

The Prevalence of Pregnancy Hypertensive Disorders and Their Related Factors in the Second and Third Level Hospitals Affiliated to Isfahan University of Medical Sciences, Isfahan, Iran

Shahrzad Tavakolipoor (MSc)¹, Marjan Beigi (MSc)^{2*}, Nafiseh Sadat Nekuei (MSc)², Fariba Shafiei (BSc)³

¹ MSc Student of Midwifery, Student Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

² Lecturer, Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran

³ BSc of Midwifery, Alzahra Curative Education Center, Isfahan University of Medical Sciences, Isfahan, Iran

ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p>	<p>Background & aim: Gestational hypertension is the leading cause of maternal mortality. The most effective ways to prevent this complication are the prediction and prevention of the factors accounting for the incidence of this condition. Regarding this, the present study aimed to investigate the prevalence of gestational hypertension and its associated factors.</p> <p>Methods: This comparative descriptive study was performed on 2,477 pregnant women referred to four secondary and tertiary care hospitals in Isfahan, Iran in 2016 using the census method. Out of 2,477 referral cases, 148 cases were found to be suffering from various types of gestational hypertensive disorders. 200 mothers who had no pregnancy complication were also randomly selected from the 2,477 referral cases. The demographic, clinical, and therapeutic data of these mothers were collected using self-structured questionnaires through making regular visits to the maternity and obstetrics wards of the hospitals under study. Data analysis was performed in SPSS (version 18) using inferential statistical methods, including Chi-square test and independent t-test.</p> <p>Results: The prevalence of hypertension was obtained as 6%, with preeclampsia as the most prevalent type (4.2%). The incidence of gestational hypertension showed a significant relationship with the mean number of prenatal care visits ($P=0.01$), type of care providers delivering preconception and prenatal care ($P=0.01$ and $P<0.001$), underlying diseases ($P<0.001$), and number of previous abortions ($P=0.01$). However, there was no significant relationship between the frequency of preconception care visits and this complication ($P=0.42$).</p> <p>Conclusion: Despite the current policies targeted toward the promotion of maternal health, in the present study, the prevalence of gestational hypertension was notably higher than the rates reported in the literature. Therefore, it is highly recommended to plan for the standardization of referral hospitals and enhancement of care services to prevent this complication.</p>
<p><i>Article History:</i> Received: 03-Jun-2018 Accepted: 14-Sep-2018</p>	
<p><i>Key words:</i> Gestational hypertension Preconception care Prenatal care Prevalence</p>	

► Please cite this paper as:

Tavakolipoor S, Beigi M, Nekuei NS, Shafiei F. The Prevalence of Pregnancy Hypertensive Disorders and Their Related Factors in the Second and Third Level Hospitals Affiliated to Isfahan University of Medical Sciences, Isfahan, Iran. *Journal of Midwifery and Reproductive Health*. 2019; 7(3): 1736-1741. DOI: 10.22038/jmrh.2019.32423.1353

Introduction

Pregnancy is a unique natural physiological process that may have serious pathological

* Corresponding author: Marjan Beigi, Lecturer, Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran. Tel: 00989133171462; Email: beigi@nm.mui.ac.ir

implications not only in the presence of underlying conditions, but also without them (1). In many developing countries, pregnancy and childbirth complications are among the leading causes of maternal mortality (2). Based on the reports on maternal health, approximately 800,000 women die from preventable pregnancy- and childbirth-related causes per day, and 99% of these deaths occur in developing countries (3).

According to the World Health Organization, the most prevalent complications of high-risk pregnancies are hemorrhage, preeclampsia, infection, preterm birth, maternal medical problems, and abortion, which are among the leading causes of the admission of pregnant women to specialized care units. These complications are the most important causes of maternal mortality all over the world and account for half of all postpartum deaths in developing countries (4).

Blood pressure disorders are among the most important complications of pregnancy and as stated before, among the top three causes of mortality in pregnant women (along with hemorrhage and infection). The prevalence of these disorders has been estimated as 5-7% (5). These disorders are classified into four groups, including gestational hypertension, chronic hypertension with superimposed preeclampsia, preeclampsia/eclampsia syndrome, and chronic hypertension (3). It should be noted that all chronic hypertensive disorders, regardless of their etiologies, are susceptible to preeclampsia/eclampsia superimposition (6).

