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The Prevalence of Restless Legs Syndrome in Pregnancy and Its Relationship with Vitamin and Mineral Use

Gebelikte Huzursuz Bacak Sendromunun Görülme Sıklığı ve Vitamin Mineral Kullanımı ile İlişkisi

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Abstract

Objective: The purpose of this study is to investigate the prevalence of restless legs syndrome (RLS) in pregnancy and its relationship with vitamin and mineral use.

Materials and Methods: The study used a cross-sectional design. The target population of the study was 612 pregnant women. Data were collected between September and December 2020 using the "pregnant woman information form", the "RLS diagnostic criteria questionnaire" and the "RLS severity assessment scale".

Results: Around one in eight participating pregnant women were found to have RLS symptoms. We found that more than half of the pregnant women with RLS experience severe symptoms of RLS. Pregnant women's RLS symptoms were found to as the income level decreased, gestational week increased, coffee consumption increased, weight gained during pregnancy increased, and the number of weekly exercises decreased; RLS symptoms were less common in pregnant women who used magnesium, multivitamin, folic acid and vitamin D ($p<0.05$).

Conclusion: This study showed that RLS is an important health problem in pregnancy and the use of magnesium, multivitamins, folic acid, and Vitamin D reduces the prevalence of RLS.

Keywords: Pregnancy, restless legs syndrome, vitamin and mineral use

Öz

Amaç: Bu çalışmanın amacı, gebelikte huzursuz bacak sendromu (HBS) prevalansını ve bunun vitamin ve mineral kullanımı ile ilişkisini araştırmaktır.

Gereç ve Yöntem: Çalışmada kesitsel bir tasarım kullanılmıştır. Çalışmanın hedef popülasyonu 612 gebe kadındır. Veriler Eylül ve Aralık 2020 tarihleri arasında "gebe kadın bilgi formu", "HBS tanı kriterleri anketi" ve "HBS şiddet değerlendirme ölçeği" kullanılarak toplanmıştır.

Bulgular: Araştırmaya katılan yaklaşık her sekiz hamile kadından birinde HBS semptomları tespit edilmiştir. HBS olan hamile kadınların yarısından fazlasının şiddetli HBS yaşadığı tespit edilmiştir. Gelir düzeyi düştükçe, gebelik haftası arttıkça, kahve tüketimi arttıkça, gebelikte alınan kilo arttıkça ve haftalık egzersiz sayısı azaldıkça gebelerin HBS semptomlarının arttığı; magnezyum, multivitamin, folik asit ve D vitamini kullanan gebelerde HBS semptomlarının daha az görüldüğü saptanmıştır ($p<0,05$).

Sonuç: Bu çalışma, HBS'nin gebelikte önemli bir sağlık sorunu olduğunu ve magnezyum, multivitamin, folik asit ve D vitamini kullanımının HBS prevalansını azalttığını göstermiştir.

Anahtar Kelimeler: Gebelik, huzursuz bacak sendromu, vitamin ve mineral kullanımı

Introduction

Restless legs syndrome (RLS) is a neurological disorder associated with the urge to move legs due to uncomfortable sensations.[1] RLS, first described by Sir Thomas Willis, was defined by Karl Axel Ekbom in 1945 as restless legs.[1] The etiopathogenesis of RLS has not been fully explained. According to epidemiologic studies report the prevalence of RLS ranges from 1 to 15% in society.[2] The prevalence of RLS was reported to be 10% in North America and Europe and 0.1% in Asia. A community-based study in Turkey reported the prevalence of RLS as 3.1%.[3] The prevalence of RLS in the general population ranges from 2 to 10% and women are affected two times more than men.[4] Pregnancy is a process that involves physiological, psychological, and social changes.[5] The risk of RLS increases due to factors such as hormonal changes, psychomotor reasons, anxiety, folate, and iron changes in the blood occurring during pregnancy.[6] A study with pregnant women in our country revealed the prevalence of RLS between 19% and 26%.[7] RLS is most common in the 3rd trimester of pregnancy, and the symptoms regress when pregnancy is over. It is hypothesized that iron and folate

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deficiency, increased estrogen, progesterone and prolactin levels, and radiculopathy are involved in the development of RLS during pregnancy. The need for iron increases 3-4 times and the need for folate increases 8-10 times during pregnancy.[2] In 1982, dopamine agonists were found to improve RLS, and the dopaminergic system was proven to have an important role in the origin of the disease. Iron works as a cofactor in dopamine synthesis, and iron deficiency delays dopamine synthesis[8,9], which indicates a relationship between changing vitamin and mineral needs and RLS during pregnancy.

