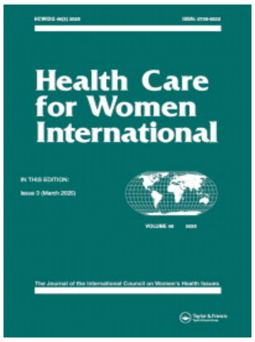

Health Care for Women International

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/uhcw20

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To cite this article: Chidiebele P. Ojukwu, Patrick C. Okwa, Ebere Y. Ihegihu, Stephen Sunday Ede & Ogehukwu J. Nebo (22 Apr 2025): Breastfeeding-related thoracic spine pain and correlates in postpartum Nigerian women: A cross-sectional study, Health Care for Women International, DOI: 10.1080/07399332.2025.2494205

To link to this article: https://doi.org/10.1080/07399332.2025.2494205

Published online: 22 Apr 2025.

HEALTH CARE FOR WOMEN INTERNATIONAL
https://doi.org/10.1080/07399332.2025.2494205

Breastfeeding-related thoracic spine pain and correlates in postpartum Nigerian women: A cross-sectional study

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ABSTRACT

Thoracic spine pain (TSP) is a disturbing condition associated with a decreased quality of life among postpartum women. We conducted a cross-sectional survey assessing the prevalence of TSP and associated factors among 400 conveniently recruited postpartum women from four public hospitals in Enugu, Nigeria. We collected data on thoracic spine pain, posture, and mobility using the Oswestry thoracic disability index, an inclinometer, and the tape rule(cm), respectively. We found a 22.5% prevalence of TSP, with over 65% of cases occurring during and after pregnancy. More than half (64.4%) of the participants recorded flexion hypomobility, while 37.3% had extension hypomobility. We found a significant association between TSP and age ($\chi^2 = 2.493$, $p = .013$), employment status ($\chi^2 = 11.650$, $p = .003$), and jobs needing repetitive spinal movements like neck bending ($\chi^2 = 9.491$, $p = .023$). TSP is fairly common in postpartum women with associated factors of younger age and being in jobs that require repetitive spinal movements.

ARTICLE HISTORY
Received 12 November 2024
Accepted 13 April 2025

The post-partum period is characterized by many pregnancy-related changes that could expose new mothers to significant discomfort. Pain in the thoracic spine and its correlates among Nigerian mothers is the particular focus of our current study, given the different physiological changes during pregnancy and lactation that could cause serious anatomical adjustments in the spine. Previous researchers have documented post-partum pain in the neck and lower back in this population. In our current cross-sectional study, we aim to add to the theoretical and clinical practice evidence for the prevention of musculoskeletal pain and the promotion

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of the general well-being of mothers. Our study is closely linked to several Sustainable Development Goals (SDGs), primarily to prevent injuries among mothers, thus contributing to overall health and well-being (SDG 3). Secondly, for productive employment and decent work for mothers (SDG8); by reducing the risk of WRMSDs and fostering a safer work environment. Also, to improve health promotion, awareness, training, and practices influencing quality health care education (SDG 4). We found a disturbing prevalence level of thoracic spine pain (TSP) that is mostly associated with younger age and being in jobs that require repetitive spinal movements. Therefore, future researchers can implement interventional trials that consider these identified factors. In this study, we have also provided important evidence for policy makers at the workplace for pregnant women and mothers' health promotion.

Background

We aim to determine the prevalence and correlates of thoracic spine pain amongst postpartum women to add to the body of knowledge on preventive interventions during maternal health classes. Thoracic spine pain (TSP) is pain in the upper or middle back, along the dorsal aspect of the trunk, and between the T1 and T12 vertebral column (Dunn et al., 2019). Ozaras (2015) have classified TSP as chronic (more than 12 weeks), subacute (4 weeks), or acute (<4 weeks). Compared to neck and lower back pain, it frequently results from severe spinal pathology (Briggs et al., 2009), though TSP can also affect healthy individuals across the lifespan without a serious underlying condition (Dunn et al., 2019). TSP affects about one-fifth of all people at some point in their lives and is a common presentation in primary health care clinical practice (Dunn et al., 2019).

