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# The Impact of Physical Activity and Diet on Primary Dysmenorrhea: A Literature Review

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## Abstract

### Introduction

Primary dysmenorrhea (PD) is one of the most common causes of gynaecological consultations among adolescent and young adult women and a major cause of chronic pelvic pain. Its prevalence is estimated to range from 20% to 90% worldwide among young female patients and tends to decrease with age. PD is a medical condition that causes many women to withdraw from their professional or private commitments for 1-3 days each month.

### Aim of study

This study aims to evaluate and compare information regarding the effects of physical activity and dietary interventions on the severity and frequency of primary dysmenorrhea symptoms.

**Materials and methods**

The search methodology incorporated the terms “primary dysmenorrhea” or “menstrual pain” in correlation with terms such as “physical activity” or “diet” or “management”, along with variations of these terms, found in many scientific databases. Publications issued before 2015 and case reports were excluded.

**Conclusion**

Specialists should discuss this condition more with their patients and inform them of possible treatment options. Physical activity and a balanced diet have a beneficial effect on PD symptoms, although further research is needed in this area.

**Keywords**

Physical activity, primary dysmenorrhea, menstrual pain, nutrition, exercise, pain management

## Introduction

Primary dysmenorrhea (PD) represents one of the most frequent reasons for gynaecological consultations among adolescents and young adult females, and it is the main cause of chronic pelvic pain [1,2]. Its prevalence is estimated to range between 20% to 90% worldwide [2-6] among young patients and tends to decrease with age [3,4]. In Poland, PD is experienced by 65% women [7]. It could be described as a cramping pain localised in the lower abdomen, which may radiate to the lower back or thighs [7,8]. This kind of pain occurs cyclically just before or during menstruation, lasts 1-3 days, and is not connected with any pelvic pathology [7,9]. However, if the patient has been diagnosed with a pelvic pathology or other disease that can cause painful menstruation in its spectrum (e.g. endometriosis), then it is called secondary dysmenorrhea [8,10,11]. These are two diseases characterised by similar symptoms, but with different underlying mechanisms and management. For this reason, this study will focus exclusively on primary dysmenorrhea.

Typically, the first symptoms of PD appear within 6-24 months after the onset of menstruation (menarche) [7,11]. The primary dysmenorrhea is characterised not only by pain, but also by many other associated symptoms such as swollen abdomen, sadness, irritability, headache,

nausea, vomiting and diarrhoea [8,9,12]. The most common risk factors are a family history of primary dysmenorrhea, early menarche and being nulliparous [7,13].

Despite the increasing awareness of primary dysmenorrhea, there are still a large number of women who do not seek medical help and who share the problem with their friends and family [8,11,13]. It is therefore important for general practitioners and gynaecologists to be aware of the situation and to educate their patients to distinguish between normal and pathological menstrual pain and how to manage the symptoms [8,11].

Primary dysmenorrhea is believed to be caused by excessive production of uterine prostaglandins, which lead to strong uterine contractions and reduced blood flow (ischaemia) [14]. There are not many treatment options, among which the most popular are oral hormonal contraceptives and NSAIDs (Nonsteroidal Anti-Inflammatory Drugs), which may cause many side effects (nausea, gastric ulcers, kidney failure), especially when they are used chronically [9,14]. In recent years, non-pharmacological methods that are not only safer for the body but also offer additional health benefits, such as physical activity and a balanced diet, have become increasingly popular. The intensity of pain associated with primary dysmenorrhea lowers the quality of life and, in many cases, results in absence from work, school or other daily duties [9,15]. A major concern of modern medicine is to establish treatment methods that prevent as many patients as possible from experiencing the loss of quality of life associated with PD [13].

## Aim of study

This study aims to evaluate and compare information regarding the effects of physical activity and dietary interventions on the severity and frequency of primary dysmenorrhea symptoms. Identifying non-pharmacological methods is essential, as their appropriate use may enhance the quality of life of affected individuals and reduce the dependence on pharmacological treatments such as NSAIDs or hormonal contraceptives.

