SZWECH , Julia, BLECHARZ, Gabriela, JAŃCZYK, Natalia, JANKOWSKA, Marlena, MĘDRYSA, Karolina, PRESAK, Michal, POKRZEPA, Jakub Jan, BARAN, Karolina, WINKOWSKA, Alicja and BARTNIK, Katarzyna. The Effects of Hormonal Contraception on Physical Performance and Health of Female Athletes: A Systematic Review. Quality in Sport. 2025;40:59410. eISSN 2450-3118.
https://doi.org/10.12775/QS.2025.40.59410
https://apcz.umk.pl/QS/article/view/59410

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 12.03.2025. Revised: 28.03.2025. Accepted: 31.03.2025 Published: 03.04.2025.

The Effects of Hormonal Contraception on Physical Performance and Health of Female Athletes: A Systematic Review

1. **Julia Szwech [JS]**
   5 Military Clinical Hospital SPZOZ in Cracow
   Wrocławska 1-3 Street, 30-901 Krakow; Cracow, Malopolska,
   https://orcid.org/0009-0006-3792-0101
2. E-mail: julia.szwech@op.pl

3. **Gabriela Blecharz [GB]**
   5 Military Clinical Hospital SPZOZ in Cracow
   Wrocławska 1-3 Street, 30-901 Krakow; Cracow, Malopolska,
   https://orcid.org/0009-0007-9275-3913
   E-mail: blecharzgabriela@gmail.com

4. **Natalia Jańczyk [NJ]**
   Stefan Zeromski Specialised Hospital (SP ZOZ) in Cracow: Cracow, os. Na Skarpie 66 Street 31-913 Kraków, Małopolska, Poland, PL
   https://orcid.org/0009-0000-1862-9681
   E-mail: nataliajanczyk34@gmail.com

5. **Marlena Jankowska [MJ]**
Stefan Zeromski Specialised Hospital (SP ZOZ) in Cracow: Cracow, os. Na Skarpie 66 Street 31-913 Kraków, Małopolska, Poland, PL
https://orcid.org/0009-0005-2240-8853
E-mail: marlena.rosol@wp.pl

6. **Karolina Mędrysa [KM]**
Voivodeship Hospital in Bielsko-Biała,
Armii Krajowej Street 101, 43-316 Bielsko-Biała
https://orcid.org/0009-0002-1557-0244
E-mail: karolinamedrysa@gmail.com

7. **Michał Presak [MP]**
5 Military Clinical Hospital SPZOZ in Cracow
Wrocławska 1-3 Street, 30-901 Krakow; Cracow, Malopolska,
https://orcid.org/0009-0006-0335-5917
E-mail: michal.presak@gmail.com

8. **Karolina Baran [KB]**
Independent Public Health Care Facility of the Ministry of Internal Affairs and Administration in Krakow, Kronikarza Galla 25 Street, 30-053 Krakow: Cracow, Malopolska,
https://orcid.org/0009-0004-1627-5065
E-mail: 99barankarolina@gmail.com

9. **Alicja Winkowska [AW]**
Independent Public Health Care Facility of the Ministry of Internal Affairs and Administration in Krakow, Kronikarza Galla 25 Street, 30-053 Krakow: Cracow, Malopolska,
https://orcid.org/0009-0005-2050-0031
E-mail: alawinkowska@gmail.com

10. **Jakub Jan Pokrzepa [JP]**
5th Military Hospital with Polyclinic in Cracow
Wrocławska 1-3 Street, 30-901 Krakow; Cracow, Malopolska,
https://orcid.org/0009-0000-7907-1511
E-mail: jakub.pokrzepa@onet.pl

11. **Katarzyna Bartnik [KBA]**
5th Military Hospital with Polyclinic in Cracow: Cracow, Wrocławska 1-3 Street 30-901 Kraków, Małopolska, Poland, PL
https://orcid.org/0009-0005-9095-5875
E-mail: kasiabartnik08@gmail.com

ABSTRACT

Introduction

Physical performance and health of female athletes are influenced by physiological changes from the menstrual cycle and hormonal contraception (HC). Hormonal fluctuations can affect muscle strength, endurance, regeneration, and psychological well-being, impacting sports results. HC prevents pregnancy, regulates menstrual cycles and alleviates premenstrual syndrome symptoms. However, it can also cause side effects such as nausea, headaches, weight gain, and mood swings.

Aim of the study

The aim of the study was to analyze the effects of hormonal contraception on the physical performance and health of female athletes.

