

RELATION OF PREMENSTRUAL SYNDROME (PMS) AND FITNESS ACTIVITIES

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Submitted: 2020-09-11

Accepted: 2021-01-10

Published online: 2021-06-30

Abstract

The survey study focuses on the relation between the premenstrual syndrome (PMS) and fitness activities. The results of the analyzed studies (since the year 1971) point out the protective factor of fitness activities in relation to PMS – individual problems are mitigated or eliminated by regular exercise. The article describes the mechanisms of this effect and the intervening variables like ideal BMI or healthy diet, which also have impact on PMS, and which can be found more frequently in fitness women. PMS can also have positive effect on fitness performance in power training. On the contrary, there are studies pointing out the negative impact of exercise on PMS in case of overtraining.

Keywords: *Aerobic exercise; Exercise; Fitness; Premenstrual syndrome (PMS)*

Abbreviations:

BMI – Body Mass Index; COPE – Calendar of Premenstrual Experience; ICD-10 – 10th Revision of The International Statistical Classification of Diseases and Related Health Problems; Code N94.3 – Premenstrual Tension Syndrome; Code N94.8 – Other Specified Conditions Associated with Female Genital Organs and Menstrual Cycle; PMDD – Premenstrual Dysphoric Disorder; PMS – Premenstrual Syndrome; WHO – World Health Organization

INTRODUCTION

The article focus is based on practical findings of trainers, which show a significant relation of the menstrual cycle and fitness activities, particularly in the PMS stage. With regard to the survey character of the article, we base our work on an analysis of professional resources on this topic all over the history of their availability in top scientific databases.

Fitness constitutes a comprehensive set of activities, most frequently performed in fitness centers or gyms, which include for example jogging, aerobic, but recently also cross fit, functional training,

yoga and other activities (Paoli and Bianco, 2015). For this reason, there are many definitions, differing from author to author (Paoli and Bianco, 2015). In the broader sense of the word, fitness can be defined as activities used to maintain health and power, primarily through exercise (Cambridge Dictionary, © 2020). Newman (2017) states that fitness includes a number of components like cardiorespiratory condition, muscle power and endurance, body composition and flexibility.

Fitness is considered a part of healthy lifestyle, which is defined by the World Health Organization (WHO, 1999) as a way of life aimed at reducing the risk of

disease or premature death. The reason consists in the fact that, additionally to exercise, fitness is related to balanced diet which includes foodstuffs with high content of fiber, low content of sugar, low-fat dairy products, etc. (Song et al., 2009). That in itself contributes to improve the physical and mental condition (Paoli and Bianco, 2015) and thus may influence a number of diseases and serve for example as prevention of stroke (Chiuve et al., 2008) and other cardiovascular diseases (Alves et al., 2016; Chomistek et al., 2015; Claas and Arnett, 2016). Improved physical condition leads also to reduced risk of some mental illnesses (Mikkelsen et al., 2017; Ramirez and Nedley, 2018). Therefore, fitness should be perceived, rather than exercise in the fitness center, as a general lifestyle in which exercise constitutes the skeleton, but the diet and mental well-being have not less importance.

Our survey article focuses on the effect of fitness activities on the premenstrual syndrome. The premenstrual syndrome (PMS) is, according to Dickerson et al. (2003), a disease characterized by a set of physical and emotional symptoms associated with the menstrual cycle; in case of strong mental symptoms, it is referred to as premenstrual dysphoric disorder (PMDD). The current International Statistical Classification of Diseases and Related Health Problems (ICD-10) does not include the premenstrual syndrome and the premenstrual dysphoric disorder (WHO, 1993); therefore, the diagnosis of the syndrome is made with the help of other diseases contained among the symptoms of the premenstrual syndrome, or it is diagnosed as N94.3 Premenstrual tension syndrome or as N94.8 Other specified conditions associated with female genital organs and menstrual cycle. The Office on Women's Health (2014) states that the premenstrual syndrome can affect women from the start of regular menstruation, i.e., from the puberty period, until the discontinuation of the menstrual cycle in the menopause period, with the exception of pregnancy when the menstrual cycle, and thus also PMS, stop. The etiology of the premenstrual syndrome and PMDD is vague, but the change of regulation of neurotransmitters and neural hormones may play a role (Dickerson et al., 2003). The symptoms of PMS are very different and individual, but they include for

example stress, anxiety, depression, mood swings, acne, changed appetite, head or back pain, breast pain or increased sensibility, increased weight, etc. (American Psychiatric Association, 1994; Naeimi, 2015).

