

# Influence of postural pattern according to the Godelieve Denys-Struyf method on pain and postpartum depression in the immediate postpartum

*Influência do padrão postural segundo o método Godelieve Denys-Struyf na dor e na depressão pós-parto no puerpério imediato*

*Influencia del patrón postural, según el método Godelieve Denys-Struyf, sobre el dolor y la depresión postparto en el puerperio inmediato*

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**ABSTRACT** | This study aimed to evaluate the relation between the postural pattern according to the Godelieve Denys-Struyf (GDS) method with postpartum depression and pain in immediate postpartum women. A cross-sectional study was conducted, including 29 women at 1-3 postpartum days. The Edinburgh Postnatal Depression Scale (EPDS) assessed depression and Visual Numerical Scale assessed pain score (from 0=no pain to 10=the most intense pain). Postural pattern was categorized into groups according to the deviation plane: axial (anteromedial, posteromedial, anteroposterior, and posteroanterior postures) and relational (anterolateral and posterolateral postures) or mixed, considering upper and lower limbs. Participants' age ranged from 19 to 41 years, body mass index from 21.4 to 43.8 kg/m<sup>2</sup>. The EPDS scored from 10 to 26 points. In total, 52% women reported pain, but the pain score was similar among postural pattern groups ( $p=0.77$ ) and not correlated with EPDS ( $p=0.88$ ). Women's postural patterns were: mixed (45%), relational (38%), and axial (17%). EPDS score was higher for relational pattern group than axial group ( $20.45\pm 1.63$  vs  $15.00\pm 3.24$ ;  $p=0.01$ ). In conclusion, the mixed postural

pattern was the most frequent. The relational postural pattern group (anterolateral and posterolateral posture) presented a higher depression score than the axial postural pattern group. No association was found between postural patterns and the pain score or between pain and postpartum depression.

**Keywords** | Posture; Postpartum period; Depression; Pain; Physical Therapy Modalities.

**RESUMO** | O objetivo deste estudo foi avaliar a relação entre o padrão postural, de acordo com o método Godelieve Denys-Struyf (GDS), a depressão pós-parto e a dor em mulheres no puerpério imediato. Foi realizado um estudo transversal com 29 mulheres no período de 1 a 3 dias após o parto. A depressão foi avaliada por meio da Escala de Depressão Pós-parto de Edimburgo (EPDS) e a dor pela Escala Visual Numérica de dor (0=ausência de dor, 10=dor intensa). O padrão postural foi categorizado de acordo com o plano do desvio da postura: axial (posturas ântero-medial, póster-medial, ântero-posterior e póster-anterior), relacional (posturas ântero-lateral e póster-lateral) ou misto, considerando membros superiores

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e inferiores. Como resultados, as mulheres, entre 19 e 41 anos de idade, apresentaram índice de massa corporal entre 21,4 e 43,8 kg/m<sup>2</sup>. A pontuação na EPDS variou de 10 a 26 pontos. 52% das mulheres relataram sentir dor, porém a pontuação na escala de dor foi similar nos três grupos de padrão postural ( $p=0,77$ ) e não houve correlação com a pontuação na EPDS ( $p=0,88$ ). Os padrões posturais apresentados foram: misto (45%), relacional (38%) e axial (17%). A pontuação da EPDS foi maior para o grupo de padrão postural relacional, em comparação com o axial ( $20,45 \pm 1,63$  vs  $15,00 \pm 3,24$ ;  $p=0,01$ ). Como conclusão, o padrão postural misto foi o mais frequente entre as mulheres. O grupo com padrão postural relacional (posturas ântero-lateral e póstero-lateral) apresentou maior pontuação na EPDS que o axial. Não houve associação entre o padrão postural e a pontuação na escala de dor ou entre a dor e a depressão.