While previous researchers have documented the highest pain prevalence in the cervical and lumbar regions of the human body due to lordosis in these areas (Casagrande et al., 2015; Close et al., 2014; Engeset et al., 2014), few literatures exist where researchers assessed the prevalence and associated factors for thoracic spine pain (TSP). Also, most researchers on the prevalence and correlates of back pain associated with pregnancy focus on low back and pelvic pain, even though thoracic spinal injuries are more incapacitating than lumbar and pelvic spine injuries (Danna-Dos-Santos et al., 2018). All back pain is a significant burden for postpartum women because it frequently reduces mobility, daily living skills, and quality of life (Close et al., 2014; Engeset et al., 2014).

Besides, the body undergoes significant physiological changes during pregnancy and lactation that could cause serious anatomical adjustments in the spine. Specific focus on TSP is necessary given many changes around the thoracic spine during pregnancy including wide-spread fluid retention, ligament laxity, weight gain, increased breast size, and increased lordosis (Borg-Stein et al., 2005; Petronilla et al., 2024). Pregnancy-related increases in breast mass and abdominal size are linked to a change in the body's center of gravity, which heightens cervical lordosis and thoracic kyphosis, posterior shoulder displacement, and medial-lateral and antero-posterior sway (Petronilla et al., 2024; Spencer & Briffa, 2013). Pregnant women frequently need to lean backward to regain balance, which widens and disrupts the entire spinal curvature (Gutke et al., 2006). Additionally, nursing mothers who frequently adopt improper breastfeeding positions are more likely to experience a variety of musculoskeletal postural issues, including upper back muscle and ligament strain, tensed shoulders, fatigue and stress, and general discomfort (Rani et al., 2019).

Only one American study by Danna-Dos-Santos et al. (2018) examined the prevalence of TSP in new mothers. Their research highlighted that TSP is a common issue among this group, likely due to the physical demands of caring for a newborn, such as breastfeeding, lifting, and carrying the baby. The researchers found that many new mothers experience significant discomfort in the thoracic region, which can impact their overall quality of life and ability to perform daily activities. Addressing this pain through proper ergonomics, physical therapy, and supportive practices can be crucial for improving their well-being (Briggs et al., 2009). In a recent and closely related research of Nigerian postpartum mothers, Petronilla et al. (2024) reported a significant link between breast size and the tendency toward a kyphotic posture of the thoracic spine. Although they did not find a direct link between breast size and TSP, the authors began to elucidate the possible compromise of the thoracic spine in this population.

Researchers have identified that an increased risk of TSP is associated with decreased spine motion, trunk strength, decreased bone mineral density, thoracic vertebral fractures, and increased thoracic kyphosis in other study populations (Dunn et al., 2019; Spencer et al., 2019). For a postpartum mother, it is not known how TSP is associated with the different maternal characteristics including age, exercise status, employment status, job requirements, and breastfeeding style. There is also no available report on how postpartum women's thoracic spine posture and thoracic spine mobility are related to TSP, as well as their impact on their quality of life.

Unlike neck and lower back pain (LBP), researchers have not well established the burden of TSP, which represents an important avenue for more research. There is a dearth of information on the prevalence of upper back pain (UBP) in postpartum women in sub-Saharan Africa. Interestingly, this is also demonstrated in the contents and scope of available maternal health education programs, where researchers or program designers do not frequently emphasize the protection of the thoracic spine and appropriate postures. Our research builds on the work of Petronilla and colleagues, as further investigation was required to understand the causes and correlates of TSP in postpartum women in Nigeria. If the correlates are understood, the information in our maternal health education program will be improved even further.