Materials and methods

The article was created based on the PubMed and Cochrane databases. The literature was analyzed using following keywords: hormonal contraception, menstrual cycle, athletes, sex hormones, physical performance

Results

HC stabilizes hormone levels, potentially reducing performance fluctuations associated with the menstrual cycle. Some studies indicate a slight reduction in aerobic capacity and muscle strength in women using HC, compared to those with a natural cycle. In addition, HC has a positive effect on regeneration after intense training and reducing the risk of overtraining. Athletes reported better sleep quality and fewer cycle-related symptoms, allowing them to train more regularly. What is more, some research highlights estrogen's anti-inflammatory effect, which supports muscle repair.

Conclusion

The use of HC use appears to have a minor impact on physical performance, especially among team athletes. However, subjective benefits may improve training comfort. Further research is needed to explore HC's effects across various sports disciplines.

Keywords

Hormonal contraception, menstrual cycle, athletes, sex hormones, physical performance

INTRODUCTION

Physical performance and health of athletes is a complex matters, influenced by lots of factors, including physiological changes resulting from a menstrual cycle and usage of a hormonal contraception. Hormonal fluctuations associated with the menstrual cycle can affect muscle strength, endurance, regeneration and psychological well-being of athletes, resulting in an impact on their sports results. Understanding these dependencies is crucial both for athletes themselves and their trainers and physicians. [1]

Hormonal contraception is based on the use of synthetic hormones. Their first function is increasing the density of cervical mucus in order to hinder sperm cells from reaching the egg cell. The second one is altering the structure of the uterine mucosa to prevent the implantation of a fertilized egg cell. And the last one is suppressing ovulation.

What is important is the fact that HC is not only the method of preventing pregnancy but also a way of controlling the menstrual cycle and alleviating premenstrual syndrome symptoms. Moreover, it is crucial not to forget that HC can also cause side effects, such as nausea, spotting, headaches, weight gain, skin changes, breast tenderness, mood swings, or reduced libido. [2], [3], [4], [5] The most popular forms of HC include oral contraceptives, intrauterine devices and hormonal patches. The aim of this systematic review is to collect and analyze the available scientific evidence regarding the impact of the menstrual cycle and hormonal contraception on the physical performance and health of athletes.

RESULTS

1. The impact of hormonal contraception on physical performance and muscle strength

The impact of the menstrual cycle and hormonal contraception on the physical performance and muscles is widely studied. Results are complex and depend on many factors, such as the type of HC, the sport discipline and the athletes' level of advancement. HC stabilizes the level of hormones, such as estrogens and progesterone. [6] It may have a positive effect on reducing fluctuations in physical performance associated with the menstrual cycle. [7]

The research provided by Ryall et al. shows that hormonal intrauterine devices (hIUDs) are particularly well-tolerated among athletes. They enable predictability of the menstrual cycle and they do not affect physical performance.

1.1. Physical performance

Study conducted on a group of 809 strength athletes, including weightlifters and individuals participating in sports such as CrossFit, revealed different perceptions of HC's effects. HC users, particularly those using OCPs, reported that HC reduced the intensity of some menstrual symptoms, such as cramps and mood swings. Nevertheless, 59.4% of participants believed that their menstrual cycle, regardless of HC use, had a negative effect on their training. On the other hand 46% experienced positive effects, for example an increased strength in the post-menstrual phase. [8]

1.2. Muscle strength

Study performed on Austrian first-league handball players assessed strength of knee extensors and flexors during different phases of the hormonal contraception cycle. The results showed no significant differences in isometric and isokinetic muscle strength between the pill consumption and the withdrawal phase. This suggests that the hormonal stability induced by HC does not have a significant impact on athletic performance. [9], [10]

On the contrary, Kayser emphasizes that HC can be a tool to minimize hormonal fluctuations that might impact strength and physical endurance. However, some forms of HC contain androgenic compounds, which could potentially affect muscle strength. [8], [11]

To sum up, the use of HC helps stabilize hormone levels, which may lead to reduced fluctuations in performance and strength during the cycle. On the other hand, women who do not use HC often notice changes in physical activity depending on the menstrual cycle phase, caused by hormonal fluctuations.

