Complementary Therapies in Medicine 45 (2019) 280–288

Contents lists available at ScienceDirect

Complementary Therapies in Medicine

journal homepage: www.elsevier.com/locate/ctim

Personal perception and body awareness of dysmenorrhea and the effects of rhythmical massage therapy and heart rate variability biofeedback—A qualitative study in the context of a randomized controlled trail

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ARTICLE INFO

Keywords:
Dysmenorrhea
Women health
Qualitative research
Body-awareness
Inner body perception autonomic regulation
Rhythmical Massage according to Ita Wegman
Anthroposophic medicine
HRV-biofeedback

ABSTRACT

Objective: The purpose was to involve women's personal experiences of daily life with primary dysmenorrhea (PD) and their body perceptions of the dysmenorrhea-related symptoms in relation to the treatment procedure and to explore the perception of Heart Rate Variability Biofeedback (HRV-BF) or Rhythmical Massage (RM) according to Ita Wegman as a therapeutic intervention within the framework of Anthroposophic Medicine (AM).
Design: From 60 women who participated in our randomized controlled trial analyzing the effects of HRV-BF or RM, we examined 14 women to get an in-depth understanding of this prevalent disease, using a qualitative design. The women drew their body image before and after the 3-month-intervention on body silhouette diagrams and described their body-perceptions. Semi-structured interviews were conducted and analyzed using content analysis.
Results: Women perceive dysmenorrhea as a disturbance of their daily lives. The body images showed the variations of experience, from misbalances of body perception to overwhelming attacks of pain hindering a normal life for several days per month. Perception of therapeutic interventions range from relaxing without effects on complaints to important changes and benefits on the physical, emotional, and/or social level. Both therapies can support stronger self-awareness through enabling a more differentiated sense of body-awareness, sometimes resulting in women experiencing fewer limitations in their daily lives. Effects may be influenced by the readiness to resonate with the therapeutic process. Qualitative interviews and body images can serve as tools to integrate individuality and help to integrate embodied more or less conscious aspects of complaints.
Conclusions: The body silhouette diagram could be used systematically to include reflections of embodiment in the therapeutic and research settings and help to diagnose in advance the ability of participants to resonate with interventions. RM and HRV-BF influence self-awareness and may enable salutogenic and self-management capacities. For more effective treatment it may be helpful to make treatment suggestions based on an integrative individual history that includes preferences, expectations and a body silhouette diagram.

1. Introduction

Dysmenorrhea is defined as intensive cramps in the lower abdomen related to the menstrual cycle, usually beginning a few hours before menstruation starts and lasting for 48–72 hours. The symptoms range from pain and cramps in the lower abdomen to circulatory collapse and unconsciousness. Although many women do not talk about their symptoms, studies show high prevalence between 20–90% of women suffering from dysmenorrhea.[1] In a WHO-review from 2006 the prevalence reported in the USA was around 70–80%, whereas in Europe we only find 26% in a large Finnish trial.[2] Although premenstrual symptoms (PMS) and dysmenorrhea have been regarded as separate identities, their co-existence has been highlighted.[3] The Australian Longitudinal Study of Women's health (ALSWH), a cross sectional survey of 7427 women aged 34–39 years reported a prevalence of 24.1% women with serious period pain, but 56.8% for cyclic premenstrual pain and discomfort (CPPD), a label used by the American Association of Woman's health, Obstetric and Neonatal Nurses for all

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https://doi.org/10.1016/j.ctim.2019.04.007
Received 31 March 2018; Received in revised form 12 April 2019; Accepted 12 April 2019
Available online 21 April 2019

changing symptoms of pains and discomfort during female cycle.[3] The ALSWH reported an overall prevalence of CPPD of 56.8% as a significant health issue of woman between 34 and 39 years, but commented this as an underestimation, as only severe levels of dysmenorrhea were recorded. Affected women additionally suffer from nausea, vomiting, diarrhea, fatigue and headache,[4] as well as depression and decreased concentration.[5] NSAIDs and oral contraceptives are established treatments for dysmenorrhea, but their inconsistent effectiveness and adverse effects call for further research and new treatment possibilities.[6] Many alternative treatments have been investigated and partially showed positive effects, especially acupuncture,[7–9] but also local heat application[11] and behavioral therapy.[10]Although different kinds of massages have been used. Rhythmical Massage (RM) as developed by Dr. Ita Wegman is an enhanced form of massage therapy based on Anthroposophic Medicine.[12]RM can result in an improvement of warmth distribution and regulation of the resting heart rate variability (HRV)[13] Chronic diseases such as musculoskeletal disorders and mental illness are indications where RM can reduce symptoms and improve quality of life. [12]HRV describes the changing time between one heartbeat (R-wave) and the next. This variability in heart rate enables the organism to adjust to its rapidly changing requirements. A rigid heart rate means low HRV; minimal stress can already overload the organism. Biofeedback training can increase HRV. A small HRV-biofeedback (HRV-BF) device called “Qiu” (Biosign GmbH, Ottenhofen, Germany) can indicate HRV by showing a green or red light, depending on the variability. By learning relaxed breathing of about 5–7 breaths per minute[14] including a feedback of the measured HRV parameters, it is possible to influence the HRV and inner tensions; blood pressure can be reduced[15,16] and asthma symptoms can be improved,[17,18] thus stress and pain can be alleviated.[19–21] An important step of therapy is to understand the patient’s perception of symptoms. Patients who choose Complementary and Alternative Medicine (CAM) wish to include not only medical symptoms. They wish to include physical, social, emotional, and maybe even spiritual levels into the treatment.[22]

