

# Postpartum Symptoms After Antepartum Bed Rest

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**Objective:** To determine the type and frequency of postpartum symptoms during recovery from antepartum bed rest treatment across 6 weeks postpartum.

**Design:** Longitudinal repeated measures study.

**Setting:** Three perinatal tertiary care hospitals in two cities in the Midwest.

**Participants:** One hundred six postpartum women who had a singleton high-risk pregnancy and were treated with antepartum bed rest.

**Main Outcome Measures:** A Postpartum Symptom Checklist assessed physiologic and psychological symptoms.

**Results:** Women reported 12.5 symptoms at 2 days postpartum, but symptoms rapidly declined at 1 week. Ninety-three percent reported a mean of 6.6 symptoms at 6 weeks postpartum. Symptoms that continued to be reported at 6 weeks by at least 40% of women were fatigue, mood changes, tenseness, difficulty concentrating, back muscle soreness, dry skin, and headache. Women who had a cesarean delivery reported significantly more symptoms than those who had a vaginal delivery ( $p = .006$ ). Length of maternal bed rest was significantly correlated with the number of symptoms at postpartum weeks 1, 2, 4, 5, and 6.

**Conclusion:** Postpartum symptoms decreased across time but reveal an underlying morbidity that is not resolved by 6 weeks postpartum. *JOGNN*, 34, 163–171. DOI: 10.1177/0884217504274416

**Keywords:** Bed rest—High-risk pregnancy—Pregnancy—Postpartum—Symptoms

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## Background

Bed rest is prescribed for approximately 1 million American women per year who have pregnancy complications, but little attention is paid to maternal recovery after bed rest. Bed rest is associated with major adverse effects during treatment and recovery among nonpregnant persons (Fortney, Schneider, & Greenleaf, 1996; National Space Biomedical Research Institute [NSBRI], 2001; Sandler & Vernikos, 1986), and recent reports indicate that pregnant women are similarly affected by bed rest (Maloni et al., 1993; Maloni & Schneider, 2002). Therefore, the purpose of this research was to describe the common symptoms and their frequency during the first 6 weeks postpartum experienced by women after antepartum bed rest treatment.

The postpartum period is considered a time of rapid return to normal function (Glazener et al., 1995). Women are often discharged from the hospital within 2 days and advised to return for evaluation at 4 to 6 weeks postpartum. During this time, medical attention rapidly shifts from the woman to infant feeding and care. As a result, maternal symptoms during postpartum recovery are often under-recognized (Albers, 2000; Brown & Lumley, 1998; Glazener et al., 1995; Thompson, Roberts, Currie, & Ellwood, 2002).

Studies about postpartum symptoms have been limited primarily to women with a healthy pregnancy. Most studies describe one symptom in depth such as fatigue, depression, or backache (Beck, 1993; Gardner, 1991; Lee & Zaffke, 1999; Russell, Dundas, & Reynolds, 1996; Smith-Hanrahan &

Deblois, 1995). Although this approach is valuable, a broader description of the variety of symptoms that affect postpartum women is needed.

Only two studies described the variety of postpartum symptoms among women who had a healthy pregnancy (Glazener et al., 1995; Thompson et al., 2002). Common symptoms at 8 weeks postpartum among 1,295 Australian women were extreme tiredness and backache (Thompson et al., 2002). Among 1,249 English women, the most common symptoms at 8 weeks postpartum were fatigue or backache. Seventy-six percent of women reported at least one symptom at 8 weeks, with fatigue reported by more than 40% (Glazener et al., 1995). However, both studies were limited because data collection occurred at 8 weeks and required maternal recall over a 2-month period. Furthermore, neither study reported reliability of the questionnaire. Both studies found that postpartum symptoms only partially resolved across the 1st year. As a result, women were left with a low level of lingering morbidity that interfered with daily function and quality of life. Another study found that fatigue lingered across 18 months among 229 new mothers and that women reported a high number of indicators of illness (Parks, Lenz, Milligan, & Han, 1999).

