

**Restless Legs Syndrome in Pregnancy: A Systematic Review**

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## **Abstract**

This systematic review examines the prevalence and current treatment options of restless legs syndrome in pregnancy and makes recommendations for future practice by analyzing twenty-one, peer-reviewed, scholarly research studies. Restless legs syndrome is a disorder manifested by the strong urge to move one's legs often accompanied by paresthesia that is alleviated only by movement. Restless legs syndrome can manifest idiopathically or as a result of a condition such as pregnancy. Pregnancy-induced restless legs syndrome is expressed in about thirty percent of pregnant women with worsening symptoms in the third trimester. Affected pregnant women are often undiagnosed due to the transient nature of the disease. Subsequently, treatment is often bypassed for lack of a diagnosis. When treatment is used, it includes nutritional therapy, heat, massage, relaxation, and some pharmaceuticals. Recommendations for future practice include the following: identification of risk factors, correct diagnosis of the disease with reassurance of low risk to the fetus, increased folate intake, relaxation techniques including distraction, massage, and heat, and pharmacological measures with extreme caution for cases that could produce potential harm to the mother or fetus.

## **Introduction**

### *Definition*

Restless legs syndrome is a neurologic disorder characterized by a desire and urge to move the legs usually including a tingling or paresthesia which is intensified by rest and the evening hours. It is usually relieved by movement. Restless legs syndrome (RLS) has been documented and studied intermittently for hundreds of years but has still yet to be eradicated or fully understood. K.A. Ekbom and Karl Ekbom Jr. became the seminal authors, when they condensed the symptoms of restless legs syndrome and named the disease (Ekbom & Ulfberg, 2009). Despite their attempts to elevate awareness, restless legs syndrome remains an elusive disorder.

### *Diagnostic Criteria*

The diagnostic criterion that is used includes the following: the strong urge to move the legs which may include paresthesia, the urge to move or paresthesia begins or worsens while resting, the urge to move or paresthesia is partially or totally relieved by movement, and the symptoms are worse in the evening or at night (Allen et al., 2003).

These diagnostic criteria apply to both primary restless legs syndrome, idiopathic, and secondary which is caused by another factor such as pregnancy (Sethi & Mehta, 2012).

Unfortunately due to the transient nature of restless legs syndrome in pregnancy, it often is under-diagnosed. Diagnosis may also be difficult due to the sudden onset in the third trimester.

The symptoms concern patients, but doctors are overlooking them as transient and of no consequence (Manconi et al., 2004b; Telstad et al., 1984; Goodman, Brodie, & Ayida, 1988). While the symptoms may be transient, they are severely uncomfortable. Women are also experiencing other complications, such as shortness of breath, dependent edema, and fatigue,

which makes these symptoms even more unbearable and complicate diagnosis. Furthermore, restless legs syndrome is a sleep disorder, thus if left untreated, it can lead to either long and exhausting vaginal deliveries or operative deliveries which can be harmful to the woman and the fetus (Hensley, 2009).

## **Purpose**

The purpose of this study is to review current and relevant literature related to the prevalence and treatment of restless legs syndrome manifested during pregnancy through a detailed analysis of the present research.

## **Methodology**

This study is comprised of journal articles written between 1980 and the present. Twenty-one research studies met the selection criteria and were included in the systematic review of literature. The studies included patient sample sizes ranging from 2 to 16,528. The studies were all published in peer-reviewed journals and obtained from searches on various databases available in the Robert Morris University online library. The databases include EBSCO host and Proquest. There were three categories of searches done that encompassed different levels of detail. The initial search was broad using the keywords “Restless Legs Syndrome.” The majority of these articles were not included, but it established a basis of the disease. The next more detailed search encompassed the words “Restless Legs Syndrome” and “Pregnancy.” These research articles provided the most information for the study. The final search was done with the keywords “Restless Legs Syndrome”, “Pregnancy”, and “Treatment.” This resulted in any remaining pertinent journal articles. The information was then compared, contrasted, and synthesized to produce a discussion of best practices for treatment of restless legs syndrome in pregnancy.

## **Risk Factors**

While the etiology of restless legs syndrome is still widely unknown, there are many risk factors that have been identified that potentially correlate with a woman's contraction of RLS symptoms during her pregnancy.

