

How does my pain look like? Characterizing dysmenorrhea-related pain using the body map

Como se parece a minha dor? Caracterizando a dor relacionada à dismenorreia utilizando o mapa corporal da dor

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ABSTRACT

BACKGROUND AND OBJECTIVES: Primary dysmenorrhea (PD) is a common gynaecological disorder characterized by pain in the abdominal region without pelvic disease. Evidence suggests that PD-related pain may not be restricted to the pelvis region, hence body mapping could be helpful in assessing the subjective location, intensity, and distribution of pain areas in women with PD. The objective of this study was to characterize dysmenorrhea-related pain location and intensity using body map.

METHODS: We conducted a web-based cross-sectional study for adult women to self-report menstrual pain during three menstrual cycles. Each participant was instructed through a messaging application to paint the body map after printing it and rank their pain according to the 11-point Numerical Rating Scale.

RESULTS: Seventy-three women (24.1 ± 3.0 years) participated in the study. A considerable proportion of participants reported pain in the lower abdomen (90.4%) and other body areas, such as the lower back (82.1%), head (54.6%), breasts (32.9%), upper abdomen (31.5%), and legs (28.8%).

CONCLUSION: Our findings revealed that women with PD also present pain outside the uterine referral area during their period. In this way, body maps can help healthcare professionals to record specific regions of pain and track changes or patterns in the location or intensity pain during menses, helping to determine treatment strategies appropriate to the individual needs of each woman with PD. Therefore, we strongly recommend the clinical use of the self-report body map to evaluate menstrual pain and help health providers to improve PD symptoms in this population.

Keywords: Dysmenorrhea, Pain, Women's health.

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HIGHLIGHTS

- The correct assessment of dysmenorrhea-related pain is crucial to determine the best interventions to each case; pain is usually assessed by using many instruments, including body map (or pain drawing) in several diseases.
- The use of body map to characterize dysmenorrhea-related pain showed that, during their menstrual cycle, women with primary dysmenorrhea showed pain not only on their lower abdomen, but also on their back and head.
- We strongly recommend the clinical use of self-report body map to evaluate menstrual pain and help health providers to improve primary dysmenorrhea symptoms in this population.

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RESUMO

JUSTIFICATIVA E OBJETIVOS: A dismenorreia primária (DP) é um distúrbio ginecológico comum caracterizado por dor na região abdominal sem doença pélvica. Evidências sugerem que a dor relacionada à DP pode não estar restrita à região da pelve, portanto, o mapeamento corporal pode ser útil para avaliar a localização subjetiva, a intensidade e a distribuição das áreas de dor em mulheres com DP. O objetivo deste estudo foi caracterizar a localização e a intensidade da dor relacionada à dismenorreia por meio do mapa corporal.

MÉTODOS: Conduziu-se um estudo transversal baseado na *web* para mulheres adultas para autorrelato de dor menstrual durante três ciclos menstruais. Cada participante foi instruído por meio de um aplicativo de mensagens a pintar o mapa corporal após imprimi-lo e classificar sua dor de acordo com a Escala de Avaliação Numérica de 11 pontos.

RESULTADOS: Setenta e três mulheres ($24,1 \pm 3,0$ anos) participaram do estudo. Uma proporção considerável de participantes relatou dor na parte inferior do abdômen (90,4%) e em outras áreas do corpo, como a parte inferior das costas (82,1%), cabeça

(54,6%), mamas (32,9%), parte superior do abdômen (31,5%) e pernas (28,8%).

CONCLUSÃO: Os presentes achados revelaram que mulheres com DP também apresentam dor fora da área de referência uterina durante o período menstrual. Dessa forma, os mapas corporais podem ajudar os profissionais de saúde a registrar regiões específicas de dor e rastrear mudanças ou padrões na localização ou intensidade da dor durante a menstruação, ajudando a determinar estratégias de tratamento adequadas às necessidades individuais de cada mulher com DP. Portanto, recomenda-se fortemente o uso clínico do mapa corporal de autorrelato para avaliar a dor menstrual e ajudar os profissionais de saúde a melhorar os sintomas de DP nessa população.

Descritores: Dismenorreia, Dor, Saúde da mulher.

