Research Article / Araştırma Makalesi

# Comparison of Spine Posture, Mobility and Body Image Perception in Healthy and Primary Dysmenorrhea Women

## Sağlıklı ve Primer Dismenoreli Kadınlarda Spinal Postür, Mobilite ve Beden İmajı Algısının Karşılaştırılması

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**Abstract:** The aim of this research was to compare spinal posture, mobility and body image perception between healthy women and women with primary dysmenorrhoea. A total of 120 women, 57 healthy and 63 with Primary dysmenorrhoea, were included in the study. The mean age of the participants was 22 years in the group with primary dysmenorrhoea and 21 years in the healthy group; BMI results were 23.05 and 21.45, respectively. Participants' pain severity, attitudes towards menstruation and menstrual symptoms, physical activity levels and body image perceptions were assessed with the corresponding questionnaires. Participants' spinal posture and mobility were assessed with Spinal Mouse device. In our study, pain score of women with Primary dysmenorrhoea was higher than healthy women ($p<0.001$). Sacrum-hip angle ($p=0.005$), inclination angle ($p=0.014$) and mobility of these regions (($p=0.006$), ($p=0.001$)) were lower in the Primary dysmenorrhoea group compared with the healthy group. Menstrual symptoms were more severe in women with Primary dysmenorrhoea ($p<0.001$) and their attitudes towards menstruation were more negative ($p=0.013$, $p=0.003$, $p=0.034$, $p=0.023$, $p<0.001$, $p<0.001$). Physical activity levels ($p=0.294$) and body image perceptions of Primary dysmenorrhoea and healthy women were similar ($p=0.225$). As a result we found that the spinal posture and mobility of women with Primary dysmenorrhoea differed negatively from healthy women and that they approached menstruation cognitively worse. These results may be important for women with Primary dysmenorrhoea to be aware of their own bodies. We think that women with Primary dysmenorrhoea should be educated about this issue.
**Keywords:** Primary Dysmenorrhea, Pain, Spinal Mouse, Posture, Spinal Mobility

**Özet:** Bu araştırmanın amacı, sağlıklı kadınlar ile Primer dismenoreli kadınlar arasında spinal postür, mobilite ve beden imajı algısını karşılaştırmaktı. Çalışmaya 57 sağlıklı ve 63 Primer dismenoreli olmak üzere toplam 120 kadın dâhil edildi. Katılımcıların yaş ortalaması Primer Dismenoreli grupta 22, sağlıklı grupta 21 iken; VKİ sonuçları sırasıyla 23.05 ve 21.45 olarak ölçüldü. Katılımcıların ağrı şiddeti, menstrüasyon ve menstrüel semptomlara yönelik tutumları, fiziksel aktivite düzeyleri ve beden imajı algıları ilgili anketlerle değerlendirildi. Katılımcıların omurga duruşu ve hareketliliği Spinal Mouse cihazı ile değerlendirildi. Çalışmamızda primer dismenoresi olan kadınların ağrı skoru sağlıklı kadınlara göre daha yüksekti ($p<0.001$). Sakrum-kalça açısı ($p=0.005$), inklinasyon açısı ($p=0.014$) ve bu bölgelerin mobilitesi (($p=0.006$), ($p=0.001$)) Primer dismenore grubunda sağlıklı gruba göre daha düşüktü. Menstrüel semptomlar Primer dismenoreli kadınlarda daha şiddetliydi ($p<0.001$) ve Primer dismenoreli kadınların menstrüasyona yönelik tutumları daha olumsuzdu ($p=0.013$, $p=0.003$, $p=0.034$, $p=0.023$, $p<0.001$, $p<0.001$). Primer dismenoreli ve sağlıklı kadınların fiziksel aktivite düzeyleri ($p=0.294$) ve beden imajı algıları benzerdi ($p=0.225$). Araştırmanın sonucunda, Primer dismenoreli kadınların omurga duruşu ve hareketliliğinin sağlıklı kadınlardan olumsuz yönde farklı olduğunu ve menstrüasyona bilişsel olarak daha kötü yaklaştıklarını bulduk. Bu sonuçlar Primer dismenoresi olan kadınların kendi bedenlerinin farkında olmaları için önemli olabilir. Primer dismenoresi olan kadınların bu konuda eğitilmesi gerektiğini düşünüyoruz.
**Anahtar Kelimeler:** Primer Dismenore, Ağrı, Spinal Mouse, Postür, Spinal Mobilite

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## 1. Introduction

Primary dysmenorrhoea (PD) is a condition that occurs in women during their reproductive years and is associated with severe, cramping abdominal pain and some systemic symptoms (1, 2). The pathological mechanism of PD is thought to be related to excessive levels of a hormone called Prostaglandin (PG) in the uterus (2).