**Descritores** | Postura; Período Pós-Parto; Depressão; Dor; Fisioterapia.

**RESUMEN** | El objetivo de este estudio fue evaluar la relación entre el patrón postural según el método Godelieve Denys-Struyf (GDS), la depresión postparto y el dolor en mujeres en el puerperio inmediato. Se realizó un estudio transversal con 29 mujeres en el período entre 1 y 3 días después del parto. Se evaluaron la depresión mediante

la Escala de Depresión Postparto de Edimburgo (EPDS) y el dolor mediante la Escala Numérica Visual del Dolor (0=ningún dolor, 10=dolor intenso). El patrón postural se categorizó según el plano de la alteración postural: axial (planos anteromedial, posteromedial, anteroposterior y posteroanterior), relacional (planos anterolateral y posterolateral) o mixto considerando tanto las extremidades superiores como las inferiores. Los resultados mostraron que las mujeres, de entre 19 y 41 años de edad, tenían un índice de masa corporal entre 21,4 y 43,8 kg/m<sup>2</sup>. La puntuación de la EPDS osciló entre 10 y 26 puntos. El 52% de las mujeres declararon sentir dolor, pero la puntuación en la escala de dolor fue similar en los tres grupos de patrones posturales ( $p=0,77$ ) y no hubo correlación con la puntuación de la EPDS ( $p=0,88$ ). Los patrones posturales presentados fueron mixto (45%), relacional (38%) y axial (17%). La puntuación de la EPDS fue mayor en el grupo de patrón postural relacional en comparación con el axial ( $20,45 \pm 1,63$  vs.  $15,00 \pm 3,24$ ;  $p=0,01$ ). Se concluye que el patrón postural mixto fue el más frecuente entre las mujeres. El grupo con un patrón postural relacional (planos anterolateral y posterolateral) obtuvo mayores tasas en la EPDS que el axial. No hubo asociación entre el patrón postural y la puntuación en la escala de dolor ni entre el dolor y la depresión.

**Palabras clave** | Postura; Período posparto; Depresión; Dolor; Fisioterapia.

## INTRODUCTION

During pregnancy, women undergo postural changes and musculoskeletal symptoms often appear<sup>1</sup>, causing discomfort and pain and possibly persisting after childbirth due to hormonal effects. In addition to physical changes, many women experience psychological disorders<sup>2</sup> such as postpartum depression (PPD)<sup>3</sup>, which is the most common disorder associated with pregnancy<sup>4</sup> and is characterized by changes in sleep, appetite<sup>3</sup>, and lack of interest in daily activities.

In the final trimester and after childbirth, women undergo changes in their body posture and daily routine, with a greater work overload related to the care for the newborn<sup>5</sup>. Postpartum women tend to remain in the same posture for long periods, such as sitting down with the newborn in their arms during breastfeeding or standing while carrying the baby. This may cause muscle tension, pain, and discomfort<sup>5</sup>, which can aggravate the clinical picture of PPD.

Postural analysis can be performed quantitatively, aided by a software<sup>6</sup>, or qualitatively. The method

developed by Godelieve Denys-Struyf (GDS) in the 1960s and 1970s is a qualitative method of analyzing and understanding posture based on specific postural patterns that reflect body organization and expression.

The GDS method includes biomechanical and behavioral analysis and acts in the prevention, treatment, and maintenance of good body discipline<sup>7</sup>. This study aimed to evaluate the relationship between the postural pattern according to the GDS method with PPD and pain in women in the immediate postpartum period.

## METHODOLOGY

This cross-sectional study was approved by the institution Research Ethics Committee, under the Certificate of Presentation for Ethical Appraisal No. 04142418.1.0000.5513, according to the recommendations of Resolution 466/2012 of the Brazilian National Health Council and was conducted at the maternity hospital Santa Casa de Misericórdia de

Santos-SP, from March to May 2019. The study employed a convenience sampling. The inclusion criteria were: women in the immediate postpartum, vaginal childbirth or Cesarean section, aged  $\geq 18$  years and able to communicate in Portuguese. The exclusion criteria were: women who had neurological or orthopedic dysfunction, whose neonate was born with disabilities; women who used psychoactive or illicit drugs during pregnancy; women who was a victim of sexual abuse; underwent psychiatric treatment before or during pregnancy; withdrew voluntary participation in the study, or filled the forms incompletely.