INTRODUCTION

Primary dysmenorrhea (PD) is defined as recurrent painful cramps in the lower abdomen that occur before and/or during menstruation without any associated pelvic or gynecological disease¹. Studies suggest that PD pain is caused by excessive production and release of prostaglandins during menstruation by the endometrium, which can lead to uterine hypoxia and ischemia². In addition to pain, PD can be associated with other conditions such as nausea, vomiting, dizziness, and gastrointestinal dysfunctions³. PD can also affect physical and social activities. A few studies related PD symptoms as the leading cause of absence from school and work among women in the reproductive age^{1,3,4}. A recent study has shown that central sensitivity symptoms were more present in women who experienced dysmenorrhea⁵, and this may predispose them to chronic pain diseases, such as migraine and fibromyalgia^{6,7}. The most frequently reported PD symptom is pain in the pelvic/low abdomen. However, women with dysmenorrhea might also present pain in multiple sites outside the uterine referral area^{3,8}. The lack of knowledge on the intensity and anatomical location of pain during menstruation has hampered progress in the treatment of women with PD. A few studies have been using the body map (or pain drawing) to assess the subjective location, intensity, and distribution of pain areas in different painful conditions^{8,9}. Body map is part of several validated measures for chronic pain, such as Visual Analogue Scale (VAS)¹⁰, 11-point Numerical Rating Scale (NRS)^{11,12}, Brief Pain Inventory (BPI)¹³ and Michigan Body Map (MBM)¹⁴, and it has been validated to be used in women with PD¹⁵.

The present study aims to fill this gap by characterizing the location and intensity level of PD-related pain using the body map. It is expected that our findings will provide clinical information to guide health providers to manage pain and improve quality of life in women with PD.

METHODS

This is a cross-sectional study carried out in the Women's Health Research Laboratory at the Federal University of São Carlos. The study was approved by the Institutional Ethics

Research Committee CAAE: 29372620.0.0000.5504; Protocol: 3.955.984 and disclosed on social media, networks, and the institution's website. The present study is reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines¹⁶.

Women interested in participating in the study contacted the researchers, who recorded the contacts and scheduled the initial assessment. All participants agreed to participate by reading the Free Informed Consent Term (FICT). Form and clicking on the "I agree to participate in this study" button at the bottom of the online form. The study was conducted online using messaging applications (WhatsApp®).

Participants' inclusion criteria were nulliparous women between 18 and 45 years old with self-reported menstrual pain in the previous three menstrual cycles. Exclusion criteria was any diagnosed pelvic disease (endometriosis, uterine fibroids, adenomyoma, etc.) and/or inability to access or print the body map.

The first assessment consisted of filling out an online questionnaire containing sociodemographic and clinical data. This initial assessment also included information regarding the menstrual cycle and the use of medications to relieve PD-related pain and symptoms. After the first assessment, the assessor sent the body map along with the Numerical Rating Scale (NRS) to each participant through messaging application (Figure 1).

The body map instrument is a chart showing the front and back view of a body. This study used a body map with seventy-six body parts (thirty-eight on the front and thirty-eight on the back view). The 11-point NRS is a self-report instrument that measures pain intensity. The scale runs from zero to 10 points, with 0 (zero) representing no pain and 10 (ten) representing the worst imaginable pain. The NRS is easy to administer, and it is a valid and reliable scale to measure pain intensity perceived by the individual¹⁷. A high correlation between the verbal rating scale and the NRS to measure menstrual pain was previously reported in the literature (18). In their report, the cut-off points for menstrual pain intensity categories were 1 to 3 for mild pain, 4 to 6 to moderate pain, and 7 to 10 to severe pain. A recent study has reported that the NRS is valid to assess dysmenorrhea, with cutoff scores of 3 points¹².

Participants were instructed to print the body map and complete it by marking all areas of pain from at least 24 hours before the start of menstruation to 72 hours after the first day of menstruation. Participants were asked to color all areas affected by pain using the following instructions: Please color the area affected by pain during menstruation. Use two different colors for pain intensity using a scale of zero to 10. Black pen for pain intensity 4 or more, and gray pen for pain intensity below 4. The region must be completely painted. Do not circle the areas. Do not mark the body region with an "x". The details of the instructions and the NRS were presented in the body map form (Figure 1). The area of pain should be fully painted for the accuracy of the software used to read the body maps. After painting the body map, the participant scanned and sent it to the assessor, who digitized and stored the image in JPEG format.