In PD, PG is known to spread to the intrapelvic organs and cause systemic symptoms (3). PD caused by PG can affect the lumbopelvic structure by causing systemic symptoms in the pelvic organs and other soft tissues (4). Curvatures in the spine are natural but not fixed. It can be displaced due to various symptoms. There is a limited amount of research on the fact that systemic symptoms and pain may linked with spinal displacement (5, 6).

The physical activity may change the symptoms of PD. The endorphin level, local blood flow of pelvic area and pain relieving mediators may increase during physical activity or exercise (7). This may effect the severity of menstrual pain. Some studies found a relation between physical activity and dysmenorrhoea, while others couldn't (8).

Posture, head posture and upper and lower extremity posture are among the factors that influence body image. Good posture and exercise promote a positive body image (9). The structure of body image is multidimensional and focuses on an individual's body weight, shape and satisfaction with their appearance (10). Excessive worry about pain, disease or injury, negative feelings about the body are associated with anxiety (11). In a study examining the relationship between dysmenorrhoea and body dissatisfaction, body dissatisfaction of adolescents with severe dysmenorrhoea was found to be much higher than women without dysmenorrhoea and women with mild-moderate dysmenorrhoea (12).

In the literature, the number of studies investigating spinal posture and mobility in women with PD is limited and the results are variable. The number of studies examining the effect of PD on body image is few and generally qualitative. The aim of our study was to compare spinal posture, spinal mobility and body image perception between healthy women and women with PD.

## 2. Materials and Methods

### 2.1 Study Design

This case-control study included healthy (asymptomatic) women and women with PD. Participants were found by snowball sampling method. The permission for the study was obtained from the Clinical Research Ethics Committee of Bolu Abant İzzet Baysal University Hospital (Decision No: 2020/192, Decision Date:25.08.2020). An Informed Consent Form was applied to the women included in the study.

### 2.2 Individuals

Inclusion criterias for both group were being a nulliparous women aged 18-35 years, being a volunteer, having a regular menstrual cycle. Women with menstrual pain severity between 1.1-10 according to VAS in the last 3 months were included in PD group and women with menstrual pain severity between 0-1 according to VAS in the last 3 months were included in healthy group. Participants with PD were divided into 3 groups according to pain intensity: 1.1-3: mild, 3.1-7: moderate, 7.1-10: severe pain (13).

Exclusion criterias for both groups were known gastrointestinal, urogynecological, autoimmune, psychiatric, neurological diseases or other musculoskeletal conditions, those with spinal surgery and spinal deformity, other chronic pain syndromes, given birth, being pregnant, using intrauterine devices, undergone pelvic/spinal surgery, using/used oral contraceptives or antidepressant drugs in the last 6 months before the study. Also the participants who have a pathological history or ultrasonography result indicating secondary dysmenorrhoea, using alternative treatment

methods and exercising regularly were excluded from the study.

### 2.3 Assessment

Participants' age, height, body weight, waist/hip circumference, menstruation information, and absenteeism from work/school within one cycle due to dysmenorrhoea were recorded. Visual Analogue Scale (VAS) was used for pain assessment of the participants. A 10-centimetre (cm) horizontal line was marked as "0: no pain" and "10: severe pain" and the participants were asked to mark the highest pain intensity they felt in the last 3 months. The Menstrual Attitude Questionnaire (MAQ) was used to assess participants' attitudes and behaviours during menstruation. The MAQ consists of 5 subscales (Sub1,2,3,4,5): 'Menstruation as a disempowering phenomenon' (MAQ Sub1), 'Menstruation as an uncomfortable phenomenon' (MAQ Sub2), 'Menstruation as a natural phenomenon' (MAQ Sub3), 'Anticipation of menstruation' (MAQ Sub4), 'Denial of the effects of menstruation' (MAQ Sub5). A high score on a subscale indicates a high level of thinking about that subscale (14). The Menstrual Symptom Questionnaire (MSQ) was used to assess participants' menstrual symptoms. This scale is divided into three sub-dimensions as 'Negative effects/somatic complaints', 'Menstrual pain', 'Methods of coping with menstrual pain' and consists of a total of 24 items. The increase in mean score is directly proportional to the severity of menstrual symptoms (15). The participants' physical activity levels were measured using the International Physical Activity Questionnaire-Short Form (IPAQ-SF). The duration of vigorous and moderate exercise, walking and sitting times in the last 7 days were recorded. Participants' total weekly MET (Metabolic Equivalent of Task) minutes were calculated by multiplying the MET values of the activities by the duration of the activity and the frequency of the activity (number of days) (16). Participants' body image was assessed using the Body Image Scale (BIS). This scale, which includes questions about a body part, organ or organ function, consists of 40 questions. A high score on the scale is directly proportional to participants' positive body image perceptions (17). Spinal postures, spinal mobility and inclination angles of the participants were evaluated with the Spinal Mouse (SM) device. SM (Idiag, Voletswil, Switzerland) is an electromechanical device that can measure spinal curvatures in the frontal and sagittal planes, is non-invasive, does not emit radiation, and can transfer the measured data to the software installed on the computer via Bluetooth. The device measures at a frequency of approximately 150 Hz and an accuracy of 1.13 mm (18). The validity and reliability of this device was investigated by Demir et al (17). SM can measure 4 different values including thoracic angle, lumbar angle, inclination angle and sacrum-hip angle. These angles were mesured in 3 positions:

