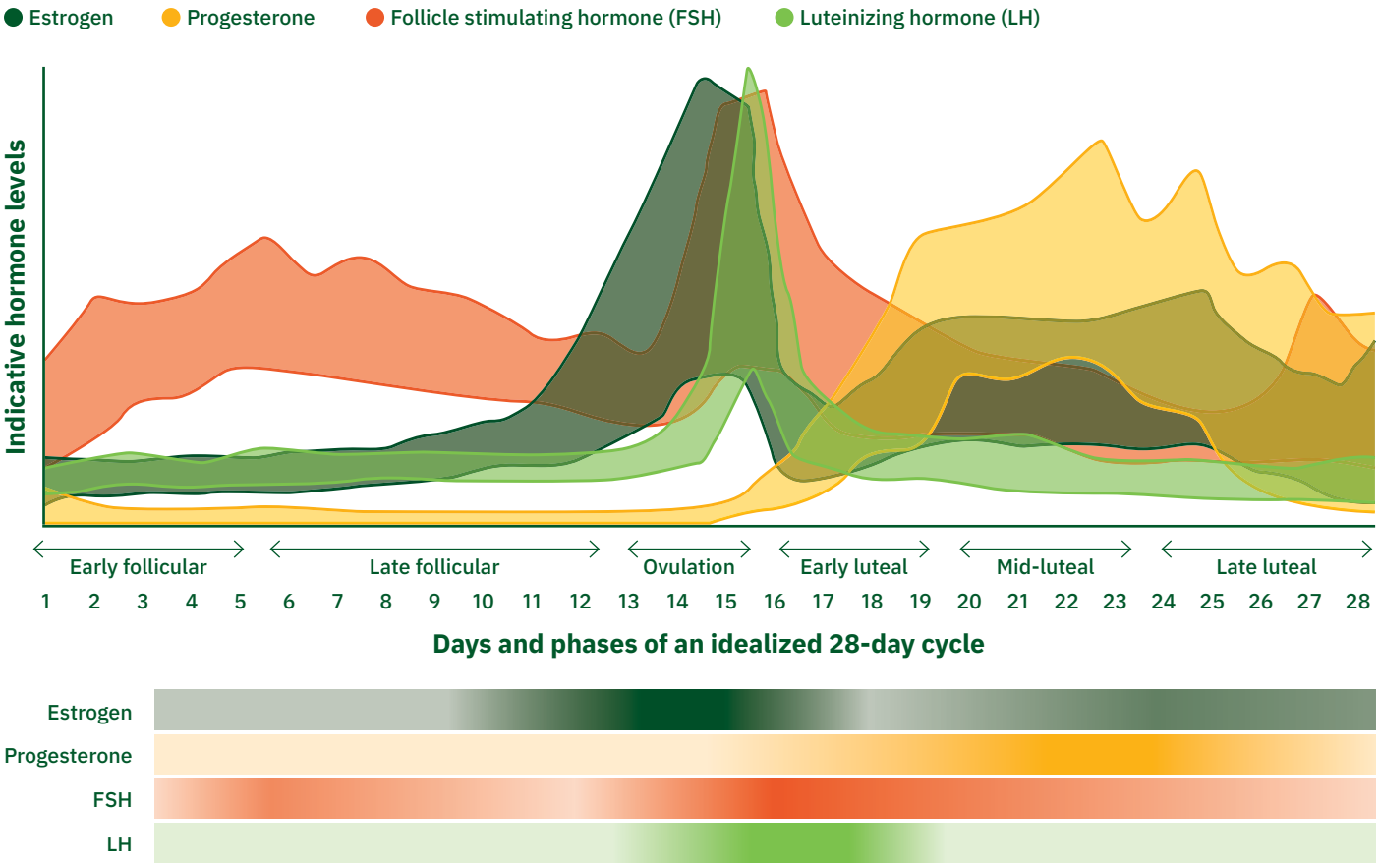


Figure 1: Fluctuations in female sex-specific hormones during the main phases of the menstrual cycle (adapted from D'Souza et al. (2023))

Important information if working with youth athletes

The average age of first menstruation, which has been on the decline, is around 12–13 years. When females first start their menstrual cycle, their cycle length can be irregular, as the body is getting used to the changes in hormones.

