Remote Complication of Hypertensive Disorders of Pregnancy

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Abstract: Background: A hypertensive disorder of pregnancy is a common problem during pregnancy, affect 5-10% of women. The incidence of hypertensive disorders in pregnancy is increased with more risk of developing chronic hypertension in their life later on, this is mostly because of sedentary lifestyle and increasing maternal age. In Egypt, there is no accurate estimation of long term postpartum complications of hypertensive disorder of pregnancy. The current study aimed to evaluate remote complications of PE, and gestational hypertension. **Methods**: This is a retrospective study included of 508women with previous hypertensive disorders of pregnancy. Women that were diagnosed to be essential hypertensive, diabetic or had chronic illness before pregnancy were excluded from the study. Women recruited from Obstetrics and Gynaecology department at Al Zahra University Hospital and El Sheikh Zayed Al-Nahyan Hospital. All women were subjected to history, examination with more concern about blood pressure measurements, investigation (cholesterol and ECG). **Results*:*** Chronic hypertension occurred in 22.4%of women with previous hypertensive disorders of pregnancy, the development of chronic hypertension was higher in pre-eclamptic women (78.1%) than in women with Previous gestational hypertension (21.9%). 30% (89/211 cases) of cases with previous preeclampsia developed remote hypertension and only 12% (25/181 cases) of cases with previous gestational hypertension developed remote hypertension. **Conclusion:** Women with previous preeclampsia had more tendancy to develop chronic hypertension more than those with previous gestational hypertension, Women who develop chronic hypertension tend to have higher lipid levels compared to normotensive women with previous history of hypertensive disorders with pregnancy. Obesity is a risk factor for hypertension in women with previous history of hypertensive disorders with pregnancy.
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1. Introduction

Cardiovascular death rates continue to rise for women under age 55, underlying the importance of focusing on female-specific conditions that may increase cardiovascular risk, including pregnancy-related disorders ***(1).*** Hypertension is the most common medical disease that occurred during pregnancy, affect 2-3% of all pregnancies. Hypertensive disorders during pregnancy include 4 categories, as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy**:** -chronic hypertension**,** - preeclampsia-eclampsia, -preeclampsia superimposed on chronic hypertension, and - gestational hypertension ***(2).***

2. Methods

The study was conducted to five hundred and eight (508) females with history of hypertensive disorders of pregnancy, from December 2017 till September 2018. Women that were diagnosed to be essential hypertensive, diabetic or had chronic illness before pregnancy were excluded from the study. All cases were subjected to informed verbal consent, proper history with more emphasize on mode of previous delivery, gestational age at delivery, diabetes, hypertensive disorders in pregnancy, order of affected pregnancy by PIH, interval from that pregnancy till the current assessment, pregnancy outcome. General examination was done as usual with more concern to (blood pressure, pulse, weight and height). Then laboratory testing was done including: Random blood glucose, cholesterol, also ECG was done for all case.

Statistical methods

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 18.0, IBM Corp., Chicago, USA, 2009. Descriptive statistics were done for quantitative data as minimum & maximum of the range as well as mean±SD (standard deviation) for quantitative normally distributed data, while it was done for qualitative data as number and percentage. Inferential analyses were done for quantitative variables using independent groups with normally distributed data. In qualitative data, inferential analyses for independent variables were done using Chi square test for

differences between proportions and Fisher's exact test for variables. While correlations were done using Pearson correlation for numerical normally distributed data. The level of significance was taken at P value < 0.050 is significant, otherwise is non-significant.

3. Results:

Table (3) shows that Chronic HTN occurred in 22.4% which is less than fifth of cases.

Table (1): Demographic characteristics among the studied cases

Variables	**Mean±SD**	**Range**
Age (years)	28.0±5.6	20–40
BMI (kg/m^2)	23.2±3.5	17.0–37.6
Parity	2.4±1.4	1 – 10
The interval from the affected pregnancy (years)	2.8±1.8	0-9
	Number of	**%**
Previous cesarean section	319	62.8
hypertensive cases	114	22.4
cases with ECG changes	13	2.56
cases with high cholesterol >200	12	2.4

Table (2): Pregnancy index of the studied cases.

Variables		**N**	**%**
Types of hypertensive disorders of the previous pregnancy	**PIH**	206	40.55
	Pre-eclampsia	300	59.06
	Eclampsia	2	0.39
Order of the affected pregnancy	**1st**	374	73.6
	2nd	64	12.6
	3rd	44	8.7
	4th-7th	26	5.1
Pregnancyoutcome	**Full term**	330	65.0
	Preterm	147	28.9
	Still birth	17	3.3
	IUFD	14	2.8

Total=508

Table (3): Demographic data of cases who developed chronic hypertension.