Method

Research design and setting

In this cross-sectional study, we followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklists (Von Elm et al., 2008). We conducted this study at four major government-owned hospitals in Enugu Metropolis, Nigeria, which comprises Enugu East and Enugu North senatorial districts. Four hospitals—a tertiary hospital and a general hospital/primary health center from the two senatorial districts were conveniently selected for this study. The hospitals include the University of Nigeria Teaching Hospital (UNTH) Ituku-Ozalla and Abakpa Health Center from Enugu East Senatorial District, the Enugu State University Teaching Hospita (ESUTH), and Polyclinic from Enugu North Senatorial District.

Participants

Our study involved a convenient sample of 400 mothers within 0–24 months postpartum who were recruited from the postnatal clinic, immunization unit, and children's outpatient departments/units of the selected hospitals. We obtained a minimum sample size of 300 at an acceptable sampling error of 0.05 through a priori calculation using the Cochran (1977) formula for an infinite population. We set the error allowance at 0.05, and the Z score for the confidence interval at 1.96 based on previous research on the prevalence rate (28.9%) of TSP among Nigerian postpartum (Omoke et al., 2021; Onyemaechi et al., 2021). The exclusion criteria were postpartum women with memory impairment, a history of thoracic spine surgery, congenital deformity, and those with neurological disorders of thoracic origin such as myelopathy and Transverse myelitis.

We sought and obtained ethical approval from the Ethical Review Committee of the University of Nigeria Teaching Hospital Ituku-Ozalla (NHREC/05/01/2008B-FWA 0000245 8-1RB00002323). Before participation in the study, the purpose and nature of the study were adequately explained to each participant, and confidentiality throughout the study was assured. On this basis, their written informed consents were obtained. Information on age, level of mobility, and medications were obtained from the participants and their anthropometric characteristics (height, weight, and body mass index) were measured.

Instrument of data collection

Thoracic spine pain constituted the primary outcome variable in this study, which we assessed using the Thoracic Oswestry Questionnaire (TOQ). The TOQ is a valid self-administered questionnaire that contains 10 items concerning the intensity of pain, lifting, and different aspects of functional ability such as ability to care for oneself, ability to walk, ability to sit, ability to stand, social life, sleep quality, ability to travel and its effect on their sex life (Fouquet et al., 2015). The total score is multiplied by 2 and expressed as a percentage. These were interpreted as follows: 0–20%, minimal disability; 21–40%, moderate disability; 41–60%, severe disability; 61–80%, very severe; 81–100%, complete dependency (Ogunlana et al., 2015). This tool has been used and proven valid in this population (Havens et al., 2022; Ogunlana et al., 2015).

We also assessed the thoracic spine mobility and posture as secondary variables to further elucidate the extent to which pain has impacted the functionality of the thoracic spine. The spine posture was assessed using an inclinometer (universal inclinometer U101). Consistent with Barrett et al. (2014), this was classified for thoracic spine kyphosis of 20–50 degrees as normal, 20–35 degrees as normal low category, 36–50 degrees as normal high category, and <20 as hypokyphosis and >50 as hyperkyphosis. The tape rule was used to assess the mobility of the thoracic spine in centimeter. According to Magee (2014), a 2.7 cm difference in measurement between a neutral position and active end-range flexion and a 2.5 cm difference in measurement between a neutral position and active end-range extension is considered normal for flexion and extension mobility, respectively.

Socio-demographics such as level of education, employment status, and occupation were also collected. As well as gynecological and obstetrics history including parity, exercise status, infant carrying methods, type of breastfeeding brazier, number of childbirths, number of children, number of children breastfed, number of children currently being breastfed, breastfeeding position, and method of delivery.

Procedures

Participants filled out the self-administered questionnaire comprising the demographic characteristics, gynecological and obstetrics history, and TOQ under the guidance of the researchers. Data collection was conducted between January and September 2023.