The prevalence of preeclampsia and eclampsia among women has been investigated in several studies. In this regard, in a meta-analysis research conducted by Kharaghani et al. (2016) on 36 studies, the mean prevalence rate of preeclampsia was reported as 0.05%. According to the mentioned study, the prevalence of hypertension increased from 0.04% in 1996-2005 to 0.07% in 2010-2013 (7). Furthermore, in a retrospective study performed in China during 2002-2011, the prevalence of mild and severe preeclampsia was estimated as 1.42% and 0.49%, respectively (8). In the aforementioned studies, the risk factors for the development of gestational hypertension were reported as age,

multigravidity, multiple pregnancy, and medical complications. They also underscored the necessity of reviewing the current diagnostic protocols for this condition.

Although the etiology of gestational hypertension is still unknown, its initial signs emerge early in pregnancy. These signs are associated with uncertain pathophysiologic changes that persist during pregnancy and ultimately become clinically apparent. In some cases, these changes may lead to multi-organ involvement and clinical features ranging from hardly noticeable manifestations to pathophysiological disturbances that are dangerous to both mother and fetus (9). As repeatedly evidenced, gestational hypertensive disorders can cause HELLP syndrome-induced disseminated intravascular coagulation, intracerebral hemorrhage, hepatic rupture-induced hemorrhage, and early placental abruption, which may result in maternal mortality (3).

The most effective solutions to reduce the incidence of gestational hypertensive disorders and their implications for fetus and mother are to predict and prevent these conditions in susceptible patients. This condition can be managed effectively if diagnosed timely. Diagnosis of this condition is important not only in the prevention of this complication, but also in the assessment of the potential factors endangering the mother and neonate and identification of an appropriate treatment for risk mitigation.

With this background in mind, the present study aimed to investigate the prevalence of various types of gestational hypertensive disorders and its related factors in the mothers referring to the secondary and tertiary care hospitals affiliated to Isfahan University of Medical Sciences, Isfahan, Iran. Since this is the first study investigating this complication in referral hospitals, the results may assist the associated health providers and officials in the decision making processes related to this important condition.

Materials and Methods

This descriptive-analytic study was conducted on the pregnant women referring to the secondary and tertiary care hospitals affiliated

to Isfahan University of Medical Sciences from July to October 2016. The sampling was performed using the census method since the goal was to investigate all patients with a gestational hypertensive disorder within the specified period.

After investigating the cause of referral in all 2,477 patients referring to the mentioned hospitals, 148 cases were found to be suffering from various types of gestational hypertensive disorders. The demographic, clinical, and therapeutic data of these mothers were collected using researcher-made forms and checklists. To study the factors associated with hypertensive disorders, 200 mothers who had no pregnancy complication were also randomly selected from the 2,477 referral cases. For these mothers, only the demographic and clinical data were collected.

In order to collect the data of the 348 included mothers (i.e., 200 healthy cases and 148 hypertensive cases), the researchers made daily visits to the maternity and obstetric wards and high-risk pregnancy care units of the hospitals under investigation to interview the mothers, and also physicians and personnel, when necessary. These interviews covered such data as patient's biography, delivery report, paraclinical findings, and final diagnosis documented in the summary sheet of the medical records.