Participants were asked to hold a relaxed, free position with feet shoulder-width apart and arms at the side (Figure 1).

Participants were asked to maximise flexion of the trunk with the knees straight and the feet stationary. They were told that they could grasp their legs if needed (Figure 2).

Participants were asked to cross their arms across their chest and maximise the extension of their trunk with their knees straight and feet stationary (Figure 3).

**Figure 1.** Posture measurement in Upright Position

**Figure 2.** Posture measurement in Maximum Flexion Position

**Figure 3.** Posture measurement in Maximum Extension Position

### 2.4 Statistical Analysis

Considering the similar studies (17-19) and assuming that the difference between the two groups has a medium effect size. It was determined that a total of 114 people, with a minimum of 57 in each group, should be studied with 80% power and 5% margin of error, using an effect size of 0.533. Sample sizes were calculated using G-Power 3.0.10.Statistical analyses were performed using IBM SPSS v.21 software (Statistical Package for the Social Sciences SPSS Inc, Chicago, IL). For descriptive statistics, mean and standard deviation or median and mode were used for numerical variables and number and percentage were used for categorical variables. The 'Shapiro-Wilks test' was used for normality analysis of distributions. The t-test was used in independent groups for normally distributed data, and the Mann-Whitney U test was used

to compare data that did not show normal distribution. In addition, the 'Pearson Correlation Coefficient' test was used when evaluating the relationship between quantitative variables. For statistical significance, the total Type-I error level was used as 5%.

## 3. Results

The study was completed with 63 women with PD and 57 healthy (asymptomatic) women.

The comparison of the physical and demographic characteristics of the study participants is shown in Table 1. The mean VAS score was higher in the PD group ($p$<0.001) and the waist/hip ratio was lower in the healthy group ($p$=0.024*) (Table 1).

**Table 1.** Comparison of physical and demographic characteristics of healthy and PD groups

| | **Group** | | | |
|---|---|---|---|---|
| | **Healthy (n=57)** | **PD (n=63)** | ***p*** | |
| **Age (year)** | 22.0 (18.0 – 28.0) | 21.0 (18.0 – 34.0) | 0.145 | z = -1.458 |
| **BMI (kg/ m²)** | 23.05 (15.6 – 34.9) | 21.45 (15.8 – 32.4) | 0.110 | z = -1.598 |
| **VAS Score (cm)** | 1.0 (0.0 – 1.0) | 7.3 (3.0 – 10.0) | <0.001* | z = 9.539 |
| **Waist/Hip Ratio (cm/cm)** | 0.79 (0.71 – 0.95) | 0.77 (0.54 – 0.96) | 0.024* | z = -2.265 |

*(*P<0.05 statistically significant difference, n: Number of individuals, BMI: Body Mass Index, VAS: Visual Analogue Scale, z: Mann Whitney U test)*

Half of the PD group was taking medication during menstruation, whereas none of the healthy group was taking medication ($p$<0.001). The duration of painful menstruation ($p$<0.001), the number of days on medication ($p$<0.001), the number of medication intake ($p$<0.001) and the number of days of absence from school/work ($p$=0.002) were higher in the group with PD (Table 2).

**Table 2.** Comparison of menstrual characteristics of healthy and PD groups

| | | **Groups** | | | |
|---|---|---|---|---|---|
| | | **Healthy (n=57) (%)** | **PD (n=63) (%)** | ***p*** | |
| **Menarche Age** | **< 10** | 1 (1.8) | 0 (0.0) | 0.515 | $\chi^2$ = 3.260 |
| | **10 – 12** | 16 (28.1) | 14 (22.2) | | |
| | **13** | 26 (45.6) | 27 (42.9) | | |
| | **14 – 18** | 12 (21.1) | 20 (31.7) | | |
| | **> 18** | 2 (3.5) | 2 (3.2) | | |
| **Length of Menstrual Cycle** | **< 21 days** | 3 (5.3) | 4 (6.3) | 0.849 | $\chi^2$ = 0.329 |
| | **21 – 35 days** | 53 (93.0) | 57 (90.5) | | |
| | **> 35 days** | 1 (1.8) | 2 (3.2) | | |
| **Duration of Menstruation** | **2 – 7 days** | 52 (91.2) | 57 (90.5) | 0.887 | $\chi^2$ = 0.020 |
| | **> 7 days** | 5 (8.8) | 6 (9.5) | | |
| **Medication Intake** | **Yes** | 0 (0.0) | 32 (50.8) | <0.001* | $\chi^2$ = 39.481 |
| | **No** | 57 (100.0) | 31 (49.2) | | |

