

Falls during Pregnancy in Turkish Women: Prevalence, Affecting Factors and Treatment-Seeking Behaviors

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ABSTRACT

Background & aim: Physiological, anatomical and hormonal changes that occur during pregnancy could increase pregnant women's risk of falling, which could lead to negative outcomes for both women and fetuses. This study aims was to identify the prevalence and influencing factors of falls in Turkish women during pregnancy as well as these women's treatment-seeking behavior.

Methods: This retrospective and descriptive study was conducted with 622 pregnant women who presented for prenatal follow-up at Niğde Training and Research Hospital in Turkey using the convenience sampling method. The data were collected with the "Structured Questionnaire Form" and "Trait Anxiety Inventory", and analyzed using SPSS 24.0 software using descriptive statistics, Chi-squared and Student's t-tests and logistic regression analysis.

Results: The prevalence of falls in pregnant women at term was found as 17.7%. The falls most commonly occurred at home (62.3%), on stairs (16.8%), and on wet (16.8%) or uneven ground (13.9%). The rates of injury and going to a hospital after such a fall were 63.6% and 14.2%, respectively. Trait anxiety mean scores did not show a significant difference in terms of pregnancy fall history ($p>0.05$). Regression analysis revealed a significant relationship between a fall history during pregnancy and medication use ($OR=1.680$; $p=0.025$) and clothing style ($OR=1.836$; $p=0.025$).

Conclusion: Approximately two out of ten pregnant women have a history of falling, with the falls usually being associated with preventable causes. It is recommended that pregnant women be informed by midwives and other healthcare professionals about falls, avoiding risk factors and seeking medical treatment.

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Introduction

Falls are among the leading causes of fatal injuries in the world. The type and degree of the injuries that may occur due to a fall depend on various factors related to the age, gender and health status of the affected individuals (1). One of the factors affecting the risk of falling is pregnancy. The physiological, anatomic and hormonal changes during pregnancy are reported to play a role in this increased risk (2, 3). In fact, falls are the second most common cause of trauma during pregnancy, after motor vehicle

injuries (4). It has been reported that 54.9% of pregnant women presenting to the emergency department are there because of fall-related trauma (5). Pregnant women have been reported to be 2.3 times more likely to be hospitalized after a trauma than non-pregnant women from a similar age group (2). Although the results of fall-related minor trauma during pregnancy are usually not significant (5), major trauma can indeed be life-threatening for the woman and the unborn child (2, 4, 6). Schiff has reported that

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pregnant women most commonly presented to the hospital due to falls while in the third trimester, and injuries were especially usually lower extremity fractures, contusions and sprains. Falls were found to increase the risk of preterm labor, placental ablation, fetal distress and fetal hypoxia in the same study (6). Although falls during pregnancy can cause various major and minor health problems, only 20-36% of these women have been reported to seek medical treatment (7, 8).

Many internal and external factors have been reported to increase the risk of falling during pregnancy (9). External factors include walking on slippery, uneven or sloping ground; rushing; carrying an object or a child; being accidentally or deliberately pushed; and poor lighting or visibility (7, 10, 11). Internal factors refer to physical, biomechanical and psychological changes that can cause pregnant women to fall (9). Information regarding the factors affecting falls during pregnancy and the effects on maternal and fetal health has mostly been obtained for patients who presented to a hospital after the trauma (4, 6-12). Some studies have investigated the prevalence of falls in pregnancy and the influencing factors (7, 8, 10, 11). However, there are no similar studies on pregnant women from Turkey. More studies are required to identify pregnant women at risk of falling and to develop prevention programs (8, 9). This primarily requires recognizing the factors causing falls during pregnancy. The purpose of the study is to determine the prevalence of falls during pregnancy, the influencing factors and treatment-seeking behavior among pregnant women in Turkey.

Materials and Methods

The population of this descriptive and retrospective study consisted of women who presented to the gynecology outpatient department of the Niğde Training and Research Hospital in Niğde, Turkey for prenatal follow-up between December 2018 and May 2019. According to the $n=t^2.p/q/d^2$ formula, and using a 95% confidence interval, and values of $t=1.96$, $p=0.27$ (7), $d=0.05$ and $q=0.73$, the minimum number of women required was calculated as 303. More pregnant women were included in the study in order to increase the strength and reliability of the study, also since increasing the sample size did not cause time or funding related difficulties. Convenience sampling was used in the study. All pregnant women who met the inclusion criteria were included in the study. These criteria consisted of being older than 18, having completed the 37th week of pregnancy, being able to answer the study questions and agreeing to participate in the study. The study

was completed with 622 term pregnant women who were able to meet the above criteria.