There is little knowledge about recovery after antepartum bed rest, but aerospace researchers have studied the side effects of bed rest in depth. As a result, there is extensive evidence that documents that bed rest results in numerous adverse side effects and a prolonged recovery among nonpregnant individuals (Bloomfield, 1997; Fortney et al., 1996; Rubin, 1988). During bed rest, the shift in body fluids toward the head and reduced weight bearing rapidly induce changes in every physiologic system (Fortney et al., 1996; Maloni & Schneider, 2002; NSBRI, 2001; Rubin, 1988; Sandler & Vernikos, 1986). Psychological changes also result from isolation, reduction of kinesthetic and other sensory stimuli, and a dulling of cortical and cognitive processes (Hammer & Kenan, 1980; Rubin, 1988). Both the physiologic and psychological changes produce a variety of adverse effects.

A major adverse effect of bed rest is musculoskeletal and cardiopulmonary deconditioning (Fortney et al., 1996; NSBRI, 2001; Sandler & Vernikos, 1986). Muscle atrophy begins within 6 hours of bed rest (Fortney et al., 1996). Recovery is prolonged and varies with specific physiologic functions (Fortney et al., 1996; NSBRI, 2001). For example, it is not known whether muscle function and bone loss are completely restored in some sites (Bloomfield, 1997; Fortney et al., 1996; LeBlanc et al., 2000; Prou & Marini, 1997). Muscle atrophy, generalized weakness, disturbances in coordination and gait, leg and back pain, and difficulty with walking become especially apparent when resuming ambulation (Bloomfield, 1997). Postural muscle strength and work capacity remain below baseline for weeks after recovery begins (Bloomfield,

1997; Fortney et al., 1996; LeBlanc et al., 2000; NSBRI, 2001; Prou & Marini, 1997). Tesch, Berg, Haggmark, Ohlsen, and Dudley (1991) found that nonpregnant persons reported that 7 weeks of recovery was insufficient to restore the muscle deconditioning effects of 4 weeks of inactivity. Cardiovascular symptoms during recovery from bed rest include decreased exercise tolerance, orthostatic intolerance, dizziness, shortness of breath on exertion, pedal edema, fainting, increased heart rate, and fatigue (Fortney et al., 1996).

There is also evidence of psychological changes during bed rest including a dulling of cortical processes resulting in impaired cognition, changes in electroencephalogram waves, and alterations in behavior and affect (Greenleaf, Bernauer, Ertl, Trowbridge, & Wade, 1989; Sandler & Vernikos, 1986). Changes in cognition result in impairment in ability to perform tracking tasks, memorization, and difficulty concentrating. Changes in behavior and affect result in increased irritability, tenseness, mood lability, boredom, depression, and sleep changes (Fortney et al., 1996; Sandler & Vernikos, 1986).

Postpartum symptoms associated with antepartum bed rest have been identified in three studies (Maloni et al., 1993; Maloni, Kane, Suen, & Wang, 2002; Maloni & Schneider, 2002). In a small study, symptoms of 17 women during bed rest recovery were compared with 18 healthy postpartum women not treated with antepartum bed rest (Maloni et al., 1993). Women treated with bed rest had postpartum symptoms of deconditioning including leg muscle atrophy; deep soreness of the postural muscles of the back, legs, and knees; and shortness of breath on exertion. Other symptoms included depression and difficulties with knee buckling, walking, negotiating stairs, and chair transfer. Symptoms decreased but were not resolved by 6 weeks (Maloni et al., 1993). In contrast, such symptoms were not reported by women who had a healthy pregnancy.

In a second longitudinal study, assessment of 65 women revealed that antepartum bed rest induced muscle atrophy (Maloni & Schneider, 2002). During recovery, atrophy improved but had not fully returned to normal by 6 weeks postpartum. In a third study, depressive symptoms were examined for 63 women prescribed bed rest (Maloni et al., 2002). Antepartum depressive symptoms decreased significantly but did not return to baseline by 6 weeks postpartum. A limitation of these studies was that none explicated the possible range of maternal postpartum symptoms or their pattern over the 6 weeks postpartum.