In many of them, aerobic capacity and muscle strength may be slightly decreased during the follicular phase, which is associated with low estrogen levels. [2]
However, research also shows that HC may cause a slight reduction in aerobic capacity and muscle strength compared to women with a natural menstrual cycle. [2], [3], [12] In spite of that, these differences turned out to be so small that researchers suggest there is no need for general recommendations about usage of OCP to optimize athletic performance. [12] Nonetheless, it is important to notice that a significant advantage, reported by athletes using HC, is the fact that they experience fewer symptoms associated with their menstrual cycle, such as menstrual pain and mood swings. Thanks to that, they can take part in trainings regularly and do not have to avoid participating in competitions. [3], [13]

2. The impact of hormonal contraception on regeneration and endurance

Numerous studies indicate that HC may affect regeneration after physical exercise and the ability to perform high-intensity training. [4]
Hormonal stabilization associated with usage of HC has a positive effect on regeneration after training and reducing the risk of overtraining. Women using HC reported improvement in sleep quality and faster muscle regeneration after intense training sessions. What is more, research suggests that reducing menstrual symptoms, such as abdominal pain and mood swings, can positively impact the ability to train regularly and participate in competitions. It was also observed that female athletes using OCPs could strategically adjust their hormone withdrawal periods to avoid adverse effects related to menstruation during sports competitions. [3], [12], [13], [14]
Some studies also report the positive anti-inflammatory effects of estrogens, supporting muscle regeneration after intense exercise. In addition, they accelerate the healing of muscle micro-injuries, which is especially important for professional athletes. [15], [16], [17]
However, when it comes to disadvantages of using HC, some studies suggest that HC may lead to a slight increase in water retention. It can contribute to a feeling of heaviness during exercise. [3]

3. The impact of hormonal contraception on health and well-being of female athletes

3.1. Menstrual symptoms and alleviation of them

In the study by SantaBarbara et al. 92% of participants experienced menstrual symptoms such as cramps and mood swings. Women using HC often report less bleeding, milder cramps and better comfort during physical activity. It suggests their positive influence on the active women's quality of life. HC, especially hormonal intrauterine devices (hIUDs), was perceived as an effective method for alleviating menstrual symptoms, which was confirmed by the study conducted by Ryall et al. [4], [8] In addition, some studies report that women using HC were less likely to report bothersome cycle-related symptoms, such as fatigue and mood swings. However, some of them observed side effects, including breast tenderness, decreased libido, and mental fluctuations. [3], [18] Furthermore, several women reported subjective negative changes in their body composition. [2], [8]

3.2. The regulation of the menstrual cycle and hormonal functions

Research by Reif et al. have shown that the use of HC can stabilize hormone levels. It leads to a more predictable menstrual cycle and reduces the impact of hormonal fluctuations on physical performance. This allows athletes to control the timing of menstrual bleeding, which can be especially beneficial during competitions or training camps. [3] However, Ryall et al. emphasize the need for an individualized approach to HC counseling, taking into account the specific needs of athletes in various disciplines. [4], [9] Additionally, the use of HC helps prevent sports amenorrhea. As we know, intense physical activity, low levels of body fat and stress can lead to menstrual cycle disorders, including secondary amenorrhea. HC, by stabilizing sex hormone levels, may reduce the risk of these disorders by supporting hormonal health. [4], [8], [19], [20] Protection against the effects of estrogen deficiency is also important. Estrogen deficiency, associated with menstrual cycle disorders, may lead to reduced bone mineral density (osteopenia, osteoporosis). HC helps maintain stable estrogen levels, which may protect against bone loss, especially in sports with a high risk of injuries, such as gymnastics or long-distance running. [4]

3.3. Potential health risks

Kayser underlines that the use of HC may be associated with disorders in body composition and affects muscle mass. This is particularly relevant in the case of formulations containing androgenic components. While these effects may be considered marginal, some female athletes report reduced regeneration and fluctuations in energy levels. Some women taking HC, observed a slight increase in body weight, which is most often related to fluid retention rather than an increase in body fat. However, research shows that such changes are usually minimal and do not significantly impact physical performance. [3], [4] Despite the general improvement in regeneration, some studies suggest that increased water retention and slower regeneration processes may affect the feeling of fatigue in certain HC users. [3] Additionally, one study noted that as many as 45.4% of athletes using HC reported side effects, although many of them were mild. [8] It is also important to remember that in some cases, HC can negatively impact women's mental health, causing mood swings, increased depressive symptoms, or irritability. Although these effects are highly individual, they should be considered when planning hormonal therapy for female athletes. [2], [3], [4], [5]

3.4. Additional health benefits

HC effectively reduces the nuisance of premenstrual syndrome symptoms, such as abdominal pain, fatigue and irritability. As a result of that, athletes may train and compete more regularly. [3]