## Materials and methods

Articles for this review were retrieved from multiple scientific databases, including PubMed, Google Scholar, and other scientific resources. The search methodology incorporated the terms “primary dysmenorrhea” or “menstrual pain” AND “physical activity” or “diet” or “management”, along with variations of these terms. The selected articles were limited to those published in English. Moreover, the lists of references of the scientific papers were reviewed to find further relevant works. Publications issued before 2015 and case reports were excluded. The last search was conducted on June 30, 2025.

## Literature Review

### 1. Pathophysiology of primary dysmenorrhea

The literature describes two types of dysmenorrhea: primary and secondary. The main difference between these types is the occurrence of the underlying disease (e.g. endometriosis, uterine fibroids, endometrial polyps) or any other pelvic pathology, which is typical only for secondary dysmenorrhea [10,15]. Other differentiating features of secondary dysmenorrhea from primary are later onset of symptoms, more intense pain, and infertility [11,15]. These two diseases not only have different underlying mechanisms but also different treatments, which is why only primary dysmenorrhea will be discussed in this study.

Regarding the latest research, the main cause of primary dysmenorrhea is an excessive production of prostaglandins (in particular PGF2a) (Figure 1)[11,14]. The researchers compared prostaglandin (PG) levels in menstrual fluids and endometrial biopsies from women with PD and those who were menstruating physiologically (eumenorrhea). They revealed that prostaglandin levels were higher in samples from women with PD [8,11]. The level of prostaglandins is especially higher during the first 48 hours of menses, which also correlates with the peak in pain intensity [11].

Prostaglandins are intracellular substances present throughout the human body that are derived from long-chain polyunsaturated fatty acids (e.g. arachidonic acid) [11]. They have a crucial role in various physiological processes, including the regulation of inflammation, pain sensation, blood flow, sleep regulation, as well as the contraction and relaxation of smooth muscle tissue in different parts of the body [11].

These locally acting biochemical mediators lead to uterine contractions and ischaemia, which result in myometrial hyperactivity and a decrease in uterine blood flow [2,9]. The human body perceives it as a pain trigger [11]. Studies have shown that both the strength of uterine contractions in affected patients and the frequency of contractions are higher compared to healthy women [11].

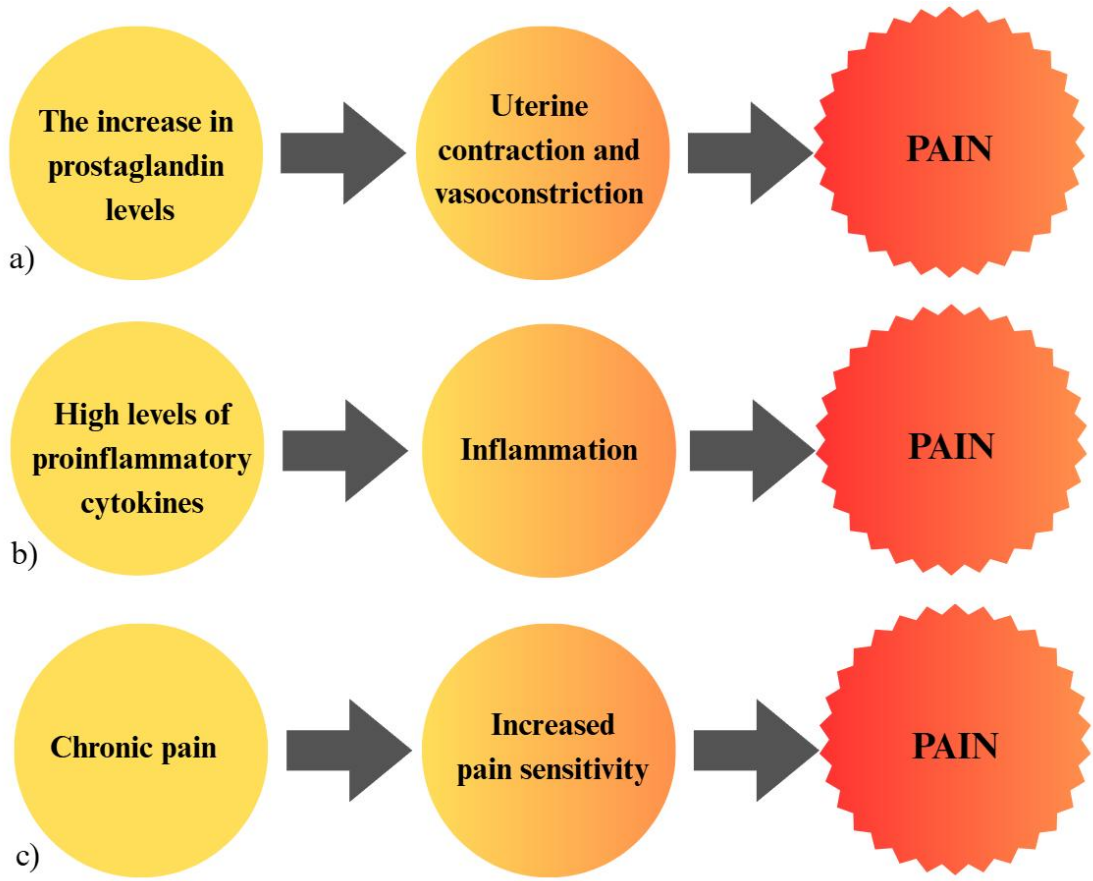
In some publications, elevated leukotrienes and vasopressin are described in addition to elevated PG. The effect of leukotrienes is also to stimulate the uterine myometrium and its vessels to contract [13].