The puerperal women were invited to participate in the study 1–3 days after delivery. After the study protocol was explained, the women signed an informed consent form and reported their personal information and lifestyle habits. Then, the Edinburgh Postnatal Depression Scale (EPDS) questionnaire<sup>8</sup> was applied. EPDS is a self-administered questionnaire that has been previously validated in Brazil<sup>9</sup>. It consists of 10 questions with four options scored from 0 to 3 points based on the presence and intensity of depressive symptoms in the previous seven days, totaling 30 points<sup>9</sup>. For the Brazilian population, scores  $\geq 10$  points are considered indicative of PPD<sup>10</sup>.

Pain was assessed by the Visual Numerical Scale (VNS), which ranged from 0 (no pain) to 10 (worst possible pain)<sup>5</sup>. An image of the human body was included in the research instrument so that the patient could identify the pain site.

Finally, to evaluate the postural pattern, the GDS method was employed, with the aid of six representative images (Figure 1)<sup>11</sup> of the different postures, four of which are related to the spinal axis and two to the relational axis: a) anteromedial (AM) posture: there is a predominance of anterior flexion of the trunk and neck, with the gaze directed to the abdomen, a posture that is associated with a lack of affection; b) posteromedial (PM) posture: predominance of extension of the trunk with forward body projection, which is associated, from a behavioral perspective, to a person in need of action; c) posteroanterior (PA) posture: upright spine and the chest held in an inspiratory position reflects a person with tendency to reactivity; d) anteroposterior (AP) posture: flexion of the trunk reflects a tendency to be fragile and emotional; e) anterolateral (AL) posture: hips flexed and in internal rotation with the knees in a valgus position reflects an introverted person; and f) posterolateral (PL) posture: varus

knees, abduction hips, and external rotation reflects an extroverted person<sup>7</sup>. PA and AP postures can occur together, demonstrating stability and mobility of the trunk and lower limbs.

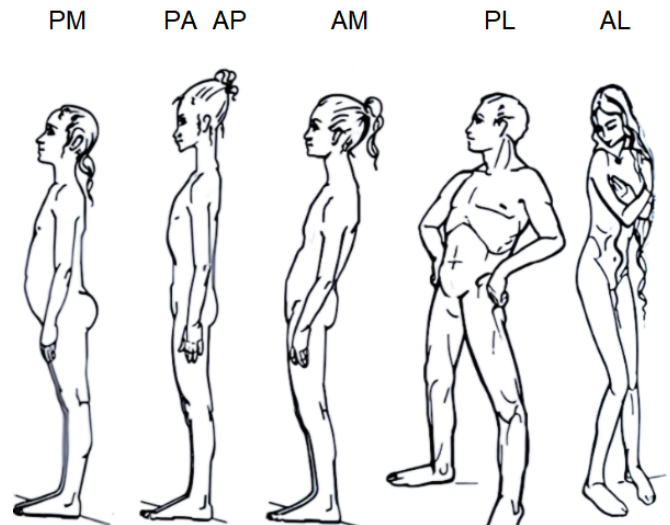


Figure 1. The five types of body posture according to the Godelive Denys-Struyf (GDS) method.

Source: Muscle and Joint Chains. The G.D.S. Godelive Denys-Struyf method. Ed. Summus, 5th edition, 1995. All rights reserved.

PM: posteromedial posture. PA: posteroanterior posture. AP: anteroposterior posture. AM: anteromedial posture. PL: posterolateral posture. AL: anterolateral posture.

The overall analysis of posture was performed in the frontal and sagittal planes without the patient having to undress so that she would not feel embarrassed in the hospital ward.

To perform a comparative analysis of EPDS and pain measured using a numerical scale, the observed postural pattern was categorized into two groups according to the deviation plane: (1) axial patterns (AM, PM, AP, and PA postures); (2) relational patterns (AL and PL postures).

The AM-PM-PA-AP postures are considered axial since they involve an important component in the spine, considering the physiological curvatures of the spine and the adaptation of the lower and upper limbs to the spine position.

