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Thermotherapy for relieving dysmenorrhea in girls – a pilot study

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SUMMARY

Introduction. Dysmenorrhea (painful menstruation) is a significant gynecological problem in girls and young women. The recommended second-line treatment includes acupuncture and hot compresses. Moreover, the World Health Organization classifies dysmenorrhea to conditions that can be effectively treated by acupuncture as proven in controlled clinical trials. This publication presents a study design that combines elements of acupuncture and thermotherapy, in which acupuncture points are stimulated with heat. Such a procedure can be called point thermotherapy (moxibustion).
Aim. The aim of the study was to evaluate the influence of moxibustion on relieving symptoms associated with painful menstruation in girls and young women aged 16–20 years.
Materials and methods. The study group included 15 participants. Four acupoints used in the study were heated with moxa in the form of smokeless cigar-shaped sticks, 12 cm long and 1.5 cm in diameter. The sticks were placed 2–5 cm over the skin of the heated site (depending on individual heat perception). The points were heated until the participant reported an evident heat stimulus. Each treatment lasted approximately 30 minutes. It was touchless and painless. The patient felt only warmth in heated sites. Each participant underwent 3 treatments over a period of 2 weeks.
Results. The research shows that moxibustion considerably reduces symptoms associated with dysmenorrhea, such as headache, backache, nausea, nervousness and mood swings. The implemented therapy significantly improved sleep quality and appetite of the participants as well as self-esteem of girls and young women suffering from painful menstruation.
Conclusions. Heating acupoints has led to positive changes in the participants' quality of life and has significantly improved physical functioning, limitations associated with the physical condition, general well-being and mental health.
Key words: dysmenorrhea; acupoints; thermal stimulation; acupuncture

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INTRODUCTION

Dysmenorrhea (painful menstruation) is a significant gynecological problem in girls and young women. It concerns 30–70% of adolescent girls and women aged 16–20 [1]. Painful menstruation can be divided based on its etiology into primary and secondary. Primary dysmenorrhea is defined as pelvic pain that appears during menstruation without any concomitant pathology within the pelvis. This type constitutes 90% of all cases of painful menstruation. Secondary dysmenorrhea accounts for only 10% of cases and coexists with a pathology in the small pelvis [2]. Primary dysmenorrhea is caused by a smooth muscle and vascular contraction that lowers the pain threshold and induces ischemia of the myometrium. It has been shown that the main risk factors that increase the frequency and severity of menstrual pain are: age (below 20 years), weight loss, anxiety disorder, mood disorder, disorders in social relationships, stress, early menarche, long and heavy menstruation, no pregnancies and childbirths, tobacco use, alcohol consumption and low level of physical activity [1,4]. Secondary causes of painful menstruation include: endometriosis, pelvic inflammatory disease, congenital anomalies of the Müllerian ducts, pelvic adhesions, lesions in the uterine adnexa, sexually transmitted diseases and ectopic pregnancy [1].

First-line treatment of primary dysmenorrhea involves certain non-steroidal anti-inflammatory drugs (NSAIDs) and two-component contraceptive pills. Second line-treatment consists in alternative methods, surgery and supplementation of first-line treatment (vitamins and dietary supplements). Alternative therapies include acupuncture and hot compresses with a temperature of 39°C [2].

The World Health Organization (WHO) has classified primary dysmenorrhea to conditions

that can be effectively treated by acupuncture, as proven in controlled clinical trials [5]. In its publication, the WHO uses the term *acupuncture* in a broader sense encompassing all traditional methods involving stimulation of acupressure points, called acupoints, also with heat [5]. This publication presents a study design that combines the elements of acupuncture and thermotherapy, since acupuncture points used in the study were stimulated with heat. Such a procedure can be called *point thermotherapy*.

Heating acupressure points using adequate preparations and agents is a commonly used technique in eastern medicine. It is referred to as *moxibustion*. This type of treatment has been used for prevention and therapy of diseases for over 2,500 years [6,7]. An analysis of available studies published in 1954–2007 in China has revealed that heating acupoints can be effectively used in 364 different diseases. Dysmenorrhea is one of them [8].

Moxibustion is divided into traditional, nature and contemporary [6]. Traditional moxibustion is the most common technique in which the moxibustion material is mugwort (moxa), i.e. specially prepared *Artemisia argyi*. Traditional moxibustion can be further subdivided into direct (the material remains in direct contact with the skin) and indirect (the material is placed at a certain distance from the skin). The nature technique uses irritant material (e.g. garlic or semen sinapis) for local flushing of the skin. Contemporary moxibustion makes use of microwaves, laser and electrothermal moxibustion to achieve therapeutic effects [6]. The term *moxibustion* usually denotes the traditional technique [6] and it is also used in this sense in the present study design.