| | | | | |
|---|---|---|---|---|
| **Duration of Painful Menstruation (year)** | 0.0 | 8.0 (1.0 – 16.0) | <0.001*¶ | t = 9.601 |
| **Days on Medication** | 0.0 | 1.0 (0.0 – 4.0) | <0.001*¶ | t = 5.705 |
| **Number of Medication Intake** | 0.0 | 1.0 (0.0 – 8.0) | <0.001*¶ | t = 4.962 |
| **Absenteeism from Work or School (day)** | 0.0 | 0.0 (0.0 – 3.0) | 0.002*¶ | t = 4.283 |

*(¶The Sign Test was used to test whether the values are equal to zero.* p<0.05 statistically significant difference, n: Number of individuals, %: Percentage, t: Independent Sample t-test, $\chi^2$: chi-square test)*

Sacrum/hip angle ($p$=0.005) and inclination angle ($p$=0.014) values in the maximum flexion position were lower in the PD group than in the healthy group. In all other postures, sacrum/hip, thoracic, lumbar and inclination angles were similar ($p$>0.05) (Table 3).

**Table 3.** Comparison of spinal posture scores between healthy and PD groups

| | | Groups | | | |
|---|---|---|---|---|---|
| | | **Heathy (n=57)** | **PD (n=63)** | ***p*** | |
| **Upright Position** | **Sacrum/Hip (°)** | 17.68 ± 6.46 | 18.14 ± 8.11 | 0.734 | t = -0.340 |
| | **Thoracic (°)** | 45.98 ± 8.63 | 46.54 ± 9.95 | 0.745 | t = -0.326 |
| | **Lumbar (°)** | -35.0 (-54.0; 7.0) | -36.0 (-64.0; 5.0) | 0.952 | z = -0.060 |
| | **Inclination (°)** | 0.11 ± 2.86 | 1.01 ± 2.76 | 0.079 | t = -1.774 |
| **Max Flexion** | **Sacrum/Hip (°)** | 72.26 ± 13.79 | 65.46 ± 12.35 | 0.005* | t = 2.851 |
| | **Thoracic (°)** | 54.93 ± 10.62 | 55.89 ± 9.31 | 0.599 | t = -0.527 |
| | **Lumbar (°)** | 26.32 ± 9.78 | 26.81 ± 10.76 | 0.794 | t = -0.262 |
| | **Inclination (°)** | 104.0 (3.0; 143.0) | 102.0 (75.0; 124) | 0.014* | z = -2.470 |
| **Max Extension** | **Sacrum/Hip (°)** | -2.70 ± 12.81 | -0.80 ± 12.84 | 0.421 | t = -0.807 |
| | **Thoracic (°)** | 43.61 ± 12.11 | 41.05 ± 12.55 | 0.258 | t = 1.137 |
| | **Lumbar (°)** | -52.0 (-79.0; -14.0) | -51.0 (-72.0; 45.0) | 0.325 | z = 0.983 |
| | **Inclination (°)** | -35.0 (-58.0; 86.0) | -31.0 (-80.0; 34.0) | 0.130 | z = 1.515 |

*(*p<0.05 statistically significant difference, n: Number of individuals, t: Independent Sample t-test, z: Mann Whitney U test)*

In the spinal mobility evaluation, the values for sacrum/hip angle ($p$=0.006) and inclination angle ($p$=0.001) were lower in the PD group compared to the healthy group (Table 4).