Pregnant women can consume supplements to meet their changing vitamin and mineral needs during pregnancy. The most important micronutrients as supplements during pregnancy include vitamins A, B, C, D, and E, folic acid, iron, zinc, iodine, copper and selenium.[10] Adequate and balanced nutrition during preconceptional and gestational periods is important for maternal and fetal health. Some countries provide selected food supplements to meet micronutrient needs, while others recommend supplementation intake throughout the antenatal period. The World Health Organization recommends oral iron and folic acid intake during the antenatal period.[11] Pregnant women should be evaluated holistically by nurses to protect maternal and fetal health and to improve women's quality of life during pregnancy. Considering the high prevalence of RLS syndrome during pregnancy and its negative effects on quality of life, it is important for nurses to examine this issue sufficiently and teach appropriate coping methods to pregnant women in this context.[6] The literature includes findings demonstrating the relationship between nutrition and RLS.[8,12] However, this relationship is nutrition-oriented, and the literature knowledge that reveals its relationship with supplements is limited.[8,13] This study aims to increase the quality of care to be provided to pregnant women by nurses to help women cope with RLS and increase the quality of care to be provided to women and enhance maternal and fetal health.

Materials and Methods

Participants

The target population of the study consisted of pregnant women who sought treatment in the obstetrics and gynecology outpatient clinic of Siirt Training and Research Hospital. The hospital has three outpatient clinics and provides service to 1,800 patients monthly. The study included 612 pregnant women as the sample, representing the target population with a rate of 0.95 in the 95% confidence interval determined with a 0.05 effect size and 0.05 margin of error according to the power analysis performed by taking the prevalence of RLS as 19 to 26%.[7]

The study included participating pregnant women using the random sampling method. We obtained ethics approval from the Non-Interventional Clinical Research Ethics Committee of Health Sciences at İnönü University before starting the study (decision number: 2020/1024, date: 29.09.2020), and institutional permission from Siirt Training and Research Hospital affiliated with Siirt Provincial Health Directorate. Before initiating the study, we informed the pregnant women about its purpose, assured them that the information they provided would remain confidential and used only for research purposes, granted them the freedom to leave the study at any time, and obtained their written consent. Data were collected by the researchers in the hospital environment by meeting the participants face-to-face every day between 08.30 and 16.30 on weekdays between May 8, 2020 and May 14, 2021.

Data Collection

Data were collected through the "pregnant woman information form" developed by the researchers in line with the literature[6,10,14], "RLS criteria questionnaire"[2,7,8,15] and the "RLS severity assessment scale".[16,17]

Statistical Analysis

Data analysis was performed in the computer environment using the SPSS Statistics 25.0 software. We used descriptive analysis descriptive analyses, chi-square, t-test in independent groups, and Cronbach's alpha reliability analysis for statistical analyses. While the confidence interval was accepted at 95%, significance was accepted at $p<0.05$.

Results

Of all the participating pregnant women, 48.4% were between the ages of 18 to 25. 26.8% of the participants had primary school education and 26.6% had secondary school or equivalent education, and 96.9% were unemployed. As for their monthly income, 83.7% of the pregnant women stated that their monthly income was less than their monthly expenses (Table 1). For 50.8% of pregnant women, the gestational week was 27 weeks or more. Besides, 52.2% of the pregnant women had three or more pregnancies and 28.8% had never given birth before (Table 1).