It is recommended that female athletes should seek professional medical advice if:

- **They haven't started their period by the age of 16**
- **Their periods stop for several months**
- **They experience extremely severe symptoms**

Menstrual cycle symptoms

Data reported from elite female athletes has found that ~77% experience negative symptoms during their menstrual cycle. The type and severity of menstrual cycle symptoms varies between individuals. In some individuals, symptoms can be experienced throughout the entire menstrual cycle, but data has revealed that the majority (82%) of symptoms are experienced in the first 1-2 days of menstruation. It is also common for symptoms to be present in the week prior to menstruation, this is referred to as pre-menstrual syndrome (often abbreviated as 'PMS') and can cause physical and emotional changes. Some of the most reported physical and emotional symptoms in female athletes are stomach cramps, back pain, and mood swings. It is important to note that symptom type and severity can vary within the same individual from cycle to cycle.

Ovulatory phase*	Days just before and during period*
Breast tenderness	**Changes in appetite**
Bloating	**Mood swings**
Cramps	**Irritability**
Slight rise in body temperature	**Fatigue**
Increased cervical mucus	**Bloating**
Pelvic or abdominal pain	**Breast tenderness**
	Headaches
	Cramps
	Spotty skin
	Lower back pain

*Not all symptoms apply to all individuals

Figure 2: Potential symptoms experienced during different menstrual cycle phases

Menstrual cycle disruption

In non-pregnant, pre-menopausal women, the menstrual cycle may stop or become irregular for a number of reasons including increased stress, or hormonal contraceptive use. Menstrual cycle disruption may also occur if a female athlete is experiencing low energy availability (see 'Energy Availability' for more information). This occurs when an athlete's body consistently does not have enough energy left after exercise energy expenditure has been accounted for to support fundamental physiological functions, including the menstrual cycle. If athletes are in a state of low energy availability for a prolonged period of time, menstrual cycle disruptions such as oligomenorrhea and amenorrhea can occur:

Oligomenorrhea
fewer than 6-8 periods per year

Amenorrhea
complete loss of periods

It is important to note that disruption to the menstrual cycle is only detectable in females that have a 'natural' menstrual cycle, and not in those that use hormonal contraceptives. Therefore, advice from a qualified professional is important if athletes are experiencing menstrual cycle disruptions (Figure 3).

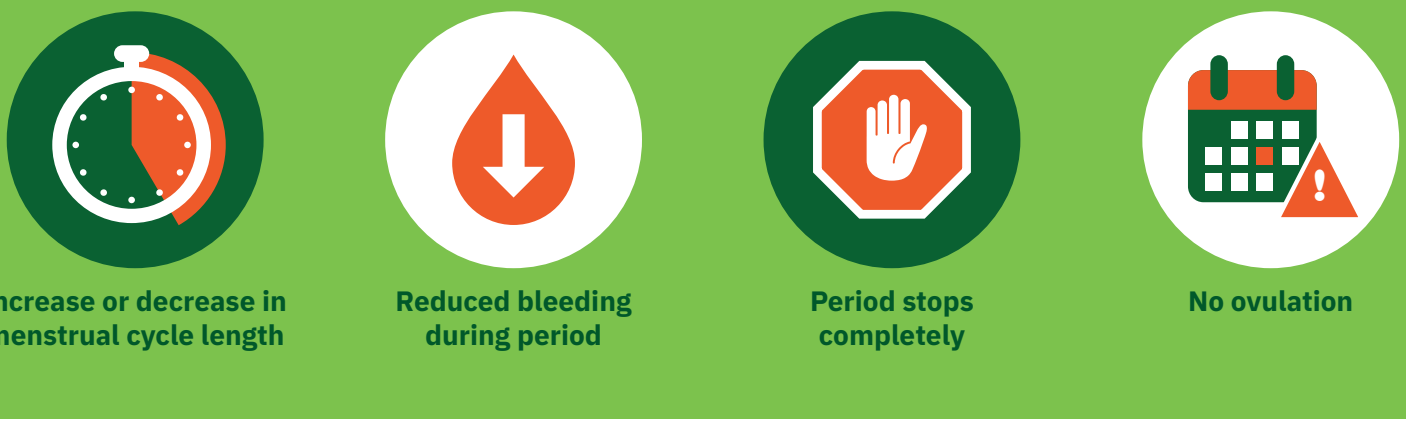
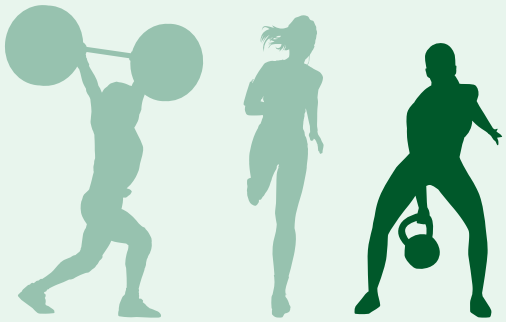