**Table 4.** Comparison of spinal mobility scores between healthy and PD groups

| | | Groups | | | |
|---|---|---|---|---|---|
| | | **Healthy (n=57)** | **PD (n=63)** | ***p*** | |
| **Spinal Mobility** | **Sacrum/Hip (°)** | 74.95 ± 20.26 | 65.0 ± 18.98 | 0.006* | t = 2.776 |
| | **Thoracic (°)** | 11.33 ± 15.20 | 14.60 ± 14.59 | 0.232 | t = -1.202 |
| | **Lumbar (°)** | 76.32 ± 14.61 | 75.02 ± 12.36 | 0.599 | t = 0.528 |
| | **Inclination (°)** | 142.0 (103.0 - 186.0) | 135.0 (61.0 - 162.0) | 0.001* | z = -3.178 |

(*$p$<0.05 statistically significant difference, n: Number of individuals, t: Independent Sample t-test, z: Mann Whitney U test)

In the PD group, MAQ Sub1 ($p$=0.013), MAQ Sub2 ($p$=0.003) and MAQ Sub4 ($p$=0.023) scores were higher, whereas MAQ Sub3 ($p$=0.034) and MAQ Sub5 ($p$<0.001) scores were significantly lower. The total MSQ score was higher in the PD group ($p$<0.001) compared to the healthy group. The BIS ($p$=0.225) and IPAQ-SF ($p$=0.294) scores were similar in both groups (Table 5).

**Table 5.** Comparison of total IPAQ-SF, MAQ, MSQ and BIS scores between healthy and PD groups

| | Groups | | | |
|---|---|---|---|---|
| | **Healthy (n=57)** | **PD (n=63)** | ***p*** | |
| **IPAQ-SF Total** | 1506 (66 – 16120) | 1980 (99 – 7998) | 0.294 | z = 1.049 |
| **MAQ Sub1** | 19.82 ± 2.77 | 21.0 ± 2.33 | 0.013* | t = -2.520 |
| **MAQ Sub2** | 13.11 ± 3.34 | 14.92 ± 3.17 | 0.003* | t = -3.054 |
| **MAQ Sub3** | 20.0 (9.0 – 25.0) | 18.0 (5.0 – 25.0) | 0.034* | z = -2.122 |
| **MAQ Sub4** | 26.21 ± 3.66 | 27.67 ± 3.66 | 0.023* | t = -2.303 |
| **MAQ Sub5** | 13.0 (6.0 – 25.0) | 10.0 (6.0 – 22.0) | <0.001* | z = -3.574 |
| **MSQ Total** | 2.0 (1.18 – 3.31) | 3.31 (1.72 – 4.54) | <0.001* | z = 7.780 |
| **BIS Total** | 142.67 ± 20.65 | 137.81 ± 22.78 | 0.225 | t = 1.219 |

*(IPAQ-SF: International Physical Activity Questionnaire-Short Form, MAQ: Menstrual Attitude Questionnaire-Subscales, MSQ: Menstrual Symptom Questionnaire, BIS: Body Image Scale, * p<0.05 statistically significant difference, n: Number of individuals, t: Independent Sample t-test, z: Mann Whitney U test)*

No significant relationship was found between spinal posture and Body Image Perception in any region. In spinal mobility, a significant positive correlation was found between sacrum/hip region and Body Image Perception (r=0.726; $p$<0.001) (Table 6).

**Table 6.** The relationship between spinal posture and spinal mobility and Body Image Perception in PD group

| | | Body Image Perception | |
|---|---|---|---|
| | | **r** | *p* |
| **Upright Position** | **Sacrum/Hip** | 0.027 | 0.773 |
| | **Thoracic** | 0.038 | 0.682 |
| | **Lumbar** | -0.042 | 0.647 |
| | **Inclination** | -0.073 | 0.431 |
| **Max Flexion** | **Sacrum/Hip** | 0.038 | 0.683 |
| | **Thoracic** | 0.140 | 0.126 |
| | **Lumbar** | -0.063 | 0.498 |
| | **Inclination** | 0.008 | 0.928 |
| **Max Extension** | **Sacrum/Hip** | 0.042 | 0.650 |
| | **Thoracic** | 0.002 | 0.982 |
| | **Lumbar** | 0.039 | 0.672 |
| | **Inclination** | 0.081 | 0.379 |
| **Spinal Mobility** | **Sacrum/Hip** | 0.726 | <0.001* |
| | **Thoracic** | 0.074 | 0.419 |
| | **Lumbar** | -0.029 | 0.755 |
| | **Inclination** | 0.011 | 0.909 |

*(*p<0.05 statistically significant difference, r: Pearson's correlation coefficient)*

## 4. Discussion

This study was planned to compare spinal posture, mobility and body image perception as well as menstrual attitudes and symptoms of women with and without PD. In our study, sacrum-hip angles, inclination angles and mobility of these regions were lower in women with PD (in the posture with maximum trunk flexion) compared to women without PD. Women with PD had more severe menstrual symptoms and worse attitudes towards menstruation than women without PD. Body image perceptions of women with and without PD were similar. In addition, pain level was higher in the group with PD. This shows the effects of dysmenorrhoea in accordance with the literature (3).