The reports showed that 6.4% of the pregnant women smoked, 85.1% drank at least one cup of tea daily and 26% consumed at least one cup of coffee daily during their pregnancy. 22.5% of them exercised at least once a week. The body mass index (BMI) values were below 18.5 in 5.4% of participating women, between 18.5 and 25 in 56%, and over 25 in 38.6%. The weight gain during pregnancy was found to be 6 kg and less in 49.4% of participating women, between 7 and 12 in 33%, and 13 kg and more in 17.6%. 29.9% of pregnant women experienced anemia during pregnancy, 13.2% were diagnosed with RLS according to the RLS diagnostic criteria questionnaire. Among those who were diagnosed with RLS 19.8% had moderate RLS symptoms, 69.1% had severe and 11.1% had very severe symptoms (Table 1).

No statistically significant difference was detected between the education level, employment status, number of pregnancies, number of deliveries, smoking, tea consumption, exercising, BMI before pregnancy, anemia status and age, and the presence of RLS ($p>0.05$). The rate of RLS diagnosis was found to be higher in those whose monthly income was less than their expenses (76.1%) than in those whose monthly income was equal to or more than their expenses (23.9%) ($p<0.05$). While the average gestational week was 29.36±10.68 in pregnant

Table 1. Distribution of pregnant women's sociodemographic, obstetric, and other characteristics and the prevalence and severity of RLS (n=612)		
Characteristics	**n**	**%**
Age*		
18-25	296	48.4
26-35	271	44.3
36-45	45	7.3
Education level		
Literate	143	23.4
Primary school	164	26.8
Secondary school	163	26.6
High school and above	142	23.2
Employed or not		
Yes	19	3.1
No	593	96.9
Monthly income		
Income less than expenses	512	83.7
Income equal to or more than expenses	100	16.3
Gestational week		
13 Weeks and less	139	22.7
14-26 Weeks	162	26.5
27 Weeks and more	311	50.8
Number of pregnancies		
1-2	292	47.8
3 and more	320	52.3
Number of deliveries		
None	176	28.8
1	162	26.5
2	112	18.2
3 and more	162	26.5
Smoking		
Yes	39	6.4
No	573	93.6
Consuming tea		
Yes	521	85.1
No	91	14.9
Consuming coffee		
Yes	159	26.0
No	453	74.0
Exercising		
Yes	138	22.5
No	474	77.5
BMI before pregnancy		
18.5 and less	33	5.4
18.5 to 25	343	56.0
25 and over	236	38.6
Weight gained during pregnancy**		
6 kg and below	302	49.4
7 to 12 kg	202	33.0
13 kg and more	108	17.6
Anemia during pregnancy		
Yes	183	29.9
No	429	70.1
Total	612	100.0
Restless legs syndrome		
Yes	81	13.2
No	531	86.8
The severity of restless legs syndrome		
Moderate	16	19.8
Severe	56	69.1
Very severe	9	11.1

*Average age: 26.64±5.37, min-max: 17-45 **Weight gained during pregnancy: 7.29±6.26

BMI: Body mass index, RLS: Restless legs syndrome

women who were diagnosed with RLS, it was 24.14±11.67 in those who were not diagnosed with RLS ($p<0.05$). The average weight gain during pregnancy was found to be 9.55±6.68 in pregnant women who were diagnosed with RLS during pregnancy and 7.33±7.85 in those who were not diagnosed with RLS ($p<0.05$). Those diagnosed with RLS during pregnancy reported consuming coffee at a rate of 37.3%, whereas those without the diagnosis reported consuming coffee at a rate of 24.2% (Table 2).

A statistically significant relationship was found between the use of magnesium, multivitamins, folic acid, and vitamin D during pregnancy and being diagnosed with RLS ($p<0.05$). Of the participating pregnant women who were diagnosed with RLS, 12.3% used magnesium while 87.7% did not; 22.8% used multivitamins while 77.8% did not; 22.9% used folic acid while 77.1% did not; and 49.4% used vitamin D while 50.6% did not ($p<0.05$).

Pregnant women who used magnesium, multivitamins, folic acid, and vitamin D had a lower incidence of RLS. No statistically significant difference was found between iron use and being diagnosed with RLS ($p>0.05$) (Table 3).