Variables		**Mean±SD**	**Range**
Age (years)		27.7±5.7	20-40
Parity		2.1±1.2	1-5
SBP (mmHg)		113.1±13.2	90–160
DBP (mmHg)		71.5±9.5	60–100
		N	**%**
Order of the affected pregnancy	**1st**	86	75.4
	2nd	13	11.4
	3rd	13	11.4
	4th	2	1.8
Number of cases of Chronic HTN		114	22.4
The Number of cases with abnormal ECG		3	0.6

Total=508

Table (4): shows that: Cases with HTN significantly had higher BMI and lower parity.

Table (4) Comparison between hypertensive and normotensive cases regarding their demographic data.

Variables	Hypertensive cases (N=114)	Normotensive cases (N=394)	P value
Age (years)	27.7±5.7	28.1±5.6	<0.461
BMI kg/m^2)	23.9±4.0	23.0±3.4	**<0.028***
Parity	2.1±1.2	2.5±1.4	**<0.001***

Table (5) shows that: about 30% (89 cases) of cases with history of preeclampsia developed chronic hypertension and 12% (25 cases) of cases with history of pregnancy induced hypertension developed chronic hypertension.

Table (5): Comparison between hypertensive and normotensive cases regarding pregnancy index.

Variables		Hypertensive cases (N=114)	Normotensive cases (N=394)	P value
Types of hypertensive disorders of pregnancy	**Gestational HTN**	25 (21.9%)	181 (45.9%)	**<0.001***
	Pre-eclampsia	**89 (78.1%)**	211 (53.6%)	
	Eclampsia	0 (0.0%)	2 (0.5%)	
Order of the affected pregnancy	**1st**	86 (75.4%)	288 (73.1%)	<0.166
	2nd	11 (9.6%)	53 (13.5%)	
	3rd	14 (12.3%)	30 (7.6%)	
	4th -7th	3 (2.6%)	23 (5.8%)	
Pregnancyoutcome	**Full term**	74 (64.9%)	256 (65.0%)	<0.643
	Preterm	32 (28.1%)	115 (29.2%)	
	Still birth	3 (2.6%)	14 (3.6%)	
	IUFD	5 (4.4%)	9 (2.3%)	
		Mean±SD	**Mean±SD**	
Interval from the last affected pregnancy (years)		2.5±1.5	2.9±1.9	**<0.008***

Table (6): shows that: hypertensive cases significantly had higher cholesterol.

Table (6): Comparison between hypertensive and normotensive cases regarding cholesterol.

Variables	Hypertensive cases (N=114)	Normotensive cases (N=394)	P value
Number of cases with Cholesterol >200	11 (9.6%)	1 (0.3%)	**<0.001**
Mean level of Cholesterol (mg/dL)	151.1±37.7	125.1±28.4	**<0.001**

Table (7): Logistic regression models for factors affecting chronic HTN.

Factors	B	SE	P value	OR (95% CI)
BMI> 30	1.28	0.45	**0.005***	3.60 (1.48–8.78)

β: Regression coefficient, SE: Standard error, OR: Odds ratio, CI: Confidence interval, *significant

By studying different factors, only obesity has significant risk factors for developing **chronic HTN** in cases with past history of hypertensive disorders of pregnancy.

Table (8): Correlation between interval from hypertensive disorders of pregnancy and development of remote complications.

Variables	R	P value
SBP	-0.002	0.966
DBP	0.008	0.852
Cholesterol	-0.085	0.056

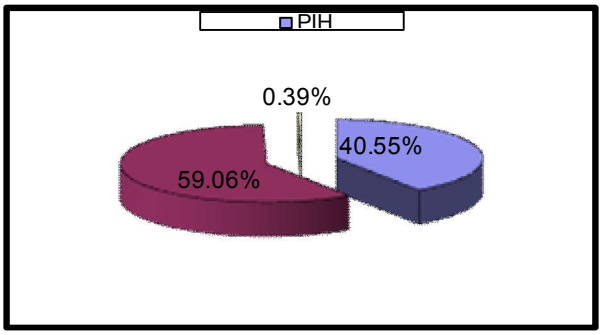

Figure (1): Types of hypertensive disorders of the previous pregnancy.