The pain is very often felt by patients not only in the lower abdomen but also radiates

to the back and thighs [8]. In some studies, primary dysmenorrhea is reported to lower the quality of sleep, which can exacerbate symptoms of fatigue and irritability during the day and increase pain sensitivity [8,11].

Another mechanism described in the literature that may also contribute to the increase in pain in PD is inflammation, which occurs as a result of increased expression of proinflammatory cytokines and PG (Figure 1) [13].

A further mechanism suspected of contributing to the painful conditions in primary dysmenorrhea is the sensitisation of the nervous system to painful stimuli (Figure 1). An organism exposed to chronic pain subsequently experiences more pain stimuli than organisms that do not suffer such chronic pain [11,13]. It is the so-called central sensitisation syndrome, which can be described as a form of pain hypersensitivity that occurs in the absence of tissue injury, inflammation, or a lesion to the nervous system




[11,13].

Figure 1. *The main pathophysiological mechanisms of primary dysmenorrhea. a) The increase in prostaglandin levels. b) High levels of proinflammatory cytokines. c) Chronic pain.*

## 2. Risk Factors

Primary dysmenorrhea has many risk factors, which are widely described in the literature (Table 1). A large proportion of them are non-modifiable factors, which are beyond control and cannot be changed. Patients with a family history of primary dysmenorrhea are particularly predisposed to developing the condition [1,7,16]. Moreover, early menarche (before the age of 12) and having long, heavy periods are frequent risk factors [1,16]. The prevalence of PD declines with age; this condition mostly affects adolescent girls and young women [6].

On the other hand, researchers describe many potentially modifiable risk factors that the gynaecologist may discuss with the patient. Many studies report that stress and anxiety may exacerbate the symptoms [6]. Moreover, smoking and alcohol consumption [6,13,16], as well as a sedentary lifestyle, are factors which also potentially cause a higher incidence of primary dysmenorrhea [15], although further research is needed.

Nulliparous young women are also more vulnerable than those who have already carried children [6].

In many diseases, obesity is a factor that worsens the course of the disease and exacerbates its symptoms. However, in dysmenorrhea, a high BMI is probably not a risk factor, more longitudinal studies must be performed [6]. In most publications, body weight is described as having no effect [7,16,17].

| **Non-modifiable** | **Potentially Modifiable** |
|---|---|
| Family history | Stress/Anxiety |
| Early menarche | Being nulliparous |
| Long/heavy periods | Smoking |
| Age | Alcohol use |

Table 1. *Potentially modifiable and non-modifiable risk factors for primary dysmenorrhea.*

## 3. Pharmacological Management of Primary Dysmenorrhea

The most common management of primary dysmenorrhea is a pharmacological treatment involving two main groups of drugs, such as NSAIDs (Nonsteroidal Anti-Inflammatory Drugs) and oral hormonal contraceptives [4,18].

