



Various forms of heat therapy and the quality of life of women with dysmenorrhea. A preliminary study

Różne formy terapii ciepłem a jakość życia kobiet z bolesnym miesiączkowaniem. Wstępne badanie

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation,

D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Kwiatkowska Z, Bielińska-Wąż D, Sotomska Z, Grzybowska ME, Zorena K. Various forms of heat therapy and the quality of life of women with dysmenorrhea. A preliminary study. Med Srodow. 2024; 27(2): 95–101. doi: 10.26444/ms/188928

■ Abstract

Objective. The aim of the study was to assess the impact of heat therapy using plaster with therapeutic mud, hot water bottle and hot bag with cherry pits on the quality of life of young women with dysmenorrhea.

Materials and methods. Thirty women with dysmenorrhea aged 18–34 (median: 22.50 years, first quartile: 21.00 years, and third quartile: 23.75 years) were randomly assigned to three groups: group 1 – used a plaster with therapeutic mud, group 2 – hot water bottle, and group 3 – a hot bag with cherry pits. Basic data was collected using a questionnaire. Therapy started 3–5 days before menstruation, warm compress was applied three times (once a day) for 20 minutes in the lower abdomen or lumbar region, depending on where women experienced more pain during menstruation. Using a Visual Analogue Scale (VAS) to assess pain level and the Likert scale to assess quality of life, menstruation after heat therapy was compared with previous cycles.

Results. Women with dysmenorrhea experienced changes in the perception of lower abdominal and lumbar pain post-heat therapy. Based on VAS, a significantly lower level of lumbar pain was observed post mud therapy vs. pre-therapy (p -value=0.013). A significantly lower level of lower abdominal pain post vs. pre-therapy using a hot bag with cherry pits was reported (p -value=0.006). Moreover, 46.7% of women were satisfied with the therapy, and 93.3% would like to continue heat therapy in the following months. Quality of life according to the Likert scale improved in 9 women in Group 1, 8 women in Group 2 and 7 women in Group 3. However, no statistical significance between groups was demonstrated (p -value=0.877).

Conclusions. According to the preliminary results, heat therapy applied a few days before menstruation can reduce dysmenorrhea and may be a good addition to pharmacological treatment.

Key words

women, dysmenorrhea, heat therapy, quality of life, Visual Analogue Scale, Likert scale

■ Streszczenie

Cel. Celem badania była ocena wpływu terapii ciepłem, z użyciem plastrów borowinowych, termoforu z gorącą wodą oraz termoforu z pestkami wiśni, na jakość życia młodych kobiet z bolesnym miesiączkowaniem.

Materiały i metody. Trzydzieści kobiet z bolesnym miesiączkowaniem w wieku 18–34 lat (mediana: 22,50 lat, pierwszy kwartył: 21,00 lat i trzeci kwartył: 23,75 lat) przydzielono losowo do trzech następujących grup: grupa 1 – stosująca plaster z borowinami, grupa 2 – stosująca termofor z gorącą wodą, a grupa 3 – korzystająca z termoforu z pestkami wiśni. Podstawowe dane zebrano za pomocą ankiety. Terapię rozpoczynano 3–5 dni przed miesiączką; polegała ona na tym, że przykładano trzy razy (raz dziennie) ciepły kompres na 20 min na podbrzuszu lub w okolicy lędźwiowej, w zależności od tego, gdzie kobieta odczuwała większy ból podczas miesiączki. Następnie oceniano odczuwany przez kobiety podczas menstruacji ból, wykorzystując w tym celu skalę wizualno-analogową (VAS), oraz jakość życia uczestniczek badania, używając do tego skali Likerta, porównując miesiączkę po terapii z poprzednimi cyklami.

Wyniki. U kobiet z bolesnym miesiączkowaniem, po terapii ciepłem wystąpiły zmiany w odczuwaniu bólu podbrzusza i okolicy lędźwiowej. Na podstawie VAS zaobserwowano istotnie niższy poziom bólu w odcinku lędźwiowym po terapii borowinowej w porównaniu z tym doświadczanym przed terapią (wartość $p = 0,013$). Stwierdzono istotnie niższy poziom bólu w podbrzuszu po terapii w porównaniu do okresu przed terapią pestkami wiśni (wartość $p = 0,006$). Ponadto 46,7% kobiet było zadowolonych z terapii, a 93,3% chciałoby kontynuować terapię ciepłem w kolejnych miesiącach. Jakość życia w skali Likerta poprawiła się u 9 kobiet w grupie 1, 8 kobiet w grupie 2 i 7 kobiet w grupie 3. Nie wykazano jednak istotności statystycznej pomiędzy grupami (wartość $p = 0,877$).