At the time of the study, a valid and reliable scale to evaluate falls in pregnancy had not been created in Turkey. For this reason, the study data about falling were collected with the "Structured Questionnaire Form", which was created by the researchers by reviewing the relevant literature (2, 3, 7, 10, 11, 13, 14). The structured questionnaire form consisted of a total of 35 questions including 8 questions on the socio-demographic characteristics of the women, 6 on general health and personal habits, 9 on obstetric characteristics, and 12 on fall-related situations and treatment-seeking behavior. Falling was described in the form as any part of the individual's body except the feet touching the ground. The structured questionnaire form was piloted with ten women who were not included in the sample. After the pilot run, the order of the questions was revised.

It has been stated that anxiety may cause falls by affecting the motor control and postural balance of pregnant women (9). Therefore, in the study, the "Trait Anxiety Inventory" (TAI) part of the "State-Trait Anxiety Inventory" (STAI) developed by Spielberger, Gorsuch, and Lushene in 1970 was used to evaluate the relationship between falling history and trait anxiety level (15). This inventory was adapted to Turkish in 1983 by Öner and Le Compte (16). TAI consists of 20 expressions of the 4-point Likert type, and the score range is 20 to 80. Increased scores indicate increased anxiety levels, regardless of the individual's situation and the conditions (15, 16).

Ethics committee approval was obtained from the Niğde Ömer Halisdemir University Ethics Committee (decision no: 2018/14-12, date: 29.11.2018), and written permission was obtained from the study hospital to conduct this study. The data were then collected with the face-to-face interview method. Written and verbal informed consent was obtained from all pregnant women who took part in this study.

SPSS IBM (24.0) software was used in this study. Descriptive statistics, Chi-squared test, Student's t-test were used for data analysis. The relationship between the independent variables with a p value below 0.25 and a history of a fall was evaluated by using the model created with Backward Stepwise Logistic Regression analysis. The findings were assessed with a 95% confidence interval and at the $p < 0.05$ significance level.

Results

The mean age of the participating pregnant women was 26.73 ± 5.26 , and the mean

gestational week was 38.27 ± 1.09 weeks. It was found that 99.7% were married, 39.4% were secondary school graduates, 13.5% were employed with pay, and 22.0% had social security.

Table 1. Prevalence, characteristics, outcomes and treatment-seeking behavior as related to falls among pregnant women

Variable	N (%)
History of fall (n=622)	
Yes	110 (17.7)
No	512 (82.3)
Number of falls (n=110)	
1 time	99 (90.0)
≥2 times	11 (10.0)
Pregnancy trimester when the fall occurred (n=110)*	
I	13 (11.0)
II	39 (33.1)
III	66 (55.9)
Fall from a height ≥1 meter (n=110)	
Yes	7 (6.4)
No	103 (93.6)
The place of the fall (n=110)**	
Home	71 (62.3)
Street/garden	32 (28.1)
Indoor environment other than home	11 (9.6)
The cause of the fall (n=110)**	
Going up and down the stairs	24 (16.8)
Wet surface	24 (16.8)
Uneven/sloping ground	20 (13.9)
Stumbling on the door sill	14 (9.8)
Snowy ground	13 (9.1)
Untidy surroundings	13 (9.1)
Hitting/tripping on something accidentally	13 (9.1)
Rushing	6 (4.2)
Trying to reach something	6 (4.2)
Dizziness	6 (4.2)
Other	4 (2.8)
Body part absorbing the fall (n=110)	
Lower extremities/back/hip	73 (66.4)
Upper extremities/abdomen/face/head	29 (26.4)
Other	8 (7.2)
Injury due to the fall (n=110)	
Yes	70 (63.6)
No	40 (36.4)
Type of injury (n=110)	
Bruising/lividity	34 (30.9)
Back pain	20 (18.2)
Sprain/strain	14 (12.7)
Abdomen and groin pain	14 (12.7)
Twisted ankle	7 (6.4)
Hip/leg pain	7 (6.4)
Cut / Laceration	6 (5.4)
Bone fracture	5 (4.6)

Other	3 (2.7)
Treatment-seeking behavior following fall (n=110)**	
Resting/movement restriction	66 (26.7)
Presenting to the hospital	35 (14.2)
Monitoring fetal movement	35 (14.2)
Telephoning husband	35 (14.2)
Consulting family/friends	17 (6.9)
Observing symptoms of delivery (bleeding, pain, water breaking, etc.)	15 (6.1)
Praying	15 (6.1)
Calling a physician/nurse	11 (4.4)
Applying ice or cold to the painful area	8 (3.2)
Using painkillers	5 (2.0)
Other	5 (2.0)

* Some participants reported more than one fall in different trimesters.