NSAIDs are the first-line treatment of primary dysmenorrhea [4,11]. In many countries, these therapeutics are over-the-counter drugs, easily accessible to all patients.
NSAIDs work by inhibiting the cyclooxygenase (COX) enzymes, which are responsible for producing prostaglandins [10,11]. This results in a decrease in the amount of prostaglandins and the symptoms they cause, as mentioned above, fewer uterine contractions and better uterine blood supply. All of which leads to a significant reduction in pain in most patients [10]. In studies, NSAIDs were significantly more effective than placebos, and patients reported significantly less pain [8].
Attempts have been made to determine whether any drug from the NSAIDs group is more effective than the others, but no such relationship has been demonstrated; all are equally effective [13].
Research shows that as many as 47-70% of female university students take analgesics themselves during menstrual pain, and only 18% use the drugs prescribed for them after consulting a doctor [11]. Kamel et al. report that 62.4% of women in their study use only NSAIDs and 87.2% of them obtain a complete reduction or minimisation of pain [8].
NSAIDs and other analgesics are over-the-counter drugs that patients could use on their own without consulting a specialist, which results in so-called self-medication [2,8]. In many cases, this leads to misuse and abuse of this kind of treatment, increasing the incidence of side effects of these drugs [2].
Some women do not respond to NSAIDs, according to Iacovides et al., this is 15% of patients [11]. This may be due to the women's insensitivity to this type of medication, or it may indicate the presence of another pathology. In these cases, the diagnostics should be extended to search for other causes of painful menstruation or even diagnostic laparoscopy - secondary dysmenorrhea may then be diagnosed [13].

The second most popular group of medications that are used in patients with primary dysmenorrhea are oral contraceptives. Oral contraceptives, through the action of synthetic oestrogens and progestins, inhibit ovulation and reduce the thickness of the endometrium. These effects contribute to a reduction in menstrual blood volume, prostaglandin production, and menstrual pain [11]. Many studies show that they protect patients from the occurrence of painful periods [6,13].
As in the previously described case of the use of NSAIDs, if the use of oral contraceptives and/or NSAIDs does not have the desired effect, the diagnosis should be expanded to look for the presence of pelvic pathology [13]. According to Armour et al., approximately 25% of women have increased painful symptoms despite the use of these two groups of drugs [4].

In some patients, the use of hormonal levonorgestrel IUDs gives satisfactory results; what is more, it also reduces the amount of bleeding, which in patients with primary dysmenorrhea is typically more intense [10,11]. There are uncertainties in the studies regarding the effectiveness of this treatment, which necessitate further research [6].

Another medication that is taken into consideration in primary dysmenorrhea is

calcium channel blockers, glyceryl trinitrate, leukotrienes, thiamine, vitamin E, omega-3 polyunsaturated fatty acids, oral zinc sulphate and cholecalciferol; however, more research must be performed [13].

## 4. Non-pharmacological Management of Primary Dysmenorrhea

Many patients do not want to use chronic medication to alleviate the symptoms of menstrual pain, for a variety of reasons. One of the most frequently mentioned is the patients' fear of side effects of the medicines [19]. A large proportion of them do not want to take the medication chronically because they feel it is not the way to manage the problem. Cultural differences also have an immense impact on patients' preferences in terms of treatment choices []. In some countries, taking pain-relieving medications or contraceptive pills is more widely allowed and socially acceptable than in others [4].

What is more, in recent years, there has been a growing interest in various treatments; as a result, patients are looking for different methods to support or replace traditional treatment [2].

Many patients also choose methods that require lifestyle changes, such as increasing their physical activity or modifying their diet [19]. For this group of patients, active participation in the treatment process gives them a greater sense of control over their illness and their lives, which gives them greater satisfaction and confidence than using traditional methods of treatment.