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Wnioski. Według wstępnych badań terapia ciepłem zastosowana na kilka dni przed menstruacją może złagodzić bolesne miesiączkowanie i stanowić dobre uzupełnienie leczenia farmakologicznego.

Słowa kluczowe

kobiety, bolesne miesiączkowanie, terapia ciepłem, jakość życia, Wizualna Skala Analogowa, Skala Likerta

INTRODUCTION

Dysmenorrhea is a widespread problem, particularly among young females, affecting up to 90% of women in some populations [1, 2]. Primary dysmenorrhea is defined as pain in the suprapubic region that may radiate to the lumbar spine and lower limbs. Dysmenorrhea usually lasts from 8–72 hours and is most severe on the 1st and 2nd day of the cycle [3, 4]. Secondary dysmenorrhea occurs in the presence of pelvic pathology or due to a diagnosed condition, such as endometriosis, adenomyosis or obstructive anomalies [4]. In addition to pain, women with dysmenorrhea may experience symptoms such as fatigue, diarrhea, headache, nausea and vomiting [1, 3]. Dysmenorrhea also deteriorates the quality of life. Women with dysmenorrhea rated their overall life satisfaction and happiness as lower during menstruation [5]. Therefore, many research teams are looking for methods to alleviate dysmenorrhea.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are used as first-line treatment for pain relief in dysmenorrhea. The most popular are ibuprofen, naproxen, mefenamic acid and ketoprofen. Researchers suggest that for the best effect and least pain, women with dysmenorrhea should take pain medications before symptoms appear and continue taking them for 3 days [6]. NSAIDs also have adverse effects, mainly consisting of gastrointestinal symptoms such as nausea, vomiting, and heartburn. Combined oral contraceptives (estrogen-progestin) are used as the second line of treatment, and act to suppress ovulation and endometrial growth, causing a decrease in menstrual volume and prostaglandin secretion [3].

In the light of previous studies, regular physical activity has been shown to cause a clinically significant reduction in menstrual pain [7, 8]. Another form of non-pharmacological therapy for preventing dysmenorrhea is manual therapy. Manual therapy uses techniques such as deep transverse massage of paraspinal muscles and specific traction of segments of the lumbar spine, which may reduce the severity and duration of pain [9].

In recent years, several studies have demonstrated the effects of both hot and cold compresses on reducing dysmenorrhea symptoms (such as pain), but the results are inconsistent [10–13]. The heat source can be applied in a variety of ways, the most common being the use of a hot water bottle [14]. Despite many studies, dysmenorrhea is still the centre of interest to scientists, gynecologists, and especially patients. Therefore, the aim of the study was the impact of heat therapy using medicinal peat, hot water bottle and cherry pits on the quality of life of young women with dysmenorrhea.

MATERIALS AND METHODS

The study involved 30 women aged 18–34 (median: 22.50 years, first quartile: 21.00 years, and third quartile: 23.75

years). The mean menstrual cycle ranged from 21 to 35 days, and duration of bleeding from 2 to 8 days. Only one subject had given birth, and one was using hormonal contraceptives.

The inclusion criteria were females aged 18–40 who reported lower abdominal and/or lumbar pain during menstruation, regular menstrual cycle (ranging from 21–35 days), nulliparous or multiparous. The exclusion criteria were irregular menstrual cycles (lasting less than 21 or more than 35 days), irregular pain (not occurring in every cycle), diagnosed gynecological pathology (i.e., endometriosis, adenomyosis, polycystic ovary syndrome and others), symptoms of infection (such as fever, cough, or runny nose), pregnancy and breastfeeding, chronic inflammation of the female genital organs, previous surgery in the pelvis, and current contraindications to local heat therapy (hypersensitivity to thermal stimuli, cryoglobulinemia, haemoglobinuria, Raynaud's disease, malignancy, severe heart and circulatory system diseases, sensory disorders, paresthesia, trophic disorders, polyneuropathy, active pulmonary tuberculosis, atherosclerosis, states of cachexia).