In the literature, excessive release of prostaglandins can cause menstrual pain due to excessive contraction of the endometrium and increased uterine pressure (22). The relationship between the pelvis and the spine is dynamic. Kim et al suggested that unstable spinal alignment was the reason why pelvic torsion was more common in women with menstrual pain than in those without pain (20). Karakuş et al. found that the spinal posture of women with PD did not change compared to women without PD, but their spinal mobility was less (23). Unlike the study of Karakuş et al. our study

includes the results of measurements made in all three positions in the sagittal plane. This also shows the positional angle difference. In our study, there was no difference between the thoracic kyphosis and lumbar lordosis angles of women with maximum flexion, whereas sacrum-hip angles and inclination angles were found to be less in women with PD than in women without PD. Similarly, sacrum-hip and inclination angle values were found to be lower in the PD group during mobility measurement in our study. In other words, the spine and pelvis mobility of women with PD was less. This may be related to the immobility of the pelvis and intra-pelvic structures due to excessive muscle contraction caused by increased PG.

Pain is another factor affecting body image perception and verbal or imaginary methods may be used to express this perception (24). In the study of Allyn et al. some of the participants with PD had negative views on body image and self-blame, while others had positive views in terms of body awareness and control (25). There are not enough studies in the literature investigating the relationship between body image perception and PD. In the present study, the body image perceptions of the participants with PD and the healthy group were similar. While there was a positive correlation between sacrum-hip mobility and body image perception in participants with PD, there was no correlation in other posture and mobility values. We can attribute this result to the fact that despite the negative effects of menstruation, especially young women think that their bodies are beautiful and unique thanks to both the 'body affirmation' movement seen in social media and peer support (25,26).

When reviewing the literature, various data have been presented on the association of age at menarche, menstrual cycle length and menstrual duration with PD. Vlachou et al. found that family history, early menarche and menstrual duration were associated with severe dysmenorrhoea (28). Bavil et al. found no significant difference between menarche age, length of menstrual cycle and duration of menstruation (29). In our study, menarche age, length of menstrual cycle and duration of menstruation were found to be similar in the PD and healthy groups. Both groups in our study were homogeneous with regard to these parameters. The fact that menstrual information was similar between the groups makes the other parameters measured in our study comparable.

Interruption of daily activities, increased absenteeism from work or school, impaired concentration, reduced performance and quality of life due to PD are commonly reported in the literature (26,27). It is known that severe dysmenorrhoea negatively affects class attendance, self-study, exercise and sociality (28). In our study, work/school absenteeism levels of participants with PD were higher than those without PD. This situation supports that PD negatively affects daily life activities and work/school life as in the literature.

The beneficial effects of physical activity on pain in different parts of the body are well known (28,29,30,31,32,33). The majority of studies show that physical activity can modify pain. In our study, the physical activity levels of the group with and without PD were similar. We can attribute this similarity to the cultural differences specific to our country, the physical activity habits of the similar age group, and the effect of the global pandemic.

Dysmenorrhoea affects attitudes towards menstruation (34,35). In our study, the attitude towards menstruation was found to be negatively affected in women with dysmenorrhoea. It can be said that the group with dysmenorrhoea considered menstruation as a debilitating and uncomfortable condition, and at the same time they were better at recognising the approaching menstruation in advance than the group without dysmenorrhoea. This may be explained by the fact that PD symptoms are severe and distressing for women. The fact that the healthy group considers menstruation to be a natural phenomenon and denies its effects may be due to the fact that PD symptoms are not experienced or are experienced in a very mild way. In our study, the total score of the MSQ was higher

in the group with PD than in the group without PD, as expected. The fact that the total value of this scale, which questions the frequency of PD symptoms and the coping methods applied accordingly, is higher in the group with PD indicates that the symptoms are challenging and disturbing for women with PD.

There are some limitations in our study. The first one is that most of the participants were not menstruating during the assessment and measurement. In future studies, assessment and measurement can be performed intermittently and regularly when all women are in the same menstrual phase. Secondly, all lumbopelvic muscles' structures, especially pelvic floor muscles, were not evaluated with objective assessments. We think that the evaluation of muscle structure should be included in future studies.

One of the strengths of our study is that we revealed the range of motion information of the women with and without PD in all positions in the sagittal plane. Thus, we had the opportunity to make a positional comparison. Another strength of our study is that it is the study with the highest sample size considering the studies conducted with Spinal Mouse.

## 5. Conclusion

In our study, spinal postures and mobility of women with PD were different from women without PD symptoms. These differences were in the sacrum/hip angle at the maximum flexion position. As each individual's experience of menstruation is different, the mechanical functioning of their own body is also different. Therefore, body awareness should be increased especially in women with PD. During our study, it was observed that women had little or incorrect knowledge about the menstrual cycle. Our study reveals the importance of patient education as well as the spinal changes that occur in PD.