In recent years awareness and scientific knowledge about embodiment and the close relation between body and self-awareness have increased. Body awareness as defined by Mehling et al. has been regarded as the most important common ground of mind-body therapies.[23] It is the subjective, phenomenological aspect of proprioception and introspections that enters conscious awareness and is modifiable by mental processes that include attention, interpretation, appraisal, beliefs, memories, conditioning, attitudes, and affects. Body image is essential to everyday life, because of its influence on motor function[24] and association with altered movement patterns.[25] For a few diseases, like chronic low back pain and anorexia, distortion of body images have been shown as relevant aspects of treatment concepts.[26] Whilst these distortions can be dramatic, they can be reversed. Therefore, drawing inner body perceptions into body silhouette diagrams can enhance patient’s body awareness and help to communicate inner perception.[27,28] Body images might support access to an imaginative perception of preconscious knowledge, as described in several ways by R. Steiner.[29] The purpose of this qualitative study was to learn about the individual participant’s perspective in describing the range of manifestations of dysmenorrhea and its impact on the daily lives of affected women. Based on this, individual experiences during therapy, and their subjective outcomes, were studied.

2. Methods

This qualitative study was conducted as part of a randomized controlled trial, submitted for publication elsewhere.[30]

2.1. The randomized controlled trial

We conducted a three-pronged, randomized, controlled clinical trial. The patients were randomized into one of two intervention groups (HRV-BF, RM) or the control group (CG) in which no intervention took place in the first three months. The subjects in the control group also received RM after the three-month observation period.

The primary endpoint of the study was the reduction of pain through RM or HRV-BF compared to the CG. Secondary outcome measures were the use of pain medication, time and frequency domain parameters of HRV and health status assessed with the questionnaire SF-12 (health survey, short form of SF-36). Logbooks (menstrual pain diaries) were handed out to the patients at the beginning of the trial with the request that the patients fill out the numeric rating scale for pain and intake of analgesics on a daily basis. During the study, the women either were treated once a week in the Filderklinik, an anthroposophic hospital in the southwest of Germany, with RM or practiced HRV-BF with a Qiu device for 15 min every day at home, concentrating only on their breathing. All participants suffered from unsuccessfully treated primary dysmenorrhea, confirmed by a gynecologist.

2.2. The qualitative study

We performed the qualitative study in two parts: The first part was realized parallel to the randomized controlled trial. The second part was realized one year after the intervention as a follow-up!

2.2.1. Sampling

First part: Out of the 60 women of childbearing age between 15 and 46 years who were enrolled in the randomized controlled trial, 14 were invited to take part in the qualitative study. To ensure a representative and heterogeneous group of subjects, we selected the patients according to the following sample criteria: age, number of pregnancies and improvement of symptoms through the treatments. We started with interviews and filled the sample allocation table until we collected 14 women fitting our requirements: Six women in the RM group, six in the HRV-BF group and two women in the CG.

Second part: We sent a letter to all women with open questions as a follow-up one year after the intervention.

2.3. Ethic approval

The University of Tuebingen’s Health Research Ethics Committee granted ethical approval (109/2012B01-2012/24/5). All data was anonymized. Each woman received an ID consisting of two letters and two numbers – for example LD10. An additional letter M (RM) or B (HRV-BF) or C (control) identified the group. Participants were only included if they had given informed consent to participate in this study, including interviews.

2.4. Data collection

2.4.1. Guideline based on face-to-face interviews

We chose a semi-structured interview to examine the physical, emotional, cognitive and social effects of menstrual pain on daily life and their changes through the interventions. The interview guide’s questions were developed based on current state of research, discussions with RM therapists, doctors and patients and were reviewed based on a sample interview (Table 1). The interview guide contained obligatory and optional questions, so that all subjects were processed and the interviewer could respond to each patient individually. The interviews lasted approximately 30 min.

2.4.2. Body images

In addition, the women were invited to draw their subjective body image before and after the three months of treatment in a body silhouette diagram.

Table 1
Interview guide.

Theme	Mandatory questions	Supplementary questions
Body image	-You painted your pain into the body silhouette. Please describe what you depicted and what it means.	- What do the colors stand for? - Please describe the quality of the pain. - How far do the paintings meet your body perception?
	-Please look now at the drawings from three months ago. How do you describe the difference between these pictures? -Please describe the pain and all the other symptoms from before the study started.	- why did you highlighted this area?
Physical changes	What kind of physical changes have you noticed in the last three months?	- How did the pain changed? (diary) - How did the other complaints changed? (circulation/ headache, backpain…) - In what way did the respiration changed?(deeper, calmer) - How did the tension in your body changed?
Body-perception	-Do you and how do you observe your body and the changes throughout the cycle? - What kind of changes did you noticed?	How do you perceive your body now in a diverent way? - How did the perception oft he body signals changed? - How do you describe your bodyperception? - Do you feel lighter, heavier, more relaxed, tighter…?
Emotional effects	How do you describe your mental condition and how did it changed?	- How did your stress and your inner tension changed?
Limitations in daily life, social effects	-How does the pain influences your everyday life and your personal environment: family, partner, sexuality? -How did it changed throughout the study?	- Do you think that you are burden the people around you because of your complaints?
Coping strategies	-What do you do to relieve your complaints? -How did this changed?	- How do you think does sport influences your complaints?
Perception of temperature	Please describe the distribution and regulation of your body warmth. How did this changed in the last three months?	- Do you often feel cold? In which areas oft he body? Where do you feel warm? - Do you feel a difference of your body warmth during the menstruation? - In which parts of your body did you feel the warmth after the massage therapy?
Cognitive aspects	- What do you think ist he cause of your strong pain? - Pain is a wrning signal of the body. What do you think does your body wants to tell you? -Where do you see a connection between dysmenorrhea and beeing a woman?	- How did your relation to your pain changed? - Are you seeing a sense in having dysmenorrhea?
Reflection	- How did you experienced the therapy? - How did you feel during the therapy? (physically and emotionally) - How did the interview helped you to reflect and understand your complaints, the therapy, your body awareness?	- What kind of contact did you have to alternative medicine untill now? - How do you describe the effectiveness of complementery medicine?