As previously mentioned, athletes using HC report better sleep quality and reduced fatigue. It is especially important for faster regeneration after intensive training sessions. [3], [14], [21] In addition it is worth mentioning that maintaining the appropriate level of sex hormones is crucial in prevention of osteoporosis. HC supports bone mineral density, which is especially important for athletes prone to low estrogen levels, resulting from intense training or low body weight. [4]

What is more, HC reduces the risk of injuries by hormonal stabilization, which may support better regeneration and decrease the risk of overload injuries to the musculoskeletal system. [3]

CONCLUSIONS

To sum up, the use of HC seems to have a minor impact on physical performance, especially among team athletes. However, the subjective benefits experienced by female athletes may improve the comfort of their training. Hormonal intrauterine devices (hIUDs) are the best-tolerated method for endurance athletes, while OCPs may be related with more side effects. In the case of strength and endurance sports, further research is needed taking into consideration the specificity of these disciplines and exploring individualized approaches to HC use. [4], [8], [9], [11] Although HC may be associated with some side effects, benefits such as reduced menstrual symptoms and improved training management make it a popular choice among female athletes. Athletes using HC are less likely to report absences from training and competition, allowing for more regular sport preparations. [2], [3] Another important aspect of HC is preventing menstrual cycle disorders, such as athletic amenorrhea, which is common in women practicing high-intensity sports. [4], [8] It should also be added that results of meta-analyses suggest that the use of oral contraceptives may have a potentially small negative impact on physical performance compared to the natural menstrual cycle. However, this effect is so minor that its practical significance may be limited. [12] Further research would be beneficial for better understand the long-term effects of HC use and the differences between women with a natural menstrual cycle and HC users. Such study should involve larger groups of female athletes practicing different sports disciplines and using different types of HC.

In conclusion, the use of HC may provide benefits in the context of hormonal stabilization, reduction of menstrual symptoms, and improved regeneration, which positively impacts athletic performance and the health of female athletes. At the same time, an individualized approach to the selection of hormonal contraception methods and monitoring of their potential side effects is necessary.

Authors' Contributions Statement: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Conceptualization: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Data Curation: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Formal Analysis: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Investigation: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Methodology: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Project Administration: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Resources: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Software: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Supervision: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Validation: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Visualization: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Writing -original Draft: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]
Writing -Review and Editing: [JS][GB][NJ][MJ][KM][MP][KB][JP][AW][KBA]

All authors have reviewed and agreed to the publication of the final version of the manuscript.

Conflict of Interest Statement:
No conflicts of interest.

Funding Statement:
This study did not receive any specific funding.

Informed Consent Statement:
Not applicable.

Ethics Committee Statement :
Not applicable.

References

[1] N. Giménez-Blasi *et al.*, "Menstrual Cycle and Sport: effects on the performance and metabolism of the athlete woman," *Retos*, vol. 46, pp. 565–572, 2022, doi: 10.47197/retos.v46.94614.

[2] L. Ekenros *et al.*, "Perceived impact of the menstrual cycle and hormonal contraceptives on physical exercise and performance in 1,086 athletes from 57 sports," *Front Physiol*, vol. 13, Aug. 2022, doi: 10.3389/fphys.2022.954760.

[3] O. Heyward *et al.*, "Oral contraceptive use in Premiership and Championship women's rugby union: perceived symptomology, management strategies, and performance and wellness effects," *Science and Medicine in Football*, vol. 8, no. 2, pp. 95–102, 2024, doi: 10.1080/24733938.2022.2156588.

[4] S. Ryall, H. Ohrling, T. Stellingwerff, S. Black, K. Reilly, and J. S. Thornton, "Contraception Choice for Female Endurance Athletes: What's Sport Got to Do With It? A Cross-Sectional Survey," *Sports Medicine*, Dec. 2024, doi: 10.1007/s40279-024-02078-1.

[5] D. Nolan, K. J. Elliott-Sale, and B. Egan, "Prevalence of hormonal contraceptive use and reported side effects of the menstrual cycle and hormonal contraceptive use in powerlifting and rugby," *Physician and Sportsmedicine*, vol. 51, no. 3, 2023, doi: 10.1080/00913847.2021.2024774.

[6] X. J. de Jonge, B. Thompson, and H. A. N. Ahreum, "Methodological Recommendations for Menstrual Cycle Research in Sports and Exercise," *Med Sci Sports Exerc*, vol. 51, no. 12, 2019, doi: 10.1249/MSS.0000000000002073.