It is widely recognized that lying in bed for long periods is not healthy, particularly for the elderly or those who have had surgery. Little thought is given to the effects of prolonged bed rest on the pregnant woman, and as a result, maternal symptoms after bed rest are often unrecognized by health care providers (Maloni et al., 2002). Rather, postpartum women treated with antepartum bed

rest are expected to quickly remobilize after birth and care for themselves and their infant. Postpartum discomfort and debilitation can affect a mother's ability to recover, safely care for her infant(s), and resume normal activities of daily living (Maloni & Schneider, 2002).

## **P**ostpartum symptoms after antepartum bed rest are unrecognized and untreated.

Of concern, when a person has multiple symptoms simultaneously, the symptoms often catalyze each other and result in an overall increase in discomfort and decrease in functional fitness, role performance, cognitive functioning, and perception of health and quality of life (Lenz, Pugh, Milligan, Gift, & Suppe, 1997; Parks et al., 1999). In turn, increased discomfort leads to further decline in physical functioning and increased morbidity (American College of Obstetricians and Gynecologists, 2002; McArdle, Katch, & Katch, 2001). It is therefore important to assess for postpartum symptoms among women who have been prescribed antepartum bed rest. Currently, no research has identified the broad range of symptoms common to postpartum recovery after antepartum bed rest. As a result, health care providers have little evidence on which to base postpartum assessment and plans for rehabilitation after bed rest. Using a psychophysiological framework based on findings in both non-pregnant and pregnant individuals on bed rest, the purpose of this study was to determine the type and frequency of weekly postpartum symptoms reported by women previously treated with antepartum bed rest at 2 days and during each of the first 6 weeks after birth.

## Method

### *Design*

A longitudinal repeated measures design was used to assess maternal symptoms at seven time points through 6 weeks postpartum. Assessment occurred at 2 days before hospital discharge and weekly thereafter. These times were chosen to replicate a previous study of postpartum side effects (Maloni et al., 1993). Data reported here are part of a larger study examining other effects of bed rest (Maloni et al., 2002; Maloni & Schneider, 2002).

### *Participants*

The convenience sample consisted of 106 postpartum women with pregnancy complications who were treated

with antepartum bed rest. Women were enrolled shortly after hospital admission. Bed rest was defined as restriction of physical activity to the hospital bed with ambulation limited to the bathroom. Postpartum recovery was the time between birth and 6 weeks postpartum. Women were included if they had a singleton gestation between 21 and 33 weeks, were at least 16 years of age, and were healthy before pregnancy. Inclusion diagnoses were preterm labor, premature rupture of membranes, placenta previa, abruption, incompetent cervix, or a combination of these conditions. Exclusion criteria were multiple gestation, the diagnosis of musculoskeletal or psychiatric disorders, or the presence of acute or chronic diseases such as, but not limited to, hypertension and diabetes. Participants were admitted to the hospital in the obstetric services of three perinatal tertiary care hospitals in two Midwest cities. These settings provided an ethnically diverse sample from both rural and urban areas.

### *Measures*

Postpartum symptoms of recovery from antepartum bed rest were assessed by a self-report Postpartum Symptom Checklist (PSC; Maloni et al., 1993). The PSC was developed based on clinical experience and an extensive review of the literature on bed rest and subsequently refined (Fortney et al., 1996; Hammer & Kenan, 1980; Maloni et al., 1993; Maloni & Kasper, 1991; NSBRI, 2001).

The PSC consists of 35 symptoms that are common to either recovery from bed rest or both bed rest and child-bearing. Subjects identified whether symptoms were present or absent. Items include symptoms of musculoskeletal and cardiovascular deconditioning (15 items), psychological symptoms (7 items), and 13 other physiologic symptoms associated with recovery from bed rest. Women were also given an opportunity to list and describe a symptom they experienced that was not listed on the checklist. Examples of musculoskeletal and cardiovascular deconditioning symptoms are shortness of breath on exertion, dizziness, fainting, fatigue and pedal edema, and muscle soreness of various postural weight-bearing muscles. Examples of psychological symptoms include difficulty concentrating, mood changes, tenseness, and boredom. Examples of the 13 physiologic symptoms include skin dryness or soreness, change in the circadian sleep cycle rhythm, and symptoms associated with the sensory system dysfunction such as nasal congestion and headache. Nine items are common to recovery from both bed rest and a healthy pregnancy such as constipation, indigestion, decreased appetite, reflux, fatigue, headache, and nightmares (Gardner, 1991; Gjerdingen, Froberg, & Kochevar, 1991; Lee & Zaffke, 1999; Smith-Hanrahan & Deblois, 1995). Items that describe only recovery from a healthy pregnancy were not included as the purpose of the PSC was to elucidate symptoms associated with recovery