Table 2
Sample: ID (group:C = Control,M = Massage,B = Biofeedback/births).

Age in years	No pain release	slight improvement of pain	strong improvement of pain
16–25	ML23(B/0)	RH28(B/0) DS24(M/0)	FP06(M/1) RD07(B/0) RS15(M/0)
26–35	CW09(C/0) EK05(M/0)	DS02(B/0)	ML14(M/0)
36–47	GM22(C/1)	CK04(B/2)	LD10(B/2) DW11(M/0)

2.5. Data analysis

The interviews were audio-recorded, transcribed and analyzed with MAXQDA computer software. The analysis was performed using qualitative content analysis in accordance with P. Mayring.[31] The interview guide provided the basis for deductive categories. From the texts, further inductive categories emerged. By paraphrasing and interpreting, the text passages were then categorized. In order to review them, we worked through the material twice again. Subsequently, a description and representative quotes were compiled for each thesis. For the evaluation and analysis of the interviews, interdisciplinary interpretation groups were conducted to minimize the bias factors of participating individuals.

3. Results

3.1. Summary of the quantitative results

There was a significant reduction in pain under RM over time and compared to the control group ($p < .001$). The effect remained in the follow-up three months after the end of therapy. Under HRV-BF there was a marginally significant reduction in pain ($p = .052$). Painkiller intake was reduced in the Massage Group while it rose slightly in the other groups. In the Massage Group physical health status (SF-12 physical), in the Biofeedback Group mental health status (SF-12 mental) improved significantly, while there was no change in the control group. There were no significant changes in the HRV parameters.[30]

3.2. Participant characteristics

According to our sample criteria, we included the following patients into our sample: (Table 2) Most of the women participating in the study had a medium to high living and educational standard. They were largely interested in Integrative Medicine. Nevertheless, very different characteristics were found in the group concerning age, number of pregnancies and interest in their own body. Two women took the contraceptive pill and five had given birth. Their ages ranged from 16 to 46 years.

Table 3
Deductive and inductive categories and respective quotations.