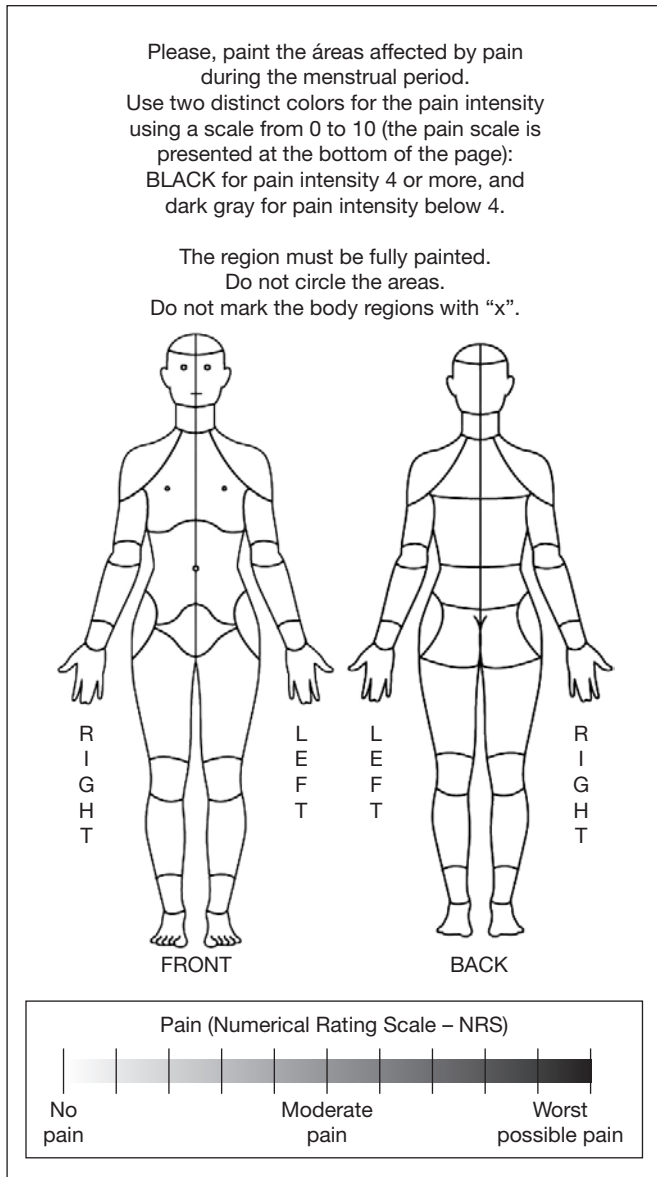


Figure 1. Body map

To describe the distribution of painful areas, the assessors counted the number of participants that painted each body area and computed the percentage from the total sample. The number of participants marking pain intensity below 4 or 4 and above were also counted for each painted body area.

Statistical analysis

Descriptive statistics were presented as means and standard deviation (SD) for continuous variables, and absolute numbers and percentages for categorical variables. All descriptive analyses were performed using SPSS 21.0.

RESULTS

One hundred women volunteered for the study, and 73 of them (24.1 ± 3.0 years old) women were randomly included.

Table 1 shows the sociodemographic and clinical characteristics of our cross-sectional study. In general, the mean menstrual cycle length was 28.2 ± 3.4 days, and the mean pain intensity level during the menstrual cycle was 6.6 ± 1.8 points. 58.9% of the participants reported moderate menstrual flow, 65.7% reported flow duration of 3 to 5 days, 45.2% reported menstrual cramping persisting 24 to 48 hours, and 83.5% reported the use of medication to alleviate menstrual cramps.

Table 1. Sociodemographic and clinical characteristics of the participants (n=73).

Sociodemographic characteristics	
Age (years, SD)	24.1±3.0 years
Education (n, % of women)	
High school	36 (49.3%)
College	34 (46.5%)
Not declared	3 (4.1%)
Clinical characteristics	
Menstrual cycle length (days, SD)	28.2±3.4 days
Menstrual flow (n, %)	
Light	12 (16.4%)
Moderate	43 (58.9%)
Intense	17 (23.2%)
Not declared	1 (1.3%)
Duration of menstrual flow (n, %)	
Up to 3 days	7 (9.5%)
3 to 5 days	48 (65.7%)
More than 5 days	18 (24.6%)
Not declared	0 (0%)
Dysmenorrhea-related pain intensity in a 0-10 scale (points, SD)	6.6±1.8 points
Duration of menstrual cramps (n, %)	
Less than 24 hours	26 (35.6%)
24 hours to 48 hours	33 (45.2%)
48 hours to 72 hours	14 (19.1%)
Not declared	0 (0%)
Use of drugs for dysmenorrhea (n, %)	
Yes	61 (83.5%)
No	12 (16.4%)

The percentages of PD-related pain in each body area are presented in table 2 and figure 2. A considerable proportion of participants reported pain in the lower abdomen (90.4%), lower back (82.2%), and head (54.7%). PD-related pain was also observed for the breasts (32.9%), upper abdomen (31.5%), and legs (28.8%). Most of the dysmenorrhea-related pain at the lower abdomen and lower back were reported as moderate to severe pain (NRS ≥ 4). Dysmenorrhea-related mild pain was also reported at a few other body areas (Table 2 and Figure 2).