The young women with dysmenorrhea were recruited using social media and were randomly assigned to 3 groups using the Random Number Generator Plus app. Group 1 used a plaster with therapeutic mud (Fig. 1A), Group 2, used a hot water bottle (Fig. 1B), and Group 3 used a hot bag with cherry pits (Fig. 1C).

Each of the woman with dysmenorrhea had their anthropometric measurements taken using the same scale. Height measurements were performed with an accuracy of 0.005 m, and body weight measurements with an accuracy of 0.1 kg. The body mass index (BMI) was calculated according to the formula: $BMI = \text{body weight}/\text{height}^2$ [kg/m²]. The Tanita SC-240 foot-to-foot body composition analyzer (Tanita Cooperation, Tokyo, Japan) was used to assess bioelectrical impedance. Measurements were collected at 50 Hz using the standard setting after manually imputing the measured gender, age, and height of the patient. The women wore minimal clothing, were barefoot, and were instructed to standstill with their feet in direct contact with all 4 metal plates.

Basic data was collected from the subjects using a questionnaire with 27 questions, based on other studies [2, 15]. In addition to information such as age, place of residence, and education, there were also questions about the women's physical activity, diet, taken medications and supplements. The next part of the survey concerned menstruation and included questions about hormonal contraception, age at first menstruation, mean length of the menstrual cycle, and mean duration of bleeding. The following questions concerned pain: when it occurs, how long it lasts, how young women deal with pain, and what other ailments (besides pain) they experience before/and during menstruation. This section also included a visual analogue scale (VAS) [16]. Using a scale from 0 to 10, on which 0 = no pain and 10 = the most intense pain, the women were asked to indicate the extent to which they experience pain in the lower abdomen and lumbar

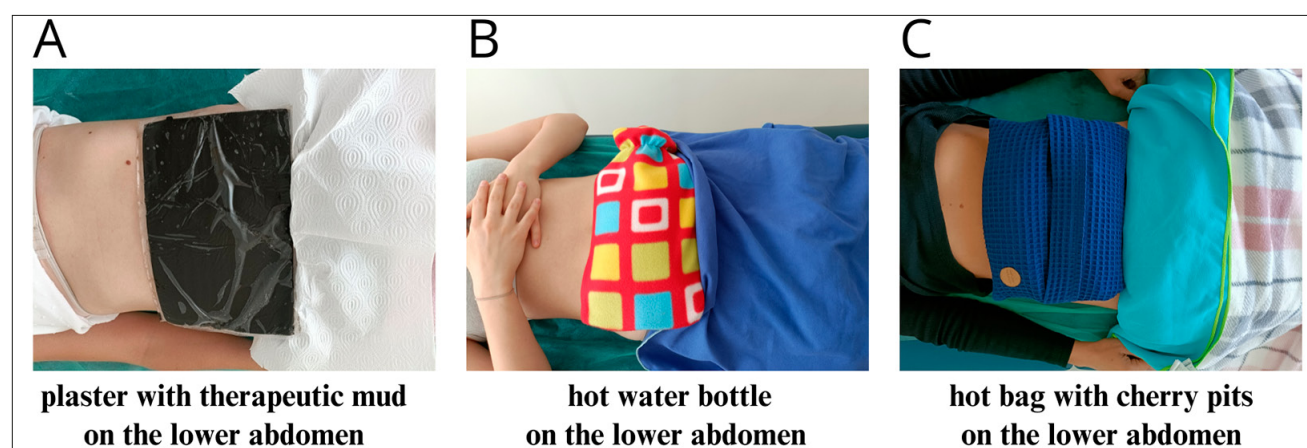


Figure 1 A, B, C. Women with dysmenorrhea using various forms of heat therapy

spine during menstruation. The quality of life of women with dysmenorrhea was assessed using a 5-point Likert scale [17].