Code	Citation
Pain	"It was as if there was a strong pulling up and down from within the lower abdomen (4.0) … as if the abdomen was so heavy (7.0), as if somehow there was something in it that didn't belong there." (M-EK05: 8) "And then the legs were especially quite painful and it actually went right into the feet." (B-RD07: 15)
Limitations in daily life	"When it starts, the pain builds up and it cramps more and more, and the point can come where the pain is so strong that I cannot move anymore, my cycle collapses, I feel like vomiting, I sweat, I'm cold, I shake and I can't speak." (K-ML14: 2) "(My girlfriend) (…) could not come to me, because that would not have brought anything. Since I lay around all my time in my bed and screamed (…) and there I could not catch much at school because I've always missed a few days. (B-RD07:37)
Body image	"So red and purple and black are for this - and in the image of the front this red and this blue in there show it like that - this red again is intense pain, which is pretty intense, and the blue in there centers it again in more detail. Yes, this strong pain that you can't just get rid of. The blue on the chest is more like it hurts, but is not as strong, which is more like a spreading pain that is not actually so precisely centered and feels now less strong than elsewhere. And yellow is this light, inaccurate … indefinable." (B-RH28: 6) "And here [in the diagram] you can see that it felt really like there was a ring (…) a ring, so to speak, all around the abdomen from the back that was stronger in the front and that, so to speak, came back around to the middle of the spine, which then, smaller, wrapped itself around the spine, but like it rayed from outside inwards." (B-DS02: 2)
Psychological dimension	"Yes, because I never know when it will start or how bad it will be, such uncertainty already compromises me … even if maybe one month is not so bad and I would have been able to do what I wanted, I'm already afraid of what might come and so I don't do anything at all." (K-ML14: 34)
Body warmth	"Around the kidney and hip area, that was actually always (…) cold, so I wear pure wool underwear three quarters of the year, still it was just always cold." (M-FP06: 15) "Um, yes, so I made another very interesting observation: there is always … about a week before the bleeding starts … two or three days when I get, ehm, crazy attacks of chills … I really have goose bumps all over my body, irrespective of the clothes I wear … it's always like that throughout the day (…) and that's totally uncomfortable … but I also know days, around ovulation I believe, when it is totally enjoyable because I am always warm (…) I then also get cold much less easily and the distribution of heat in my body is really good and balanced" (K-ML14: 46).
Rhythmical Massage	"At first I imagined something else, I thought that it would be kind of rhythmical and harder, like a regular massage, but it was more like stroking, I would say, and it was totally interesting … when my abdomen was massaged then my stomach started to gurgle and when my back was massaged my gut gurgled … hmm…and I found it impressive that by just a movement of the hands my pelvis could be moved back and forth, which was totally relaxing." (M-RS15: 88) "Then thoughts went through my head and then … that was very strange, I was kind of tired but wide awake in my head … And it depended on the circumstances, sometimes I was in a rather sad mood and then sometimes I was totally euphoric… You know, I can't really tell you now exactly how I felt, no idea." (M-RS15: 86)
HRV-Biofeedback	"So physically I realized that I relaxed. And afterwards I always noticed while documenting that I hardly really totally relax, hardly ever had no stress, but I noticed that during the breathing exercises I was more relaxed than otherwise ever during the day." (B-RH28: 73) "The adjustment went quite well and one simply became more aware of oneself - just in general, not just the breathing. And the breathing eventually became automatic, with the rhythm I found I did not have to pay attention to the indicator, which goes up and down, but that I had just gotten into the rhythm and then I could simply just feel myself, better perceive because of where it bothered me or how I gradually felt (…) In the beginning I just thought: That lasted forever! But in the end it was actually often feeling that it was over much too quickly." (B-DS02: 42, 44)
Change of Pain	"From cycle to cycle it got increasingly better. It is amazing, now, at the end of the study, I don´t have to take any pain medication. "(M-DW11: 2) "The pain is different, I think it is somehow more balanced now, than before. It is, I think, weaker, but all over. It was very strong just at specific places. Yes." (M-DS24: 10)
Change of Limitations in daily life	"I still feel something, but I am not so restricted any more. I can actually do everything normally, without taking medication. "(M-RS15:12) "… So before the three months of massage my menstruation was having a huge effect on me, causing me to just stay at home, and I missed a lot of what was going on at school, because I was always absent for a few days. And, now not at all, really. So I can do everything normal and … yes" (M-DR12: 3)
Change of body perception	"Through the massage… earlier the awareness of my body stopped here (points to hip), I didn´t really feel my legs. Through the massage I can now feel a lot more of my body and also the boundaries of my body are more present for me. "(M-FP06:10) "…. I have also very much noticed, that certain areas of my body have, when they had been touched, caused reactions, as it were. These reactions were at first incomprehensible to me. I had such a strong sense, as if somehow something was stored in body memory which was stirred by this form of therapy – which has then given me reason to want to continue working on it and somehow want to investigate what is going on " (ML14,15-19) „Yes, I have also drawn the body contours which I have left out (before) actually only because I did not have that feeling, so I missed before, it was just so floating so to speak and now actually … so through the massage is the same as before, but I do not have the feeling that I have not felt so consciously, I am doing much more now "(M-FP06: 10)
Change of body warmth	"… I had really warm feet, not only because of all the socks and wool, but properly from the inside. "(M-FP06: 17 see paining) "Yes … It was often quite cold and so and that is when I mostly noticed that I no longer get cold so quickly after the massage, so it lasted about two days until I was cold again, which was actually quite good. "(M-DS24 / 168-173) "The previous tendency towards hot feet changed to warmth spreading over the whole body. Even the kidney area, which is otherwise rather cool, feels more pleasant. So when I touch my kidney area I simply realize "okay, it's better" (…) now after the massage the warmth is much better distributed. "(M-DW11 / 406-418)
Emotional and social effects	"…there was this experience, that I had during the relaxation period after a massage, a spiritual experience, where an angel put a gift into my hands concerning the subject of healing… and of course there is this question… how I can integrate this impulse into my life. "(M-ML14: 36) "The pain increases) if I have a psychological problem, somehow, if I'm sad, or get disappointed, I don't know, when I'm alone I pay more attention to the pain and when I pay attention to the pain, then there's also more. I don't know, that's the way it is with me." (M-RS15: 70)

(*continued on next page*)

Table 3 (*continued*)

Code	Citation
Readiness for treatment	"I think I'm more someone for whom that isn't so important …I really don't concern myself with it. I don't know. There are … yes, there are many who can … who know exactly what kind of pain it is and why it comes and the allergies they have and what they will get … I don't know all that. It's just that … I'm not so interested in all that. It's strange really" (M-EK05: 83) "I believe that I previously already had, so I'd say, a relatively high level of reflection about my pain…and have for years actually very accurately, for example, observed my body and body changes during the cycle … and have a good perception of my body." (K-ML14: 62)

3.3. Themes

The deductive categories based on the interview guideline were: pain, limitations in daily life, body image, body heat, emotional and social effects, RM, HRV-BF, comparison between RM and HRV-BF. From the texts one relevant inductive category emerged: the readiness of women for therapy. (Quotations cited in Table 3).

3.3.1. Manifestations of dysmenorrhea

3.3.1.1. Pain. As a first step, we collected descriptions of all manifestations of dysmenorrhea experienced by the women. Pain perception differed. Some women described the pain as a strong contracting and cramping pain below the abdomen, while the abdomen also felt bloated. Other women had the feeling that their lower abdomen did not really belong to them. They described an imbalanced and selective body perception where they couldn´t really feel the boundaries of their hips and legs, which were often cold. Pain could also radiate into the legs and the lower back (M-EK05:8); (B-RD07:15).