Table 2. Frequency and percentage of women reporting dysmenorrhea-related pain per body area; and the frequency and percentage of women referring pain intensity level below and equal/above 4 per body area (n=73)

Body area	n (%) of participants from the total sample	Number of participants	
		NRS < 4	NRS ≥ 4
Head	40 (54.7%)*	25 out of 40 (62.5%)	15 out of 40 (37.5%)
Neck	8 (10.9%)	6 out of 8 (75.0%)	2 out of 8 (25.0%)
Shoulder	12 (16.5%)	8 out of 12 (66.7%)	4 out of 12 (33.3%)
Arm	6 (8.2%)	5 out of 6 (83.3%)	1 out of 6 (16.7%)
Hand	4 (5.5%)	4 out of 4 (100.0%)	0 out of 4 (0.0%)
Breasts	24 (32.9%)*	18 out of 24 (75.0%)	6 out of 24 (25.0%)
Upper abdomen	23 (31.5%)*	14 out of 23 (60.9%)	9 out of 23 (39.1%)
Lower abdomen	66 (90.4%)*	16 out of 66 (24.2%)	50 out of 66 (75.8%)
Upper back	7 (9.5%)	5 out of 7 (71.4%)	2 out of 7 (28.6%)
Lower back	60 (82.2%)*	22 out of 60 (36.7%)	38 out of 60 (63.3%)
Gluteus	18 (24.7%)	14 out of 18 (77.8%)	4 out of 18 (22.2%)
Hip	15 (20.5%)	10 out of 15 (66.7%)	5 out of 15 (33.3%)
Thigh	15 (20.5%)	10 out of 15 (66.7%)	5 out of 15 (33.3%)
Knee	6 (8.2%)	4 out of 6 (66.7%)	2 out of 6 (33.3%)
Popliteal fossa	6 (8.2%)	6 out of 6 (100.0%)	0 out of 6 (0.0%)
Leg	21 (28.8%)*	17 out of 21 (81.0%)	4 out of 21 (19.0%)
Ankle	6 (8.2%)	4 out of 6 (66.7%)	2 out of 6 (33.3%)
Foot	7 (9.6%)	6 out of 7 (85.7%)	1 out of 7 (14.3%)

* Means percentage of women reporting dysmenorrhea-related pain above 25%

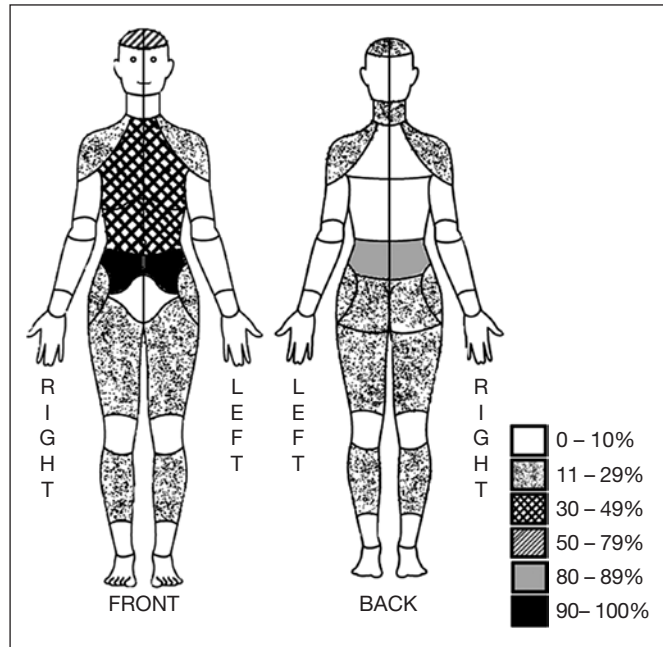


Figure 2. Body map

DISCUSSION

To our knowledge, this is the first study to map the location of menstrual cycle-related pain in women with PD using a body map remotely. As expected, most participants marked the lower abdomen as a moderate to severe painful area during menstrua-

tion. Interestingly, they also reported other body areas such as the head, breasts, upper abdomen, and legs. This finding is crucial to advance knowledge on the effects of the menstrual cycle in women with PD.