### *Demographics*

According to a study involving 4,310 participants, women in general were twice more likely than men to experience symptoms of RLS. Concomitantly, this study verified that as women increase in age, their probability of developing RLS augments (Berger, Luedemann, Trenkwalder, John, & Kessler, 2004). Often in parallel, primiparous or multiparous women significantly acquired symptoms of RLS more than a nulliparous woman (Neau et al., 2010).

### *Preexisting Conditions*

Conditions that were acquired before a woman's pregnancy can greatly influence whether she will exhibit symptoms of restless legs syndrome. Balendaran, Champion, Jaaniste, and Welsh established a 42.1% chance that women that experienced growing pains will experience symptoms of RLS. Growing pains were seen to be a stronger predictor than family history or iron deficiency (2011).

Other conditions that increased a woman's likelihood for RLS included conditions that already affected her sleep. Hensley deduced that women with central nervous system dysfunctions that affect the neurotransmitters that influence sleep will likely experience RLS symptoms during their pregnancies; however, the study lacked specificity of disorders (2009). More specifically, sleep apnea was detailed by Sarberg, Josefsson, Wiréhn, and Svanborg and shown to be an indicator of RLS symptoms later in pregnancy potentially due to the decreased quality of sleep which leads to the increased susceptibility to RLS symptoms (2012).

The chief preexisting conditions that lead to RLS symptoms are idiopathic restless legs syndrome and RLS symptoms in previous pregnancies. When a woman has previous idiopathic RLS, her symptoms are often exacerbated by pregnancy (Manconi et al., 2004b). Similarly, a study showed that out of 74 women that had experienced RLS symptoms in prior pregnancies, 58% of them had a reoccurrence of symptoms with later pregnancies (Cesnik et al., 2010).

#### *Conditions Precipitated by Pregnancy*

Since the anatomy and physiology of women is altered during pregnancy, some of these alterations can predispose women to symptoms of RLS. According to a study, increased stress in relation to pregnancy can induce symptoms of restless legs syndrome. Consequently, the increased stress as well as other negative symptoms of pregnancy such as gastric distress, increased weight gain, and difficulty breathing can lead to poor sleep quality which in turn makes women susceptible to RLS (Sethi & Mehta, 2012).

The chemical alterations made in pregnancy have also been linked to restless legs syndrome in pregnancy. Decreased hemoglobin and mean corpuscular volume were observed in women that exhibited RLS symptoms (Manconi et al., 2004a). The increase in prolactin and estradiol has also been seen to play a potential role in the onset of symptoms (Sethi & Mehta, 2012; Pereira Jr., Rocha e Silva, & Pradella-Hallinan, 2013).

#### *Chemical Imbalances*

Physiological and pathophysiological chemical imbalances can also precipitate symptoms. A widely accepted risk factor of restless legs syndrome is iron deficiency. Pregnancy depletes iron which can affect movement (Bourjeily, 2009; Ekbom & Ulfberg, 2009; Hensley, 2009; Neau et al., 2010). Converse to the opinions of most, some research suggests that a decreased folate level is even more indicative of RLS than a decreased iron level (Lee, Zaffke, &

Baratte-Beebe, 2001). Likewise, women with RLS during pregnancy often had a lower ferritin than pregnant women without symptoms (Lee et al., 2001).

An undermodulation of thyroid hormone has also been identified as a possible predictor for RLS due to its effect on dopamine (Pereira Jr. et al., 2013). Since the dopamine works in the brain as a neurotransmitter that affects sleep and movement, any disruption can lead to potential symptoms of restless legs syndrome (Bourjeily, 2009; Pereira Jr. et al., 2013; Hensley, 2009).

### **Prevalence**

The occurrence rate of restless legs syndrome in pregnancy varies among studies. The most minimal percent was eleven (Ekblom & Ulfberg, 2009). Conversely, a study of 251 postpartum women reported that 34% of them had experienced RLS symptoms during their pregnancy (Uglane, Westad, & Backe, 2011). Despite the variation, most studies found a prevalence rate within this range. Likewise, the vast majority of studies found either the origin of symptoms or a worsening of symptoms in the third trimester of pregnancy (Ekblom & Ulfberg, 2009; Galdino Alves, Coin de Carvalho, Fausto de Moraes, & Fernandes do Prado, 2010; Hensley, 2009; Ismailogullari et al., 2010; Neau et al., Sethi & Mehta, 2012). One study found that the prevalence rate of RLS symptoms increased from 0% at the time of conception to 23% in the third trimester (Lee et al., 2001).