Among the most popular and best-evidenced treatments are acupuncture [5,11,13], physical activity, proper diet, transcutaneous electrical nerve stimulation (TENS) [13-15] and heat pads on the abdomen [4,11].

Non-pharmacological and alternative therapies should also be recommended for patients for whom first-line treatment has not been successful [15].

### 4.1. Physical Activity

According to the World Health Organisation (WHO), every adult should perform at least 150–300 minutes of moderate-intensity aerobic physical activity, or at least 75–150 minutes of vigorous-intensity aerobic physical activity per week [20]. Regular physical activity reduces the risk of many diseases, such as cardiovascular diseases, some cancers (e.g. colon and breast cancer), type 2 diabetes, hypertension, adiposity and increases all-cause mortality [20]. Increasing importance is also being given to the

positive effects of physical activity on stress, incidence of depression, cognitive ability and sleep [20]. Not only does regular physical activity prevent the onset of many chronic diseases, but in many diseases it also has a positive effect on the development of the symptoms of the diseases or slows their progression [20].

This study aimed to investigate the relationship between the occurrence of primary dysmenorrhea symptoms and physical activity (Figure 2). A large proportion of the studies showed that physical activity had a positive effect on reducing pain in PD and that PD even occurred less frequently [2]. However, some studies did not find a correlation between physical activity and the reduction of pain and the occurrence of PD [8,13,16]. Several studies indicate that the amount and type of physical activity are not easy to demonstrate and measure despite the use of different scales, and therefore, it is difficult to determine at what minimum level of physical activity positive effects are observed [2,14]. More research is needed in this area [14,21].

The proposed mechanisms through which symptom alleviation in primary dysmenorrhea may occur include the impact of physical activity on increasing endorphin production [3] and on reducing stress levels [3,9]. Regular physical activity has been shown to contribute to stress reduction, which may subsequently lead to a decrease in the activity of the sympathetic nervous system [9]. Since increased sympathetic activity is associated with the intensification of menstrual symptoms, its modulation through exercise could play a significant role in alleviating the discomfort and severity of symptoms experienced during menstruation [9].

Moreover, exercise may reduce cortisol levels, which results in reduced prostaglandin synthesis. As mentioned above, this process is one of the main factors contributing to pain aetiology in primary dysmenorrhea [4].

Another proposed mechanism through which physical exercise may alleviate pain associated with primary dysmenorrhea involves its ability to reduce systemic inflammation [4,21]. Regular exercise has been shown to decrease the levels of pro-inflammatory cytokines and other inflammatory markers, which are often elevated during menstruation [21].

As a result of the mechanisms described above, not only is pain relieved, but also stress, anxiety and mood stabilisation are improved, resulting in a better overall well-being of women not only during menstruation, but also throughout the month [4]. Mood changes are often more distressing to patients than the pain itself, so mood stabilisation has a positive effect on PD patients [4].

Despite the variety of different types of physical activity, researchers most often mention low-intensity training, stretching and yoga as having the best influence on health [4,21]. More research is needed to determine what frequency and intensity of training would be best for PD patients [2,21].