The intervention with the use of various forms of heat therapy for young women with dysmenorrhea was conducted as follows: analysis of the preliminary questionnaire by a physiotherapist who allowed the determination of the area of heat therapy, which included the lower abdomen or lumbar spine (depending on where the women experienced more pain on the VAS scale during menstruation). Once a woman was qualified for the study, body composition analysis was measured. The woman's body area was then examined for local contraindications to heat therapy. The heat sources were prepared according to the manufacturer's recommendations. Therapeutic mud plaster: immersion in 40°C water for 15 minutes. Hot water bottle: filling the hot water bottle with 50°C water to $\frac{3}{4}$ of its capacity. Hot bag with cherry pits: heating the insert in a 600W microwave for 3 minutes. Subsequently, the heat source was placed on the treatment area (lower abdomen or lumbar spine) and covered with a blanket (Fig. 1). The woman remained in this position for 20 minutes. After this time, the heat source was removed, and the woman rested under the blanket for a further 15 minutes. The trial consisted of 3 treatments administered on 3 consecutive days, 3–5 days before the expected menstruation.

After completing the treatment cycle, the women were provided with a heat source for their own use. Women with dysmenorrhea completed the final survey after 3 days of heat therapy and menstruation. Comparison of responses allowed analysis of the difference in severity of pain, women's well-being, and other complaints during dysmenorrhea after heat therapy. Figure 2 presents the flow-chart of the study.

Statistical analysis. Statistical analysis was performed using the functions and procedures of the R package [18]. Median, first and third quartiles characterized the distributions of quantitative variables. In the case of qualitative variables, the basic statistics in the collected research material was the number of elements related to a given category. The Shapiro-Wilk test was used to test the hypothesis that the quantitative data came from a population with a normal distribution. Samples with related quantitative values were compared using the Wilcoxon signed rank exact test. The non-parametric Kruskal-Wallis test was used if more than 2 samples were compared. Fisher's exact test for count data was used to determine whether there was a significant difference

between observed and expected frequencies in the designated categorical variables. The Cochran-Mantel-Haenszel test was also used to examine the relation between 2 binary variables, while controlling for a third nominal confounding variable. The significance level was set at $\alpha = 0.05$.

RESULTS

Sociodemographic factors of the examined women with dysmenorrhea. The study involved 30 women experiencing dysmenorrhea. A preliminary survey revealed that 66.7% of the women lived in cities with populations exceeding 100 000, and 63.3% had had a high school education (Fig. 3A). It was also found that 63.3% of the women had chronic diseases,

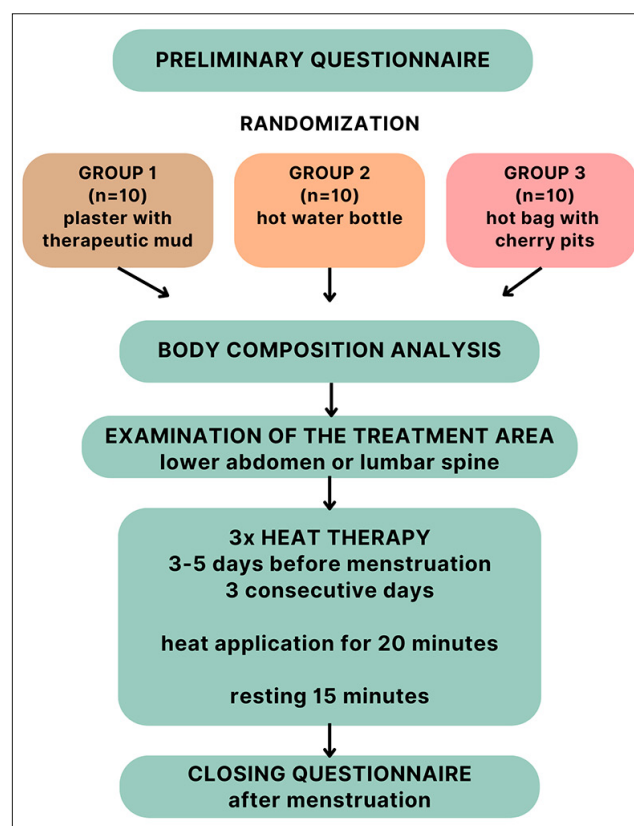


Figure 2. Recruitment process and procedures regarding various forms of heat therapy in young women with dysmenorrhea