### **Treatment**

Treatment of restless legs syndrome in pregnancy—if diagnosed—is different than in primary RLS. Its etiology is different; because it is transient in pregnancy and also solely in women (Berger et al., 2004). Also, many medications are contraindicated in pregnancy, and thus treatment must be creative (Thomas & Watson, 2008). For the least severe conditions, reassurance and education on the disease can be enough treatment for patients (Telstad et al.,

1984). If a patient knows what to expect, they are less likely to expatiate their symptoms with anxiety. Relaxation techniques have been effective in alleviating some symptoms and making sleep possible; these include: walking, taking a bath, flexing and extending the legs, and stopping strenuous activities prior to 4 pm (Telstad et al., 1984; Thomas & Watson, 2008). Nutritional changes can also affect sleep. When caffeine and chocolate were not consumed past the morning hours, women fell asleep more quickly (Hensley, 2009). Also, elimination of large meals before bed decreased symptoms of restless legs syndrome (Thomas & Watson, 2008). Furthermore, pregnancy depletes many vitamins in the body; supplementation of these vitamins (iron, folate, vitamin E, flavonoids, and magnesium) aided women in their sleep hygiene: by allowing them to fall asleep faster and to reduce fatigue (Gaby, 2007). Specifically, iron is depleted from the body, thus a replenishment of iron in combination with vitamin C can alleviate symptoms of RLS (Ekbohm & Ulfberg, 2009; Hensley, 2009). If relaxation techniques and nutritional altering are unsuccessful, a limited amount of pharmacological options have been experimented with and proven somewhat effective. Carbamazepine was tested on two women who received instant relief of their symptoms, plus they did not experience any relapse of symptoms postpartum until after they ceased taking the medication (Telstad et al., 1984). If there are no other options and the woman's labor and delivery could be hindered by her restless legs syndrome induced exhaustion, then dopamine receptor agonists, opioids, anticonvulsants, or benzodiazepines could be used with extreme caution because of the potentially harmful effects to the fetus (Hensley, 2009).

### **Tabular Synthesis of Literature**

The following table is a synthesis of the literature regarding the current understanding of risk factors, prevalence, and treatment options of restless legs syndrome in pregnancy.

**Table 1 Review of RLS Studies**

Author and Date	Research Design	Sample Size	Variables	Results
Allen, Picchietti, Hening, Trenkwalder, Walters, Montplaisi (2003)	Report of diagnostic criteria	Synthesized information	<ul style="list-style-type: none"> <li>- Diagnostic criteria</li> </ul>	<ul style="list-style-type: none"> <li>- Diagnostic criteria for RLS includes the following four things:               <ol style="list-style-type: none"> <li>1. Strong, overwhelming urge to move one's limbs often accompanied by paresthesias</li> <li>2. Symptoms that are worse in the evening or at night</li> <li>3. Symptoms that are worse at rest</li> <li>4. Symptoms that are alleviated by movement</li> </ol> </li> </ul>
Balendaran, Champion, Jaaniste, Welsh (2011)	Questionnaire and Case Control Studies	211 Pregnant Women	<ul style="list-style-type: none"> <li>- Prevalence of RLS</li> <li>- A history of growing pains</li> <li>- Awareness of RLS diagnosis</li> <li>- Consequences of RLS</li> </ul>	<ul style="list-style-type: none"> <li>- Forty-seven women (22.5%) fulfilled the diagnostic criteria for RLS, and 12 of 47 reported a previous diagnosis of RLS.</li> <li>- The PPV of past growing pains history for RLS was 42.1%.</li> <li>- Only 25.5% of women with RLS were aware of their diagnosis.</li> <li>- Growing pains were more significant than family history.</li> <li>- RLS was seen to be the most common sleep disorder in pregnancy.</li> <li>- Restless legs syndrome often leads to operative deliveries.</li> </ul>