Discussion

Epidemiologic studies have revealed the prevalence of RLS as 11 to 22.5% in pregnancy.[7,18-20] The prevalence of RLS in pregnancy is reported to be between 19% and 26% in our country.[7] This study found that one out of every eight pregnant women had RLS (Table 1). The prevalence of RLS was reported to be 11.2% by Shang et al.[18] 12% by Ma et al.[20] and 13.5% by Alves et al.[19] A study conducted by Çakmak et al.[7] in our country revealed the prevalence of RLS in pregnant women as 15.4%.

Our finding is similar to the findings reported by Shang et al.[18], Ma et al.[20], Alves et al.[19], and Çakmak et al.[7].

Three out of every four participating pregnant women diagnosed with RLS were found to have severe RLS symptoms (Table 1). Alves et al.[19] reported that 53.5% of pregnant women with RLS experienced severe and very severe RLS symptoms. Vahdat et al.[21] reported that 74.7% of pregnant women experienced moderate RLS symptoms. Akbaş[22] also reported that 40.5% of pregnant women experienced severe RLS symptoms. Our findings are comparable to those of other studies.

No statistically significant difference was found between age and RLS (p>0.05) (Table 2). Published evidence on the relationship between age and RLS during pregnancy is contradictory. While Manconi et al.[23], Sikandar et al.[24], and Liu et al.[25] reported a relationship between age and RLS, Chen et al.[26], Hübner et al.[27], and Vahdat et al.[21] found no relationship. The findings of the

Table 2. Comparison of pregnant women's receiving restless legs syndrome diagnosis and some variables (n=612)

		RLS				Test, p
		Yes (n=81)		No (n=531)		
Variables		**n**	**%**	**n**	**%**	
Education level	Literate	12	16.7	131	24.4	**X^2**= 7.315 **p**=0.120
	Primary school	25	31.0	139	26.2	
	Secondary school	28	33.2	135	25.6	
	High school and above	16	19.0	126	23.8	
Employed or not	Yes	3	3.6	16	3.0	**X^2**= 0.111 **p**=0.729
	No	78	96.4	515	97.0	
Monthly income	Income less than expenses	61	76.1	452	84.8	**X^2**= 4.992 **p=0.025**
	Income equal to or more than expenses	20	23.9	79	15.2	
Number of deliveries	None	24	29.8	152	28.6	**X^2**= 0.478 **p**=0.924
	1	23	27.4	139	26.3	
	2	15	17.9	97	18.4	
	3 and more	19	25	143	26.7	
Smoking	Yes	9	10.7	30	5.7	**X^2**=3.513 **p**=0.061
	No	72	89.3	501	94.3	
Tea consumption/cup/day	Yes	74	91.6	447	84.1	**X^2**=2.860 **p**=0.091
	No	7	8.4	84	15.9	
Coffee consumption/cup/day	Yes	31	37.3	128	24.2	**X^2**=7.334 **p=0.007**
	No	50	62.7	403	75.8	
Exercising/times/weekly	Yes	25	30.1	113	21.4	**X^2**=3.696 **p**=0.055
	No	56	69.9	418	78.6	
BMI before pregnancy	Below 18.5	3	3.7	30	5.6	**X^2**=1.418 **p=0.492**
	Between 18.5 and 25	50	61.7	293	55.2	
	Over 25	28	34.6	208	39.2	
Anemia	Yes	22	17.8	161	30.3	**X^2**=0.335 **p**=0.563
	No	59	82.2	370	69.7	
Number of pregnancies	1 and 2	40	48.8	252	47.5	**X^2**=0.104 **p**=0.747
	3 and more	41	51.2	279	52.5	
		$\bar{X}$±SD		**$\bar{X}$±SD**		
Weight gained during pregnancy		9.55±6.68		7.33±7.85		t=2.409 **p=0.016**
Gestational week		29.36±10.68		24.14±11.67		t=4.045 **p=0.001**
Age		26.57±5.63		26.65±5.33		t=-0.125 **p**=0.901

BMI: Body mass index, RLS: Restless legs syndrome, SD: Standard deviation

Table 3. Comparison of pregnant women's receiving restless legs syndrome diagnosis and vitamin and mineral use during pregnancy (n=612)