**Participants declared more than one answer

The mean BMI (body mass index) of the pregnant women was 29.43 ± 4.41 during the study period. The BMI of 44.2% of the subjects was 25.00-29.99 kg/m². Among the pregnant women, 28.9% stated that this was their first pregnancy, 20.6% had become pregnant unintentionally, 13.5% had a health problem, 26.5% exercised regularly, 23.9% were on medication, and 5.6% were being monitored having been diagnosed with a high risk pregnancy. The mean TAI score was 49.28 ± 6.66 . Loose and comfortable clothes (skirt, dress, baggy pants and topcoat) were generally preferred by 46.0% and athletic shoes by 41.2%. Among the entire group, 6.6% stated that they had received information on falling in pregnancy and what to do to prevent it, and 13.3% had taken measures to decrease the risk. Such measures included in-house arrangements like such as placing mats in front of the bathroom and immobilizing carpets (10.8%), choosing suitable shoes (10.8%), and moving with caution (78.3%).

A history of falling was reported by 17.7% of the pregnant women included in the study. The number of falls was two or more in 10.0%. The fall took place in the third trimester in 55.9%, and 6.4% had fallen from a height of one meter or more. The majority of the women had fallen in their house (62.3%), while going up and down the stairs (16.8%), on a wet surface (16.8%) or on uneven/sloping ground (13.9%), and landed on their lower extremities/back/hips (66.4%). An injury caused by the fall was reported by 63.6% of the pregnant women.

Table 2. Falls according to various characteristics and TAI scores of the pregnant women

Characteristics	Yes	No	Test / p value
	(n = 110) N (%)	(n = 512) N (%)	
Age group			
18-22	29 (26.4)	112 (21.9)	$\chi^2 = 4.335$
23-27	36 (32.7)	196 (38.2)	p = 0.227
28-32	32 (29.1)	118 (23.1)	
≥33	13 (11.8)	86 (16.8)	
Educational level			
Primary school graduate	15 (13.6)	101 (19.7)	$\chi^2=5.239$
Secondary school graduate	50 (45.5)	195 (38.1)	p = 0.155
High school graduate	30 (27.3)	118 (23.1)	
University graduate and above	15 (13.6)	98 (19.1)	
Occupational status			
Working	11 (10.0)	73 (14.3)	$\chi^2 = 1.064$
Not working	99 (90.0)	439 (85.7)	p = 0.302
Social security			
Has	87 (79.1)	398 (77.7)	$\chi^2 = 0.097$
Does not have	23 (20.9)	114 (22.3)	p = 0.755
Height			
<160 cm	64 (58.2)	266 (52.0)	$\chi^2 = 1.410$
≥160 cm	46 (41.8)	246 (48.0)	p = 0.235
BMI group			
18.5-24.99 kg/m ²	17 (15.5)	73 (14.3)	$\chi^2 = 0.149$
25.0-29.99 kg/ m ²	49 (44.5)	226 (44.1)	p = 0.928
≥30.00 kg/m ²	44 (40.0)	213 (41.6)	
Regular exercise (Weekly ≥3 times 30-45 minutes)			
Yes	32 (29.1)	133 (26.0)	$\chi^2 = 0.451$
No	78 (70.9)	379 (74.0)	p = 0.502
Gravida			
1 time	31 (28.2)	149 (29.1)	$\chi^2 = 4.728$
2 times	23 (20.9)	140 (27.4)	p = 0.193
3 times	32 (29.1)	104 (20.3)	
≥4 times	24 (21.8)	119 (23.2)	
Parity			
0	36 (32.7)	178 (34.8)	$\chi^2 = 5.752$
1	29 (26.4)	150 (29.2)	p = 0.124
2	36 (32.7)	117 (22.9)	
≥3	9 (8.2)	67 (13.1)	
Presence of health problems			
Yes	22 (20.0)	62 (12.1)	$\chi^2 = 4.826$
No	88 (80.0)	450 (87.9)	p = 0.028*
High risk pregnancy			
Yes	8 (7.3)	27 (5.3)	$\chi^2 = 0.357$
No	102 (92.7)	485 (94.7)	p = 0.550
Medicine use in pregnancy			
Yes	36 (32.7)	113 (22.0)	$\chi^2 = 5.645$
No	74 (67.3)	399 (78.0)	p = 0.018*
Clothing style			
Leggings/Pants	22 (20.0)	150 (29.3)	$\chi^2 = 6.341$
Sweat suit bottoms	26 (23.6)	138 (27.0)	p = 0.042*
Long Skirt/Dress/Topcoat/Baggy Pants	62 (56.4)	224 (43.7)	
Commonly preferred shoes			
Flat or low heels	47 (42.8)	178 (34.8)	$\chi^2 = 2.629$
Athletic shoes	42 (38.2)	214 (41.8)	p = 0.269
Slippers	21 (19.0)	120 (23.4)	
	Mean ± SD	Mean ± SD	
Total TAI Score	49.9 ± 6.8	49.1 ± 6.6	t = -1.115 p = 0.265