## REFERENCES


1. Iacovides S, Avidon I, Baker FC. What we know about primary dysmenorrhea today: A critical review. Hum Reprod Update. 2015;21(6):762–78.
2. Proctor M, Farquhar C. Diagnosis and management of dysmenorrhoea. Br Med J. 2006;332(7550):1134–8.
3. Burnett M, Lemyre M. No. 345-Primary Dysmenorrhea Consensus Guideline. J Obstet Gynaecol Canada. 2017;39(7):585–95.
4. Karakus A, Balaban M, Kaya DO, Celenay ST. Lumbopelvic muscle endurance, morphology, alignment, and mobility in women with primary dysmenorrhea: A case-control study. Clin Biomech. 2022;105582.
5. Neumann DA. Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation. 2nd ed. Vol. 14. St. Louis: Mosby, Elsevier; 2010. 379–422 p.
6. Kim MJ, Baek IH, Goo BO. The effect of lumbar-pelvic alignment and abdominal muscle thickness on primary dysmenorrhea. J Phys Ther Sci. 2016;28(10):2988–90.
7. Mahvash N, Eidy A, Mehdi K, Zahra MT, Mani M, Shahla H. The effect of physical activity on primary dysmenorrhea of female university students. World Appl Sci J. 2012;17(10):1246–52.
8. Matthewman G, Lee A, Kaur JG, Daley AJ. Physical activity for primary dysmenorrhea: a systematic review and meta-analysis of randomized controlled trials. Am J Obstet Gynecol. 2018;219(3):255.e1-255.e20.
9. Öngören B. Sosyolojik Açıdan Sağlıklı Beden İmgesi. Sos ve Beşeri Bilim Araştırmaları Dergisi/ J Soc Sci Humanit Res. 2015;(34):25–45.
10. De Morais MSM, Do Nascimento RA, Vieira MCA, Moreira MA, Da Câmara SMA, Maciel ÁCC, et al. Does body image perception relate to quality of life in middle-aged women. PLoS One. 2017;12(9):1–12.
11. Secord PF, Jourard SM. The appraisal of body-cathexis: body-cathexis and the self. J Consult Psychol. 1953;17(5):343–7.
12. Ambresin AE, Belanger RE, Chamay C, Berchtold A, Narring F. Body Dissatisfaction on Top of Depressive Mood among Adolescents with Severe Dysmenorrhea. J Pediatr Adolesc Gynecol. 2012;25(1):19–22.
13. Hu Z, Tang L, Chen L, Kaminga AC, Xu H. Prevalence and Risk Factors Associated with Primary Dysmenorrhea among Chinese Female University Students: A Cross-sectional Study. J Pediatr Adolesc Gynecol. 2020;33(1):15–22.
14. Kulakaç Ö, Oncel S, Firat MZ, Akcan A. Menstruasyon Tutum Ölçeği : Geçerlik ve Güvenirlik Çalışması. Turkiye Klin J Gynecol Obs. 2008;18(6):347–56.
15. Güvenç G, Seven M, Akyüz A. Menstrüasyon Semptom Ölçeği ' nin Türkçe ' ye Uyarlanması. TAF Prev Med Bull. 2014;13(5):367–74.
16. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-Country reliability and validity. Med Sci Sports

