

## The Prevalence and Types of Hypertensive Diseases in Pregnant Women Admitted to Department of Obstetrics and Gynecology in Tanta University Hospitals

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### Abstract

**Background:** Hypertensive disorders of pregnancy are used as an umbrella term that includes chronic and gestational hypertension, preeclampsia and eclampsia, representing a major cause of maternal and perinatal morbidity and mortality, considered to be the most common medical problem encountered during pregnancy, and so this study was done to find the prevalence and types and the proper methods of treatment of each type of hypertension in pregnant women admitted to Department of Obstetrics, Tanta University Hospital.

**Aim of Study:** The aim of this study is to find the prevalence and types of hypertension in pregnant women admitted to Department of Obstetrics, Tanta University Hospital.

**Patients and Methods:** This prospective, randomized, comparative study included Seven hundred and fifty (750) pregnant women in the Department of Obstetrics and Gynecology in Tanta University Hospital during the period between December 2016 and December 2017. In this study, hypertensive pregnant females were categorized in to 4 major groups: Chronic hypertension, gestational hypertension, pre-eclampsia, eclampsia and no cases of superimposed pre-eclampsia on top of chronic hypertension were encountered. Informed consents were obtained from all study participants.

**Results:** Number of patients examined in this study was 750 pregnant women, 179 were hypertensive (23.86%). Chronic hypertension 15 cases (8.37%), gestational hypertension 61 cases (34.07%), pre-eclampsia 90 cases (50.27%) and eclampsia 13 cases (7.26%), according to the clinical characteristics, the mean age was significantly higher in chronic hypertensive group (40.53 ± 5.3 years), and was significantly lower in eclamptic patients (23.31 ± 4.33 years), the highest gravidity was recorded in chronic hypertension (3.20 ± 0). The body mass index was similar in all the studied groups. Blood pressure was highest in preeclampsia, according to methods of delivery in different studied groups, assisted and spontaneous vaginal delivery were highest in gestational hypertension (23%) and (13.1%) respectively and Caesarian section was highest in eclampsia (84.6%) and lowest in chronic hypertension (60%), the gestational age of the studied groups was showing that prematurity was encountered in 61.54% of cases

of eclampsia and was lowest (0%) in chronic hypertension; this was due to induction of labor, the main cause of death in this study is prematurity. The mean APGAR score in the present study was highest in chronic hypertension group (7.40 ± 1.88) and lowest in eclamptic group (5.08 ± 1.19) after one minute of delivery and after 5 minutes APGAR score was highest in pre-eclamptic (8.80 ± 1.52) and lowest in eclamptic group (7.23 ± 1.88). The respiratory distress syndrome, Neonatal Intensive Care Unit and neonatal mortality were highest in eclampsia group (3 8.5%, 30.8% and 23.1% respectively) and lowest in chronic hypertension group (0% in all), a comparison between 2 forms of pre-eclampsia (mild and severe) showed that all the parameters including blood pressure, hematocrit value, creatinine, uric acid levels and liver enzymes were higher in severe preeclampsia compared to the mild form. C.S was 100% in severe pre-eclampsia and 73.01% in mild pre-eclampsia, the respiratory distress syndrome, Neonatal Intensive Care Unit and neonatal mortality were significantly higher in severe pre-eclampsia than mild pre-eclampsia, gestational age and birth weight were significantly higher in severe pre-eclampsia than mild pre-eclampsia, Intra Uterine Growth Restrictions (I.U.G.R) were found only among the severe pre-eclampsia group (18.52%).

**Conclusions:** From this study we can reach the following conclusions:

- 1- High blood pressure complicates 23.9% of all pregnant women.
- 2- The incidence of chronic hypertension in the present study is 8.37%, gestational hypertension is 34.1%, pre-eclampsia is 50.3% and eclampsia is 7.3%.
- 3- The worst prognosis was found among the eclamptic group.
- 4- Chronic hypertension when perfectly managed doesn't develop into superimposed pre-eclampsia.
- 5- No cases of secondary chronic hypertension were encountered in the study denoting that it is rare with pregnancy. The cause of secondary hypertension may compromise her fertility.
- 6- Neonatal complications were most common with pre-eclampsia and eclampsia.