Note. *The level of statistical significance was set at p <0.05; TAI: Trait Anxiety Inventory; SD: Standard Deviation

The most common problems in the women after the fall included bruising/lividity (30.9%), back pain (18.2%), sprain/strain (12.7%), and pain in the abdomen and groin (12.7%). Following the fall, the pregnant women rested and restricted their movements (26.7%), went to a hospital (14.2%), monitored the movements of the fetus (14.2%), and telephoned their husbands (%14.2) (Table 1).

In the study, a history of a fall in the pregnant women was only found to be statistically significantly associated with having a health problem, using medication, and the clothing style ($p < 0.05$). There was no significant relationship between a history of a fall in the pregnant women and the other variables investigated (age, education level, occupational status, social security, height, BMI group,

amount of regular exercise, gravida, parity, history of risk during current pregnancy, commonly preferred shoes and TAI Score) ($p > 0.05$) (Table 2).

The effect of probable risk factors on the history of a fall was investigated using Backward Stepwise Logistic Regression Analysis. In the presence of other variables, the pregnant women who preferred loose clothes such as long skirts, dresses, topcoats, loose pants were found to be 1.8 times more like to fall compared to those who wore leggings/pants (OR=1.836; 95% CI: .080-3.121) ($p < 0.05$). Those who took medication during pregnancy were 1.6 times more likely to fall than those who did not take medication (OR=1.680; 95% CI: 1.068-2.641) (Table 3).

Table 3. Statistical analysis of factors associated with falls during pregnancy according to the backward stepwise logistic regression analysis

Risk Factors	β	SE	p	OR	95% CI	
					Lower	Upper
Clothing style						
Leggings/Pants				1 (Reference)		
Sweat Suit Bottoms	0.219	0.314	0.486	1.245	0.672	2.304
Long Skirt, Dress, Topcoat, Baggy Pants	0.607	0.271	0.025*	1.836	1.080	3.121
Medication use during pregnancy						
No				1 (Reference)		
Yes	0.519	0.231	0.025*	1.680	1.068	2.641

Note. Pseudo (Nagelkerke) $R^2 = 0.030$; Hosmer–Lemeshow $\chi^2 = 1.209$, $p = 0.877$.

Dependent variable: 1 = Fall present, 0 = Fall absent

Abbreviations: CI: confidence interval; OR: odds ratio; SE: standard error.

* The level of statistical significance was set at $p < 0.05$.

Discussion

In the literature, the prevalence of falling at least once in pregnant women is seen to vary between 26.0% and 32.5% (7, 10, 11, 17). Studies have revealed that 35.3% - 37.0% of pregnant women who report falls have fallen two or more times (7, 10). In this study, the rate of falls in pregnant women was found to be lower than in similar studies (7, 10, 11, 17). The reason could be the higher employment rates of the pregnant women in the other studies and cultural differences between the study populations.

Postural stability deteriorates during pregnancy and balance worsens, especially after the third trimester (3, 18). The decrease of postural control in pregnancy increases the risk of falling (19). The risk score for falls in pregnant women in the third trimester was found to be significantly higher than in the first and second trimesters in the study conducted by Inanir et al (3). Okeke, et al. reported that pregnant women to fall more often in the third trimester (10). The results of this study was similar to the literature (3, 10, 18, 19).

In order to prevent falls, which constitute a public health problem, it is necessary to investigate the variables related to risk factors and to take effective preventive measures accordingly. It is also emphasized that arrangements should be made for known domestic and environmental risk factors to decrease the risk of falling (1). Parallel to this study, various studies have reported that the majority of women fall inside the house (7, 10, 11). The evaluation of the factors influencing falls in pregnancy in this study revealed that the three most common causes were going up and down the stairs, wet surfaces, and uneven/sloping ground. Similar results have been reported by Dunning, et al (7,11). Okeke et al., once again, reported similar results, but they found the third most common cause to be rushing (10). Based on the results of the present study and others, it could be recommended that pregnant women be provided training about simple precautions (placing railings or handrails on the stairs, not leaving floors wet, removing objects that could result in slippery floors, ensuring adequate lighting, choosing suitable shoes, exercising regularly and seeing a

physician for follow-ups) to help prevent the development of this health problem.