The AL and PL postures are mainly based on the medial and lateral rotation movements of the shoulder and hip joints and on adaptations in the upper and lower limbs.

To analyze the body posture as a whole, that is, considering both upper and lower limbs, the body posture classification was grouped and reclassified into three groups as follows: (1) postural pattern in both lower and upper limbs, as described in the

AM-PM-PA-AP postures by the GDS method (considered axial postures); (2) postural pattern in both lower and upper limbs, as described in the AL-PL postures by the GDS method (considered relational postures); and (3) mixed postural pattern, in which the upper limbs may present the characteristics of the AM-PM-PA-AP postures and the lower limbs may present characteristics of the AL-PL postures concurrently or vice versa.

The data were analyzed using descriptive statistics. Then, the groups were compared using one-factor analysis of variance (ANOVA) (postural pattern) or a Kruskal-Wallis test, depending on the data distribution pattern. SigmaStat software

was used for statistical analysis. A 5% significance level was adopted.

## RESULTS

This study initially included 32 women, but three were excluded due to the presence of orthopedic dysfunction, illicit drug use before and during pregnancy, and psychiatric treatment before pregnancy; thus, 29 women completed the study. Women's age ranged from 19 to 41 years, body mass index from 21.4 to 43.8 kg/m<sup>2</sup>, and 69% were housewives. Table 1 presents the women's characteristics.

Table 1. Characteristics of the study participants (N=29).

Characteristic	Value
Age, years	25.17±5.76
BMI, kg/m <sup>2</sup>	29.91±5.74
<i>Race, n (%)</i>	
White	15 (52)
Black	14 (48)
<i>Women Education, n (%)</i>	
Less than eight years	1 (3)
8-11 years	6 (21)
More than 11 years	22 (76)
<i>Childbirth, n (%)</i>	
Vaginal delivery	10 (34)
Cesarean section	19 (66)

BMI: body mass index; n: absolute number. The data are presented either as mean and standard deviation or as absolute number and percentage of the sample.

In total, 15 women (52%) reported pain, with a mean score of 3.1±3.0. From these, nine women reported pain in the surgical scar and six in the spine. The EPDS score

ranged from 10 to 26 points, with a mean of 18.59±3.51 points. In the postural evaluation, the most common patterns were relational patterns (Table 2).

Table 2. Postural patterns observed by the Godelive Denys-Struyf method (N=29) for the segmental evaluation of the upper and lower limbs.

	Pattern	Upper limbs, n (%)	Lower limbs, n (%)
<i>Axial pattern</i>	Anteromedial	7 (24)	2 (7)
	Posteromedial	3 (10)	1 (3)
	Posteroanterior	4 (14)	2 (7)
	Anteroposterior	2 (7)	2 (7)
<i>Relational pattern</i>	Anterolateral	7 (24)	11 (38)
	Posterolateral	6 (21)	11 (38)

The Godelive Denys-Struyf postural patterns were categorized into two groups according to the deviation plane: (1) axial patterns (anteromedial, posteromedial, anteroposterior, and posteroanterior postures) and (2) relational patterns (anterolateral and posterolateral).

The distribution of postural pattern presented by 29 women considering the combined assessment of upper and lower limbs was as follows: axial postural pattern=5 (17.2%), relational postural pattern=11 (37.9%), and mixed postural pattern=13 (44.8%).

Table 3 presents the value obtained on the EPDS and the pain reported using the VNS. ANOVA was used to compare the EPDS among groups, indicating a significant

difference ( $p=0.01$ ). The Holm–Sidak method showed a difference between the relational pattern posture group and the axial pattern posture group regarding the EPDS ( $p=0.008$ ). The mixed pattern presented no significant differences when compared with the other two postural patterns. The power of the test for this comparison was 0.72, considering a 0.05 type I error of and the sample size of the study.

Table 3. Pain scale and Edinburg post-partum depression according to the postural pattern evaluated by the Godelive Denys-Struyf method (N=29).