Our results are consistent with previous researches reporting the multiple location of PD-related pain^{3,4,18-20}. Based on these studies, the most common sites of pain are the lower abdomen and suprapubic region, lower back, head, and thighs. Pain in the lower abdomen is common associated with higher levels of prostaglandins causing muscle contractions in the uterus to expel the uterus lining. Such contractions seems also to be related to different levels of pain and discomfort inside and outside the uterine referral area²¹.

Unfortunately, the causes of pain outside the uterine area (such as lower back, head, breasts, upper abdomen, and legs) are still not clear. Our study corroborates the high incidence of moderate to severe low back pain during menstruation. Such pain has been reported as dull pain, throbbing pain or sharp/stabbing pain¹⁸. Despite its exact cause is unknown, it might be related to the effect of uterine contractions in muscles and deep tissues located in the lower back²¹. PD-related pain in the head reported by our participants also corroborates the menstrual-related headaches and menstrual migraine reported in the literature²². Changes in estrogen levels during menstruation seems to trigger abnormal neurotransmitter and neurohormonal responses or abnormal release of prostaglandins. This process seems to cause headaches and migraines in women with PD^{23,24}. The pain in the breast area reported by our cohort aligns with the cyclical breast pain that some women reports from the luteal phase to the onset of

menses²⁵. Some studies relate cyclical breast pain to the excess of estrogen or prolactin²⁶ and others to the deficiency of progesterone²⁷ during the luteal phase. As discussed, hormonal changes during the menstrual period seems to trigger pain not only in the uterus and ovarian area. It has been suggested that the cyclic pain of dysmenorrhea might predispose women to central sensitization and consequent widespread and long-lasting pain in other areas of the body²¹.

More than 80% of our participants reported the use of pain relief medication during their period. Even so, most of them reported moderate to severe pain in the lower abdomen and lower back. According to the literature, moderate pain intensity is considered a risk factor for lower response to pharmacological depression treatment²⁸. Moreover, women exposed to painful episodes of moderate to severe intensity monthly might be more susceptible for central sensitization (CS)¹. CS involves the alteration of the pain processing by the brain²⁹, and it has been reported in women with PD^{5,21,29,30}. The association between CS and PD suggests the urgency in early diagnose and treatment of PD-related pain³¹. Our study suggests the use of the body map as a clinical tool to map the women pain and guide health providers on the diagnosis and treatment of women with PD.

The importance of using the body map for other pain conditions is clear. All participants were able to use the body map to mark the location and intensity level of their pain during their period. A previous study investigated the measurement properties of the body map in patients with several types of pain³². Despite variations in pain location and distribution, the body map was reliable for use in patients with acute and chronic lower back pain. Another study has validated the use of the body map to assess widespread pain in a pediatric population³³. These findings indicate that the body map is a versatile tool available to evaluate pain location and distribution.

The COVID-19 pandemics hit the world and healthcare professionals have struggled to find ways to evaluate their patients remotely. This was also the case for our study. Proper assessments are crucial during the process of evaluation, diagnosis, prognosis, plan of treatment, and treatment. A recent study developed a computerized body map with excellent reliability compared with the paper version³⁴. This particular form of pain assessment allows patients to more accurately indicate how their pain looks like. It also allows clinicians and researchers to better understand the impact that pain on that particular patient. The present study was also able to show evidence that pain assessment can be performed remotely, allowing healthcare professionals to evaluate the PD-related pain extent more precisely.

Our findings strongly recommend the use of the body map to assess PD pain and guide clinicians in their decision for the most effective pain management intervention. However, there were some limitations in this study. The pain measures used only assess the pain and do not cover other conditions experienced in PD, such as the presence of comorbidities. Some comorbidities, for example, might be related to the location and intensity level of pain reported in the body map. Furthermore, only participants over 18 years old with internet access were included. We were

not able to assess adolescents and women with lower socioeconomic levels without internet access, and selection bias may have occurred in this sample. We suggest that future studies include comorbidities in a probabilistic sample of women, including adolescents.

CONCLUSION

Women with primary dysmenorrhea present additional PD-related pain outside the uterine referral area during their period. We strongly recommend the clinical use of the body map to identify pain location and severity in this population.

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