<p>Berger, Luedemann, Trenkwalder, John, Kessler (2004)</p>	<p>Cross-sectional survey with face-to-face interviews and physical examination</p>	<p>4310 male and female participants aged 20 to 79 years old</p>	<ul style="list-style-type: none"> <li>- Gender</li> <li>- Parity</li> </ul>	<ul style="list-style-type: none"> <li>- There was a 10.6% chance of restless legs syndrome as age increased.</li> <li>- Women were twice more likely to have RLS than men.</li> <li>- Increased parity increases the likelihood of RLS.</li> </ul>
<p>Bourjeily (2009)</p>	<p>Systematic Review</p>	<p>Synthesized information</p>	<ul style="list-style-type: none"> <li>- Folate</li> <li>- Iron</li> <li>- Medications</li> <li>- Reemergence of RLS in later pregnancies</li> <li>- Secondary idiopathic RLS</li> </ul>	<ul style="list-style-type: none"> <li>- Folate deficiency may be linked to RLS symptoms in pregnancy.</li> <li>- Also, iron deficiency, dopamine disruption, and hormone imbalance have been related to RLS symptoms.</li> <li>- Levodopa has not been proven safe in pregnancy, and pramipexole and ropirinoles have not been researched for RLS in pregnancy.</li> <li>- Benzodiazepines and opiates can be used with extreme caution for severe symptoms in which the benefits of the drugs outweigh the risk to the fetus or baby.</li> <li>- Clonidine may be effective in pregnancy.</li> </ul>
<p>Cesnik, Casetta, Turri, Govoni, Granieri, Strambi, Manconi (2010)</p>	<p>Longitudinal follow-up study with interviews</p>	<p>74 women who had experienced RLS symptoms during pregnancy, 133 women who had not experienced RLS symptoms during pregnancy</p>	<ul style="list-style-type: none"> <li>- Secondary RLS symptoms during pregnancy</li> <li>- Current pregnancy</li> <li>- Idiopathic RLS symptoms</li> </ul>	<ul style="list-style-type: none"> <li>- In women that had previously experienced secondary RLS symptoms, it reemerged in 58% of the women.</li> <li>- In the 133 women that had not experienced RLS during pregnancy, only 3% had idiopathic symptoms later in life.</li> </ul>

Ekbohm, Ulfberg (2009)	Systematic Review	Synthesized information	<ul style="list-style-type: none"> <li>- Iron</li> <li>- Vitamins</li> <li>- Resolution of symptoms</li> <li>- Time period of symptoms</li> </ul>	<ul style="list-style-type: none"> <li>- The main cause of restless legs syndrome during pregnancy is iron deficiency.</li> <li>- RLS is most common during the third trimester.</li> <li>- Most symptoms resolve after delivery.</li> <li>- In review, anywhere from 11-26% of pregnant women were affected by RLS.</li> <li>- Oral or intravenous iron therapy was seen to alleviate symptoms.</li> </ul>
Galdino Alves, Coin de Carvalho, Fausto de Morais, Fernandes do Prado (2010)	Cross sectional study with clinical diagnostic interview	524 pregnant women in Brazil	<ul style="list-style-type: none"> <li>- Positivity for symptoms</li> <li>- Severity of symptoms</li> <li>- Primary or secondary RLS symptoms</li> <li>- Demographic data</li> </ul>	<ul style="list-style-type: none"> <li>- The prevalence of RLS in pregnancy was seen to be 13.5%; 90.1% were secondary symptoms.</li> <li>- The severity of symptoms was severe in 53.5% of the women.</li> <li>- Most symptoms were seen in the third trimester, and demographic data did not affect the symptoms.</li> </ul>
Hennessy, De La Torre (2013)	Systematic Review	Synthesized information	<ul style="list-style-type: none"> <li>- Parity</li> <li>- Family History</li> </ul>	<ul style="list-style-type: none"> <li>- Family history and personal history of RLS during previous pregnancies were strong predictors for RLS during pregnancy.</li> </ul>
Hensley (2009)	Systematic Review	Various studies were synthesized	<ul style="list-style-type: none"> <li>- Iron deficiency</li> <li>- Central nervous system dysfunction</li> <li>- Dopamine</li> <li>- Leg cramps</li> <li>- Amount of sleep per night</li> <li>- Amount of awakenings per night</li> <li>- Medications</li> <li>- Nonpharmacologic</li> </ul>	<ul style="list-style-type: none"> <li>- Sleep disorders increased the rate of operative deliveries and longer labors.</li> <li>- Etiologies of RLS include: dysfunction in the central nervous system, imbalance of neurotransmitters such as dopamine, and iron deficiency.</li> <li>- RLS differs from leg cramps during</li> </ul>