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**Key Words:** Hypertensive disorders – Pre-eclampsia – Eclampsia – Gestational hypertension.

## Introduction

**HYPERTENSIVE** disorders of pregnancy represent a major cause of maternal and perinatal morbidity and mortality. Hypertension is the most common medical problem encountered during pregnancy. It complicates 5% to 7% of all pregnancies [1,2].

The blood pressure depends on the work being done by the heart and the resistance of the blood vessels. The World Health Organization (WHO) suggests that the growth of the processed food industry has impacted the amount of salt in diets worldwide, and that this plays a role in hypertension. Hypertension in pregnancy and postpartum period is currently diagnosed by a Systolic Blood Pressure (SBP) greater than or equal 140mmHg and/or diastolic blood pressure greater than or equal to 90mmHg. There is a need to reevaluate the usual thresholds of abnormal blood pressure values in pregnancy [3]. Evaluating blood pressure in late pregnancy and labor can help minimizing the complications and enabling the obstetrician to plan for the proper time and methods of interference and take the proper preparations and considerations for the next pregnancies.

### *Aim of study:*

The aim of this study is to find the prevalence and types of hypertension in pregnant women admitted to Department of Obstetrics, Tanta University Hospital.

### *Study design:*

This prospective, randomized, comparative study included Seven hundred and fifty (750) pregnant women in the Department of Obstetrics and Gynecology in Tanta University Hospital, hypertensive pregnant females were categorized in to 4 major groups: Chronic hypertension, gestational hypertension, pre-eclampsia, eclampsia and no cases of superimposed pre-eclampsia on top of chronic hypertension were encountered. Informed consents were obtained from all study participants.

## Patients and Methods

This study included Seven hundred and fifty (750) pregnant women in the Department of Obstetrics and Gynecology in Tanta University Hospital during the period between December 2016 and December 2017. In this study, hypertensive pregnant females were categorized in to 4 major groups: Chronic hypertension, gestational hypertension, pre-eclampsia, eclampsia and no cases of

superimposed pre-eclampsia on top of chronic hypertension were encountered.

*Inclusion criteria include:* Age from 16 to 42 years old, both primi-gravida and multigravida, including all pregnant females admitted the department.

*Exclusion criteria include:* Diabetic patients or any other chronic diseases with pregnancy.

## Results

### *Statistical analysis:*

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 5% level.

### *The used tests were:*

- 1- Chi-square test: For categorical variables, to compare between different groups.
- 2- Fisher's Exact or Monte Carlo correction: Correction for chi-square when more than 20% of the cells have expected count less than 5.
- 3- F-test (ANOVA): For normally distributed quantitative variables, to compare between more than two groups.
- 4- Kruskal Wallis test: For abnormally distributed quantitative variables, to compare between more than two studied groups.

Number of patients examined in this study was 750 pregnant women, 179 were hypertensive (23.86%). Chronic hypertension 15 cases (8.37%), gestational hypertension 61 cases (34.07%), pre-eclampsia 90 cases (50.27%) and eclampsia 13 cases (7.26%).

The mean age was significantly higher in chronic hypertensive group ( $40.53 \pm 5.3$  years), and was significantly lower in eclamptic patients ( $23.31 \pm 4.33$  years). Gravidity; the highest gravidity was recorded in chronic hypertension ( $3.20 \pm 0$ ). The body mass index was similar in all the studied groups. Blood pressure was highest in preeclampsia.

Assisted and spontaneous vaginal delivery were highest in gestational hypertension (23%) and (13.1%) respectively and Caesarian section was

highest in eclampsia (84.6%) and lowest in chronic hypertension (60%).

Prematurity was encountered in 61.54% of cases of eclampsia and was lowest (0%) in chronic hypertension; this was due to induction of labor.

The main cause of neonatal death is prematurity. The mean APGAR score in the present study was highest in chronic hypertension group (7.40±1.88) and lowest in eclamptic group (5.08±1.19) after one minute of delivery and after 5 minutes APGAR score was highest in pre-eclamptic (8.80±1.52) and lowest in eclamptic group (7.23±1.88). The respiratory distress syndrome, Neonatal Intensive Care Unit and neonatal mortality were highest in eclampsia group (38.5%, 30.8% and 23.1% respec-

tively) and lowest in chronic hypertension group (0% in all).