Table 1. Maternal age, number of abortions, and frequency of preconception and prenatal care visits in the hypertensive and healthy groups

Variable	Hypertensive mothers		Healthy mothers		Independent t-test	
	Mean	Standard deviation	Mean	Standard deviation	t	P-value
Age	30.7	5.7	29.8	5.3	1.55	0.12
Number of previous abortions	0.44	0.1	0.26	0.05	2.45	0.01
Frequency of preconception care visits	0.65	0.12	0.78	0.13	0.69	0.49
Frequency of prenatal care visits	10.6	4.89	12.07	5	2.54	0.01

The findings showed no significant relationship between the frequency of preconception and prenatal care visits and hypertensive disorders ($P>0.05$). However, prenatal care (mean number of visits to care providers) was significantly higher ($P<0.05$) in the hypertensive group, compared to that in the healthy group. There was also a significant difference ($P<0.05$) between the two groups in

The hospitals sampled in this study were Isa-Ibn-Maryam and Shahid Beheshti recognized as secondary hospitals and Al-Zahra and Amin as tertiary care hospitals. All participants were living in Isfahan province and were enrolled in the study with informed consent. The data were analyzed in SPSS software (version 18) using the descriptive and inferential (e.g., Chi-square test and independent t-test) statistical methods.

The data collection instruments included a demographic form and a researcher-made form developed for collecting the medical and therapeutic data. The content and face validities of the instruments were confirmed by the members of the Faculty of Obstetrics and Gynecology of Isfahan University of Medical Sciences. This validation process involved an initial review of the instruments by the faculty members, followed by a second review after making the suggested modifications.

Results

In this study, the prevalence of gestational hypertensive disorders was estimated as 6%. In this regard, 1.2%, 4.2%, 0.1%, 0.3%, and 0.2% of the cases were related to chronic hypertension, preeclampsia, eclampsia, chronic hypertension with superimposed preeclampsia, and transient hypertension, respectively. The most prevalent type of gestational hypertensive disorder was preeclampsia (4.2%).

terms of the frequency distribution of the type of care provider delivering preconception and prenatal care (tables 1 and 2).

The results also showed that the hypertensive group had a significantly higher prevalence of underlying diseases (i.e., diabetes and autoimmune, cardiovascular, and renal diseases) than the healthy group ($P<0.05$; Table 2). Another notable disease diagnosed in this

study was hypothyroidism.

No significant difference was found between the two groups in terms of the mean age, occupation status, or education level ($P < 0.05$).

However, the hypertensive group had a significantly higher mean prevalence of previous abortions, compared to the healthy group ($P < 0.05$; Table 1).

Table 2. Frequency distribution of preconception and prenatal care visits and underlying diseases in the hypertensive and healthy groups

Variable		Hypertensive mothers	Healthy mothers	χ^2	P-value
		Frequency (%)	Frequency (%)		
Preconception care visits	Yes	42 (28.4)	49 (24.5)	0.66	0.42
	No	106 (71.6)	151 (75.5)		
Prenatal care visits	Yes	146 (98.6)	200 (100)	-	0.18
	No	2 (1.4)	0 (0)		
Care provider delivering preconception care	Specialist	26 (65)	15 (32.6)	9.16	0.01
	Midwife	10 (25)	24 (52.2)		
	Both	4 (10)	7 (15.2)		
Care provider delivering prenatal care	Specialist	47 (33.1)	15 (7.6)	36.37	<0.001
	Midwife	39 (27.5)	81 (40.9)		
	Both	56 (39.4)	102 (51.5)		
Underlying disease	Cardiovascular	5 (3.3)	4 (2)	42.33	<0.001
	Renal	2 (1.3)	1 (5)		
	Diabetes	12 (8.1)	10 (5)		
	Autoimmune	2 (1.3)	0 (0)		
	Others	47 (31.7)	23 (11.5)		
	N/A	80 (54.3)	162 (81)		

Discussion

In this study, the prevalence rate of various types of hypertension disorders was estimated as 6%, with the highest prevalence (4.2%) belonging to preeclampsia. These findings are relatively consistent with the results of other studies, including those performed by Lisonkova et al. in Washington (3% for preeclampsia) (10), Kooffreh et al. (1.2% for preeclampsia) (11), Chan et al. in Taiwan (1.21% for preeclampsia) , Ma et al. in China (2-8% for preeclampsia) (13), Lotfalizadeh et al. in Iran (2.37% for preeclampsia) (14), and Shahidifar et al. in Iran (1-8% for gestational hypertensive disorders) (15), and also the range cited in the primary reference of the field (3-5% for gestational hypertensive disorders) (3).