from antepartum bed rest. Discriminant validity and Cronbach's alpha reliability (.78) of the PSC was established in a previous study (Maloni et al., 1993). Cronbach's alpha for the current study ranged from .79 to .84.

Demographic and perinatal data were also obtained from the hospital record and participant interview using the Demographic Assessment Tool (Maloni et al., 1993). Interrater reliability was .98. Data about the length of hospital and home bed rest were collected but because compliance with home bed rest varies greatly (Josten, Savik, Mullett, Campbell, & Vincent, 1995), only length of hospital bed rest was used in the analysis.

Training of data collectors occurred before study initiation and every 3 months thereafter. Interrater reliability for protocols was maintained at .95. After approval by institutional review boards, written informed consent was obtained. Enrollment occurred over a 5-year period between 1996 and 2002. Data were collected at 2 days after birth in the hospital; by telephone interview at 1, 3, and 5 weeks; and at 2, 4, and 6 weeks during a home visit. Subjects received \$50 for participation. Data were analyzed using descriptive statistics. Pearson correlations were used to determine the relationship between the length of hospital bed rest and weekly symptoms and between symptom reports. Repeated measures analysis of variance determined whether symptoms decreased over time and determined differences in the number of symptoms reported by type of birth and parity.

## Results

The sample consisted of 106 women with a singleton gestation who completed the PSC seven times. Approximately 76% of women were White, and 21.7% were African American. Additional demographic and perinatal characteristics are given in Table 1. Maternal diagnoses were primarily preterm labor or preterm labor combined with another inclusion diagnosis (59.4%), preterm rupture of membranes (22.6%), placenta previa (7.5%), or a combination of these diagnoses (7.5%). The majority of the participants were married (65.6%). One third of the women had an annual income less than \$30,000. Although all women were treated with hospital bed rest, some were also treated with home bed rest (see Table 1). Forty-six women were on bed rest at home before admission, and 60 women remained on bed rest at home after hospital discharge. Almost 70% of women had a vaginal birth ( $n = 73$ ), whereas 31% ( $n = 33$ ) had a cesarean birth. Also, 70% of women had an infant who was born before 38 weeks gestation.

The mean total number of symptoms reported each week is given in Table 2. Women reported a mean of 12.45 different symptoms 2 days after delivery. Repeated measures analysis of variance revealed that symptoms significantly decreased across time ( $F = 492.2$ ,  $df = 1, 105$ ,

**TABLE 1**  
*Maternal Demographic and Perinatal Characteristics (N = 106)*

<i>Characteristic</i>	<i>M</i>	<i>SD</i>	<i>Range</i>
Age (years)	27.42	6.16	16–43
Education (years)	14.18	2.68	9–21
Gestational age at hospital admission (weeks)	28.96	3.06	21.1–33.3
Length of home bed rest before admission (days)	27.78	24.77	2–91
Length of hospital bed rest (days)	19.77	13.65	2–70
Number of hours per day in hospital bed	22.44	0.94	20.2–23.8
Length of home bed rest after hospital discharge (days)	28.15	18.92	1–72
Total length of home and hospital bed rest (days)	42.05	27.18	5–106
Gestational age at birth (weeks)	34.55	3.58	23.0–42.0

$p < .000$ ). Women continued to report an average of six symptoms at 6 weeks postpartum.