		RLS				
Vitamins and minerals		**Yes (n=81)**		**No (n=531)**		**Test, p**
		n	**%**	**n**	**%**	
Iron use	Yes	26	33.7	218	40.9	X^2=2.351 p=0.125
	No	55	66.3	313	59.1	
Magnesium use	Yes	10	12.3	21	4.0	X^2=13.140 **p=0.001**
	No	71	87.7	510	96.0	
Multivitamin use	Yes	18	22.8	191	36.0	X^2=5.907 **p=0.015**
	No	63	77.8	340	64.0	
Folic acid use	Yes	17	22.9	181	34.1	X^2=5.801 **p=0.016**
	No	64	77.1	350	65.9	
Vitamin D use	Yes	40	49.4	147	27.7	X^2=15.595 **p=0.001**
	No	41	50.6	384	72.3	

RLS: Restless legs syndrome

present study are similar to the studies conducted by Chen et al.[26], Hübner et al.[27], and Vahdat et al.[21]

No significant relationship was found between the education and employment status of participating pregnant women and RLS diagnosis (p>0.05) (Table 2). The study conducted by Akbaş[22] also indicated no relationship between pregnant women's working status and education level and RLS diagnosis. Our findings are comparable to those reported by Akbaş.[22]

The decrease in pregnant women's income level prevents them from accessing their daily vitamin needs and adequate nutrition. Therefore, there is an inverse relationship between income level and RLS.[28] Health status and health perception levels are reported to increase with the increase in income level.[29,30] An epidemiologic study conducted by Cho et al.[31] revealed a relationship between income perception and RLS as well as an inverse relationship between the increase in income level and the prevalence of RLS. In this study, the prevalence of RLS was found to increase with the decrease in the income level perception (p<0.05) (Table 2), which is parallel with the finding reported by Cho et al.[31]

The prevalence of RLS increases when estradiol reaches the highest level in the third trimester of pregnancy. The decrease in the prevalence and severity of RLS after birth is associated with the normalization of estrogen levels.[32] Progesterone level also increases during pregnancy and reaches its peak in the third trimester; its relationship with RLS is due to the interaction between progesterone and dopamine in the striatum, the nucleus of the basal ganglia.[32] Our study found that the prevalence of RLS increased with the increase in the gestational week (p<0.05) (Table 2). Taylor and Lebovic[33] reported the prevalence of RLS highest in the third trimester. Estradiol levels were found to be significantly higher in women with RLS symptoms in the third trimester compared to women with no RLS symptoms.[32] The findings in this study are comparable to the ones reported by Taylor and Lebovic.[33]

The number of pregnancies and the number of deliveries were found to have no significant relationship with RLS (p>0.05) (Table 2). Berger et al.[34] reported that the prevalence of RLS in pregnant women was strongly associated with the number of deliveries. The study conducted by Şahin et al.[35] showed that the prevalence of RLS in pregnant women wasn't affected by the number of pregnancies and births. Similarly, Çakmak et al.[7] discovered that there was no association between the number of pregnancies, number of deliveries, and RLS. The finding in this study is in line with the findings of Şahin et al.[35] and Çakmak et al.[7] The difference between the present study and the findings reported by Berger et al.[34] is considered to be due to cultural reasons.

Smoking and BMI were not associated with RLS in this study (p>0.05) (Table 2). Esposito et al.[36] reported that smoking during pregnancy and BMI were not associated with RLS. The findings of this study are parallel with those reported by Esposito et al.[36]

This study found no significant relationship between tea consumption and RLS (p>0.05) (Table 2). The study conducted by Khan et al.[37] with pregnant women showed that tea consumption was not associated with RLS. The findings in this study are similar to those reported by Khan et al.[37]

No statistically significant relationship was found between BMI before pregnancy and RLS diagnosis (p>0.05) (Table 2). Esposito et al.[36] also reported no significant difference in terms of BMI between pregnant women with and without RLS diagnosis. These findings in this study are similar to those reported by Esposito et al.[36]

It is reported that being overweight may be associated with low hemoglobin levels in serum, which may trigger RLS. Severe obesity is reported to be associated with RLS in the study conducted by Lee.[38] A significant relationship was found between pregnant women's weight gain during pregnancy and their RLS diagnosis (p<0.05) (Table 2). RLS was found to be more common in those who gained a lot of weight during pregnancy. The study conducted by Minar et al.[39] reported that high weight gain during pregnancy affected RLS diagnosis positively. The findings are in this study are similar to those reported by Minar et al.[39]