			<p>treatments and adaptive lifestyle procedures</p> <ul style="list-style-type: none"> <li>- Rate of poor consequential labors</li> </ul>	<p>pregnancy. RLS affects a whole region, while leg cramps affect a specific location.</p> <ul style="list-style-type: none"> <li>- Treatment of RLS includes an increase in iron intake in combination with vitamin C.</li> <li>- Nonpharmacological treatment options for RLS include retiring and rising at the same time each day, avoiding strenuous activities after 4:00 pm, avoiding caffeinated products and chocolate in the evening, taking a hot bath before bed, addressing concerns to a health professional, and engaging in handheld gaming devices.</li> <li>- Pharmacologic treatment includes dopamine receptor agonists, opioids, anticonvulsants, and benzodiazepines.</li> <li>- RLS affects about 26% of pregnant women. It is usually the most severe in the third trimester and usually resolves after delivery.</li> <li>- Women on prolonged bed rest should be treated thoroughly for RLS since symptoms are most severe at rest.</li> <li>- If symptoms are seen in the upper limbs, a woman will need to creatively position a breastfeeding baby as to not aggravate RLS symptoms.</li> </ul>
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<p>Ismailogullari, Ozturk, Mazicioglu, Serin, Gultekin, Aksu (2010)</p>	<p>Interview with structured questionnaire</p>	<p>983 pregnant women</p>	<ul style="list-style-type: none"> <li>- Course of pregnancy</li> <li>- Demographic data</li> <li>- Anthropometric data</li> <li>- Iron and vitamin supplements</li> <li>- Sleep habits</li> <li>- Current or previous sleep disorders</li> </ul>	<ul style="list-style-type: none"> <li>- There were 103 out of 983 women that complained of RLS symptoms. Of these women, 10.48% complained of symptoms 3 times per month, 9.46% complained of symptoms 7 times per month, and 6.51% experienced symptoms 15 times per month.</li> <li>- Fourteen of the women had prior RLS, and eighty-nine of the women experienced RLS for the first time.</li> <li>- The variables that were tested showed that RLS was seen some but not significantly more often in women that were older.</li> <li>- Iron and folate supplements did not lessen the occurrence of RLS.</li> <li>- Forty- eight percent of women that experienced symptoms had their original symptoms in the third trimester.</li> </ul>
<p>Lee, Zaffke, Baratte-Beebe (2001)</p>	<p>Secondary analysis of a longitudinal study</p>	<p>32 women</p>	<ul style="list-style-type: none"> <li>- Folate</li> <li>- Ferritin</li> <li>- Iron</li> <li>- Time of sleep onset</li> <li>- Mood</li> <li>- Trimester in which symptoms were most severe</li> </ul>	<ul style="list-style-type: none"> <li>- The prevalence of RLS symptoms increased from 0% in preconception to 23% in the third trimester.</li> <li>- Women with lower folate and ferritin were more likely to experience RLS symptoms.</li> <li>- Reduced folate was seen more often in women with RLS than reduced iron.</li> <li>- Women with RLS had a</li> </ul>

				longer time of onset before sleep and a more depressed mood state.
Manconi, Govoni, De Vito, Economou, Cesnik, Casetta, Mollica, Ferini-Strambi, Granieri (2004)	Face to face interview following labor 1,3,6 months after birth	642 postpartum women	<ul style="list-style-type: none"> <li>- Hematologic tests</li> <li>- Iron</li> <li>- Folate</li> <li>- Prevalence in trimesters</li> </ul>	<ul style="list-style-type: none"> <li>- Twenty-six percent of women were affected by RLS during their pregnancy.</li> <li>- It was most commonly seen in the third trimester, and most symptoms faded near delivery.</li> <li>- The subjects had low hemoglobin and mean corpuscular volume.</li> <li>- Iron and folate supplements were not seen to be significant.</li> </ul>
Manconi, Govoni, De Vito, Economou, Cesnik, Mollica, Granieri (2004)	Systematic Review	Various studies were synthesized to identify information	<ul style="list-style-type: none"> <li>- Occurrence of RLS and likelihood in each trimester</li> <li>- Iron and folate deficiency</li> <li>- Hormonal increase of prolactin</li> <li>- Previous primary RLS</li> <li>- Progesterone and estrogen changes in late pregnancy</li> <li>- Motor habit changes in pregnancy</li> <li>- Psychological state of pregnant women with RLS</li> </ul>	<ul style="list-style-type: none"> <li>- The likelihood of experiencing restless legs symptoms increases two to three times more in pregnancy.</li> <li>- Eleven to twenty-seven percent of women experience restless legs syndrome at some point in their pregnancy; it is most common in the third trimester and usually is alleviated by delivery.</li> <li>- If primary RLS existed, pregnancy often worsens the symptoms.</li> <li>- Iron and folate use may not aid in the alleviation of RLS.</li> <li>- Symptoms of RLS are often not recognized by healthcare a provider, which increases the likelihood of anxiety in pregnant women experiencing the symptoms.</li> </ul>