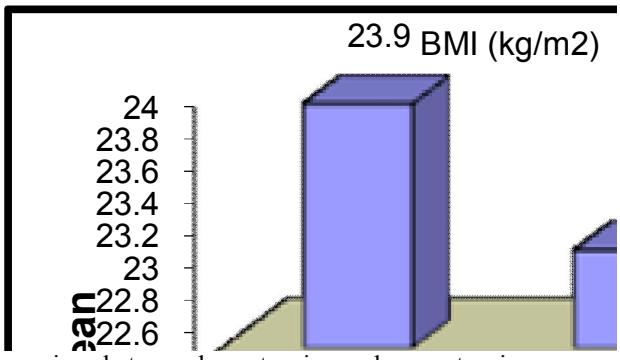

Figure (2) Comparison between hypertensive and normotensive cases regarding BMI.

Pearson correlation

No significant correlation between interval from hypertensive disorders of pregnancy and blood pressure and, cholesterol.

4. Discussion

Cardiovascular death rates continue to rise for women under age 55, underlying the importance of focusing on female-specific conditions that may increase cardiovascular risk, including pregnancy-related disorders ***(1).*** Hypertension is the most common medical disease that occurred during pregnancy, affect 2-3% of all pregnancies. Hypertensive disorders during pregnancy include 4 categories, as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy**:** chronic hypertension**,** preeclampsia-eclampsia, preeclampsia superimposed on chronic hypertension, and gestational hypertension ***(2).*** In severe PE, multiple organ systems can be affected, potentially resulting in complications such as renal failure, stroke, congestive heart failure, disseminated intravascular coagulopathy, and liver failure ***(3).*** Pre-eclampsia (PE) and the more severe "eclampsia" together affect approximately 2%–8% of pregnancies and result in more than 50,000 maternal deaths globally ***(4). Ghossein-Doha et al,*** repoted in their large and comprehensive study of the postnatal cardiac and hypertensive consequences of preeclampsia, their results highlight the previously underestimated cardiac burden of this pregnancy disorder **(5).** The incidence of hypertensive disorders of pregnancy in the world appears to have increased 25% in the last two decades ***(6),*** and is a leading contributor to maternal and infant morbidity and mortality ***(1).***

In the current study, 508 women with history of hypertensive disorders of pregnancy were recruited (their mean age was 28 years ± 5.6). 59.1% had previous pre-eclampsia, 40.6% had gestional hypertension and 0.4% had eclampsia. Chronic hypertenion occurred in 114 cases (22.4%). In agreement with this study, ***Ghossein-Doha et al,*** observed a high percentage of women who remained or became hypertensive at time of screening was 28% **(5).** Also the current study supported by a study introduced by ***Williams (2011)*** in which women who had gestional hypertension had increasing risk for future chronic hypertension **(7).** The current study also supported by ***Heidrich et al. (8)*** study which confirm the association of preeclampsia with the future CVD later in life.

The current study found that development of chronic hypertension among women with history of hypertensive disorders of pregnancy was higher in pre-eclamptic women (78.1%). 30% (89 cases) of cases with previous preeclampsia developed remote hypertension and only 12% (25 cases) of cases with previous pregnancy induced hypertension (PIH) developed remote hypertension. This finding was supported by a study made by ***Ghossein-Doha et al. (5)*** which found that the development of remote chronic HTN in initialy normotensive formelypreeclamptic women within the next 12 years, occurred in one for each three women, this is much higher than general population (36% versus 6%). The higher rate in this study could be related to the high rate of early onset preeclampsia and preterm preeclampsia (73% and 84% respectively). In disagreement with this finding, ***Ray et al. (9)*** found that women who had isolated gestional hypertension, without proteinuria, also have an increased risk of future chronic hypertension and cardiovascular disease. The risk appears to be similar to those who had late-onest, term preeclampsia (>37 wk), but not as great as the risk seen in women who had preterm preeclampsia. In disagreement with this finding, ***Young and Ecker (10)*** noted in their study that there was a limited knowledge of association between preeclampsia and future cardiovascular disease.

In the current study, ECG was done for all cases. Only 13 cases had abnormal ECG changes which were non specific.

It is debated whether preeclampsia itself is a risk factor for CVD or whether there are additional, more classic risk factors that add on to the risk. There is increasing evidence that preeclampsia and CVD do share the same risk factors. Part of these factors can be modified if identified at an early stage. However, it is still not clear to what extent the classic risk factors really add on to the risk of CVD and to what extent modification of these factors decreases the risk ***(5).***

The current study shows that cases who develop chronic hypertension had higher cholesterol level than normotensive group. This was supported by ***Bodnar et al. (11)*** a study conducted in USA and found that there was high incidence of increasing total cholesterol among cases with chronic HTN who previously were PIH. In disagreement with this finding, ***Magnussen et al. (12)*** found that after preeclampsia or eclampsia, dyslipidemia is still evident, but not usually as strongly as other components of the metabolic syndrome.