No significant relationship was found between pregnant women's exercise routine and RLS ($p>0.05$) (Table 3). Liu et al.[25] found no significant relationship between pregnant women's exercise status and the presence of RLS. The findings of this study are similar to those reported by Liu et al.[25]

The development of RLS during pregnancy was suggested to be potentially associated with iron and folate deficiencies. During pregnancy, the need for iron increases three to four times, and the need for folate increases eight to ten times.[9] The prevalence of RLS is reported to be less in those who take folate supplements during pregnancy.[21] This study found no significant relationship between iron use and RLS diagnosis ($p>0.05$). Almeneessie et al.[40] found a significant and positive correlation between iron deficiency and RLS diagnosis ($p<0.05$). Manconi et al.[2] found that folate supplementation was not associated with the presence or absence of RLS. The difference between Almeneessieet al.'s[40] and our study's findings are considered to be caused by nutrition as it is influenced by cultural factors, which have an indirect role in the prevalence of anemia. The findings are similar to those reported by Manconi et al.[2]

This study found that the prevalence of RLS was less in pregnant women who used multivitamins ($p<0.05$) (Table 3). Almeneessie et al.[40] and Çakmak et al.[7] both reported no significant relationship between multivitamin use and the prevalence of RLS during pregnancy in their respective studies. The difference with the finding of Almeneessie et al.[40] is considered to be due to racial differences. The reason for the difference with the finding of Çakmak et al.[7] is considered to be related to the duration and amount of multivitamin use.

The prevalence of RLS was found to be less in pregnant women who used magnesium ($p<0.05$) (Table 3). There are limited researches on the relationship between RLS diagnosis in pregnancy and magnesium level.[41] The study conducted by Yıldırım and Apaydın[41] reported that magnesium levels were lower in pregnant women with RLS symptoms. The findings in this study are similar to those reported by Yıldırım and Apaydın.[41] Vitamin D deficiency is reported to be associated with impaired dopaminergic neurotransmission. The role of vitamin D in the development of RLS was further supported by the higher concentration of vitamin D binding protein in the cerebrospinal fluid of patients with RLS.[40] This study found that the RLS prevalence was less in pregnant women who used vitamin D ($p<0.05$) (Table 3). Almeneessie et al.[40] found a significant relationship between vitamin D and RLS ($p<0.05$). This study has similar findings to the ones reported by Almeneessie et al.[40]

Conclusion

Around one in every eight pregnant women was found to have RLS, and more than half of the pregnant women diagnosed with RLS experienced severe RLS. This study found that the RLS prevalence increased with the increase in the gestational week and in those who had low monthly income, who consumed coffee during pregnancy, and who did not exercise during pregnancy ($p<0.05$). In addition, those who did not use magnesium, multivitamin, folic acid, and vitamin D during pregnancy received more RLS diagnoses than those who did ($p<0.05$). Based on the findings obtained from the study, it is recommended that during pregnancy, necessary vitamin and mineral supplements should be taken in addition to adequate and balanced nutrition; nurses should inform pregnant women about RLS; pregnant women should try to benefit more from sunlight and use vitamin D to reduce the prevalence of RLS; and further studies should be conducted in larger sample groups in which vitamin and mineral use is evaluated by considering laboratory values.

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Ethics

Ethics Committee Approval: We obtained ethics approval from the Non-Interventional Clinical Research Ethics Committee of Health Sciences at İnönü University before starting the study (decision number: 2020/1024, date: 29.09.2020), and institutional permission from Siirt Training and Research Hospital affiliated with Siirt Provincial Health Directorate.

Informed Consent: Before initiating the study, we informed the pregnant women about its purpose, assured them that the information they provided would remain confidential and used only for research purposes, granted them the freedom to leave the study at any time, and obtained their written consent.

Authorship Contributions

Design: F.B., S.T.T., Data Collection or Processing: F.B., S.T.T., Analysis or Interpretation: F.B., S.T.T., Literature Search: F.B., S.T.T., Writing: F.B., S.T.T.

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