As can be seen, studies conducted in different parts of the world have given slightly different estimates of hypertension prevalence. This variability seems to be affected by the type and quality of services provided in hospitals, method of data collection, and hospital admission criteria. It can be concluded that the prevalence of gestational hypertension in Isfahan is likely to be higher than what was obtained in this study because mild

preeclampsia and transient hypertension cases, which are much more prevalent than other blood pressure disorders (e.g., superimposed preeclampsia to chronic hypertension and eclampsia syndrome) do not require any special interventions other than monitoring and could be referred to other hospitals.

Several studies have shown the growing prevalence of gestational hypertension over the past decade (6), which could be due to the low frequency of receiving preconception care, change of lifestyle, and increased rate of pregnancy at older ages. Consequently, this issue requires the attention of hospital directors and healthcare decision makers.

The results of the present study also indicated that the frequency of preconception care visits had no significant relationship with hypertensive disorder prevalence ($P > 0.05$). Nonetheless, the healthy group had a significantly higher mean number of prenatal care visits, compared to the hypertensive group ($P < 0.05$). The higher frequency of care visits in the healthy group can be due to their higher gestational age. However, the women in the hypertensive group had also received adequate

care relative to their gestational age, which had led to the early detection of hypertension and referral to hospitals.

The lack of a significant relationship between the frequency of preconception care visits and gestational hypertension could be attributed to the generally low prevalence of this care.

The receipt of preconception care facilitates the healthy transition of the mother into the pregnancy state and can prevent or control the effect of underlying diseases on pregnancy. In this regard, some researchers have reported that the provision of both preconception and prenatal care services improves the pregnancy outcomes; accordingly, they have highly recommended these services for all women of reproductive age (12, 15).

Our results also revealed a significant relationship between the type of care provider delivering the preconception and prenatal care and the incidence of gestational hypertension. In this regard, the women in the hypertensive group had visited a gynecologist more frequently than those in the healthy group. This can be attributed to the high-risk status of these mothers (given their higher frequency of underlying diseases and abortions). This indicates they were more interested in being monitored by a specialist during the preconception and prenatal periods and were inclined to be referred from health centers or midwives to a specialist. Moreover, a higher abortion frequency itself could be caused by underlying diseases that induce gestational hypertension (8).

Regarding the underlying diseases, our findings indicated that the hypertensive group had a significantly higher frequency of underlying diseases than the healthy group ($P < 0.05$). In the healthy group, 162 (81%) patients had no underlying disease, while in the hypertensive group, only 80 (54%) patients had no history of underlying diseases. In a study performed by Abdollahipour et al. in Ilam, Iran, there was a direct correlation between high-risk pregnancy and the incidence of underlying diseases in mothers (16). Hajizadeh et al. have also shown that the women with a history of high-risk medical or pregnancy-related condition have a double chance of developing at least one pregnancy complication (17).

In the present study, the most common underlying diseases were those classified as "others" (hypothyroidism being the most frequent one), followed by diabetes. The concurrence of diabetes with hypertension seems reasonable. The relationship between hypertension and hypothyroidism is probably due to the autoimmune nature of hypothyroidism in these women because gestational hypertension is directly associated with autoimmune diseases (10). The reason behind the low frequency of cardiovascular diseases and other autoimmune diseases in this study could be the lack of a diagnostic stage at the time of admission, which can be considered a limitation of this research.

On the other hand, this research had an advantage over other studies, which was the measurement of all types of gestational hypertensive disorders. Additionally, this study involved the assessment of the association of some less frequently researched underlying factors (e.g., receipt of preconception and prenatal care and type of care provider) with this complication.

Conclusion

The prevalence of gestational hypertension in this study was higher than the values reported in the literature. Since the current maternal health policies and related protocols are focused on reducing the prevalence of preeclampsia, it is recommended to review the existing guidelines for the better monitoring of the quality and quantity of care services so as to improve the prevention and early diagnosis of these complications. Moreover, healthcare authorities and planners are suggested to pay closer attention to equipping and standardizing health centers, especially referral hospitals, in order to improve the health of both neonates and mothers.