<p>Neau , Marion, Mathis, Julian, Godeneche, Larrieu, Meurice, Paquereau, Ingrand (2010)</p>	<p>Cross sectional questionnaire survey</p>	<p>186 Pregnant Women</p>	<ul style="list-style-type: none"> <li>- Family history</li> <li>- Previous pregnancies with RLS</li> <li>- Alleviation of symptoms after delivery</li> <li>- Estrogen</li> <li>- Iron</li> <li>- Trimester prevalence</li> </ul>	<ul style="list-style-type: none"> <li>- Thirty-two percent of women were affected by RLS during the third trimester of their pregnancy.</li> <li>- A family history of pregnancy increases a woman’s likelihood of experiencing RLS.</li> <li>- Multiple pregnancies and iron intake during pregnancy were significantly associated with RLS during the third trimester.</li> <li>- RLS disappeared after delivery among 64.8% of the women, and by less than 2 weeks after delivery in half of them.</li> <li>- Increased estrogen during pregnancy increases the likelihood of RLS during pregnancy.</li> <li>- This improvement after delivery was not associated with the number of previous pregnancies, the RLS severity and iron intake during pregnancy, peridural anaesthesia, caesarean section delivery complications, newborn weight, breastfeeding, dopaminergic agent intake after delivery, or with the absence of RLS before pregnancy.</li> </ul>

<p>Pereira Jr. , Ramos Rocha e Silva, Pradella- Hallinan (2013)</p>	<p>Medical Hypothesis</p>	<p>Various studies were synthesized to identify information.</p>	<ul style="list-style-type: none"> <li>- Dopamine</li> <li>- Thyroid hormone</li> <li>- Thyroid stimulating hormone</li> <li>- Peripheral somatosensory system</li> <li>- Estradiol</li> </ul>	<ul style="list-style-type: none"> <li>- Evidence suggests a correlation between an undermodulation of thyroid hormone and dopamine.</li> <li>- The correlation between thyroid hormone and dopamine is evidenced by the following five things: dopamine agonists are effective treatment for RLS and dopamine regulates thyroid stimulating hormone, thyroid hormone is crucial for regulating the somatosensory system, when symptoms worsen in the evening there is also an increase in thyroid stimulating hormone, medications that worsen RLS are seen to improve thyroid function, and some drugs that lessen symptoms of RLS decrease thyroid hormone.</li> <li>- Peripheral somatosensory system is the site of initiation of restless legs syndrome symptoms.</li> <li>- RLS symptoms may be the result of too strong of a transmission of peripheral stimuli.</li> <li>- Thyroid hormone naturally rises during pregnancy which may indicate a correlation between itself and RLS.</li> <li>- Estradiol (form of estrogen) was found to be increased more in women with RLS than women</li> </ul>
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				without RLS during their pregnancy.
Sarberg, Josefsson, Wiréhn, Svanborg (2012)	Prospective study with questionnaires given in all three trimesters, an additional questionnaire sent to women who were positive for RLS symptoms during pregnancy	500 pregnant women	<ul style="list-style-type: none"> <li>- Snoring</li> <li>- Trimester prevalence</li> <li>- Sleep apnea</li> <li>- Body weight</li> <li>- Blood pressure</li> <li>- Hemoglobin</li> <li>- Daytime sleepiness and fatigue</li> <li>- Dependent edema</li> <li>- Age</li> <li>- Parity</li> <li>- Iron and folate intake</li> </ul>	<ul style="list-style-type: none"> <li>- In the first trimester, 17% of women experienced RLS symptoms, 29.6% experienced symptoms in the second, and overall 32% of women had RLS.</li> <li>- Age, parity, body mass index, weight gain, anemia, hemoglobin, iron and folate intake, edema, and twins were not significant in RLS symptoms.</li> <li>- Restless legs syndrome symptoms increased daytime fatigue and sleepiness.</li> <li>- Three years later, 31.2% of women still suffered from symptoms of RLS.</li> <li>- Another 57.3% of women stated that symptoms disappeared immediately following delivery or within one month.</li> <li>- Symptoms were seen early in pregnancy and did not worsen between the second and third trimester.</li> <li>- Sleep apnea which is often manifested by snoring was shown to be an indicator of RLS symptoms later in pregnancy potentially due to the decreased quality of sleep which leads to the increased susceptibility to RLS symptoms.</li> </ul>