We assessed the thoracic spine posture using an inclinometer in a confined room for privacy purposes. The participants were asked to remove their upper body clothing while wearing a singlet or a vest. On the C7 and T12 spinous processes, marks were made on the skin over the spine. Palpation was used to locate the C7 spinous process, which is thought to be the most prominent at the cervicothoracic junction (Määttä et al., 2022) The participants were told to extend their neck and head to verify that the assessor was in the correct anatomical position, as the C7 spinous process would not move while the C6 spinous process moves anteriorly (Lumley, 2002). This technique is more accurate than relying on the C7 spinous process as the most prominent (Lumley, 2002). The T12 was found in the current investigation by first identifying L4 using Lumley's technique and then numbering up the spinous processes to T12 using palpation (Shin et al., 2011). The L4 is located in the middle of an imaginary line drawn between the iliac crests and is the most exact spinal landmark in the lower thoracic and lumbar spine (Määttä et al., 2022). During the measurement at C7, amongst the 2 contact pillars of the inclinometer, the edge of the upper contact pillar was in touch with the marking at the C7, while the lower contact pillar was lying just below the upper pillar. At the T12, the edge of the lower contact pillar of the inclinometer was in touch with the marking, while the upper contact pillar was lying just above the marking/lower contact pillar.

The mobility test using the tape rule in centimeter was performed in a standing position from the spinous process of T1 to that of T12. Measurements were performed in a neutral position, in active end-range flexion of the thoracic spine, and active end-range thoracic spine extension.

Data analysis

We summarized the data using descriptive statistics of frequency, percentage, mean, and standard deviation. We used the Chi-square test to assess the association between pain and posture, spinal mobility, and gynecological and obstetric characteristics. Where appropriate, an independent t-test and multiple logistic regression were employed for the inferential test. We conducted the data analysis with the aid of the Statistical Package for Social Sciences (SPSS) (IBM Corp., 2012). The level of significance was set at $\alpha = 0.05$.

Results

The mean age and body mass index were 28.2 ± 5 years and 27.4 ± 4.8 kg/m^2, respectively. Most of the participants (95%) were between the ages of 21–40. Less than half of them (47.5%) possessed secondary education. More than half of them were currently employed (58.5%) and did not engage in occupations and jobs needing repetitive spinal movements such as prolonged neck bending (61%) (Table 1).

Table 1. Sociodemographic characteristics of the participants.

Variables	Mean ± standard deviation/frequency	Percentage
Age(years)	28.2 ± 5.0	
Weight (kg)	71.9 ± 14.3	
Height (m)	1.61 ± 0.1	
BMI (kg/m^2)	27.4 ± 4.8	
Age (years)		
<20	12	3.0
21–40	380	95.0
>40	8	2.0
Level of education		
Primary	16	4.0
Secondary	190	47.5
Tertiary	180	45.0
Post-graduate	14	3.5
Employment status		
Yes	234	58.5
No	166	41.5
Employment in the last 12 months (n = 166)		
Yes	33	19.9
No	133	80.1
Occupation (n = 234)		
Professional/technical/managerial	70	29.9
Clerical	22	9.4
Sales	56	23.9
Skilled manual	69	29.5
Unskilled manual	6	2.6
Agriculture	11	4.7
Engagement in jobs needing repetitive spinal movements like the bending of the neck and upper back		
Yes	156	39.0
No	244	61.0

More than half (61%) of the participants were multigravida with 2–4 pregnancies, 61% of them were multiparous and most of them (87%) were not practicing any postnatal exercises. More than half (57%) of the mothers had breastfed 2–4 children, 92% were breastfeeding infants, with the majority (91.7%) breastfeeding one infant. More than half (57%) of the mothers adopted the cradle position as their most common breastfeeding position, and the majority (75.3%) did not use breastfeeding pillows for support. Less than half (38%) of them were using infant carriers, and the majority (96%) adopted front infant carrying methods. Also, 41% identified nursing brassiere as their commonly utilized type of breastfeeding brassiere (Table 2).

The prevalence of thoracic spine pain was 22.5% of the participants, out of which 37.8%of them started experiencing their pain after childbirth, and 58% of them rated their pain intensity to be moderate (Table 3).