Moxibustion exerts a triple effect on tissues: thermal effect, radiation effect and pharmacological effect [6]. This therapy constricts blood vessels within the heated point and, at the same time, dilates vessels around it. It also increases peripheral arterial blood circulation and capillary permeability. The burning moxa emits visible light and infrared radiation. That is why, next to the heat effects, moxibustion efficacy also depends on nonthermal action. Thermal effects are a consequence of electromagnetic waves – the human body absorbs energy from infrared radiation and transforms it into heat. As a result, circulation as well as cellular and enzymatic activity are enhanced. The nonthermal effect is a result of interactions between electromagnetic waves and the human organism. Near infrared radiation (NIR) penetrates the skin to the depth of approximately 10 mm. It reaches tissues where it is absorbed. NIR is absorbed by the connective tissue, blood vessels, lymphatic vessels and nerves. In these tissues, it induces active substances, which are then distributed to other parts of the body with the blood circulation, thus enhancing the metabolism and thermogenesis of organs they reach. NIR can also promote cellular metabolism thanks to energy generated by the photoelectric effect and photochemical processes [6].

The pharmacological action of moxibustion is associated with the material used, i.e. moxa (*Artemisia argyi*). It contains essential oils that relax the airway smooth muscles, relieve cough and have an expectorant as well as antioxidant activity. The smoke of moxa has antiviral and antifungal properties [6]. Research studies indicate that no other heat stimulation has moxibustion properties [6].

AIM

The aim of the study was to evaluate the influence of moxibustion on relieving symptoms associated with painful menstruation in girls and young women aged 16–20 years.

MATERIAL AND METHODS

The study was approved by the Ethics Committee of the Medical University of Silesia in Katowice by virtue of Resolution No KNW/0022/KB1/57/I/14 of September 30 2014.

The study included patients who reported to the Clinic of Gynecology or Pediatric Gynecology of the "SIGNUM" Medical Center in Katowice and to a Physiotherapy Clinic Qimed.com in Katowice. All participants were informed about the aim of the study and its procedures. All patients expressed written consent to procedures envisaged in the study protocol; in underage patients, the consent was obtained also from their legal guardians. The study included girls or young women aged 16–20 years with diagnosed dysmenorrhea. Young women expressed consent to participate, and in the case of underage participants, additional consent was obtained from their legal guardians. General medical and gynecological history, including menstrual cycle assessment, was collected from each candidate. This was conducted by a specialist in gynecology who recruited patients to the study. Patients with systemic diseases and those who used pharmacotherapy (such as hormonal drugs, contraceptives or

NSAIDs) within 6 months before the study were excluded.

The participants filled in questionnaires directly before the first treatment, after the final treatment and three months later. The questionnaires asked about the degree of pain during menstruation and other symptoms, such as nausea, appetite, fatigue, diarrhea, headache, quality of sleep, back pain, nervousness, mood swings and dizziness. Each of these symptoms was assessed on a visual analogue scale (VAS) from 0 to 100. The range was divided into four zones: green (0–25 points), yellow (25–50), orange (50–75) and red (75–100). Explanations concerning the meaning of 0 and 100 were provided on each scale. The color and description indicated that values nearer the 0 value were more positive (e.g. no pain) whereas those nearing 100 were the most negative (the worst imaginable pain). Moreover, the quality of life, level of anxiety and depression and participants' self-esteem were also evaluated.

All procedures were conducted free of charge. Four acupoints were used in the study: *Guanyuan* (CV4), *Sanyinjiao* (SP6), *Taichong* (LR3) and *Taixi* (KI3). These points were selected on the basis of available literature reports that have proven their efficacy in dysmenorrhea therapy and relief of its accompanying symptoms [9–16]. The acupoints were heated with moxa in the form of smokeless cigar-shaped sticks, 12 cm long and 1.5 cm in diameter. The sticks were placed 2–5 cm over the skin of the heated site (depending on individual heat perception). The points were heated until the participant reported an evident heat stimulus. Each treatment lasted approximately 30 minutes. It was touchless and painless. The patients felt only warmth in heated sites. Each participant underwent 3 treatments over a period of 2 weeks.