The number of women reporting each symptom varied with time. Some symptoms quickly decreased in incidence whereas others did not. Also some symptoms were consistently reported by a larger number of women while others were not. Seven symptoms were most frequently reported across the postpartum period and continued to be reported by at least 40% of women at 6 weeks. These symptoms included mood changes, fatigue, tenseness, dry skin, back muscle soreness, difficulty concentrating, and headache. The frequency with which these seven symptoms were reported at 2 days postpartum and each week through 6 weeks postpartum is given in Table 3. In contrast, other symptoms (see Table 4) were reported less frequently and in varying patterns (see Table 4). For example, the incidence of nasal congestion, indigestion, decreased appetite, soreness of various muscle groups, dizziness, and shortness of breath on exertion were high during the early weeks but decreased to less than 35% of women at 6 weeks. Additional symptoms not reported in Tables 3 and 4 were consistently reported by less than 10% of women after 2 days postpartum. These symptoms were other muscle soreness, earache, visual problems, and faintness or fainting. Last, some women listed additional symptoms they experienced in the item provided, but no single symptom was consistently reported.

There was no correlation between the number of postpartum symptoms and length of bed rest at 2 days. The total number of symptoms reported at Weeks 1, 2, 4, 5, and 6 was significantly correlated with the length of hospital bed rest. Correlations ranged between .16 and .27 ( $p = .05$  to .01). Repeated measures analysis of variance

**TABLE 2**

*Mean Number of Postpartum Symptoms Reported by 106 Women at 2 Days and Each Week Through 6 Weeks*

	Number of Symptoms						
	2 days	1 week	2 weeks	3 weeks	4 weeks	5 weeks	6 weeks
Mean	12.45	9.42	8.44	6.75	7.08	5.85	6.58
Standard Deviation	5.59	4.92	4.30	4.34	4.09	4.12	4.46
Range	2–27	0–27	0–20	0–23	0–19	0–19	0–21

**TABLE 3**

*Seven Symptoms Reported by at Least 40% of 106 Women at 6 Weeks Postpartum and Their Pattern of Occurrence From 2 Days Through 6 Weeks*

Symptom	Day 2		Week 1		Week 2		Week 3		Week 4		Week 5		Week 6	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Mood changes	74	69.8	77	72.6	83	78.3	68	64.2	63	59.4	53	50.0	64	60.4
Fatigue	81	76.4	73	68.9	70	66.0	62	58.5	67	63.2	53	50.0	62	58.7
Tenseness	75	70.8	53	50.1	57	53.8	50	47.2	59	55.7	42	39.6	50	47.2
Dry skin	68	64.2	38	35.8	56	52.8	53	50.0	58	54.7	47	44.3	51	48.1
Back muscle soreness	68	64.2	67	63.2	51	48.1	44	41.5	42	39.6	49	46.2	43	40.6
Difficulty concentrating	57	53.8	50	47.2	53	50.0	45	42.5	48	45.3	41	38.7	45	42.5
Headache	27	25.5	45	42.5	51	48.1	45	42.5	48	45.3	41	38.7	42	39.6

revealed that there was no significant difference in the number of symptoms reported by primiparas or multiparas. In contrast, women with a vaginal birth reported significantly fewer symptoms than did women who had a cesarean birth (repeated measures analysis of variance,  $F = 7.32$ ,  $df = 1, 1, 104$ ,  $p = .006$ ). The mean number of symptoms for women with a vaginal birth at 6 weeks was 6.27 ( $SD = 4.35$ ), ranging from 0 to 18, whereas women who had a cesarean birth reported a mean of 7.24 ( $SD = 4.70$ ) symptoms, ranging from 0 to 21. The types of symptoms reported by the two groups were similar, but women who had a cesarean delivery tended to report more shortness of breath on exertion.

## Discussion

Comparison of studies of postpartum symptoms of healthy women with women post-bed rest is problematic, as studies of healthy women did not report a mean number of symptoms or collected data at different time points. However, some comparisons can be made. Whereas women recovering from antepartum bed rest reported a mean of 6.6 symptoms at 6 weeks postpartum, Glazener et al. (1995) found that women recovering from a healthy

pregnancy reported at least 1 symptom at 8 weeks postpartum. Thompson et al. (2002) reported a number of maternal symptoms after a healthy pregnancy at 8 weeks postpartum but did not provide a mean.