Sethi, Mehta (2012)	Systematic Review	Synthesized information	<ul style="list-style-type: none"> <li>- Severity of symptoms</li> <li>- Secondary or primary</li> <li>- Resolution of symptoms</li> <li>- Prolactin</li> <li>- Stress</li> <li>- Poor sleep</li> <li>- Iron, folate, and ferritin</li> </ul>	<ul style="list-style-type: none"> <li>- Symptoms are seen in ¼ of pregnant women in the third trimester and resolve within weeks of delivery.</li> <li>- Transient RLS is a risk factor for future idiopathic RLS.</li> <li>- Potential causes of RLS during pregnancy would be an increase in prolactin, increased stress levels, poor sleep, and decreased iron, folate, and ferritin.</li> </ul>
Suzuki, Ohida, Sone, Takemura, Yokoyama, Miyake, Harano, Motojima, Suga, Ibuka (2003)	Cross sectional questionnaire survey	16,528 pregnant women living in Japan	<ul style="list-style-type: none"> <li>- Trimester of pregnancy</li> <li>- Difficulty initiating sleep</li> <li>- Maintenance of sleep</li> <li>- Early morning awakening</li> <li>- Daytime sleepiness and fatigue</li> </ul>	<ul style="list-style-type: none"> <li>- If the difficulty maintaining sleep, early morning awakenings, and daytime sleepiness and fatigue were present, restless legs syndrome was likely.</li> <li>- Restless legs syndrome was found in 19.9% of pregnant women and manifested more in the later stages of pregnancy.</li> </ul>
Telstad, Sorenson, Larsen, Lillevoid, Stensrud, Nyberg-Hansen (1984)	Double blind study	2 pregnant women who had unrelieved symptoms from other treatments	<ul style="list-style-type: none"> <li>- Effective nonpharmacologic treatments</li> <li>- Carbamazepine</li> </ul>	<ul style="list-style-type: none"> <li>- Restless legs syndrome can be occasionally rectified by massage, flexion and extension, and walking.</li> <li>- Carbamazepine was given to 2 women whose symptoms were alleviated without relapse.</li> </ul>
Thomas, Watson (2008)	Systematic Review	Synthesized information	<ul style="list-style-type: none"> <li>- Iron and folate deficiency</li> <li>- Caffeine intake</li> <li>- Relaxation techniques</li> </ul>	<ul style="list-style-type: none"> <li>- Iron and folate supplements are thought to possibly reduce RLS symptoms as well as eliminating caffeine and late night meals.</li> <li>- Relaxation such as taking baths, massaging legs, and walking can be</li> </ul>

				beneficial in relieving symptoms.
Uglane, Westad, Backe (2011)	Short Report on a Questionnaire Experiment	251 postpartum patients	<ul style="list-style-type: none"> <li>- Prevalence of RLS</li> <li>- Resolution of symptoms</li> <li>- Hemoglobin</li> <li>- Iron supplementation</li> </ul>	<ul style="list-style-type: none"> <li>- Thirty-four percent of women reported symptoms of RLS during their recent pregnancies.</li> <li>- All but 3% of women reported that symptoms were alleviated within 3 days of delivery.</li> <li>- Iron supplementation and hemoglobin did not affect RLS symptoms.</li> </ul>

## Discussion

Restless legs syndrome is described as a strong urge to move one's legs that is often accompanied by numbness and tingling that worsens with rest and at night (Allen et al., 2003). Many conditions predispose a person to the symptoms of RLS, but one of the most significant predisposing factors is pregnancy. Eleven to thirty-four percent of pregnant women reported symptoms of RLS, particularly in the third trimester (Ekbom & Ulfberg, 2009; Uglane et al., 2011).