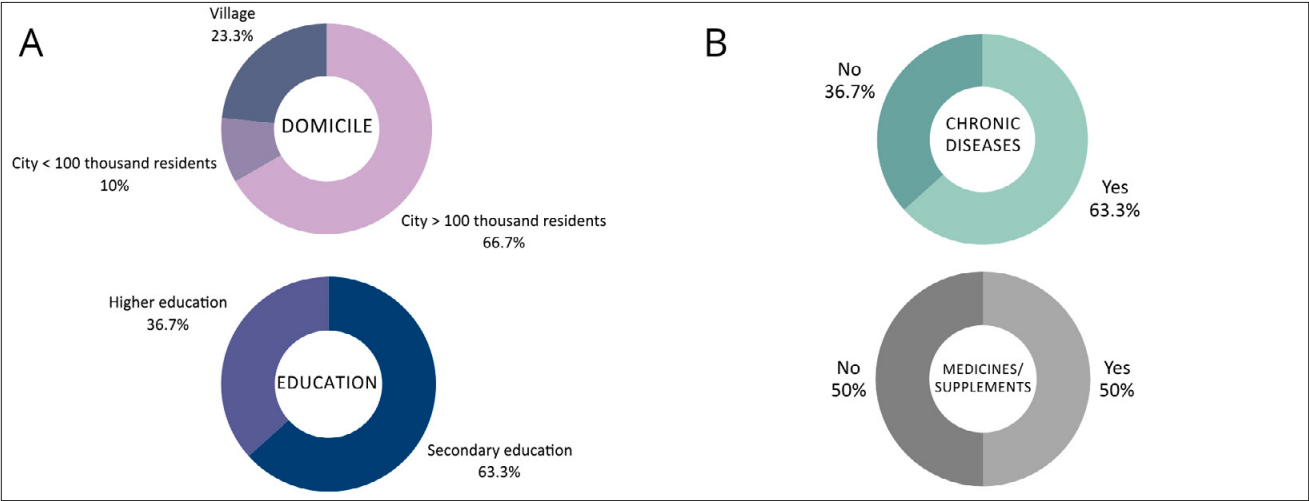


Figure 3. Domicile and education among women with dysmenorrhea (A), Chronic diseases and medicines/supplements among women with dysmenorrhea (B)

with thyroid diseases, such as hypothyroidism or Hashimoto’s disease, and bronchial asthma being predominant (Fig. 3B). Fifty percent of the women reported taking medication and/or dietary supplements (Fig. 3B). The medications taken were related to the afore-mentioned conditions. The most common supplements were vitamin D, B vitamins, and iron. Additionally, 13.3% of the women experiencing dysmenorrhea reported adhering to a vegetarian diet.

Using the Fisher test, it was found that there was no relation between the type of therapy used in women with dysmenorrhea and the place of residence (p-value=0.325). There was also no relation between the type of therapy used and the level of education (p-value=0.709) (Tab. 1).

Table 1. Contingency tables for place of residence and level of education among women with dysmenorrhea

	Group 1 plaster with therapeutic mud (n=10)	Group 2 hot water bottle (n=10)	Group 3 hot bag with cherry pits (n=10)	Fisher test p-value
Village	2	1	4	0.325
City < 100 000	0	2	7	
City > 100 000	8	5	4	
Secondary education	7	7	5	0.709
Higher education	3	3	5	

Moreover, according to the survey, 26 (87%) women with dysmenorrhea engaged in physical activity. However, 16 (53.3%) women said that they exercise 1–3 times a week, 10 (33.3%) women exercise more than 3 times a week, and 4 (13.3%) women did not engage in any activity. The most popular activities were weight training, yoga, walking and dancing, such as Zumba. Other activities mentioned were also cycling, stretching, swimming and running.

Characteristics of the 3 study groups of young women with dysmenorrhea. There were no differences detected between the examined women with dysmenorrhea who received different types of heat therapy in terms of age, height, BMI, BMR, Fat mass, FFM, TBW, or age of menarche (Tab. 2).

Assessment of lower abdominal and lumbar pain in women with dysmenorrhea. The young women with dysmenorrhea showed changes in the perception of lower abdominal pain and lumbar pain post-heat therapy. On the basis of the VAS scale, a lower level of pain in the lumbar spine was detected post-mud therapy vs. pre-therapy. The result was statistically significant (p-value=0.013) (Fig. 4B). Moreover, young women with dysmenorrhea experienced significantly less lower abdominal pain (VAS) post-hot bag with cherry pits treatment (p-value=0.006) (Fig. 4E).