Falls constitute 25% of the traumatic injuries that women sustain during pregnancy. Major and minor trauma can occur due to such falls. Minor trauma constitutes 70% of the injuries during pregnancy (20). Dunning et al. has reported that 51.4% of employed pregnant women were injured at work, and 57.2% were injured outside the workplace due to a fall; with the most common types of such injury being bruising, sprains/strains and a twisted ankle (11). An injury was reported by 58.9% of the pregnant women who fell, with the most common types being bruises, sprains/strains and cuts in another study (7). Trauma during pregnancy is reported to occur most commonly in the lower extremities (6, 21). Although the rates found for the type of trauma after falls vary by study (7, 11), in this study, similar to the literature (6, 21), injuries due to falls during pregnancy were common, with the most common injuries occurring in the lower extremities.

Approximately 43% of falls during pregnancy have been reported to occur from heights (13). Dunning, et al. reported that 9.4% of pregnant women fell from a height of one meter or more (7). This rate was found to be 3.7% in another study (11) and 6.4% in this study. Since falling from heights can cause serious health problems (13), the necessary protective safety measures should be taken and environmental regulations should be set for social living areas and the professional environments of pregnant women in order to prevent this problem.

Although major and minor trauma may occur in pregnant women (20), only 19.3%-29.6% have been reported to seek medical help afterwards (7, 10, 11). The results of this study showed that few pregnant women exhibited medical help-seeking behavior (such as presenting to the hospital and calling a physician/nurse) with approximately 2 out of 10 presenting to the hospital. Although the cultural, educational and awareness levels of individuals influence medical help seeking-behavior, this result was similar to that reported by Okeke, et al. (10).

It is emphasized that preventive and interventional measures against the risk factors

causing falls are needed in order to improve fall-related maternal and fetal outcomes. One of these measures is to provide training about preventing falls (9). In this study, few pregnant women reported having received training regarding falls. Also, seeking social support from family and friends as well as using spiritual methods such as praying were among the treatment seeking behaviors following a fall. Awoleke et al. have found no relationship between a history of falling in pregnant women and their level of relevant knowledge (17). However, the health-seeking behavior of women and whether they use antenatal services could be significantly affected by their perceptions. It is reported that taking into account the cultural characteristics of women is necessary to ensure that they benefit more from primary healthcare services during pregnancy (22). The spiritual tendencies of pregnant women and their socio-cultural environment should therefore also be taken into consideration when planning training and counseling services for pregnant women on how to prevent falls and ensure they seek help from health care professionals.

Any neurologic, cardiac or other underlying medical condition can cause falls (1). In this study, pregnant women who experienced a health problem during pregnancy had a higher fall rate, but regression analysis revealed no significance. Similar to the presence of a medical condition, the use of medication can result in falls (1). Using medication during pregnancy was found to increase the probability of falls approximately 1.6 times. Various studies have evaluated the effect of environmental factors on falls (7, 10, 11). In this study, those who preferred loose clothes such as skirts, dresses, topcoats, baggy pants, etc. were found to have a 1.8 times greater likelihood of falling. However, the authors were unable to compare their results on the relationship between falls during pregnancy and the presence of a health problem, using medication, and the clothing style with other studies as there are no similar articles to the best of their knowledge.

In this study, the falls were questioned retrospectively, and the data obtained were limited to the statements of pregnant women. This may have led to a potential bias in the data for a variety of reasons such as individual

perceptions of falling and injury, the possibility of some reasons being concealed (such as domestic violence and abuse), and inability to remember. Another limitation is that the study was conducted in only one province in Turkey. Therefore, it is possible to generalize the results of this study only to pregnant women in that province.

Conclusion

In this study, approximately two out of 10 pregnant women fell during their pregnancy, usually in the third trimester, mostly resulting in minor or major injury in the lower extremities. Only a minority of the pregnant women who had experienced a fall sought medical help afterwards. It was also found that the pregnant women had not received adequate information from healthcare professionals about the conditions that cause falls and what to do for prevention. The presence of health problems, medication use and clothing style during pregnancy were found to increase the risk of falling. Therefore, considering the risk groups, it is necessary for nurses, midwives and other health care professionals to provide training and consultancy services to pregnant women on the risk factors causing falls and the interventions prevent them. More extensive studies on the external and internal risk factors for falls during pregnancy that explore issues other than the woman's immediate surroundings are required. In addition, conducting randomized controlled studies on the effect of training that are culturally appropriate and acceptable for the women on decreasing the risk of falls could be recommended.

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Conflicts of interest

Authors declared no conflicts of interest.

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