[7] M. S. Dasa *et al.*, "The Female Menstrual Cycles Effect on Strength and Power Parameters in High-Level Female Team Athletes," *Front Physiol*, vol. 12, 2021, doi: 10.3389/fphys.2021.600668.

[8] K. SantaBarbara, E. Helms, M. Armour, and N. Harris, "Menstrual cycle characteristics, hormonal contraceptive use and perceptions of related effects in resistance-trained athletes," *Int J Sports Sci Coach*, vol. 19, no. 4, pp. 1570–1577, Aug. 2024, doi: 10.1177/17479541241228986.

[9] A. Reif, B. Wessner, P. Haider, H. Tschan, and C. Triska, "Strength Performance Across the Oral Contraceptive Cycle of Team Sport Athletes: A Cross-Sectional Study," *Front Physiol*, vol. 12, Jul. 2021, doi: 10.3389/fphys.2021.658994.

[10] A. Dole, M. Beaven, and S. T. Sims, "Menstrual Cycle Tracking in Sports Research: Challenges, Progress, and Future Directions," *Physiologia*, vol. 3, no. 4, pp. 598–610, Nov. 2023, doi: 10.3390/physiologia3040044.

[11] B. Kayser, "Where sports performance meets reproductive rights: hormonal contraception," *Drugs: Education, Prevention and Policy*, vol. 31, no. 4, pp. 396–402, 2024, doi: 10.1080/09687637.2023.2261614.

[12] K. J. Elliott-Sale *et al.*, "The Effects of Oral Contraceptives on Exercise Performance in Women: A Systematic Review and Meta-analysis," Oct. 01, 2020, *Springer*. doi: 10.1007/s40279-020-01317-5.

[13] N. Brown, C. J. Knight, and L. J. Forrest, "Elite female athletes' experiences and perceptions of the menstrual cycle on training and sport performance," *Scand J Med Sci Sports*, vol. 31, no. 1, pp. 52–69, Jan. 2021, doi: 10.1111/sms.13818.

[14] H. E. Cabre, L. M. Gould, L. M. Redman, and A. E. Smith-Ryan, "Effects of the Menstrual Cycle and Hormonal Contraceptive Use on Metabolic Outcomes, Strength Performance, and Recovery: A Narrative Review," Jul. 01, 2024, *Multidisciplinary Digital Publishing Institute (MDPI)*. doi: 10.3390/metabo14070347.

[15] A. C. D'Souza *et al.*, "Menstrual cycle hormones and oral contraceptives: a multimethod systems physiology-based review of their impact on key aspects of female physiology," Dec. 01, 2023, *American Physiological Society*. doi: 10.1152/japplphysiol.00346.2023.

[16] N. Martínez-Fortuny, A. Alonso-Calvete, I. Da Cuña-Carrera, and R. Abalo-Núñez, "Menstrual Cycle and Sport Injuries: A Systematic Review," 2023. doi: 10.3390/ijerph20043264.

[17] K. M. Hicks, K. McNulty, and P. Ansdell, "The Effect of the Menstrual Cycle on Exercise and Sports Performance," in *Sex Hormones, Exercise and Women: Scientific and Clinical Aspects, Second Edition*, 2023. doi: 10.1007/978-3-031-21881-1_11.

[18] K. Vogel, B. Larsen, C. McLellan, and S. P. Bird, "Female Athletes and the Menstrual Cycle in Team Sports: Current State of Play and Considerations for Future Research," 2024. doi: 10.3390/sports12010004.

[19] D. Martin, C. Sale, S. B. Cooper, K. J. Elliott-Sale, and K. Elliott-Sale, "Period prevalence and perceived side effects of hormonal contraceptive use and the menstrual cycle in elite athletes Submission type: Original Investigation."

[20] F. M. Coutinho, A. Rebelo-Marques, R. Andrade, J. Espregueira-Mendes, T. Bombas, and P. Moura, "Menstrual pattern and contraceptive choices of Portuguese athletes," *European Journal of Contraception and Reproductive Health Care*, vol. 26, no. 3, 2021, doi: 10.1080/13625187.2021.1879780.

[21] M. A. Carmichael *et al.*, "A pilot study on the impact of menstrual cycle phase on elite australian football athletes," *Int J Environ Res Public Health*, vol. 18, no. 18, 2021, doi: 10.3390/ijerph18189591.