Table 2. Characteristics of young women with dysmenorrhea

	Group 1 plaster with therapeutic mud (n=10)	Group 2 hot water bottle (n=10)	Group 3 hot bag with cherry pits (n=10)	Kruskal-Wallis p-value
Age (years)	22.5 (21; 23.8)	22 (20; 23)	22.5 (21; 23.8)	0.632
Height (cm)	168 (168; 170.5)	169 (165.2; 171.5)	168 (162; 170)	0.790
Weight (kg)	63.9 (56.4; 68.7)	62.4 (58.5; 69.8)	61.8 (55.7; 73)	0.929
BMI (kg/m2)	21.6 (19.7; 24.1)	22.3 (20.2; 23.5)	22.4 (19.8; 25.2)	0.938
BMR (kJ)	6071 (5855.8; 6262.2)	5893 (5687.2; 6410.8)	5799 (5535.8; 6723.8)	0.924
BMR (kcal)	1451 (1399.5; 1496.8)	1408.5 (1359.2; 1532.2)	1386 (1323; 1607)	0.924
Fat (%)	24.1 (18.9; 26.5)	27.4 (24.4; 29.2)	27.8 (23; 29.4)	0.264
Fat mass (kg)	15.6 (11; 17.8)	16.6 (14.8; 21)	17.2 (12.9; 21.4)	0.650
FFM (kg)	48.2 (46; 48.8)	46.1 (43.2; 50)	44.6 (42.9; 51.6)	0.780
TBW (%)	55.5 (54; 59.5)	53 (51.5; 55.8)	52.5 (52; 56.2)	0.299
Age at menarche	12.5 (12; 13.8)	12 (12; 13)	12 (11.1; 12.8)	0.376

BMI – Body Mass Index; BMR – Basal Metabolic Rate; FM – Fat Mass; FFM – Fat Free Mass; TBW – Total Body Water. Data are presented as median (first quartile; third quartile).