The assessment of study results included severity of pain during menstruation (as measured on the visual analogue scale from 0 to 100, where 0=no pain and 100= the worst imaginable pain) and the degree of coexisting symptoms, such as nausea, appetite, fatigue, diarrhea, headache, sleep, backache, nervousness, mood swings and dizziness. Each of these symptoms was assessed on a visual analogue scale (VAS) from 0 to 100: nausea (0=no nausea, 100=the worst imaginable nausea); appetite (0=good appetite, 100=complete loss of appetite); fatigue (0=no fatigue, 100=the worst imaginable fatigue); diarrhea (0=no diarrhea, 100=constant diarrhea); headache (0=no headache, 100=the worst imaginable headache); sleep (0=ideal sleep; 100=complete lack of sleep); back pain (0=no pain, 100=the worst imaginable pain); nervousness (0=completely relaxed, 100=the worst imaginable nervousness); mood swings (0=no mood swings, 100=constant mood swings); dizziness (0=no dizziness, 100=constant dizziness). The quality of life assessment was made using a Short Form-36 (SF-36) questionnaire, the severity of anxiety and depression was measured on the Hospital Anxiety and Depression Scale (HADS), and self-esteem – on the Rosenberg Self-Esteem Scale.

Statistical data were prepared in the Statistica PL system. The results were considered statistically significant at the significance level of $p \geq 0.05$. The data were statistically analyzed using the analysis of variance (ANOVA) for repeated measures. The null hypothesis was verified with an F-test and a multiple comparison procedure, involving statistical significance of a dependent variable, was based on the Tukey test.

RESULTS

The study enrolled 15 girls and young women. All participants completed the study and filled in three assessment questionnaires. The mean age of the patients was 18.07±1.71, and most of them came from cities of over 100 thousand inhabitants (73.33%). Most participants were physically active (86.67%) and had not initiated sexual activity (86.67%). The mean age of menarche was 12.53±0.74 and in over 53% of cases menstruations were painful from the very beginning.

Figure 1 presents average changes in dysmenorrhea symptoms after moxibustion treatments. All parameters improved. As for pelvic pain, a tendency for improvement was also noted (statistically insignificant, p=0.184903). The severity of additional symptoms improved considerably: headache (p=0.000075), mood swings (p=0.003426), nervousness (p=0.018362), back ache (p=0.000042), sleep quality (p=0.005361), appetite (p=0.001042) and nausea (p=0.001062).

Figure 2 presents post-intervention self-esteem that improved considerably (p=0.024836), whilst changes in the level of anxiety and depression were not statistically significant.

Figure 3 shows positive changes in the quality of life after moxibustion treatments. In certain aspects these changes were statistically significant: physical functioning (p=0.009863),

limitations due to physical health (p=0.028948), general well-being (p=0.001272) and mental health (p=0.0421330).

DISCUSSION

The results of this study show a positive influence of moxibustion on relieving symptoms associated with painful menstruation in girls and young women aged 16–20 years. The severity of headache, back pain, nausea, nervousness and mood swings reduced considerably after interventions while the quality of sleep and appetite improved markedly. These results are consistent with those obtained by other authors [9–16]. Research shows that thermal stimulation of acupoints brings positive effects in primary dysmenorrhea treatment. The study presented above has demonstrated that heating acupoints leads to positive changes in the quality of life and significantly improves physical functioning, limitations associated with the physical condition, general well-being and mental health.

A meta-analysis of studies on point therapies in dysmenorrhea treatment has revealed that non-invasive stimulation of acupoints (including moxibustion) is more effective than invasive stimulation (acupuncture, electroacupuncture). Moreover, undesirable effects (of which none was serious and which included bleeding, hematomas and pain at the site of puncture) were reported only during invasive stimulation, but were not observed during non-invasive treatments [13]. It can be therefore concluded that thermotherapy is an efficacious and safe alternative treatment for women with dysmenorrhea.

Moxibustion regulates endocrine secretion, e.g. estrogen, progesterone and prostaglandin levels. Research indicates that unregulated es-