Table 4 shows the factors associated with thoracic spine pain. We found that increasing age was statistically associated with thoracic spine pain ($\chi^2 = 12.064$, $p = .007$). There was a statistically significant association between employment status and thoracic spine pain, with pain being more frequently recorded in persons who are currently employed compared to those not currently employed ($\chi^2 = 11.650$, $p = .003$). The bending status of

Table 2. Obstetrics and gynecological characteristics of the participants.

Variables	Frequency	Percentage
Number of pregnancy		
Primigravida	123	30.8
Multigravida (2–4)	245	61.2
Multigravida (>4)	32	8.0
Parity		
Primiparous	125	31.2
Multiparous (2–4)	243	60.8
Multiparous (>4)	32	8.0
Number of children alive		
1–4	368	92.0
>4	32	8.0
Current practice of postnatal exercise(s)		
Yes	52	13
No	348	87
Mode of practiced Physical Exercise		
Aerobics	28	53.8
Stretches	22	42.3
Others	2	3.8
Children breastfed throughout lifetime		
1	142	35.6
2–4	226	56.6
>4	32	7.8
Current breastfeeding status		
Yes	368	92.0
No	32	8.0
Children being breastfed currently		
1	344	91.7
>2	31	8.3
Body weight of baby being breastfed		
<5 kg	21	58.3
>5kg	15	41.7
Commonly utilized Breastfeeding Position		
Cradle	228	57.0
Cross cradle	66	16.5
Football hold	70	17.5
Laid back	6	1.5
Side-lying	30	7.5
Use of breastfeeding pillows		
Yes	99	24.8
No	301	75.3
Use of infant carriers		
Yes	151	37.8
No	249	62.2
Infant carrying methods for those that used infant carriers (*n* = 151)		
Back	7	4.5
Front	147	95.5
Most frequently used brazier on an average day		
Convertible	25	6.3
Basic brallete	42	10.5
Push up	162	40.5
T-shirt/nursing bra	165	41.3
Sports bra	68	1.5

occupation (i.e., jobs needing repetitive spinal movements like prolonged neck bending) was associated with thoracic spine pain ($\chi^2 = 9.491$, $p = .023$). There was no statistically significant association between thoracic spine pain and obstetrics and gynecological characteristics ($p > .05$). Similarly, there was no statistically significant association between thoracic spine

Table 3. Thoracic spine pain, posture and mobility among the participants.

Variables	Frequency	Percentage
Active thoracic spine pain (400)		
Yes	90	22.5
No	310	77.5
Timing of pain ($n = 90$)		
Before pregnancy	31	34.4
During pregnancy	25	27.8
After childbirth	34	37.8
Pain intensity ($n = 59$)		
Mild	17	28.8
Moderate	34	57.6
Severe	8	13.6
Posture ($n = 400$)		
Hypokyphosis	–	–
Low normal	180	45
High normal	210	52.5
Hyperkyphosis	10	2.5
Thoracic spine mobility (flexion) ($n = 59$)		
Normal	20	33.9
Hypomobile	38	64.4
Hypermobile	1	1.7
Thoracic spine mobility (extension) ($n = 59$)		
Normal	25	42.4
Hypomobile	22	27.3
Hypermobile	12	20.3

pain and exercise status ($p > .05$), thoracic spine mobility ($p > .05$), and posture ($p > .05$).

Table 5 presents the multiple logistic regression analysis conducted to understand further how age, employment status, and jobs needing repetitive bending affect TSP. Our model correctly classified 77.2% of the cases and was found to be statistically significant ($\chi^2(3)=14.415$, $p = .002$), and explained between 3.5% to 5.4% of the variance in TSP. The analysis of coefficients and odds ratios indicated that acting alone, age ($p = .051$), employment status($p = .094$), and jobs needing repetitive bending ($p = .059$) are not significant predictors of TSP among postpartum women in Nigeria.