All the parameters including blood pressure, hematocrit value, creatinine, uric acid levels and liver enzymes were higher in severe preeclampsia compared to the mild form; C.S was 100% in severe pre-eclampsia and 73.01% in mild pre-eclampsia. Respiratory distress syndrome, neonatal intensive care unit and neonatal mortality were significantly higher in severe pre-eclampsia than mild pre-eclampsia, gestational age and birth weight were significantly higher in severe pre-eclampsia than mild pre-eclampsia and Intra Uterine Growth Restrictions (I.U.G.R) were found only among the severe pre-eclampsia group (18.52%).

Table (1): Clinical characteristics of studied patients.

	Chronic hypertension (n=15)	Gestational hypertension (n=61)	Pre-eclampsia (n=90)	Eclampsia (n=13)	Test of sig.	P
<i>Age (years):</i>						
Range	32.0-42.0	17.0-38.0	18.0-35.0	16.0-34.0	F=	<0.001 *
Mean ± SD	39.53±2.30	27.25±3.20	20.08±1.75	23.31±4.33	66.587*	
<i>Gravidity:</i>						
Range	2.0-3.0	1.0-1.0	1.0-1.0	1.0-1.0	H=	<0.001 *
Mean ± SD	2.80±0.41	1.0-1.0	1.0-1.0	1.0-1.0	177.782*	
<i>Parity:</i>						
Range	2.0-5.0	—	—	—	—	—
Mean ± SD	3.5±0.53	—	—	—	—	—
<i>Abortion:</i>						
Range	1.0-1.0	—	—	—	—	—
Mean ± SD	1.0±0.0	—	—	—	—	—
<i>BMI (kg/m<sup>2</sup>):</i>						
Range	26.0-32.70	16.90-35.0	16.20-34.90	16.0-34.10	F=	0.063
Mean ± SD	28.81±2.01	27.31±3.37	26.77±3.92	25.10±5.91	2.476	

Table (2): Methods of delivery in the different studied groups.

	Chronic hypertension (n=15)		Gestational hypertension (n=61)		Pre-eclampsia (n=90)		Eclampsia (n=13)		χ <sup>2</sup>	MC <sub>p</sub>
	No.	%	No.	%	No.	%	No.	%		
	*Spontaneous vaginal delivery	5	33.3	15	24.6	10	11.1	0		
*Assisted vaginal delivery	1	6.7	7	11.58	7	7.8	2	15.38		
*C.S	9	60.0	39	63.9	73	81.1	11	84.6		

Table (3): Gestational age at delivery in the studied groups.

Gestational age at delivery	Chronic hypertension (n=15)		Gestational hypertension (n=61)		Pre-eclampsia (n=90)		Eclampsia (n=13)		χ <sup>2</sup>	P
	No.	%	No.	%	No.	%	No.	%		
	• Full-term (≥37 weeks)	(15)	100	(55)	90.16	(73)	81.11	(5)		
• Pre-mature (<37 weeks) (induced preterm labour)	(0)	0	(6)	9.84	(17)	18.89	(8)	61.54	18.745*	<0.001 *

Table (4): Neonatal outcome in different studied groups.

	Chronic hypertension (n=15)		Gestational hypertension (n=61)		Pre-eclampsia (n=90)		Eclampsia (n=13)		Test of sig.	<i>P</i>
<i>APGAR score after 1min:</i>										
Mean ± SD	7.40±1.88		7.31±1.77		7.37±1.90		5.08±1.19		F=6.315*	<0.001 *
<i>After 5mins:</i>										
Mean ± SD	8.07±2.02		7.77±1.90		8.80±1.52		7.23±1.88		F=6.159*	<0.001 *
	N	%	N	%	N	%	N	%	$\chi^2$	MC <sub>p</sub>
•Respiratory distress syndrome	0	0	8	13.1	9	10.0	5	38.5	0.729	0.876
•Neonatal Intensive Care Unit (NICU)	0	0	11	18	23	25.6	4	30.8	2.211	0.525
•Neonatal death	0	0	4	6.6	10	11.1	3	23.1	1.426	0.715

Table (5): Clinical and laboratory characteristics and pregnancy outcome in mild and severe pre-eclampsia.