	Axial postures in both lower and upper limbs	Relational postures in both lower and upper limbs	Mixed postural pattern
Edinburgh Postnatal Depression Scale, mean±SD	15.00±3.24*	20.45±1.63*	18.38±3.80
Pain scale, median (1st–3rd quartile)	5 (0–6)	2 (0–7.5)	0 (0–5.5)

=Axial postures: anteromedial, posteromedial, posteroanterior, or anteroposterior postures according to the GDS method in both lower and upper limbs. Relational postures: anterolateral or posterolateral postural pattern according to the GDS method in both lower and upper limbs. Mixed postural pattern: upper limbs may present the characteristics of the axial postures and the lower limbs may present characteristics of the relational postures concurrently or vice versa. SD: standard deviation. \*statistical significant difference between the relational pattern posture group and the axial pattern posture group ( $p=0.008$ ).

Regarding the reported pain, no significant differences were found between groups ( $p=0.77$ ) in the Kruskal–Wallis test. Pearson correlation test showed no correlation between depression and pain ( $p=0.88$ ).

## DISCUSSION

This study showed that 50% of the postpartum women experienced pain, more frequently located in the surgical wound (60%) than in the spine (40%). The most common postural patterns were relational (37.9%) and mixed (44.8%) patterns. However, no relationship was found between postural patterns and the pain score. All groups reported similar levels of pain. EPDS showed a score indicative of depression ( $\geq 10$  points) for all women with an average of 18 points. No correlation was found between the pain scale and EPDS. Finally, the relational postural pattern group presented a higher EPDS mean score than the axial postural pattern group, but there was no difference when compared with the mixed postural pattern group.

The high prevalence of pain among puerperal women was similar to previous studies<sup>12</sup>. Most women reported pain in the surgical wound and spine, which was expected as previously reported<sup>5,12,13</sup>. We found no association between the pain score and women's postural pattern, thus other issues are possibly involved,

such as muscle tension or shortening and maintaining an incorrect position while breastfeeding, holding, or cleaning the newborn.

The postural pattern may also be related to emotional aspects, as described by the GDS method. Anterior flexion of the trunk (AM posture) is associated to the puerperium in the GDS method and can be interpreted as a protective posture or of introspection, in which the woman adopts a more curved aspect with positioning of the upper limbs closer to the center of the body. This posture was reported in 24% of the sample for upper limbs and may be related to decreased abdominal tone in the postpartum period and position for breastfeeding and baby care. This can affect the lower back and generate discomfort.

Gaudet et al.<sup>13</sup> reported that postpartum women with problematic perinatal pain within three months postpartum were at higher risk of developing PPD but we did not find any association between pain and depression, which corroborates with cross-sectional studies conducted in Brazil<sup>12</sup> and France<sup>14</sup>.

PPD is highly prevalent<sup>12</sup> and associated with several factors<sup>15</sup>: pain, prolonged labor ( $>12$  h), maternal complications, and preterm birth ( $<36$  weeks) associated with neonatal diseases. We included women who had both vaginal and cesarean delivery and, despite all having healthy newborns, 100% of the sample had sufficiently high EPDS scores to indicate symptoms of depression.

The cutoff score used to define the presence or absence of the risk for PPD may vary. A cutoff score of  $\geq 13$  was less sensitive but more specific; a cutoff score of 11 may avoid false positive and false negative assessments<sup>16</sup>. A cutoff of  $\geq 10$  points (sensitivity 80%; specificity 53%<sup>9</sup>) is currently used in Brazil to avoid false negatives. Although EPDS holds low validity for the diagnosis of PPD in a general population of mothers<sup>9</sup>, PPD is a problem that deserves attention in the follow-up of puerperal women, regardless of reports of pain.

Angelo et al.<sup>12</sup> found an association between pain intensity and EPDS score, but not between the type of posture presented and EPDS score. The intensity of pain was higher in the group of women with what the authors called a “less structured posture.” The authors did not use the GDS method but rather performed postural evaluation by naturalistic observation.