3.3.1.2. Limitations in daily life. Autonomic imbalance can significantly restrict quality of life: Some women described hemodynamic collapse with weakness, vomiting and fainting. Such limitations to daily activities can result in strong handicaps leading to emotional problems. These complaints did not only appear during menstruation. Some women noticed changes of the body, like breast pain and emotional dysregulation, over the whole cycle (K-ML14: 2).

The women experienced a variation of cycle length and pain level from cycle to cycle. This makes the symptoms unpredictable, with the consequence that the women restrict themselves prophylactically in their daily activities. Some women are not able to pursue their daily tasks and have to stay at home for at least two or three days every cycle (B-RD07:37).

3.3.1.3. Body image. Drawing their own body image was quite unusual for the women to execute. Drawing allows the women to express their feelings. Even if for some women it was more difficult than for others to put what they sensed on paper, there was an overall accordance concerning the choices of colors. Red often represented the strongest pain, but for some women also warmth and anger. For some women nuances in pain intensity were represented by orange and yellow. Light colors were also used to visualize emotional symptoms, inner restlessness (ML14) and weakness. Black was used to intensify red. Green often represented pain release and improvement, lilac was associated with dull pain (B-RH28: 6); (B- 202 DS02: 2). When talking about emotions, body images could be used to initiate verbal reflections and counseling, facilitating the women's expression of their individual perceptions.

3.3.1.4. Psychological dimension. For fear of the possible pain, women felt paralyzed and limited in quality of life. This affective aspect might be responsible for the worsening of the physiological dimension of pain (K-ML14:34).

3.3.1.5. Body warmth. Body warmth was one of many factors changing throughout the cycle. Some women could feel this. Many women had cold hands and feet. Some women also described coldness in the kidney region, which was also recognized by the masseuses treating the women with dysmenorrhea (M-FP06: 15) (K-ML14: 46).

3.3.2. Effects of the treatments on dysmenorrhea

In a second step, the women described the effects of the treatments on their lives. Firstly, we will give a summary description of the different perceptions of the two treatments as experienced by the women. Then we will describe the results on the different dimensions. They show a very heterogeneous picture of the therapy's effects. For some women it was relaxing, but without any effect on their complaints, while other women described changes and benefits on the physical, emotional, and/or social level.

3.3.2.1. Rhythmical massage. Women described the RM mostly as a soft and beneficial touch, different to conventional massage. It can produce an intense feeling that some women had to get used to and only after a while sensitive areas could be touched, for example the lower abdomen. The whole body can be influenced by this massage (M-RS15: 88). Emotional reactions were also experienced. Women tended to calm down, concentrate on themselves and relax. Reactions would depend on the moods the women were in; long forgotten thoughts would come up, some described crying fits or trance states (M-RS15: 86).

3.3.2.2. HRV-Biofeedback. HRV-BF could calm them down, make one sleepy and relax the body. HRV-BF could improve body perception; many women realized how rarely they breathe deeply. The daily break could deepen the awareness of relaxation and this way improve the ability of participants to perceive disturbing influences and minimize stress (B-RH28: 73). Although 15 min is not long, some women found it difficult to find time for the breathing exercise. They often did it in bed before going to sleep. At the beginning, for many women, the 15 min felt very long. However, with time they got used to the rhythm (B-DS02: 42, 44).

3.3.2.3. Change of pain. The intensity of pain was most frequently described in the lower abdomen, which has the closest connection to the uterus and was thus affected the most by the interventions. The rigid menstrual cycle could be loosened up such that the intensity of pain fluctuated. For some women it got better every month (M-DW11: 2). For other women the radiation of pain in the back and the legs disappeared and a lighter pain remained only in the lower abdomen. For others the extent of pain stayed the same but was less intense and lasted a shorter period of time. Both were described as a release (M-DS24: 10).

3.3.2.4. Limitations in daily life. Women perceived a reduction in the limitations to daily activities and the need of pain medication. Some women felt more independent and relaxed. They needed fewer sickness leaves and took part in life more actively due to decreasing anxiousness concerning the duration and intensity of pain (M-RS15:12); (M-DR12: 3).

3.3.2.5. Change of body perception. The interventions enabled some women to sense their body in a more differentiated way. Through the improvement of their body perception, they could understand the