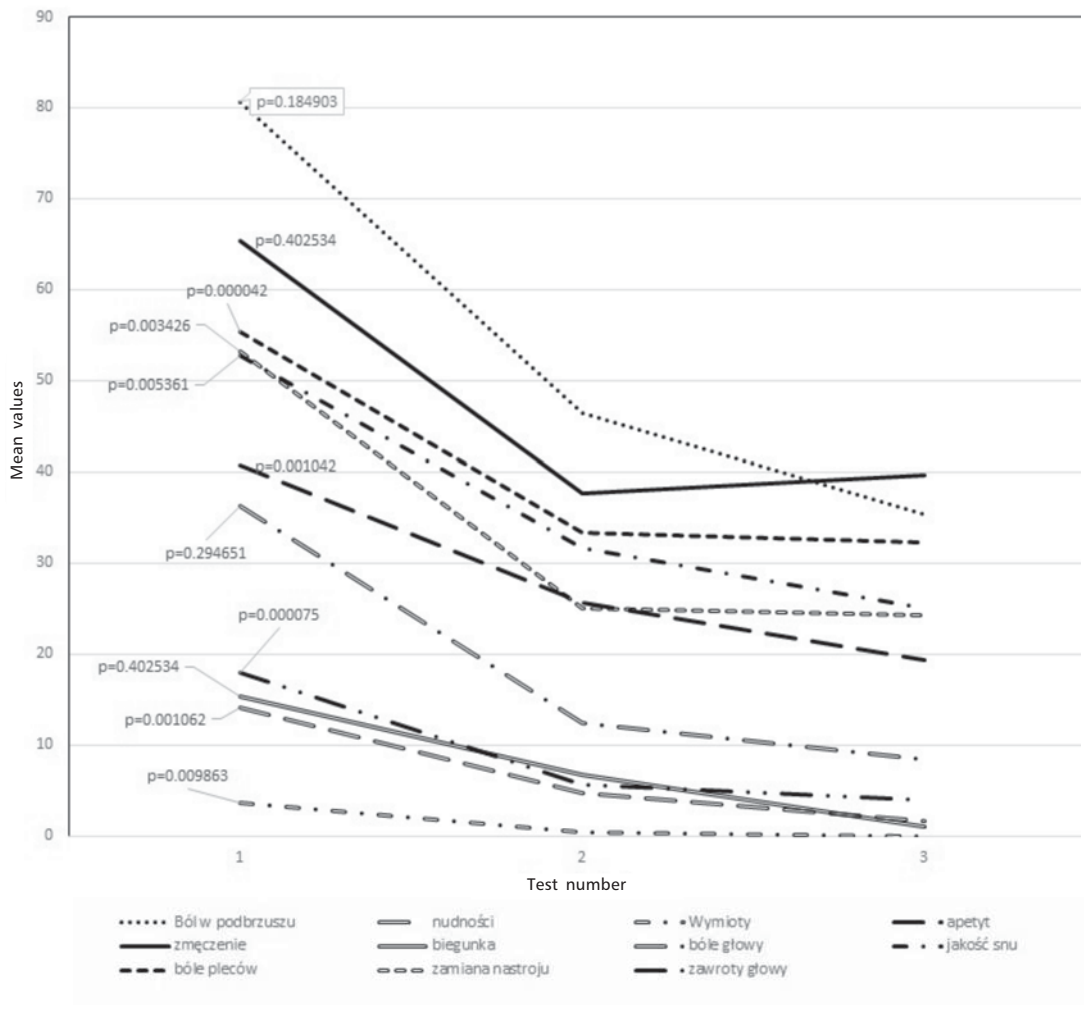

Fig. 1. Symptoms of dysmenorrhea

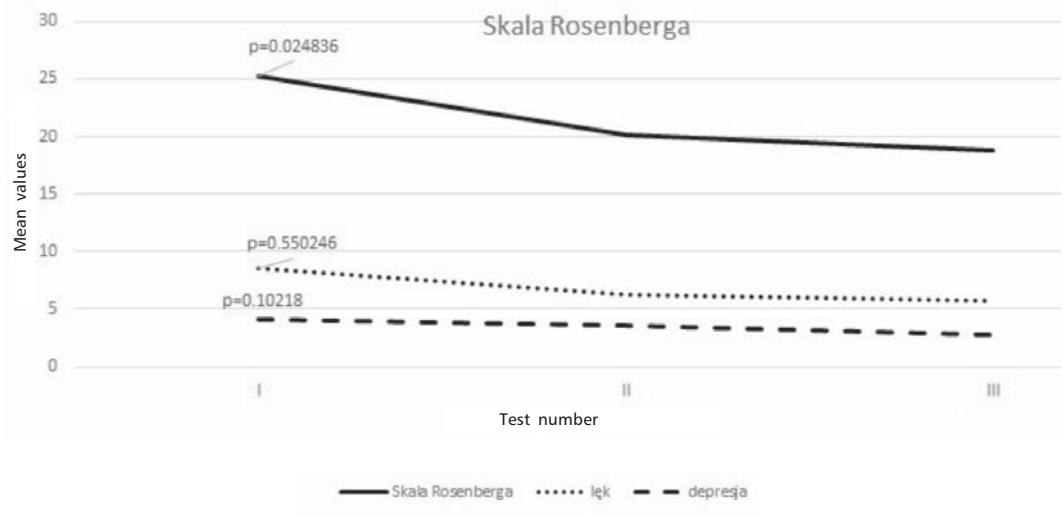

Fig. 2. Rosenberg scale

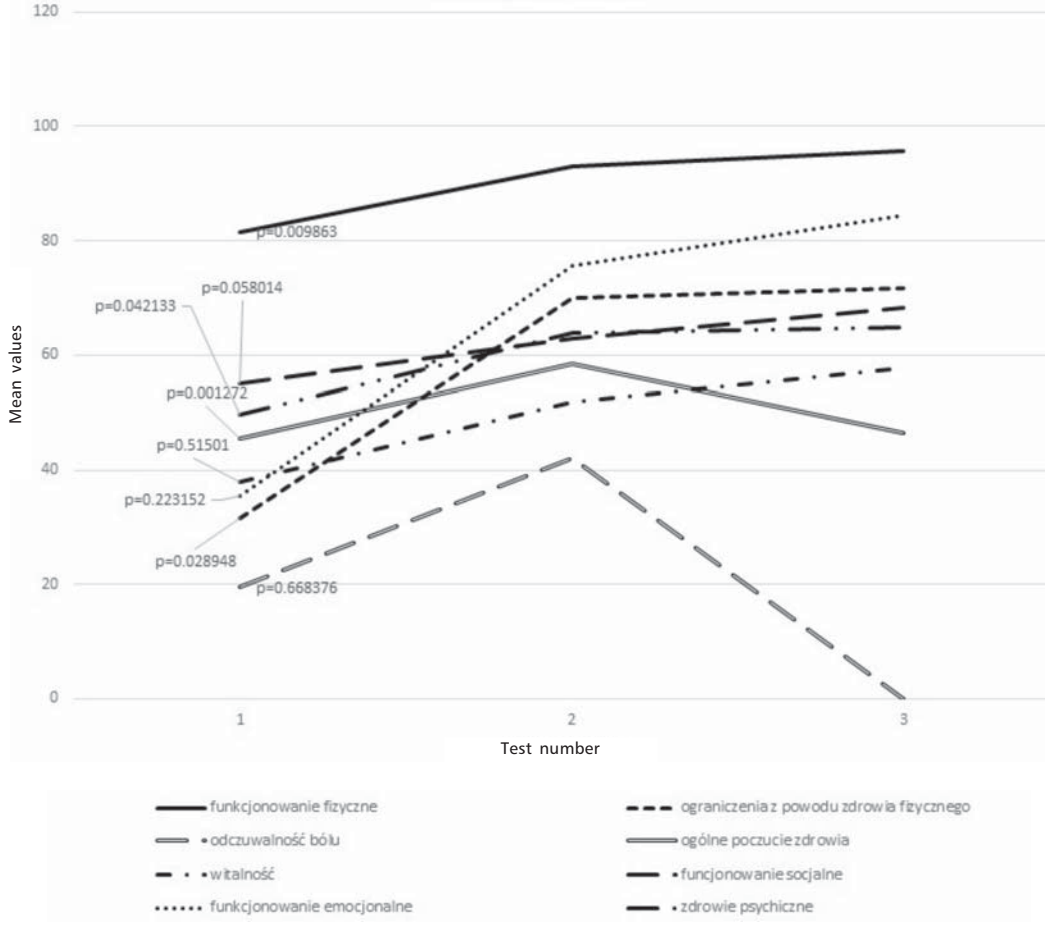

Fig. 3. Quality of life (SF-36)

trogen and progesterone levels as well as immune disorders can lead to excess prostaglandin production which, in turn, is considered a causative factor for uterine contraction in women with primary dysmenorrhea. Furthermore, the excess in prostaglandin levels induces hyperalgesia, vasoconstriction, ischemia and contraction of the myometrium as well as leads to gastrointestinal and cardiovascular symptoms [14].

The study described above has certain limitations. It was based on a low number of patients, there was no control group and evaluation based on self-assessment questionnaires was subjective.

CONCLUSIONS

The research shows that moxibustion considerably reduces symptoms associated with dysmenorrhea, such as headache, backache, nausea, nervousness and mood swings. The implemented therapy significantly improved sleep quality and appetite of the participants as well as self-esteem of girls and young women suffering from painful menstruation. Heating acupoints has led to positive changes in the participants' quality of life and significantly improved physical functioning, limitations associated with the physical condition, general well-being and mental health.

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