Gilleard et al.<sup>17</sup> evaluated upper body alignment in the sagittal plane in sitting and standing positions during pregnancy and postpartum. They observed that, in the standing position, the pelvic spine was more rectified in the postpartum period compared with nulliparous subjects, arguing that this may be related to the fatigability of the trunk extensor muscles and to an impairment in the stabilization of the pelvis by the abdominal muscles, resulting in an imbalance between the anterior and posterior muscles.

Biviá et al.<sup>18</sup> identified no lumbopelvic postural changes in postpartum women compared with that in nulliparous women; however, they observed higher electrical activity of the trunk extensor muscles, indicating that these muscles adaptively responded to the previous load increase during pregnancy.

Catena et al.<sup>19</sup> reported that gestational lordosis persists for up to six weeks postpartum. Hyper lordosis increases stress on the thoracolumbar spine, enhancing burden on the anterior facets and fibrous ring, and may be associated with spine pain after delivery. Similarly, Opala-Berdzik et al.<sup>20</sup> found that trunk mobility for anterior flexion was increased two months after delivery with a peak at six months compared with the first gestational trimester. The authors also found that the mobility of the trunk for frontal flexion was associated with anteroposterior oscillation velocity at six months postpartum<sup>20</sup>.

Although the spine is undoubtedly relevant in the postural evaluation of postpartum women, this study indicates the importance of upper and lower

limbs in the physical therapeutic evaluation, especially regarding the medial rotation of the shoulder (upper limb function depends on good shoulder positioning) and the medial and lateral rotation of the hip, highlighting that some hip rotator muscles work in synergy with the pelvic floor.

In the GDS method, the characteristics of introspection and extroversion are associated with the postures AM and PM regarding the trunk, and with the postures AL and PL regarding the upper and lower limbs. Classifying the postures according to the axial or relational patterns is part of the GDS method.

In this study, the GDS postural patterns most frequently found, considering upper limbs and lower limbs alone, were the relational pattern, i.e., AL and PL postures. From the point of view of emotional response, the AL and PL postures may be associated with the ambiguous behavior of self-retraction and euphoria experienced by women, the need of relate to others to learn about motherhood, and, at the same time, to be watchful to her own sensations and experiences to build the maternal identity. The comparison to other mothers, the desire to protect the baby, and the hormonal fluctuation after delivery make this period even more difficult. Considering the high frequency of depressive symptoms in postpartum women, it is important to highlight the role of physical therapists in this context as professionals who have weekly contact with the patient and can detect early depressive symptoms. From the biomechanical point of view, at the end of pregnancy, the hip flexor muscles lose their effectiveness due to the increase of the pelvic anteversion, and the hip rotator muscles become more relevant to the hip's stabilization and mobility and to the synergism with pelvic floor muscles. Hip rotations that are relevant for Physical Therapy during the preparation phase for the delivery are also important in the puerperium.

In the GDS method, the posture that is mostly associated with emotional balance is the PA AP, which demonstrates stability and allows the trunk and lower limbs to move. In this study, we observed that the relational patterns of posture showed association with higher scores in the EPDS, pointing to the importance of exercises that focus on the stability and the mobility of the trunk, according to the posture PA AP.

The prevention of PPD remains an important but difficult goal to achieve<sup>19</sup>. Physical therapists can analyze puerperal women with greater specificity

using the GDS method since the body postures in this method are described based on body biomechanics and behavioral aspects.

Some limitations of this study must be considered, such as its observational design, which does not allow to establish causal relationships between variables. Moreover, we highlight that the same investigator performed all the assessments and evaluations. We only evaluated women in the immediate postpartum period, thus we do not have data regarding the development of postpartum depression in the long-term. Also, we used a convenience sample in a single center, thus we advise caution when generalizing the results.

## CONCLUSION

The mixed postural pattern was the most frequent pattern noted in the immediate postpartum period, followed by the relational and axial patterns. The relational postural pattern group presented a higher depression score than the axial postural pattern group, but no significant differences were found when compared with the mixed postural pattern group. No relationship was found between postural patterns and pain score or between pain and PPD.

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