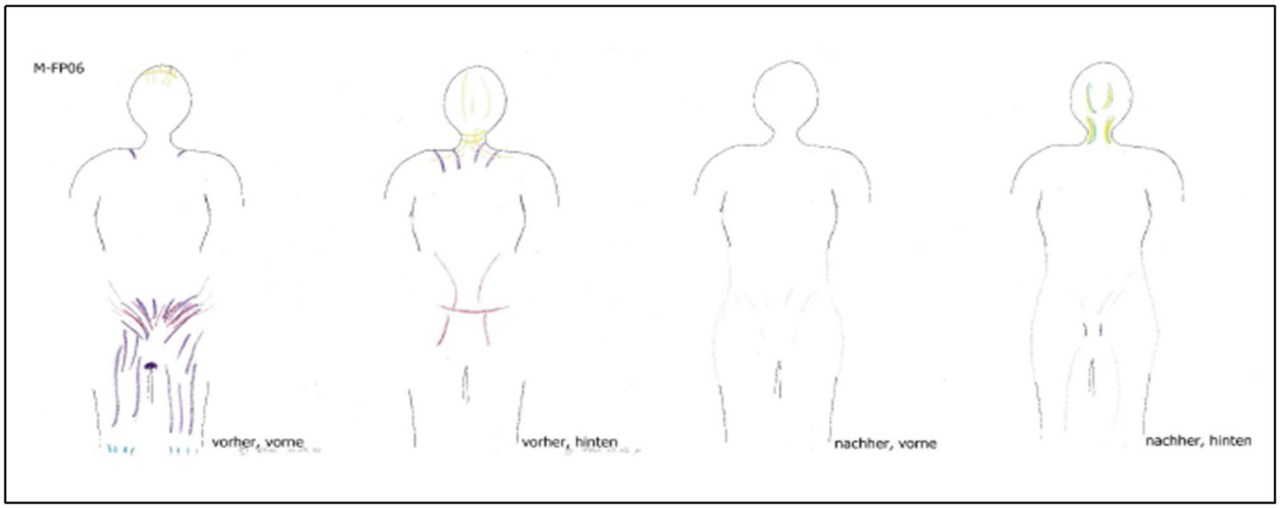

Fig. 1. Body Schema M-FP06.

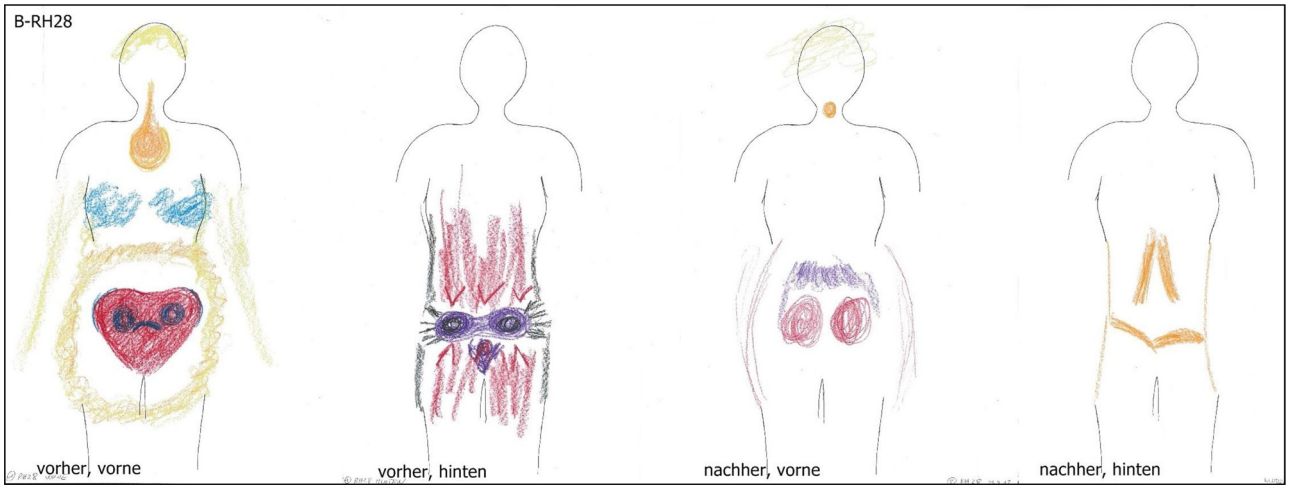

Fig. 2. Body Schema B-Rh 28.

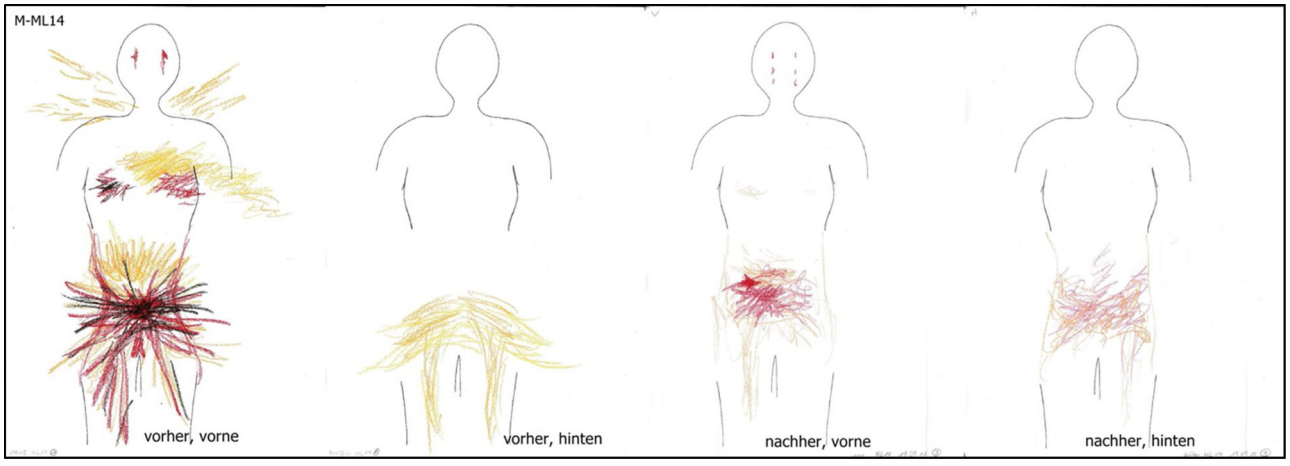

Fig. 3. M-ML14.

correlations between their symptoms and their cycle. Following this, they achieved higher self-acceptance. In addition, they could develop a better awareness of their needs and respond accordingly. Some women perceived the body to be greatly altered. Through the convulsions in the abdomen they described an inward contracting, thus a narrower body silhouette, but at the same time also the feeling of a pain that pushed outwards. A widened body silhouette has also been described, often linked to a feeling of puffiness (ML14:15-19); (M-FP06:10). Body drawings helped in perceiving and describing the changed body schema: The ability to recognize the body's limitations was reported as a changing aspect (Figs. 1–3). Other women found it difficult to draw their body boundaries.