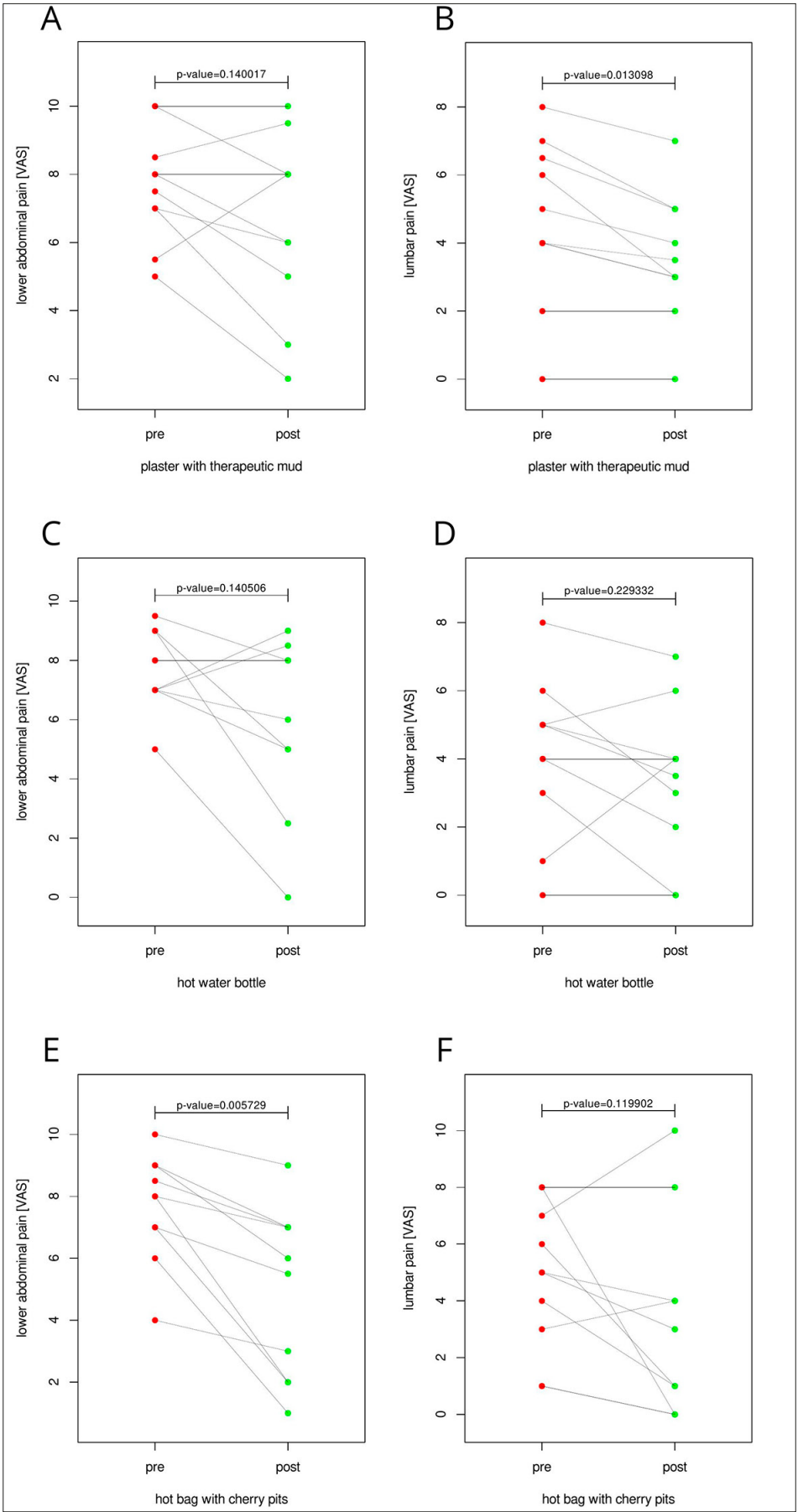


Figure 4 A-F. Lower abdominal and lumbar pain pre- and post-heat therapy among the 3 groups of women with dysmenorrhea

Pharmacological treatment in women with dysmenorrhea while using various forms of heat therapy. Women with dysmenorrhea during both pre- and post-therapy menstruation used various forms to relieve menstrual pain. Antispasmodics and painkillers were used as a pharmacological form of pain relief. The most commonly used medications were drotaverine, paracetamol, nimesulid and ibuprofen. There were no statistically significant differences in the frequency of use of antispasmodics (Cochran-Mantel-Haenszel test, p -value=0.448) and analgesics (Cochran-Mantel-Haenszel test, p -value=0.770) in women with dysmenorrhea when using different forms of heat therapy.

Impact of heat therapy on the quality of life among women with dysmenorrhea. Quality of life according to the Likert scale improved in 9 women in Group 1, 8 women in Group 2 and 7 women in Group 3. However, no statistical significance between groups was demonstrated (p -value=0.877).

Assessment of dysmenorrhea after completing heat therapy. In the closing questionnaire, the women with dysmenorrhea rated their menstruation after heat therapy from 'very mild' to 'very severe'. After heat therapy, as many as 40% of the women stated that their menstruation was medium, 13.3% stated that their menstruation was mild, and 36.7% stated that their menstruation was severe. However, extreme sensations, such as very severe and very mild menstruation, were reported by 6.7% and 3.3%, respectively. However, the obtained results were not statistically significant (p -value=0.899). Moreover, interestingly, 46.7% of women were satisfied with the therapy, but as many as 93.3% would like to continue heat therapy in the following months.

DISCUSSION

The study comprised 30 women with dysmenorrhea who were randomly assigned to one of 3 groups, each utilizing a different heat source: therapeutic mud plaster (Group 1), a hot water bottle (Group 2), or a hot bag with cherry pits (Group 3). After conducting the statistical analysis, no significant statistical differences were found between the groups in terms of height, weight, body mass index, basal metabolic rate, fat mass, fat free mass, and total body water. The majority of women had normal body weight. Another study has shown that BMI >18.5 and <25.0 categorizes women as 'at risk' of menstrual cycle irregularities or menstrual pain [19].

In the current study, no statistically significant differences were detected between groups at the age of menarche. However, a previous study by the authors showed that the age at menarche had a significant relationship with the occurrence of dysmenorrhea. As many as 48% of respondents had their first menstrual period at the age of ≤ 12 years [2].

The study shows that in everyday life, 87% of women with dysmenorrhea undertook various physical activities, the most popular included strength training, yoga, walking, and dancing, as well as cycling, stretching, swimming and running. Previous studies have shown that physical activity causes clinically significant reductions in menstrual pain [7, 8].