The current study found that cases who developed chronic hypertension significantly had higher BMI with p value less than 0.028. This was supported by ***Williams (7)*** reported that there was increasing in BMI among patients who previously had preeclampsia and now chronic HTN. This also was supported by ***Villamor and Cnattingius (13)*** who reported that weight retention or weight gain after pregnancy is associated with an increased risk of preeclampsia in a subsequent pregnancy compared with women who returned back to their initial pre-pregnancy weight. This observation not only supports the association between maternal overweight and preeclampsia risk, but also the stronger association between recurrent pregnancies affected with preeclampsia and future cardiovascular disease.

Finally, our results showed that women who have had hypertensive disorders of pregnancy are more likely to develope chronic hypertension. Cases with chronic hypertension following previous preeclampsia significantly had higher cholesterol level and random blood glucose more than normotensive cases. Obesity has significant risk factor for chronic hypertension. Chronic hypertension ocuure more frequently when the hypertensive disorder of pregnancy affects the first pregnancy 75.4% of hypertensive cases had hypertension in their first pregnancy.

Conclusion

Hazards of hypertensive disorders of pregnancy can be resolved after delivery of the placenta, however the risk for chronic hypertension and cardiovascular disease increased on their later life. Preeclampsia is considered as positive "stress test" for developing chronic hypertension. In the current study, women with history of preeclampsia are more likely higher blood pressure than women with previous PIH. Women who develop chronic hypertension tend to have higher lipid levels, and higher random blood glucose compared to normotensive women with previous history of hypertensive disorders with pregnancy. Obesity is a risk factor for hypertension in women with previous history of hypertensive disorders with pregnancy.

Recommendations

We recommended postpartum follow up for those having hypertensive disorders of pregnancy for longer period. This follow up should include cardiological consultation with echocardiography at least once during first 10 years for early diagnosis of long term complications of hypertensive disorders of pregnancy and more concern to modify life style behaviors and to avoid overweight gain and obesity. Also, further studies to assess long term complications of hypertensive disorders of pregnancy on the future health of children.

References

1. Lindheimer MD, Taler SJ, Cunningham FG. Hypertension in pregnancy. J Am SocHypertens 2010;4(2):68–78.
2. Barton JR, O'brien JM, Bergauer NK, Jacques DL, Sibai BM. Mild gestational hypertension remote from term: progression and outcome. Am J Obstet Gynecol. 2001; 184(5):979–983.
3. Jeyabalan A. Epidemiology of preeclampsia: impact of obesity. Nutr Rev 2013; 71Suppl 1: S18–S25.
4. Duley L. The global impact of pre-eclampsia and eclampsia. Semin Perinatol 2009; 33(3):130–7.
5. Ghossein-Doha C, Peeters L, van Heijster S, van Kuijk S, Spaan J, Delhaas T, Spaanderman M. Hypertension after preeclampsia is preceded by changes in cardiac structure and function. Hypertension. 2013; 62(2):382-90.
6. Wallis AB, Saftlas AF, Hsia J, Atrash HK. Secular trends in the rates of preeclampsia, eclampsia, and gestational hypertension, United States, 1987-2004. Am J Hypertens 2008;21(5):521–6.
7. Williams D. Long-term complications of preeclampsia. In Seminars in nephrology, WB Saunders; 2011; 31(1): 111-122.
8. Heidrich MB, Wenzel D, von Kaisenberg CS, Schippert C, von Versen-Höynck FM. Preeclampsia and long-term risk of cardiovascular disease: what do obstetrician gynecologists know?. BMC pregnancy and childbirth. 2013; 13(1):61.
9. Ray JG, Vermeulen MJ, Schull MJ, Redelmeier DA. Cardiovascular health after maternal placental syndromes (CHAMPS): population-based retrospective cohort study. Lancet. 2005;366:1797-803.
10. Young BC and Ecker JL. Fetal macrosomia and shoulder dystocia in women with gestational diabetes: risks amenable to treatment?. Current diabetes reports. 2013; 13(1):12-8.
11. Bodnar LM, Ness RB, Harger GF, Roberts JM. Inflammation and triglycerides partially mediate the effect of prepregnancy body mass index on the risk of preeclampsia. American journal of epidemiology. 2005; 162(12):1198-206.
12. Magnussen EB, Vatten LJ, Davey Smith G, Romundstad PR. Hypertensive disorders in pregnancy and sub-sequently measured cardiovascular risk factors. Obstet Gynecol. 2009;114:961-70.
13. Villamor E and Cnattingius S. Interpregnancy weight change and risk of adverse pregnancy outcomes: a population-based study. The Lancet. 2006; 368(9542):1164-70.

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