Fatigue is common during postpartum recovery. Initially, fatigue appears to be high post-bed rest. Two studies reported that 31% of healthy Canadian women and 42% of English women were fatigued at 1 week postpartum compared to 76% of the bed rest participants (Glazener et al., 1995; Smith-Hanrahan & Deblois, 1995). Similarly, at 2 weeks, 44% of American women who had a healthy pregnancy were fatigued compared to 66% of women post-bed rest (Ruchala & Halstead, 1994). At 6 to 8 weeks postpartum, however, fatigue after a healthy pregnancy ranged from 19% to 60% in three studies (Glazener et al., 1995; Smith-Hanrahan & Deblois, 1995; Thompson et al., 2002), whereas 59% of women post-bed rest were fatigued. Of concern, data about fatigue among healthy women were collected retrospectively and thus are subject to recall bias. Fatigue among women after bed rest could be due to musculoskeletal and cardiovascular deconditioning, postpartum sleep interruptions, depression, or a combination of these factors (Affonso, Lovett, Paul, & Sheptak, 1990; Gard-

**TABLE 4**  
*Other Symptoms Frequently Reported by 106 Women Across 6 Weeks Postpartum*

<i>Symptom</i>	<i>Day 2</i>		<i>Week 1</i>		<i>Week 2</i>		<i>Week 3</i>		<i>Week 4</i>		<i>Week 5</i>		<i>Week 6</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Nasal congestion	46	43.4	33	31.1	31	29.2	29	27.4	32	30.2	31	29.2	36	34.0
Decreased appetite	61	57.5	53	50.0	58	54.7	38	35.8	46	43.4	29	27.4	32	30.2
Neck muscle soreness	37	34.9	32	30.2	31	29.2	24	22.6	27	25.5	20	18.9	26	24.5
Boredom	41	38.7	18	17.0	25	23.6	22	20.8	17	16.0	12	11.3	20	18.9
Shortness of breath on exertion	38	35.8	32	30.2	29	27.4	20	18.9	20	18.9	20	18.9	19	17.9
Constipation	38	35.8	29	27.4	22	20.8	13	12.3	13	12.3	11	10.4	16	15.1
Dizziness	45	42.5	14	13.2	18	17.0	11	10.4	15	14.2	7	6.6	14	13.2
Sleep cycle changes	49	46.2	23	21.7	13	12.3	11	10.4	7	6.6	10	9.4	14	13.2
Nightmares	13	12.3	15	14.2	15	14.2	11	10.4	15	14.2	15	14.2	14	13.2
Lower leg muscle soreness	30	28.3	36	34.0	28	26.4	22	20.8	21	19.8	14	13.2	13	12.3
Knees sore	17	16.0	19	17.9	15	14.2	16	15.1	15	14.2	17	16.0	13	12.3
Muscle cramps	41	38.7	21	19.8	14	13.2	11	10.4	14	13.2	8	7.5	12	11.3
Arm muscle soreness	35	33.0	24	22.6	17	16.0	14	13.2	14	13.2	13	12.3	11	10.4
Upper leg muscle soreness	39	36.8	27	25.5	23	21.7	11	10.4	13	12.3	4	3.8	10	9.4
Rash on body	15	14.2	13	12.3	17	16.0	7	6.6	10	9.4	10	9.4	10	9.4
Abdominal muscles sore (no incision)	59	55.7	45	42.5	19	17.9	10	9.4	7	6.6	5	4.7	9	8.5
Indigestion	44	41.5	20	18.9	13	12.3	16	15.1	11	10.4	10	9.4	8	7.5
Skin sore	23	21.7	17	16.0	11	10.4	7	6.6	8	7.5	6	5.7	7	6.6
Faintness or fainted	29	27.4	5	4.7	8	7.5	6	5.7	4	3.8	4	3.8	6	5.7
Reflux	43	40.6	14	13.2	6	5.7	7	6.6	5	4.7	7	6.6	5	4.7
Heels sore	17	16.0	15	14.2	5	4.7	3	2.8	5	4.7	5	4.7	5	4.7
Pedal edema	41	38.7	36	34.0	13	12.3	6	5.7	7	6.6	6	5.7	2	1.9

ner, 1991; Lee & Zaffke, 1999; Smith-Hanrahan & Deblois, 1995).