	Mild pre-eclampsia (n=63)	Severe pre-eclampsia (n=27)	Test of sig.	<i>p</i> -value
<i>Age (years):</i>				
Mean ± SD	29.44±5.54	28.37±3.20	<i>t</i> =0.070	0.945
<i>BMI (kg/m<sup>2</sup>):</i>				
Mean ± SD	27.46±2.37	26.25±5.59	<i>t</i> =1.066	0.295
<i>Blood pressure Systolic:</i>				
Mean ± SD	149.29±6.14	170.81±6.20	<i>t</i> =6.729	<0.001 *
<i>Diastolic:</i>				
Mean ± SD	96.03±4.95	115.44±3.29	<i>t</i> =9.468*	<0.001 *
Hematocrit value	37.29±2.35	44.58±2.84	<i>t</i> =5.710*	<0.001 *
<i>Platelet:</i>				
Count (* 10 <sup>3</sup> /ul)	248.4±68.2	149.27±86.4	<i>t</i> =5.820*	<0.001 *
<i>Creatinine (mg/dl):</i>				
Mean ± SD	0.64±0.14	0.95±0.22	<i>t</i> =6.919*	<0.001 *
<i>Uric acid Mg/dl:</i>				
Mean ± SD	4.56±0.94	7.03±0.88	<i>t</i> =2.188*	0.031 *
<i>Liver function tests:</i>				
ALT u/l	14.74±3.93	54.54±30.73	<i>t</i> =10.162*	<0.001 *
AST u/l	24.14±2.56	40.34±10.83	<i>t</i> =11.239*	<0.001 *
Induction of labor	6 (9.5%)	1 (3.7%)	$\chi^2=0.893$	FE <i>p</i> =0.670
Caesarian section	46 (73.01%)	27 (100%)	$\chi^2=8.982*$	0.003 *
Gestational age at delivery	36±2.2	34.7±3.1	<i>t</i> =2.261 *	0.026*
Birth weight	2648±810.2	2154±649.2	<i>t</i> =2.803 *	0.006*
Admission of N.I.C.U.	9 (14.28%)	14 (51.85%)	$\chi^2=14.020*$	<0.001 *
Respiratory distress syndrome	2 (3.2%)	7 (25.92%)	$\chi^2=10.870*$	FE <i>p</i> =0.003 *
Neonatal death	2 (3.17%)	8 (29.62%)	$\chi^2=13.393$	FE <i>p</i> =0.001 *
Intra uterine growth restrictions	0 (0%)	5 (18.52%)	$\chi^2=10.233$	FE <i>p</i> =0.001 *

## Discussion

In this study the comparison between the 4 groups was done according to multiple clinical characteristics including (age, gravidity, parity, abortion rate, body mass index, hemoglobin percentage and blood pressure).

In the present study the most frequent type of hypertension with pregnancy was the pre-eclampsia 90 cases (50.27%), then gestational hypertension 61 cases (34.07%), chronic hypertension 15 cases (8.37%), and the least was the eclamptic group 13 cases (7.26%), our results were with agreement with that of Assis et al., who found that the most

frequent type was pre-eclampsia 63 cases (48.8%), gestational hypertension 24 cases (18.6%) and chronic hypertension 8 cases (6.2%) and the only difference was that there was no eclamptic cases recorded in Assis et al., study [4].

In the present study the incidence of hypertensive disorders was found to be (23.9%) out of the whole pregnant females compared to (15%) in the study of Payne et al., while in Assis et al., study it was (14.5%), and in another study by Mehta et al., it was (6.9%) and (16.2%) in the study by berhe et al. [4-7].

This study revealed that (46.7%) of chronic hypertensive females and (57.3%) of the severe hypertensive females (involving pre-eclamptic and eclamptic groups) had induced preterm deliveries with gestational age less than (37) weeks compared to 34% and 70% respectively in the study by Seely et al., 19.4% and 27.7% respectively in the study of Atika et al., [7,8].

The incidence of superimposed pre-eclampsia in the chronic hypertension is (26.4%) in the study of Guida et al., but in the present study we didn't encounter the superimposed pre-eclampsia because we treated chronic hypertension from the start of pregnancy [9].