The effect of applying heat as an adjunct in relieving pain in dysmenorrhea was investigated in this study by using

questionnaires in which the women marked their lower abdominal and lumbar pain complaints. On a visual-analog VAS scale, the severity of menstrual pain after therapy was compared with previous cycles. There was a statistically significant reduction in the severity of lower abdominal pain in the group with the hot bag with cherry pits, and also a statistically significant reduction in the severity of lumbar pain in the group with the therapeutic mud plaster. The effectiveness of mud treatments in reducing the severity of pain in osteoarthritis has been confirmed [20]. However, its effectiveness in dysmenorrhea has not been proven in previous studies. A hot bag filled with cherry pits has its uses in pain relief, and works well as a non-pharmacological method of relieving labour pain [21].

Chaudhuri et al. compared the use of exercise and a hot water bottle in the management of dysmenorrhea. The intervention lasted 3 months, and the heat was applied to the lower abdomen for 15–20 minutes when pain occurred during the menstrual period. The study showed that a statistically significant difference was obtained on the VAS scale, where the hot water bottle showed better results in reducing pain, compared to exercise [14].

In other study conducted by Mori MM et al. was the evaluation of FIR technology applied to FIT® Lady patch thought to be used to alleviate pain associated to dysmenorrhea. The FIT® Lady patch medical device (active patch) was evaluated in comparison with a placebo patch, in order to assess its action in reducing pain related to dysmenorrhea in 40 female patients. This study confirmed a good tolerability of the product, by demonstrating the ability to significantly reduce inconvenience and feeling of pain. The mineral that was responsible of the reflection activity (titanium dioxide), conveniently contained in a patch, was able to work without any active substances in contact with and absorbed from the skin [22].

In previous studies, the authors investigated the effectiveness of manual therapy in the treatment of dysmenorrhea [23, 24]. It has been shown that including physiotherapy as an additional method for treating patients with dysmenorrhea, aimed at decreasing pain, is an innovative and effective solution. Manual therapy had a similar effect on the severity of dysmenorrhea as Ibuprofen, but after manual therapy, unlike after Ibuprofen, fewer muscles with dysfunction were detected in patients with primary dysmenorrhea [24].

In the current study, women with dysmenorrhea were not restricted as to their ability to relieve pain during menstruation. This was due to the fact that the therapy was carried out within a single menstrual cycle. In addition, the heat therapy was performed a few days before menstruation, with no recommendation to use heat during menstruation, so the subjects would have been left without the ability to relieve pain during menstruation. Questions about relief from menstrual pain were included in both the pre- and post-questionnaires in order to be able to compare how a woman with dysmenorrhea managed her pain before and after therapy.

Another important indicator is quality of life, which can be significantly reduced during dysmenorrhea [2, 5]. Using several questions relating to the impact of pain during menstruation on aspects such as physical activity, feelings of attractiveness, fulfillment of household duties, participation in social life or feelings of depression, quality of life was assessed using a 5-point Likert scale, both in pre-therapy

cycles and during menstruation after therapy. It was shown that quality of life improved in each group. This aspect was probably related to a reduction in the severity of pain and a decrease in the frequency of other discomforts during menstruation. It may also have been influenced by the fact that the women participating in the study were obliged to take a moment to rest, lie down and relax, which is often difficult to do in a busy daily life.

Furthermore, as many as 46% of the women in the study, rated themselves as unequivocally satisfied with the heat therapy. Moreover, interestingly, as many as 93.3% of young women with dysmenorrhea would like to continue heat therapy in the following months.

By maintaining contact with females with dysmenorrhea participating in this study, it was confirmed that they willingly use the hot water bottles provided, and the women in the therapeutic mud plaster group had the opportunity to discover a new, previously unknown source of heat. This shows that the field, although increasingly popular, needs much more publicity so that women know that there are many ways in which they themselves can administer relief from the pain of dysmenorrhea.

CONCLUSIONS

It is recommended that heat therapy used a few days before menstruation can reduce dysmenorrhea and may be a good complement to pharmacological treatment. Further research is needed on larger numbers of women with dysmenorrhea, as well as studies of heat therapy over several menstrual cycles.

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