The therapy of premenstrual syndrome and premenstrual dysphoric disorder is very inconsistent, and it can be divided into pharmacological and non-pharmacological therapy. Pharmacological therapy can be divided, according to Halbreich (1996), into symptomatic therapy and suppression of ovulation. Symptomatic therapy recommends inhibitors of serotonin reuptake, e.g., Sertraline, Clomipramine, etc. (Connolly, 2001), while ovulation suppression therapy recommends for example Danazol, Buserelin and other drugs serving as agonists of the gonadotropin releasing hormone (Connolly, 2001). Non-pharmacological therapy recommends for example caffeine-free diet, aerobic exercise (Roztočil et al., 2011), healthy diet (Brown and Ling, 1996), as well as psychological techniques and therapies (Connolly, 2001).

Positive relation of PMS and fitness

The Office on Women's Health (2014) points out that fitness may help to cure the PMS syndrome. Regular weight training may mitigate the PMS symptoms even more when combined with avoiding unhealthy foodstuffs and adhering to regular sleep.

The results of a study by Safarzadeh (2016) suggest that regular fitness exercise may have great effect on PMS prevention. However, the authors also point out that the relation between fitness and PMS may be influenced by several other factors with effect on the final result, and therefore furthermore extensive studies on this topic are needed.

Abbaspour et al. (2006) found in their study that aerobic exercise performed once or twice a week during one to six months may have a great effect on reducing the symptoms of menstrual problems. Ghanbari et al. (2008) add that sporting activities are effective particularly to reduce PMS psychological problems. This thesis is confirmed also by the study by Dehnavi et al. (2017) who add that if aerobic exercise is connected with further types of therapy, such combination could constitute an adequate cure to pre-menstrual syndrome. Exercise has significant effect also

on reduction of physical syndromes, because of increased level of beta-endorphin, which is released during exercise, reducing the individual's pain feelings. In late luteal stage, the beta-endorphin level drops in women, which may lead to PMS physical symptoms like pain in lower abdomen or headache (Charkoudian and Joyner, 2004). Stoddard et al. (2007) suggested in their study a positive effect of medium-intensity sport on clinical symptoms of PMS like muscle pain and water retention. General tranquilization and elimination of pre-menstrual tension with the help of aerobic sport is confirmed also by the study by Freeman et al. (1995).

Stoddard et al. (2007) found significantly lower incidence of PMS in women who had generally more physical activities as compared to those who had not. A study by Haghighi et al. (2015) also confirms a positive effect of exercise on reduction of PMS symptoms. Cardio-respiratory fitness, similarly to active exercise, had significant negative correlation with physical and psychological symptoms of PMS, while BMI had significant positive correlation with physical and psychological symptoms. That suggests that exercise not only reduces PMS symptoms directly, but that they can be reduced also indirectly by maintaining healthy BMI (Haghighi et al., 2015). Halbreich et al. (2003) mentions that physical activity may reduce the blood estrogen level, which affects the amount of serotonin, thus influencing the individual's mood and behaviour and suppressing mental symptoms of PMS.

Additionally, to physical activity, PMS is improved also by healthy regime in fitness. Avoiding of sweet foodstuffs, which are usually left out in fitness diet, also has positive effect on reduction of PMS symptoms. A study by Rasheed and Al-Sowielem (2003) observed a significant relation between the seriousness of PMS and the consumption of sweet foodstuffs like chocolate, cakes and desserts. Similar results were found also by Seedhom et al. (2013) who include also excessive consumption of coffee or frequent eating in fast food restaurants among negative dietary impacts during PMS, which are also rather eliminated in fitness activities. Zaka and Mahmood (2012) mention in their article the positive effect of combination of correct diet and exercise on PMS symptoms.

Multiple studies, as well as practical findings of trainers, show that the menstruation cycle has effect on sporting performance. For example, Wikström-Frisén et al. (2015) point out that in the pre-menstrual stage of the cycle, training leads to stronger growth of muscle mass than in other periods. Similar results were stated also by Reis et al. (1995) who found a significant correlation between different parameters of power and accumulation of estradiol. On the contrary, Romero-Moraleda et al. (2019) did not find changed performance in fitness exercise in three different stages of the cycle.

Negative relation of PMS and fitness

However, there are also studies with results suggesting that for the time being, there is only little evidence to support a clear negatively correlated relation between physical activity and PMS. A study by Lustyk et al. (2004), which investigated several factors in parallel, found out that factors like frequency, amount or intensity of physical activity do not directly affect the PMS symptoms. Kroll (2010) even found out by a questionnaire survey that there is slight correlation between physical activity and PMS symptoms. The study assessed both physical activity and diet, as well as other factors of fitness lifestyle in relation to PMS symptoms and found that women who exercised less on average had a lower score of PMS symptoms than those who exercised more. The results were ascertained with the help of questionnaires taken over and adapted from a health study of nurses and from a version of the calendar of premenstrual experience (COPE) proposed by Mortola et al. (1990). The questionnaires were evaluated with the help of linear regression, where physical activity was linked to each of the three scores of PMS symptoms (general, emotional and physical). Biological processes were not described in the study. Despite the previous studies, an unexpected result of effect of physical activity on the frequency of PMS symptoms was found also by a study by P. Rasheed and Al-Sowielem (2003) which demonstrated that women with higher physical activity showed a higher percentage of PMS symptoms with a higher score of seriousness than women with a sedentary lifestyle. The data were collected with the help of a questionnaire survey carried out among students of medical educational programs.