In our study the gravidity was ranging from 2-3 and the parity was 2-5 in the chronic hypertension with pregnancy. Other types of hypertension with pregnancy were primi-gravidae. This is in agreement with the study by Assis et al. [4].

Body Mass Index (BMI) in the present study, gestational hypertension was 16.90 to 35.0. In pre-eclampsia and eclampsia it was 16.20 to 34.90 and 16.0 to 34.10 respectively. In chronic hypertension it was 26.0 to 32.70. The Body Mass Index (BMI) was 15.70 to 36.90, 14.33 to 33.0, 15.20 to 34.40 and 28.20 to 33.37 respectively. This is in agreement with Mrema et al. [10].

The incidence of caesarian section in pre-eclamptic group in the present study was 81.1%, while in the study of Guida et al., it was 72% [9].

Eclamptic cases recorded the highest percentage in neonatal deaths 23.1%, while in pre-eclamptic and gestational hypertension was 11.1 and 6.6% respectively, and 0% in chronic hypertension, the study by Barbosa et al., recorded 23.88%, 14.36% and 19.45% respectively for respiratory distress syndrome and 26.87%, 11.26% and 15.78% respectively for neonatal death [11].

In this study, the neonatal deaths was significantly higher in severe pre eclampsia being 29.62% compared to 3.17% in mild form, Parveen et al., recorded them as 0.63% and 0.11% respectively [12].

Parveen et al., reported 8.6% intra uterine fetal demise in severe pre-eclamptic group and 2.15% still births whereas our study stated 18.52% intra uterine fetal demise among the same group with no cases of still births [12].

There were no neonatal deaths or respiratory distress syndrome and no admission to the neonatal intensive care in the chronic hypertension group; this was reported by Parveen et al., [12].

#### Conclusion:

*From this study we can reach the following conclusions:*

- 1- High blood pressure complicates 23.9% of all pregnant women.
- 2- The incidence of chronic hypertension in the present study is 8.37%, gestational hypertension is 34.1%, pre-eclampsia is 50.3% and eclampsia is 7.3%.
- 3- The worst prognosis was found among the eclamptic group.
- 4- Chronic hypertension when perfectly managed doesn't develop into superimposed pre-eclampsia.
- 5- No cases of secondary chronic hypertension were encountered in the study denoting that it is rare with pregnancy. The cause of secondary hypertension may compromise her fertility.
- 6- Neonatal complications were most common with pre-eclampsia and eclampsia.

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## معدل إنتشار وأنواع أمراض إرتفاع ضغط الدم لدى النساء الحوامل بقسم التوليد وأمراض النساء بمستشفيات جامعة طنطا

إرتفاع ضغط الدم هو المشكلة الطبية الأكثر شيوعاً أثناء الحمل. يمثل من ٥٪ إلى ٧٪ بسبب تسمم الحمل أو (BP) من جميع حالات الحمل، لا سيما عندما يكون إرتفاع ضغط الدم أمراض الأوعية المزمنة. ويتم تشخيصه عندما يكون ضغط الدم عند ١٤٠/٩٠ مم زئبق أو أكثر في قياسين مع فاصل زمني على الأقل ٤ ساعات.

تصنف إضطرابات إرتفاع ضغط الدم إلى ثلاث فئات رئيسية، على النحو الموصى به من قبل الفريق العامل المعنى بضغط الدم المرتفع أثناء الحمل: إرتفاع ضغط الدم الأولي (إرتفاع ضغط الدم الأساسي)، فرط ضغط الدم الثانوي (سبب المرض)، وأنواع خاصة أخرى (معزولة ضغط الدم الإنقباضي، وإرتفاع ضغط الدم الخبيث ومقاومة إرتفاع ضغط الدم).

السيطرة على ضغط الدم في كل من الحمل والولادة المتأخرة يمكن أن تساعد في الحد من التعقيدات وتمكين الجراح من التخطيط للوقت المناسب وطرق التدخل وإتخاذ الإستعدادات والإعتبارات المناسبة لحالات الحمل التالية، وبالتالي هناك حاجة لإعادة تقييم الطرق المعتادة لضغط الدم المرتفع في الحمل.

ترتبط معالجة ضغط الدم الشرياني العالي المعتدل (الذي يعرف بأقل من ١٦٠/١٠٠ mmHg بالأدوية بتحسّن متوسط العمر المتوقع).