The incidence of headache also appears to be high after bed rest. At 8 weeks postpartum, approximately 20% of women who had a healthy pregnancy reported headache (Glazener et al., 1995; Thompson et al., 2002) whereas 40% of women prescribed bed rest reported headache at 6 weeks. Postpartum headache has been attributed to epidural anesthesia, but a large study now disputes this belief (Thompson et al., 2002). Headache could be due to fatigue, lack of sleep, or recovery from the congestion induced by the headward shift of body fluids during bed

rest (Fortney et al., 1996; NSBRI, 2001; Rubin, 1988; Sandler & Vernikos, 1986). Women also reported increased nasal congestion that can result from headward shift of body fluids.

Postpartum postural muscle soreness of the back, upper and lower legs, and neck was common among women. Back muscle soreness remained at 6 weeks postpartum for 40% of women. This finding is consistent with research conducted in both pregnant and nonpregnant individuals treated with bed rest (LeBlanc, Rowe, Schneider, Evans, & Hedrick, 1995; Maloni et al., 1993; Maloni & Schneider, 2002; Sandler & Vernikos, 1986).

Muscle soreness results from muscle tissue damage and inflammation that occur during remobilization (Krippendorf & Riley, 1993; LeBlanc et al., 2000; Prou & Marini, 1997; St Pierre & Flaskerud, 1995; St Pierre & Tidball, 1994).

Studies of healthy women have assessed for backache at 8 weeks postpartum and found that it is common (Glazener et al., 1995; Russell et al., 1996; Thompson et al., 2002). It is unclear whether back muscle soreness assessed in the current study is the same as backache. We defined back muscle soreness as a localized, deep muscle tissue pain rather than a generalized backache (Schneider & Sannes, 2001). Thus, the back muscle soreness in our study may differ from other studies.

Negative postpartum mood is also common after pregnancy, but again, the incidence after bed rest appears to be high (Glazener et al., 1995; Maloni et al., 1993; Maloni & Schneider, 2002; Thompson et al., 2002). Glazener and colleagues (1995) reported that 21% of women who had a healthy pregnancy had depressive symptoms at 8 weeks, compared to 60% of the sample who reported mood changes and 47% who reported being tense at 6 weeks post-bed rest (Glazener et al., 1995; Thompson et al., 2002). Symptoms of depression after bed rest (mood changes, tenseness, and difficulty concentrating) might be caused by the residual effects of bed-rest-induced psychophysiological changes, having a high-risk pregnancy, having a preterm infant, or a combination of factors.

Other symptoms reported after bed rest have not been reported among women with a healthy pregnancy. Dry skin among 48% of women at 6 weeks may be due to delayed recovery from bed rest, induced diuresis, and cell rehydration (Fortney et al., 1996; Sandler & Vernikos, 1986). Decreased appetite is commonly reported after bed rest (Fortney et al., 1996; Sandler & Vernikos, 1986) but could also be due to depressive symptoms or maternal concern about losing weight.

Women who had a cesarean birth after bed rest reported significantly more symptoms than did women who had a vaginal birth, but the clinical significance of this finding is not clear, as the difference was only one symptom. Although it might be expected that women who had a cesarean birth report an increased number of postpartum symptoms, research is conflicting on this issue (Glazener et al., 1995; Thompson et al., 2002).

High levels of fatigue, headache, mood changes, tenseness, difficulty concentrating, back muscle soreness, and dry skin were still present at 6 weeks. Although such symptoms are not life threatening, the effect may be multiplicative and result in a lingering morbidity that decreases quality of life (Lenz et al., 1997). Of concern, two longitudinal studies of recovery after a healthy pregnancy conducted across 6 months to 1 year found that while symptoms declined, there was only partial resolution of symptoms (Glazener et al., 1995; Thompson et al., 2002).