Figure 3: Potential menstrual cycle disruptions

Heavy menstrual bleeding

Heavy menstrual bleeding (HMB), which is also known as menorrhagia, is when menstrual cycle bleeding is particularly heavy or prolonged. Athletes that experience HMB may:

Pass large blood clots	Need to use two types of sanitary products at once	Bleed through clothes
Need to change sanitary products frequently	Have periods that last > 7 days	Often feel tired



Research suggests that around one in three exercising females experience HMB

HMB can reduce well-being and confidence, and create concern in clothing choices (a factor that is often outside of an athletes control). In addition, those that experience HMB are more likely to suffer from an iron deficiency. Research shows that female athletes with HMB are more likely to perceive that their period negatively impacts their training and performance.

Athletes with HMB often do not feel comfortable discussing this with support staff, coaches or medical staff. However, it is important to create an environment that facilitates open conversations about this topic so that athletes can sought help, which in turn will help manage the impact of HMB on well-being and performance.

Nutrition and the menstrual cycle

There is currently no evidence to suggest that diet should be altered depending on the phase of the menstrual cycle. Instead, athletes should focus on optimizing their daily nutrition as well as optimizing nutrition before, during, and after exercise. General dietary considerations in relation to the menstrual cycle are displayed in Figure 4.

Dietary considerations

No evidence to suggest changing diet depending on menstrual cycle phase. Instead, focus on optimizing daily nutrition.

Regular menstruation = ↑risk of being iron deficient. Optimize iron intake in daily diet.

Low energy availability can lead to menstrual cycle disruption. Ensure daily energy intake matches daily energy demands.

Figure 4: Dietary related factors that may want to be considered

Hormonal contraceptives

Contraception (birth control) comes in a range of preparations, brands, and delivery methods (Figure 5). This section will cover hormonal contraceptives (HC), as opposed to non-hormonal, meaning that they contain artificial hormones, typically estrogen and progestin (the synthetic form of progesterone). A study including 430 elite female athletes found that ~70% had reported using hormonal contraception at some point. No study to date has reported reasons why athletes use hormonal contraception, however potential reasons may be to prevent pregnancy, to alter menstrual cycle around competition, or to prevent negative side effects of the menstrual cycle. A qualified professional should be involved if an athlete wishes to use, or terminate use, of HC.

One of the most popular contraceptives is an oral contraceptive pill (combined pill) taken on a 28-day cycle, whereby an 'active' pill is taken for 21 days, followed by an 'inactive' pill (or no pill) for 7 days, during which a bleed occurs. It is important to note that the bleeding experienced during this time is not natural menstruation, it is a 'withdrawal bleed' which is a result of the levels of the artificial hormones temporarily decreasing. If the 'inactive' pills are skipped and 'active' pills are continuously taken in their place, then bleeding does not occur.

Types of hormonal contraception

Combined pill
Contains artificial estrogen and progestin. Active pill taken for 21 days, followed by an inactive pill for 7 days.

Progestin only pill (POP)
Contains progestin, which thickens mucus in the cervix to stop sperm reaching an egg. One pill taken every day.