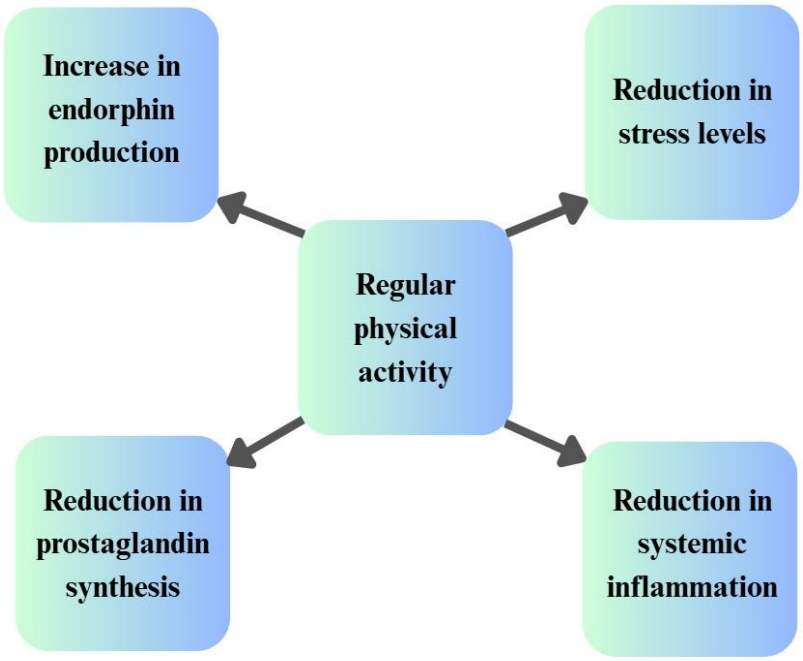



Figure 2. *The pleiotropic effects of regular physical activity in patients with primary dysmenorrhea.*

### 4.2. Diet Influence

A healthy diet is essential for overall well-being and the prevention of chronic diseases, as well as a physical activity. According to the WHO, a balanced diet should include at least 400 grams (five portions) of fruits and vegetables per day, limit free sugar intake to less than 10% of total energy, and reduce salt consumption to under 5 grams per day. Total fat should not exceed 30% of daily energy intake, with a preference for unsaturated fats over saturated and trans fats. Additionally, red meat and processed meats should be limited, while whole grains, legumes, nuts, and lean proteins should be emphasized. Proper hydration and reduced intake of sugary drinks are also recommended [22,23].

There is a lot of inaccuracy in the context of the influence of diet on the severity of

symptoms of primary dysmenorrhea [19]. Researchers do not fully agree on which foods have a positive or negative effect [19,23]. Table 2 shows several products that have been studied and, according to some sources, may reduce PD symptoms [1,6,13, 17,19,23]. However, further research is needed in this area.

| **Products with a probable positive impact** | **Products with a probable negative impact** |
|---|---|
| Herbal medicines | Caffeine |
| Ginger | Theine |
| Food rich in magnesium | Chocolate |
| Fish | Salt |
| High-fiber products | Sugar |
| Eggs | Sweetened beverages |
| Nuts | Sugar-rich snacks |

Table 2. *Products reported to be important in patients with primary dysmenorrhea.*

Some patients have experienced relief from pain during menstruation by drinking hot liquids [8].

**Conclusion**

Although the prevalence of primary dysmenorrhea in the population is very high, too few studies are devoted to this disease. Insufficient knowledge of the disease is not only present among patients, who far too rarely seek medical help in this area, but also in specialists themselves, who often underestimate the severity of the condition. There are a lot of gaps and limitations in the available studies - the study groups are small, the heterogeneity within the groups is too high, and the studies are short-term.

There are still no standardised guidelines for physical activity and diet in primary dysmenorrhea. Physical activity should be offered to patients with this disease, particularly moderate exercise, yoga and stretching. Patients should avoid foods rich in salt, sugar and chocolate in their diet and increase their intake of high-fibre products, eggs, fish and nuts.

Women suffering from PD should not be excluded from household and work duties for a few days each month. The objective of research for the coming years is to provide PD

treatment options that are as side-effect-free as possible, accessible to all patients, including the youngest, effective and affordable.

## Disclosure

### Author's contribution

Conceptualization: Kinga Racisz, Paweł Racisz

Methodology: Kinga Racisz, Paweł Racisz, Joanna Duda

Software: Alicja Obcowska, Jakub Kędzia

Check: Joanna Duda, Jakub Kędzia, Alicja Obcowska, Aleksandra Walendzik

Formal analysis: Alicja Obcowska, Jakub Kędzia

Investigation: Kinga Racisz

Resources: Joanna Duda, Paweł Racisz

Data curation: Alicja Obcowska

Writing-rough preparation: Paweł Racisz, Jakub Kędzia

Writing-review and editing: Joanna Duda, Aleksandra Walendzik

Visualization: Aleksandra Walendzik

Supervision: Kinga Racisz, Paweł Racisz

Project administration: Kinga Racisz, Paweł Racisz

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**Conflict Of Interest**

The authors declare no conflict of interest.

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