تهدف هذه الدراسة إلى معرفة معدل إنتشار وأنواع ضغط الدم في الحوامل المقبولين بقسم التوليد في مستشفيات جامعة طنطا.

أجريت هذه الدراسة على ٧٥٠ من الإناث الحوامل تتراوح أعمارهن بين ١٧ و٤٧ سنة، ١٧٩ منهن مصابات بإرتفاع ضغط الدم إلى أربع مجموعات: المجموعات المزمنة وضغط الدم الحاملي وما قبل الإرتجاعية والإرتجاعية.

لم يتم تسجيل أى حالات من مقدمات الإرتجاع المتراكبة فوق فرط ضغط الدم المزمن في دراستنا الحالية. تم تقدير عمر الحمل من خلال آخر دورة شهرية وفحص الموجات فوق الصوتية.

خضعت جميع الحالات لأخذ التاريخ الكامل متضمننا: العمر، عدد مرات الحمل، عدد مرات الولادة، أى أمراض سابقة مثل مرض السكرى أو إرتفاع ضغط الدم وأى عوامل ذات أهمية محتملة في مشاكل إرتفاع ضغط الدم أو الغدة الكظرية أو الغدة الدرقية، وكذلك الولادة السابقة لأوانها، والحمل السابق، وكذلك طرق الولادة التي يمكن أن تكون الولادة المهبلية التلقائية أو بمساعدة أو قيصرية، تاريخ الأسرة من مرضى السكرى وإرتفاع ضغط الدم، تلقى المرضى الرعاية الطبية والمتابعة حتى الولادة ولمدة ١٢ إسبوعاً بعد الولادة.

التاريخ السابق لإرتفاع ضغط الدم قبل الحمل، وفي حالات الحمل السابقة، تم تسجيل العقاقير المضادة لإرتفاع ضغط الدم التي استخدمها المرضى، وإلتهاب الكلية الحاد وإلتهاب الحوض الكلوى والكلية التي يمكن تحديدها من العوامل التالية (الحمى، تورم الجسم والأطراف السفلية، بول دموي، قلة البول).

تم تشخيص هذه المجموعات الأربع على النحو التالي:

- إرتفاع ضغط الدم المزمن: عندما يكون ضغط الدم  $\leq 140/90$  مم زئبق في مناسبتين قبل ٢٠ إسبوعاً من الحمل، أظهر قاع العين تضيق شرايين في الشبكية، والبول خالية من البروتين، أو تضخم البطين الأيسر المكتشفة بواسطة الأشعة السينية.
- إرتفاع ضغط الدم الحاملي: عندما يظهر إرتفاع جديد في ضغط الدم دون وجود بروتين في البول في النصف الثاني من الحمل.
- مقدمات الإرتجاع: عندما يرتبط إرتفاع ضغط الدم الحاملي بالبروتين في البول  $\geq 30$  ملليجرام/١٠٠ سم<sup>٣</sup>.
- الإرتجاع: عندما يعاني مرضى ما قبل تسمم الحمل من تشنجات و/أو غيبوبة بعد إستبعاد جميع الأسباب الأخرى للنوبات والغيبوبة.

تم إجراء معدل النبض ودرجة الحرارة وفحص الصدر والقلب لكل مريض.

كما أجريت عدة فحوصات معملية للمرضى المشمولين بتحليل البول الكامل، واليورينا AST والكرياتينين، وصورة دم كاملة ونسبة هيمجلوبين وكذلك إختبارات وظائف الكبد مثل ALT و (المستويات الطبيعية  $\geq 40$  وحدة دولية/لتر و  $\geq 34$  وحدة دولية/لتر على التوالي).

تم إجراء فحص قاع العين للتأكد من تشخيص إرتفاع ضغط الدم المزمن من أجل البحث عن أى تغير مثل التقلص أو التورم أو تغيرات تصلب الشرايين.

كما تم تسجيل بعض الأدوية التي إستخدمها المرضى أثناء الحمل في المجموعات الأربع: Tenormin و labetalol و methyldopa و Epilat retard وأقراص (atenolol) في حالة إرتفاع ضغط الدم إلى ١٥٠/١٠٠ أو أكثر Mg So<sub>4</sub>.