CONCLUSIONS

As for studies focused on the positive effect of fitness on mitigation of PMS symptoms, it is necessary to consider that the effect of the actual physical activity can be difficultly separated from other lifestyle aspects connected with fitness – particularly from high-quality diet. It is therefore rather fitness lifestyle as a whole which has effect on PMS. On the other hand,

the fact that there are also studies describing negative impacts of fitness on PMS symptoms must be considered as well. However, such studies were mostly implemented by questionnaire surveys on small samples of women and they exist in lower number.

Conflict of interests

The authors have no conflict of interests to declare.

REFERENCES

1. Abbaspour Z, Rostami M, Najjar SH (2006). The effect of exercise on primary dysmenorrhea. *J Res Health Sci* 6(1): 26–31. DOI: 10.1016/S1550-8579(06)80151-8.
2. Alves AJ, Viana JL, Cavalcante SL, Oliveira NL, Duarte JA, Mota J, et al. (2016). Physical activity in primary and secondary prevention of cardiovascular disease: Overview updated. *World J Cardiol* 8(10): 575–583. DOI: 10.4330/wjc.v8.i10.575.
3. American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington DC: American Psychiatric Association.
4. Brown C, Ling FW (1996). Premenstrual Syndrome/Premenstrual Dysphoric Disorder. *Clinical Gynecology*. *Clinical Gynecology*, pp. 19–35. DOI: 10.1016/B978-0-443-06691-7.50007-8.
5. Cambridge Dictionary (2020). Meaning of fitness in English. [online] [cit. 2020-03-03]. Available from: <https://dictionary.cambridge.org/dictionary/english/fitness>
6. Charkoudian N, Joyner M (2004). Physiologic considerations for exercise performance in women. *Clin Chest Med* 25(2): 247–255. DOI: 10.1016/j.ccm.2004.01.001.
7. Chiuve SE, Rexrode KM, Spiegelman D, Logroscino G, Manson JE, Rimm EB (2008). Primary prevention of stroke by healthy lifestyle. *Circulation* 118(9): 947–954. DOI: 10.1161/CIRCULATIONAHA.108.781062.
8. Chomistek AK, Chiuve SE, Eliassen AH, Mukamal KJ, Willett WC, Rimm EB (2015). Healthy lifestyle in the primordial prevention of cardiovascular disease among young women. *J Am Coll Cardiol* 65(1): 43–51. DOI: 10.1016/j.jacc.2014.10.024.
9. Claas SA, Arnett DK (2016). The role of healthy lifestyle in the primordial prevention of cardiovascular disease. *Curr Cardiol Rep* 18(6): 56. DOI: 10.1007/s11886-016-0728-7.
10. Connolly M (2001). Premenstrual syndrome: an update on definitions, diagnosis and management. *Advances in Psychiatric Treatment* 7(6): 469–477. DOI: 10.1192/apt.7.6.469.
11. Dehnavi ZM, Sabzevari MT, Rastaghi S, Rad M (2017). The relationship between premenstrual syndrome and type of temperament in high school students. *The Iranian Journal of Obstetrics, Gynecology and Intertility* 20(5): 15–23. DOI: 10.22038/ijogi.2017.9076.
12. Dickerson LM, Mazyck PJ, Hunter MH (2003). Premenstrual syndrome. *Am Fam Physician* 67(8): 1743–1752.
13. Freeman EW, Schweizer E, Rickels K (1995). Personality factors in women with premenstrual syndrome. *Psychosom Med* 57(5): 453–459. DOI: 10.1097/00006842-199509000-00007.
14. Ghanbari Z, Manshavi FD, Jafarabadi M (2008). The effect of three months regular aerobic exercise on premenstrual syndrome. *Journal of Family and Reproductive Health* 2(4): 167–171.
15. Haghighi ES, Jahromi MK, Osh FD (2015). Relationship between cardiorespiratory fitness, habitual physical activity, body mass index and premenstrual symptoms in collegiate students. *J Sports Med Phys Fitness* 55(6): 663–667.
16. Halbreich U (1996). Reflections on the cause of premenstrual syndrome. *Psychiatric Annals* 26(9): 581–585. DOI: 10.3928/0048-5713-19960901-11.
17. Halbreich U, Borenstein J, Pearlstein T, Kahn LS (2003). The prevalence, impairment, impact, and burden of premenstrual dysphoric disorder (PMS/PMDD). *Psychoneuroendocrinology* 28(3): 1–23. DOI: 10.1016/S0306-4530(03)00098-2.
18. Kroll A (2010). *Recreational physical activity and premenstrual syndrome in college-aged women*. A thesis for Master of Science. Amherst, MA: University of Massachusetts.