Contraceptive patch
Small sticky patch which lasts ~1 week which releases artificial estrogen and progestin.

Vaginal ring
Small plastic ring placed inside the vagina which releases a continuous dose of artificial estrogen and progestin.

Implant
Small, flexible plastic rod placed under the skin in the upper arm which releases progestin.

Injection or "shot"
Injection which releases progestin into the bloodstream.

Intrauterine device (IUD)
Small, T-shaped plastic device placed into the uterus which releases progestin.

Figure 5: Different types of hormonal contraceptions

Hormonal profile of combined oral contraceptive

HC reduce the amount of natural occurring estrogen and progesterone, because they provide artificial hormones into the body. This results in a different hormonal profile to a 'natural' menstrual cycle (Figure 6 is related specifically to the combined oral contraceptive).

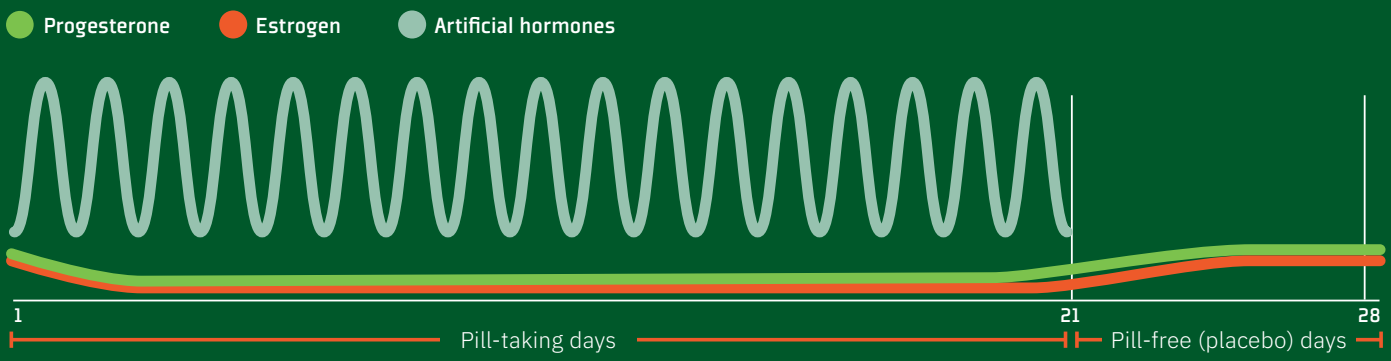


Figure 6: Hormonal profile when using the combined oral contraceptive

Impact of menstrual cycle and hormonal contraceptives on exercise performance

The menstrual cycle is a biopsychosocial phenomenon meaning that the knowledge, attitudes and beliefs of the menstrual cycle will influence how females experience and interpret the biological changes, symptoms, and effects. Feelings and symptoms associated with the menstrual cycle can cause increased anxiety and distraction for athletes.

Research has investigated whether menstrual cycle phase, and therefore the change in hormone levels, has an impact on exercise performance. However, there is currently no strong evidence to suggest that exercise performance is impacted during different phases of the menstrual cycle. Instead, it could be recommended to assess individual performance, as well as measures of energy and well-being, across different phases of the menstrual cycle to assess repeated associations between menstrual cycle phase and performance indices.

Research has also investigated if HC have an affect on exercise performance. There is some evidence to suggest that HC might result in slightly inferior exercise performance on average when compared to natural menstruation. However, only a very small difference in performance outcomes have been observed, and there is not enough evidence to advise athletes not to use HC.

Menstrual cycle tracking

It might be of interest for athletes to track their menstrual cycle. It can help to:

Notice any changes in menstrual cycle e.g., in length or amount of bleeding

Empower athletes to become more in tune with menstrual cycle related symptoms

Better understand the connection between menstrual cycle and other factors e.g., sleep, activity, energy, performance, recovery, mood, etc

If the athlete feels comfortable, encourage them to share this information as it may help to inform their training. For instance, if they consistently struggle to recover from high-intensity sessions during a certain phase of their menstrual cycle, training or recovery time could be adapted accordingly. There are several ways that athletes can track their menstrual cycle including using phone based apps, using a diary/calendar, or simply by writing it down. It is important to note that athletes should track for their whole menstrual cycle, and not just the days that they are bleeding.