At 6 to 7 months postpartum, only 19% of women reported no health problems (Thompson et al., 2002), and 94% reported one or more symptoms (Brown & Lumley, 1998). At 1 year, only 24% reported no health problems (Glazener et al., 1995). Another study in France and Italy found that the prevalence of postpartum symptoms was higher at 12 than at 6 months (Saurel-Cubizolles, Romito, Lelong, & Ancel, 2000). The impact of postpartum symptoms on maternal health suggests the presence of a lingering "hidden morbidity" (Albers, 2000).

## **P**ostpartum symptoms of antepartum bed rest reveal an underlying morbidity that is not resolved by 6 weeks postpartum.

The persistence of a high number of symptoms post-bed rest indicates that postpartum recovery is not complete at 6 weeks. The low correlation between the length of bed rest and symptoms at 2 days indicates that other factors such as recovery from birth are influencing symptom reports at this time. In contrast, the significant correlations between the number of symptoms and the length of hospital bed rest at other times indicate that antepartum bed rest is associated with increased postpartum morbidity. The number of symptoms reported by women treated with antepartum bed rest is not inconsequential, as bed rest is prescribed for approximately 1 million women per year. Ironically, antepartum bed rest is not known to be effective in preventing preterm birth or improving gestational age or birth weight (Crowther, 2001; Goldenberg, 2002; Gulmezoglu & Hofmeyr, 2001), but it is the standard of care in many U.S. institutions.

### **Implications for Research**

The physiologic changes induced by bed rest provide a plausible explanation for many postpartum symptoms. An alternative explanation is that the symptoms may solely be due to recovery from either a normal or high-risk pregnancy. Therefore, further research is needed to determine the cause of these symptoms. Because the current research used a convenience sample, random controlled clinical trials are needed to compare symptoms among women with a no-risk or high-risk pregnancy.

Another limitation of our study was that we were unable to differentiate between symptoms exhibited after spontaneous vaginal birth and those after an assisted vaginal birth or by type of anesthesia. Additional research

is needed to study these outcomes. To conduct comparison studies that assess not only symptoms after bed rest but also those exhibited after a healthy pregnancy, a new valid and reliable tool is needed. The PSC was not designed to assess postpartum symptoms solely related to recovery from a healthy pregnancy. Future studies should also strive to collect data at similar times so that comparison of results can be more accurately made.

## Implications for Nursing

After antepartum bed rest, assessment of symptoms before hospital discharge is indicated, and continued assessment may be needed beyond 6 weeks postpartum (Gunn, Lumley, Chondros, & Young, 1998). Early postpartum discharge among women treated with antepartum bed rest may not be advisable, as women must recover not only from birth but also from bed rest. Early ambulation will help women begin to recover from musculoskeletal and cardiovascular deconditioning but must be done carefully. Overuse of muscles can cause muscle tears and lead to injury and falls. Postpartum women should also be advised that (a) limited strength, increased fatigue, muscle soreness, and orthostatic hypotension are symptoms that often occur after bed rest; (b) ambulation will restore function; (c) extra help with household tasks will be needed; (d) caution is needed to prevent injury and falls, especially when using stairs; and (e) lingering symptoms should be reported to their health care provider. Last, referral to a rehabilitation program will help women safely rebuild atrophied muscles without injury and restore cardiovascular status (LeBlanc et al., 2000; Maloni & Schneider, 2002; Prou & Marini, 1997; St Pierre & Flaskerud, 1995).

In conclusion, postpartum symptoms after antepartum bed rest are similar to those identified by aerospace scientists in nonpregnant individuals. Some symptoms are similar to women recovering from a healthy pregnancy. Correlation between length of bed rest and number of symptoms implicates bed rest as a factor associated with increased symptoms. The high number of symptoms at 6 weeks postpartum indicates that recovery is not complete at this time, and the symptoms might adversely affect maternal quality of life. Knowledge of common symptoms can assist health care providers in developing a plan of care and interventions, particularly postpartum rehabilitation, to help women return to a normal level of physical functioning after bed rest without injury.

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