19. Lustyk MKB, Widman L, Paschane A, Ecker E (2004). Stress, Quality of Life and Physical Activity in Women with Varying Degrees of Premenstrual Symptomatology. *Women Health* 39(3): 35–44. DOI: 10.1300/j013v39n03_03.
20. Mikkelsen K, Stojanovska L, Polenakovic M, Bosevski M, Apostolopoulos V (2017). Exercise and mental health. *Maturitas* 106: 48–56. DOI: 10.1016/j.maturitas.2017.09.003.
21. Mortola JF, Gorton L, Beck L, Yen SS (1990). Diagnosis of premenstrual syndrome by a simple, prospective, and reliable instrument: The calendar of premenstrual experiences. *Obstet Gynecol* 76(2): 302–307.
22. Naeimi N (2015). The prevalence and symptoms of premenstrual syndrome under examination. *J Biosci Med* 3: 1–8. DOI: 10.4236/jbm.2015.31001.
23. Newman T (2017). What does being physically fit mean? *Medical News Today*. [online] [cit. 2020-02-28]. Available from: <https://www.medicalnewstoday.com/articles/7181>
24. Office on Women's Health, U.S (2014). Department of Health and Human Services. Premenstrual syndrome (PMS) fact sheet. Washington, DC. [online] [cit. 2020-03-03]. Available from: <https://web.archive.org/web/20150628073755/http://www.womenshealth.gov/publications/our-publications/fact-sheet/premenstrual-syndrome.html>
25. Paoli A, Bianco A (2015). What Is Fitness Training? Definitions and Implications: A Systematic Review Article. *Iran J Public Health* 44(5): 602–614.
26. Rasheed P, Al-Sowielem LS (2003). Prevalence and predictors of premenstrual syndrome among college-aged women in Saudi Arabia. *Ann Saudi Med* 23(6): 381–387. DOI: 10.5144/0256-4947.2003.381.
27. Reis E, Frick U, Schmidtbleicher D (1995). Frequency variations of strength training sessions triggered by the phases of the menstrual cycle. *Int J Sports Med* 16(8): 545–550. DOI: 10.1055/s-2007-973052.
28. Romeo-Moraleda B, Del Coso J, Gutiérrez-Hellín J, Ruiz-Moreno C, Grgic J, Lara B (2019). The Influence of the Menstrual Cycle on Muscle Strength and Power Performance. *J Hum Kinet* 68: 123–133. DOI: 10.2478/hukin-2019-0061.
29. Roztočil A, et al. (2011). *Moderní gynekologie*. Praha: Grada Publishing, 528 p.
30. Safarzadeh A (2016). The relationship between Exercise and premenstrual syndrome. *Int J Med Res Health Sci* 5(9): 183–189.
31. Seedhom AE, Mohammed ES, Mahfouz EM (2013). Life style factors associated with premenstrual syndrome among El-Minia University Students, Egypt. *ISRN Public Health*. DOI: 10.1155/2013/617123.
32. Song H-J, Gittelsohn J, Kim M, Suratkar S, Sharma S, Anliker J (2009). A corner store intervention in a low-income urban community is associated with increased availability and sales of some healthy foods. *Public Health Nutr* 12(11): 2060–2067. DOI: 10.1017/S1368980009005242.
33. Stoddard JL, Dent CW, Shames L, Bernstein L (2007). Exercise training effects on premenstrual distress and ovarian steroid hormones. *Eur J Appl Physiol* 99(1): 27–37. DOI: 10.1007/s00421-006-0313-7.
34. Wikström-Frisén L, Boraxbekk CJ, Henriksson-Larsén K (2015). Effects on power, strength and lean body mass of menstrual/oral contraceptive cycle based resistance training. *J Sports Med Phys Fitness* 57(1–2): 43–52. DOI: 10.23736/S0022-4707.16.05848-5.
35. World Health Organization (1993). *The ICD-10 Classification of Mental and Behavioural Disorders: Diagnostic criteria for research*. Geneva: WHO, 223 p.
36. World Health Organization (1999). *The world health report 1999: making a difference*. Geneva: WHO, p. 116.
37. Zaka M, Mahmood KT (2012). Pre-menstrual syndrome – a review. *J Pharm Res* 4(1): 1684–1691.

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