Exerc. 2003;35(8):1381–95.
17. Hovardaoğlu S. Vücut Algısı Ölçeği. Psikiyatr Psikoloji, Psikofarmakol Derg. 1992;1:26–7.
18. Kiss RM. Verification of determining the curvatures and range of motion of the spine by electromechanical-based skin-surface device. Period Polytech Civ Eng. 2008;52(1):3–13.
19. Demir E, Atalay Guzel N, Cobanoglu G, Kafa N. The reliability of measurements with the spinal mouse device in frontal and sagittal planes in asymptomatic female adolescents. Ann Clin Anal Med. 2020;11(2):146–9.
20. Kim MJ, Baek IH, Goo BO. The relationship between pelvic alignment and dysmenorrhea. J Phys Ther Sci. 2016;28(3):757–60.
21. Orhan C, Çelenay ŞT, Demirtürk F, Özgül S, Üzelpasacı E, Akbayrak T. Effects of menstrual pain on the academic performance and participation in sports and social activities in Turkish university students with primary dysmenorrhea: A case control study. J Obstet Gynaecol Res. 2018;44(11):2101–9.
22. Coco A. Primary dysmenorrhea. Am Fam Physician. 1999;60: 489–49.
23. Karakuş A, Özer Kaya D, Toprak Çelenay Ş. Primer Dismenoresi Olan ve Olmayan Kadınlarda Omurga Postür ve Mobilitesinin Karşılaştırılması. Türk Fiz ve Rehabil Derg. 2020;32(1):20–7.
24. Schwoebel J, Friedman R, Duda N, Coslett HB. Pain and the body schema. Brain. 2001;124:2098–104.
25. Allyn K, Evans S, Seidman LC, Payne LA. "Tomorrow, I'll Be Fine": Impacts and coping mechanisms in adolescents and young adults with primary dysmenorrhoea. J Adv Nurs. 2020;76(10):2637–47.
26. Armitage CJ. Evidence that self-affirmation reduces body dissatisfaction by basing self-esteem on domains other than body weight and shape. J Child Psychol Psychiatry Allied Discip. 2012;53(1):81–8.
27. Guest E, Zucchelli F, Costa B, Bhatia R, Halliwell E, Harcourt D. A systematic review of interventions aiming to promote positive body image in children and adolescents. Body Image [Internet]. 2022;42:58–74.
28. Vlachou E, Owens DA, Lavdaniti M, Kalemikerakis J, Evagelou E, Margari N, et al. Prevalence, Wellbeing, and Symptoms of Dysmenorrhea among University Nursing Students in Greece. Diseases. 2019;7(1):5.
29. Abadi Bavil D, Dolatian M, Mahmoodi Z, Akbarzadeh Baghban A. A comparison of physical activity and nutrition in young women with and without primary dysmenorrhea. F1000Research. 2018;7(0):59.
30. Mohapatra, D., T. Mishra, M. Behera and PP. a Study of Relation Between Body Mass Index and Dysmenorrhea and Its Impact on Daily Activities of Medical Students. Asian J Pharm Clin Res. 2016;9(9):297–9.
31. Yoshino O, Takahashi N, Suzukamo Y. Menstrual Symptoms, Health-Related Quality of Life, and Work Productivity in Japanese Women with Dysmenorrhea Receiving Different Treatments: Prospective Observational Study. Adv Ther. 2022;
32. Alzahrani H, Mackey M, Stamatakis E, Zadro JR, Shirley D. The association between physical activity and low back pain: a systematic review and meta-analysis of observational studies. Sci Rep. 2019;9(1):1–10.
33. de Zoete RMJ, Brown L, Oliveira K, Penglaze L, Rex R, Sawtell B, et al. The effectiveness of general physical exercise for individuals with chronic neck pain: a systematic review of randomised controlled trials. Eur J Physiother. 2020;22(3):141–7.
34. Hayden JA, Ellis J, Ogilvie R, Malmivaara A, van Tulder MW. Exercise therapy for chronic low back pain. Cochrane Database Syst Rev. 2021;2021(9).
35. Song TJ, Chu MK. Exercise in Treatment of Migraine Including Chronic Migraine. Curr Pain Headache Rep. 2021;25(3).
36. Denham-Jones L, Gaskell L, Spence N, Tim P. A systematic review of the effectiveness of yoga on pain, physical function, and quality of life in older adults with chronic musculoskeletal conditions. Musculoskeletal Care. 2022;20(1):47–73.
37. Denham-Jones L, Gaskell L, Spence N, Pigott T. A systematic review of the effectiveness of Pilates on pain, disability, physical function, and quality of life in older adults with chronic musculoskeletal conditions. Musculoskeletal Care. 2022;20(1):10–30.
38. Sönmezer E, Yosmaoğlu BH. Dismenoresi Olan Kadınlarda Menstruasyona Yönelik Tutum ve Stres Algısı Değişiklikleri. Türk Fiz ve Rehabil Derg. 2014;25(2):56–62.
39. Chiu MH, Hsieh HF, Yang YH, Chen HM, Hsu SC, Wang HH. Influencing factors of dysmenorrhoea among hospital nurses: A questionnaire survey in Taiwan. BMJ Open. 2017;7(12):1–8.

## Ethics

**Ethics Committee Approval:** This study was approved by the Clinical Research Ethics Committee of the Bolu Abant İzzet Baysal University Hospital (Decision No: 2020/192, Decision Date:25.08.2020). The women included in the study were informed verbally and in writing in accordance with the Informed Consent Form and their consent was obtained.
**Informed Consent:** The authors declared that it was not considered necessary to get consent from the patients because the study was a retrospective data analysis.
**Authorship Contributions:** Concept: Z.D., H.D., N.Ö, Design: Z.D., H.D., N.Ö, Data Collection or Processing: H.D., Z.D., M.A.T., Analysis or Interpretation: H.D., N.Ö, Literature Search: Z.D., H.D., N.Ö, Writing: Z.D., H.D., N.Ö., M.A.T.
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