Discussion

Our study explored the prevalence of thoracic spine pain (TSP) and associated factors among postpartum women in Nigeria. The results confirmed a 22.5% prevalence of TSP, indicating that it affects a moderate proportion of postpartum women in the studied population. This prevalence rate is similar to those reported for other back pain such as lumbar-pelvic pain (Wu et al., 2004), which were reported in 25% of postpartum women. The prevalence value in the present study is also higher than those reported for lower back pain (9.6%) among pregnant women attending ante-natal clinics obtained in a Nigerian-based study (Ayanniyi et al., 2006; Muhammad et al., 2022). Although the discrepancy in the findings could be explained by the year of study, the method of assessment of pain, and the population

Table 4. Factors associated with thoracic spine pain.

	Pain status			
Factors	Yes	No	t/x²-value	*p*
Age	29.4 ± 4.2	27.9 ± 5.2	2.493	.0013*
13–19 years	1	7	12.064	.007*
20–29 years	46	208		
30–39 years	41	82		
40–49 years	2	12		
Employment				
Yes	64	169	11.650	.003*
No	25	139		
Occupation				
Professional	14	56	3.201	.669
Clerical	5	17		
Sales	19	43		
Skilled	23	52		
Skilled manual	1	5		
Agriculture	3	8		
Does occupation require repetitive spinal movements like the bending of the neck and upper back?				
Yes	44	111	9.491	.023*
No	43	194		
No of children				
1	24	101	4.699	.195
2–4	54	186		
>4	12	21		
No children breastfed in lifetime				
1	30	112	2.130	.546
2–4	50	174		
>4	10	21		
Currently, breastfeeding a child?				
Yes	84	283	0.496	.780
No	6	25		
Commonly utilized Breastfeeding position				
Cradle	52	176	1.656	.799
Crosscradle	16	49		
Football hold	16	54		
Laid-back	2	2		
Sidelying	4	24		
Use of breastfeeding pillow				
Yes	20	79	1.237	.539
No	69	229		
Use of Infant carrier				
Yes	37	114	0.643	.458
No	52	195		
Infant carrying methods for those that used infant carriers				
Back	2	5	0.083	.773
Front	35	112		
Commonly utilized bra type				
Convertible	4	21	5.019	.285
Basic bralette	7	35		
Pushup	32	130		
T-shirt/nursing	46	118		
Sports bra	1	4		
Current exercise status				
Yes	9	41	0.989	.610
No	81	267		
Exercise type				
Aerobic	5	23	0.683	.711
Stretched	5	27		
Others	-	2		

(*Continued*)

Table 4. Continued.

Factors	Pain status Yes	No	t/x²-value	*p*
Thoracic spine flexion mobility				
Normal	–	1	4.074	.254
Hypomobile	65	215		
Hypermobile	25	93		
Thoracic spine extension mobility				
Normal	–	–	0.001	.980
Hypomobile	38	130		
Hypermobile	52	179		
Thoracic spine Posture				
Hypokyphosis	–	–	2.482	.280
Normal	34	145		
Low normal	53	157		
High normal	3	7		
Hyperkyphosis	-	-		

*Indicates significance at $p < 0.05$.

Table 5. Coefficients and odds ratios of multiple logistic regression model.

Variable	B	S.E.	df	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
Age	0.049	0.025	1	0.051	1.050	1.00	1.104
Employment status	−0.465	0.278	1	0.094	0.628	0.364	1.083
Occup involving bending	−0.475	0.251	1	0.059	0.622	0.380	1.018
Constant	−2.197	0.760	1	0.004	0.111		

studied, our study's findings highlight the significant burden of TSP in this population.