There are many known risk factors that precipitate restless legs syndrome in pregnancy that influence current treatment options. Demographics as well as preexisting conditions such as idiopathic restless legs syndrome and growing pains are unable to be modified (Balendaran, Champion, Jaaniste, and Welsh, 2010; Manconi et al., 2004b). Iron deficiency, low hemoglobin, and low mean corpuscular volume have been linked to RLS in pregnancy, thus iron supplementation is often begun to lessen symptoms (Bourjeily, 2009; Ekbom & Ulfberg, 2009; Hensley, 2009; Manconi et al., 2004a; Neau et al., 2010). Other vitamins and minerals such as folate are seen to be depleted when restless legs syndrome is present. Subsequently, an increase

in folate supplementation has been seen to help in alleviation of symptoms in some women (Lee et al., 2001; Gaby, 2007). The increase in stress during pregnancy has also been seen to exacerbate symptoms (Sethi & Mehta, 2012). Consequently, relaxation techniques such as warm bath, massage, and hand-held gaming devices can be used to decrease stress and consequently decrease symptoms of RLS. Also to improve relaxation, exercise and strenuous activities should be eliminated in the evenings (Telstad et al., 1984; Thomas & Watson, 2008). Nutritional changes have also been seen to help decrease the intensity of symptoms. Changes include elimination of caffeine and chocolate after 4:00 pm (Hensley, 2009). If symptoms are critically harmful to the mother or fetus such as a forced operative or dangerously long vaginal delivery due to exhaustion, then there are some medications that can be used to alleviate the symptoms. For example, carbamazepine was used in a double blind study in which two women were included. Their symptoms were relieved, but the benefits of the alleviation outweighed the risk to the fetus (Telstad et al., 1984). Other treatments include dopamine receptor agonists, opioids, anticonvulsants, and benzodiazepines, but they are reserved for only the most severe symptoms due to the possible teratogenic effects (Hensley, 2009).

### **Recommendations for Practice**

Despite the numerous treatment options available, restless legs syndrome of the pregnant woman is being ignored (Manconi et al., 2004b). This is leading to operative and more complicated vaginal deliveries (Balendaran et al., 2011; Hensley, 2009). Many times a woman just needs the acknowledgement that these symptoms, while cumbersome, do not directly harm herself or the fetus. Often education about treatment is not being provided due to the transient nature of RLS in pregnancy, and in turn the difficulty of pregnancy is being heightened (Manconi et al., 2004b). There are simple treatment techniques with no associated risks that can

provide relief for women. These include massage, heat therapy, warm baths and playing with hand-held gaming devices. Also, women should have a set sleep schedule that they follow, rising and falling asleep at the same time each morning and night. There are also dietary alterations that can be made to aid in the alleviation of symptoms. Caffeine should be eliminated from the diet to aid in sleep hygiene. Chocolate should either be eliminated after 4:00 pm or completely from the diet. Women should also stop all strenuous activities in the evening which includes exercising in the morning in order to promote sleep. While there has been some experimentation into using pharmacological methods such as opioids, carbamazepine, and clonidine, the benefit usually does not outweigh the risk, and there is not enough evidence to disprove them as teratogenic (Hensley, 2009; Telstad et al., 1984). Conversely, some vitamin and mineral pharmacological measures can be taken such as increasing iron, folate, and folic acid supplements in pregnancy and consistently taking the supplements while women are of birthing age in order to decrease the likelihood of symptoms during pregnancy (Bourjeily, 2009; Ekbom & Ulfberg, 2009; Hensley, 2009; Lee et. al, 2001; Neau et al., 2010; Sethi & Mehta, 2012; Thomas & Watson, 2008).

Women need education about these symptoms. Even though they are mostly transient in nature, healthcare providers must provide treatment options in order to decrease the stress, anxiety, and complications of pregnancy in order to facilitate an uncomplicated labor and delivery for mothers and babies.

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