3.3.2.6. Change of body warmth. The interventions could improve the dissemination and perception of body warmth. The lower part of the body, often described as cold, was in these cases better interfused with warmth. Participants reported different ways of perceiving changes in body warmth: they perceived their body as more complete, felt warm feet by thinking about the massage, and sweating in the relaxation period after the massage, or a more balanced body warmth from massage to massage. Despite the warmth, some women could be more sensitive to cold and were in need of a blanket (M-DS24/168–173); (M-DW11/406–418).

3.3.2.7. Emotional and social effects. In some cases, the intervention had emotional and social effects. It brought up feelings or thoughts of which the patients had not been aware. The therapy gave them the opportunity to work on themselves at an emotional level and to become aware of the ability to influences their feelings. Strong connections between life conditions, emotional wellbeing and the pain threshold were recognizable. Determining current social and emotional states can be important in evaluating influencing factors. Stress was described very often as a factor that exacerbated the pain (M-ML14: 36); (M-RS15: 70).

3.3.2.8. Readiness for treatment. The level of dealing with their problems was very diverse before the participation in the study. In the course of the study, two tendencies emerged which divided the women into two general groups. One group had never really dealt with their complaints. They had difficulties describing their symptoms and their body awareness was quite low. They wanted to be cured in a passive way without having to do anything themselves. They were happy to be in the RM group, where one just has to lie on the table. Interest in their own bodies and the changes they underwent throughout the cycle varied a lot from woman to woman (M-EK05: 83). The other group consisted of women who wanted to do something themselves for their healing. Some of them did yoga and it was easier for them to do the breathing exercises. Also during massage therapy, they had fewer problems relaxing. The women in this group tried more often to understand reason and influencing factors, and observed changes during their cycle. Women with a strong interest in their bodies observed the changes throughout their cycle and were able to describe their symptoms as very differentiated with possible interrelations (K-ML14: 62).

3.4. Results from the open questionnaires

The answers to the open questionnaires sent to all 60 patients one year after intervention revealed further aspects: 13 women sent their answers back and could be included in the analysis, seven of them belonging to the massage group, and six belonging to the HRV-BF group.

In both groups, some of the women reported general or specific improvements, while in the massage group a women reported, that a transforming processes could be initiated. Other women reported changes of menstruation cycles, no cramps anymore and the improvement of the ability to retain the body heat. Other enjoyed massage so, that they ordered massage treatment again. In the HRV-group women often reported no change of pains, but improvement of ability to define and control the pain (Table 4). On the other hand, women from both groups also reported no improvement, the same pain level and feeling disturbed by pain or even a worsening of pain complaints (Table 4). A detoriation of pain from 1 to 2 days per month on 3–4 days on month was reported by one woman.

4. Discussion and conclusion

4.1. Discussion

The aim of this qualitative study was to describe dysmenorrhea in all its manifestations and the impact of RM and HRV-BF on the women who participated in the study. The interviews show that next to physical symptoms, emotional wellbeing and quality of life are influenced by this disease and may be limited. So the complexity of complaints is comparable with the results of other qualitative studies in relation to PD [32] Nevertheless, in this study, effects of therapeutic intervention and reflective tools could be added. Study participants perceived changes of their complaints using RM and HRV-BF. They could improve body perception, which reduced discomforts. Thus, women where better enabled to deal with dysmenorrhea.

4.1.1. Comparison of RM and HRV-BF

The quantitative study shows that both therapies can influence pain levels and their related effects. However, both therapies did not seem to fit every woman. HRV-BF requires discipline and endurance for daily performance. During the RM the masseuse performs the treatment and some patients had difficulty finding their own active participation. However, RM can work as a gentle body therapy that helps being in touch with one's body without overstepping any limits experienced by some women. Whereas HRV-BF enables women to perceive pain differentially, RM could sometimes initiate emotional relief. Emotional relief is reported as a relevant outcome of massage and similar body intervention.[33] For some women it was very positive to experience such attention and affection. Bertram defines three typical patterns of patient-reaction to Rhythmic Embrocation (a simplified form of Rhythmical Massage according to the same principles): being uncaged – re-identifying – empowering. These patterns do not only lead to changes of physical parameters, but also suggest changes of autonomic, mental and spiritual dimensions. He proposes this pattern as an archetypical reaction to specific kinds of therapeutic touch.[34]However, since this pattern was found in only some of the participants of this study, this kind of method might not be fitting for everybody.

This therapy is dependent on a masseur, which may explain why, in some cases, the effects faded after the study.[30] HRV-BF can be performed at home and might help to induce relaxing breathing patterns in daily life, even without having to continue to use the feedback technique with the Qiu device. The initial effect was weaker, but lasted longer for some women who found it helpful. [35]

4.1.2. Body images as a reflective tool

Color-coding perception of dysmenorrhea on a body silhouette diagram to assess pain can help realize one's bodily needs and enables women to perceive and communicate the affective dimension of their pains. Alma Bucci,[36,37] who defined for her therapeutic processes three possible accesses (symbolic verbal, symbolic nonverbal and pre-symbiotic level), describes the connection between the three levels as a referential process in which images represent the role of the translation from the pre-symbiotic body level to the verbal level. Thus, body images help to become aware of the relationship between pain and the whole body. Body images allow improving the recognition of subtle body cues. However, not every woman showed an interest in improving body perception. A lack of interest seems to be related to a lack of confrontation with symptoms and no ability to listen to their bodies and be aware of personal needs.