Acknowledgements

This article is the result of a research project approved by the Research Deputy of Isfahan University of Medical Sciences (No. 395251). We would like to express our gratitude to the Research Deputy and the staff of this department for their cooperation.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Bahreini S, Beigi M, Rahimi M, Valiani M. Analysis of maternal mortality in Isfahan, Iran: a case series study. *Annals of Tropical Medicine and Public Health*. 2017; 10(6):1591.
2. Magoma M, Massinde A, Majinge C, Rumanyika R, Kihunrwa A, Gomodoka B. Maternal death reviews at Bugando hospital north-western Tanzania: a 2008-2012 retrospective analysis. *BMC Pregnancy and Childbirth*. 2015; 15(1):333.
3. Cunningham FG. *Williams obstetrics* 24th ed. New York: McGraw-Hill Education; 2014. P. 728-732.
4. World Health Organization. *Maternal mortality, 2016*. Geneva: World Health Organization; 2016.
5. Sharifzadeh F, Kashanian M, Fatemi F. A comparison of serum androgens in pre-eclamptic and normotensive pregnant women during the third trimester of pregnancy. *Gynecological Endocrinology*. 2012; 28(10):834-836.
6. James DK, Steer PJ, Weiner CP, Gonik B. *High risk pregnancy e-book: management options-expert consult*. New York: Elsevier Health Sciences; 2010.
7. Kharaghani R, Cheraghi Z, Okhovat Esfahani B, Mohammadian Z, Nooreldinc RS. Prevalence of preeclampsia and eclampsia in Iran. *Archives of Iranian Medicine*. 2016; 19(1):64.
8. Xiao J, Shen F, Xue Q, Chen G, Zeng K, Stone P, et al. Is ethnicity a risk factor for developing preeclampsia? An analysis of the prevalence of preeclampsia in China. *Journal of Human Hypertension*. 2014; 28(11):694.
9. Magowan BA, Owen P, Thomson A. *Clinical obstetrics and gynaecology E-Book*. New York: Elsevier Health Sciences; 2014. P. 291-295.
10. Lisonkova S, Sabr Y, Mayer C, Young C, Skoll A, Joseph KS. Maternal morbidity associated with early-onset and late-onset preeclampsia. *Obstetrics & Gynecology*. 2014; 124(4):771-781.
11. Kooffreh ME, Ekott M, Ekpoudom DO. The prevalence of pre-eclampsia among pregnant women in the University of Calabar Teaching Hospital, Calabar. *Prevalence*. 2014; 3(3): 133-136.
12. Chan TF, Tung YC, Wang SH, Lee CH, Lin CL, Lu PY. Trends in the incidence of pre-eclampsia and eclampsia in Taiwan between 1998 and 2010. *Taiwanese Journal of Obstetrics and Gynecology*. 2015; 54(3):270-274.
13. Ma Y, Shen X, Zhang D. The relationship between serum zinc level and preeclampsia: a meta-analysis. *Nutrients*. 2015; 7(9):7806-7820.
14. Lotfalizadeh M, Khoshshima M. Relationship between maternal age and season with preeclampsia in the patients admitted in gynecology ward of Imam-Reza hospital during 3 years (2001-2004). *The Iranian Journal of Obstetrics, Gynecology and Infertility*. 2016; 19(8):1-5.
15. Sharifnia H, Taghipoor B, Hekmat Afshar M, Motevalli R, Mazraie F. Association between seasonal patterns and preeclampsia. *The Iranian Journal of Obstetrics, Gynecology and Infertility*. 2014; 17(125):8-14.
16. Abdolapour P, Babaei M, Gasemi YM. Causes of maternal mortality in pregnant women in urban and rural areas of Ilam. *Iranian Journal of Health Sciences*. 2011; 7(6):1278-1287.
17. Hajizadeh S, Ramezani Tehrani F, Simbar M, Farzadfar F. Factors affecting pregnancy, postpartum and neonatal complications in rural areas of Kurdistan Province, Iran. *Journal of School of Public Health and Institute of Public Health Research*. 2015; 13(3):19-36.