As a minimum it is recommended to keep note of:

- **Days of bleeding**
- **Bleeding amount**
- **Symptoms**
- **Response to exercise**

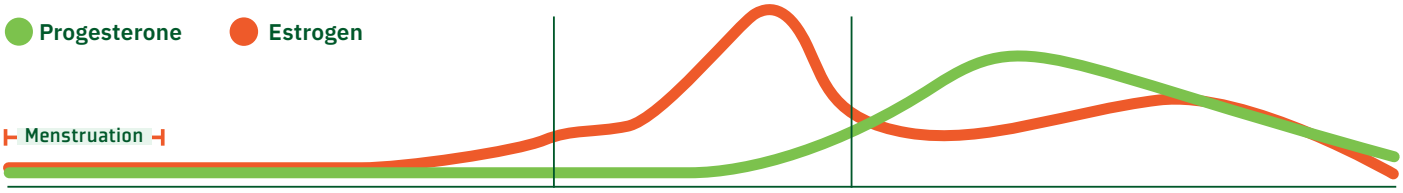
Practical advice to support menstrual health and well-being in athletes

- Encourage athletes to speak up if they are experiencing concerns about menstruation.
- The menstrual cycle has historically been perceived as a taboo subject, normalizing the topic will empower athletes to talk to their support team if menstrual cycle issues arise.
- As menstruation can cause symptoms that may impact an athlete's output, encourage athletes to listen to their bodies and get extra rest, hydration, and nutrition as and when required.
- If athletes experience symptoms which impact their ability to exercise during menstruation, then this can present a time to focus on cross training, slower paced endurance exercise, and strength training.
- Assure athletes at the start of the season that they will not be penalized for poor practices or competition performance that may be as a result of their menstrual cycle.
- Ensure that locker room / changing facilities / bathrooms are accessible and always stocked with menstrual products.
- Understand the insecurities that female athletes may have around wearing white clothing (i.e., shorts, pants, leotards, etc).

MENSTRUAL CYCLE

Important for health

Supports performance



Follicular phase
Estrogen levels: Low
Progesterone levels: Low

Ovulatory phase
Estrogen levels: High
Progesterone levels: Low

Luteal phase
Estrogen levels: High
Progesterone levels: High

TRACKING

- Helps to notice changes in menstrual cycle e.g., length or amount of bleeding
- Empowers athletes to become more in tune with symptoms
- Better understand the connection between menstrual cycle and other factors

Track:

- Days of bleeding
- Bleeding amount
- Symptoms
- Response to exercise

HORMONAL CONTRACEPTIVES

- Provide artificial hormones to the body
- Mask natural menstrual cycle
- Impact on exercise performance should be monitored on an individual basis

Types:

- Combined pill
- Progestin only pill (POP)
- Contraceptive patch
- Vaginal ring
- Implant
- Injection or "shot"
- Intrauterine device (IUD)

MENSTRUAL CYCLE DISRUPTION

Potential causes:

- Stress
- Using a hormonal contraceptive
- Low energy availability

Warning signs:

- Increase in menstrual cycle length
- No ovulation
- Reduction in amount of bleeding during period
- Period stops completely

HEAVY MENSTRUAL BLEEDING (HMB)

- One in three exercising females experience HMB
- More likely to feel that period negatively impacts training/performance
- Can reduce well-being and confidence
- More likely to suffer from an iron deficiency

Those experiencing HMB may:

Pass large blood clots	Need to change sanitary products frequently
Need to use two types of sanitary products at once	Have periods that last >7 days
Bleed through clothes	Often feel tired

NUTRITION

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Regular menstruation = ↑ risk of being iron deficient. Optimize iron intake in daily diet.

No evidence to suggest changing diet depending on menstrual cycle phase. Focus on optimizing daily nutrition.

Low energy availability can lead to menstrual cycle disruption. Ensure daily energy intake matches daily energy demands.

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AIS Female Performance & Health Initiative: https://www.ais.gov.au/fphi/education