4.1.3. Body warmth as important dimension of autonomic regulation

Body warmth has been discussed as an important dimension of autoregulation. In a small study of 11 participants, Waechli et al. could show in 2013 that RM led to an immediate increase in the patient's dorsal surface temperature, as well as increased HRV and sympathetic stimulation. In the long term, RM resulted in a progressive

Table 4
Follow up, one year later.

Inter-vention	Dimension of changes	Citation
Massage	Improvement: - Beginning of a deep process of transformation	"I am still immensely grateful that I was selected to participate in the study because it was the beginning of a rapid and profound change in my life. Very intensive processes were enabled and have been taken up by me in further therapeutic work, and all this has brought about and moves an infinite amount. It is particularly helpful for me that my body now feels like mine during menstruation, it is also my pain and / or my (circulatory) weakness and I can accept and even love that as part of my individual femininity. And the physical processes are now accessible again to medical measures, hot water bottle, rubbing with copper ointment and antispasmodic drops help! "(RH 28)
	Enjoyment of being touched	"… I've never felt so much affection, tenderness, and unconditional love before; from time to time, I still go to RM treatments and enjoy it a lot.(EG06) "I feel enabled and empowered to rest and to relax" (RH28) "I am better able to retrain the body heat" (RH28)
	No improvement of Pain, but sometimes improved management	"For me, nothing has changed in the menstrual pain." (EK05) "Unfortunately, the pain did not change for me. But I have the feeling that I can better define the pain and thereby control the pain better and handle it better." (DS24) "I` am still not able to work and to meet friends during menstruation" (RH28) "Unfortunately, I cannot say that today I still benefit from the therapy in terms of body sensation, heat regulation, etc., the massages were at the moment pleasant and relaxing. But it is something that affects one through another person and not like an exercise that you can learn and then continue at home."(GM22)
HRV-BF	Improvement of daily functioning	"I have learned that it is OK just to breathe and do nothing" "Pains perception is changing quite strongly, decrease of tension, feel more irritated and sensitive before" (DS02) The complaints the first two days are accompanied only with slight pulling. I used to have strong cramps.(CK04)
	No improvement	"Still menstrual pains, but improved ability to cope with the pains" (DS02) "More sensibility for emotions before the menstruation" (DS02) "I had the biofeedback; unfortunately it did not help, so we finally stopped it." (ML23) "The menstrual cramps have unfortunately become stronger, longer and more intense." (ML23)

improvement of warmth distribution and regulation of the resting HRV.[13] Only recently, we have started to understand the strong relation between body warmth and the feeling of social acceptance.[38] These results show the importance of body warmth for quality of life and might even influence one's own life processes. F. Edelhäuser could show that subjective body warmth perception can serve as an own dimension of health related quality of life.[30]

4.2. Limitations

The design of this qualitative study in combination with a randomized controlled trail was very complex. Apart from the treatments, the examinations, interviews and logbooks focused on the participants' attention on their symptoms and processes. The interviews showed that reflecting complaints could be important and helpful. However, how far interview and body drawing improves reflection and thus becomes an aspect of the intervention, influencing outcomes, should be investigated separately.

4.3. Individualization of treatment could be useful

In cases of dysmenorrhea, studies already show that the quality of life can be reduced [39,40] Affected women can suffer from depression,[5] decreased concentration ability or even lead to absences from school or work.[41,42] Primarily through the body imaging we could see a differentiation in the suffering with each participant, and these women felt that they were taken seriously in terms of their individual situation. There are several risk factors for chronic pelvic pain. Based on a systematic literature research, Latthe could identify that the presentation with dysmenorrhea is associated with age (< 30 years), being thin (BMI < 20), smoking, early menarche (< 12 years), longer cycles/duration of bleeding, irregular or heavy menstrual flow, presence of premenstrual symptoms, clinically suspected pelvic inflammatory disease, sterilization, and history of sexual assault.[2] The ability to profit from the treatment might be related to the specific biographic background and etiology of this disease and this should be taken into consideration. For example, as far as dysmenorrhea can be a part of a traumatic response to sexual abuse, RM allows the body to carefully find its own language to release and re-solve the life experiences without re-traumatization. The phenomenological study of Burbeck [43] showed the relevance of context factors in this disease as well; they should be taken into considerations for further studies and treatments. Readiness to treat differed considerably in this study. It might be an opportunity to use instruments to test readiness to treat as relevant inclusion criteria or at least as a relevant factor influencing outcomes of intervention.

4.4. Conclusion

This analysis illustrates the relationships between pain, individual emotional condition, self- awareness, and the effects of RM and HRV-BF therapies. This leads to the assumption that synergetic effects can be attained by combining reflecting tools like body drawings and psychotherapeutic treatment with RM or HRV-BF. In fact, the RM therapists often also end up counselling their patients in response to surfacing emotions and body awareness. Analysis of individualized risk profile and personal readiness for these special kinds of therapies could be part of the treatment pathway protocols.

Conflict of interest

The authors have no conflicts of interest.

Acknowledgements

This work was supported by grants from the from the MAHLE Foundation and the Software AG Foundation.

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