Of the factors assessed in this study, only three were associated with the occurrence of TSP, although their impact diminished with further regression analysis. They include age, employment status, and jobs needing repetitive spinal movements such as neck bending. While mothers involved in the study were young, the result shows that increasing age was statistically associated with TSP. This is contrary to Briggs et al. (2009) and Leboeuf-Yde et al. (2009) which reported no association between age and frequency of TSP among adults. However, when comparing adults with children, Spencer et al. (2019), as well as Briggs and colleagues observed higher TSP prevalence in children compared to adults aged 40–69. Age transition from early to late adolescence was a significant risk factor for TSP (Dunn et al., 2019). There is also evidence to suggest that pain or dysfunction in the thoracic spine is not trivial in adulthood (Leboeuf-Yde et al., 2009). The rising incidence of spinal pain and its impact on future adults indicate the need for preventive and interventional care for pregnant and postpartum mothers. These could be attended to as part of ante-natal care education.

There was a significant association between employment status and TSP, with a higher frequency of pain reported among individuals currently employed. This could be because these categories of people are exposed to additional work-related musculoskeletal disorders. This could also explain the significant association noted between being in jobs needing repetitive spinal movements such as frequent neck bending and TSP. This finding is consistent with Briggs et al. (2009), who reported in a systematic study describing 65 cohorts covering manual laborers, office workers, health professionals, manufacturing and industrial workers, drivers, military personnel, and performing artists, that the prevalence of TSP varied with occupational groups and period. Employment-related factors associated with TSP that were identified by Briggs et al. (2009) included general work-related factors such as high workload, high work intensity, perceiving ergonomic problems in the workplace, performing boring/tedious work tasks, certain year levels of study, employment duration, driving specialized vehicles. Secondly, there are psychosocial work-related factors including the perceived risk of injury and high mental pressure. Also, physical work-related factors include manual physiotherapy tasks, climbing stairs, and high physical stress. Similar to our study's findings, Fidecki et al. (2016) also noted that frequent bending is associated with some occupations of their respondent working in neurology, neurosurgery, and orthopedics units. Some identified occupations included physiotherapists, paramedics, and nurses (Jabłońska et al., 2016). While being in occupation is part of life and could provide an avenue for exercise and optimum physical activity level during pregnancy and post-partum period, jobs requiring excessive effort might need to be modified to support this group, including providing adequate periods for maternity leave and doing less manual tasks at work.

This novel study contributes to discussions on the burden of TSP among postpartum mothers, an area that has not been well explored. It adds to previous research in this population that has weakly linked TSP with increased breast size in new mothers (Petronilla et al., 2024). However, interpretations of our study's findings should take into account some notable limitations. The use of the inclinometer for spinal mobility assessment as their reliability can vary depending on the operator's experience and consistency (Lewis & Valentine, 2010), as well as the participant's varying body type, posture, and positioning (Barrett et al., 2014). These limitations of the inclinometer might have influenced the results of our study compared to studies assessing the angle of Cobb with more advanced tools like the X-ray. Also, the cross-sectional nature of our study means there is a poor estimate of causality and future studies are recommended for a robust study methodology to further confirm this study's findings.

Conclusion

Thoracic spine pain is fairly common in postpartum women with possible associated factors of age, employment status, and being in jobs that require repetitive spinal movements like neck bending. Education on back care pre- and postpartum should be given a central space and ante-natal targeted screening for TSP could be focused on postpartum women who were employed, younger, and employed in jobs involving manual handling.

Acknowledgments

We acknowledge the management of the hospitals that served as study settings and the women who volunteered to participate in this study.

Ethical approval

The Health Research Ethics Committee, University of Nigeria Teaching Hospital, Ituku-Ozalla, and Enugu State University Teaching Hospital, Parklane, both in Enugu state, Nigeria approved this study. Before participation in this study, participants were informed of the study's purpose, risks, and benefits, on which basis their informed consent was obtained. This study was carried out in accordance with the Declaration of Helsinki. Ethics number: NHREC/05/01/2008B-FWA0000245 8-1RB00002323 (University of Nigeria teaching hospital) and ESUTH/C-MAC/RA/034/vol.3/14 (Enugu state University teaching hospital, Parklane).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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Data availability statement

The data supporting this study's findings are available on request from the corresponding author, [CPO]. The data are not publicly available due to [restrictions, e.g., their containing information that could compromise the privacy of research participants].

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