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Research Paper

**PREGNANCY OUTCOME IN MOTHERS WITH CHRONIC HYPERTENSION
IN A TERTIARY HEALTH INSTITUTION, PORT HARCOURT, NIGERIA**

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Abstract

Background: Chronic hypertension in pregnancy is a major health problem globally. It is associated with adverse maternal and perinatal outcome. The pregnancy outcome of mothers with chronic hypertension have not been documented in Port Harcourt, Southern Nigeria, hence this study. **Objective:** To determine the prevalence, perinatal and maternal outcome of chronic hypertension in pregnancy in the University of Port Harcourt Teaching Hospital, Port Harcourt. **Methods:** It was a descriptive retrospective study of mothers with chronic hypertension in pregnancy conducted between 1st January 2012 to 31st December 2017 at the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria. Their folders were retrieved from the medical records department and the maternal bio-data, and maternal and perinatal outcome were obtained. The data were analyzed using SPSS version 20 and result presented as frequency tables, percentages, chi-square χ^2 , as appropriate. $P < 0.05$ is considered statistically significant. **Results:** Of the 13,285 mothers who had antenatal care and delivery at the UPTH during the study period, 54 had chronic hypertension, giving a prevalence of 0.4%. Of these, 45(83.3%) had pre-eclampsia superimposed on chronic hypertension, while 7(13%) had intrauterine fetal death (IUFD). Of the 18 women that presented at 12 weeks and below, half of them (50%) had adverse fetal outcome, while of the 35 pregnant women that presented between 13 and 28 weeks, 29(82.9%) had adverse fetal outcome and women with worse perinatal outcome had late ante-natal care registration. **Conclusion:** The percentage of women with chronic hypertension in this study who had pre-eclampsia superimposed on chronic hypertension is high. Increasing gestational age at presentation tend to impact negatively on perinatal outcome. Therefore, early antenatal care registration recommended.

Key words: Chronic hypertension, pregnancy outcome, Port Harcourt.

INTRODUCTION

Chronic hypertension is blood pressure ≥ 140 mmHg systolic and / or 90 mmHg diastolic on at least two occasions measured at least four hours apart with the patient at rest before pregnancy or in recognition that many women go for medical care only when gravid, before 20 weeks' gestation, take antihypertensive medication before pregnancy or persistence of hypertension for >12 weeks after delivery.¹⁻⁴ It occurs with or without proteinuria.⁵ Chronic hypertension in pregnancy accounts for approximately 3-5% of pregnancies.^{2,5}

Chronic hypertension can occur de novo (essential) usually without proteinuria or secondary to other causes. Primary hypertension has been identified as the most common cause of chronic hypertension in young pregnant women, accounting for about 90% of cases, while diabetes mellitus and renal failure diseases account for about 10%.^{2,3,5,6}

Chronic hypertension complicating pregnancy is a public health concern throughout the world.⁷ Gravid women who have pre-existing hypertension are at increased risk of maternal and perinatal morbidity, such as superimposed pre-eclampsia, acute renal failure, placenta abruption, maternal death, fetal growth restriction, preterm delivery, increased caesarean delivery rate and perinatal death.^{2,5,8} The risk of developing one of these complications correlates with the degree of maternal blood pressure elevation.⁵

These risk are particularly found in patients with uncontrolled hypertension, end organ damage, superimposed pre-eclampsia and in those who are depleted with prenatal care.⁸

Other risk factors that predispose one to developing chronic hypertension during a person's life time, aside from primary hypertension, are African-American race, obesity, dyslipidaemia, and physical inactivity.^{9,10}

The risk of superimposed preeclampsia increases with an increased duration of hypertension.^{1,2} Low dose aspirin can be given daily to the pregnant woman with risk factors for developing pre-eclampsia as early as 12 weeks' gestation and continued until 36 weeks. It has the best evidence so far among the options available.¹¹

Most women with chronic hypertension have a decrease in blood pressure during pregnancy similar to that observed in normotensive women. Blood pressure falls toward the end of the first trimester and rises toward pre-pregnancy values during the third trimester. As a result of this, antihypertensive medications can often be tapered during pregnancy.^{1,5} As the prevalence of advanced maternal age and obesity increase among child bearing women¹², hypertension diseases are likely to become an increasingly common obstetric condition.^{1,4}

In a two-centre United Kingdom based cohort study, an incidence of chronic hypertension in pregnancy of 1.3% was noted.¹³ However, a systematic review and meta-analysis showed that chronic hypertension in pregnancy complicated about 3% of all pregnancies.¹⁴ But an earlier population based study done in South Wales in 2002 showed that 0.6% of women had chronic hypertension in pregnancy.¹⁵ In America, chronic hypertension has a prevalence of 1-5%, but this estimate was drawn from a small number of population based studies, including publications from more than 20 years ago. A prevalence of 6.9% was recorded in India, this was a cross-sectional study.¹⁶

An Ethiopian systematic review involving 17 studies with a total of 258,602 pregnant women gave a prevalence of chronic hypertension in pregnancy of 5.79%.¹⁷ This was similar to a case control Cameroonian study with a prevalence of 5.3%.¹⁸ There was prevalence of 0.3% and 0.4% for urban and rural Ghana respectively.¹⁹ This was in contrast to another prospective study of 1010 women conducted in two ante-natal clinics in Accra, which showed that 2% of women had chronic hypertension in pregnancy.²⁰ The prevalence in Sokoto, Nigeria is 6%²¹ which is not far from 4.5% in Benin city, Nigeria.²²

A prospective cohort study of 503 pregnant women with chronic hypertension, between 2012 and 2017 in the United Kingdom showed that 8.9% developed early placental disease, 12.8% developed pre-eclampsia, and 18% developed small for gestational age infants without signs of maternal disease.²³ However, a secondary analysis of a cohort of 759 women in Alabama, USA with chronic hypertension with mild blood pressure elevation, 22% had small for gestational age babies, 31% had perinatal death and 26% had preterm birth.²⁴

In two other retrospective cohort study in USA, high caesarean rate (52.25%), small for gestational age (14.05%) at early and late terms were observed in one.²⁵ While the other study showed highest rates of growth restriction and preterm birth rates amongst black women, Hispanics had higher rates of growth restriction and preterm birth.²⁶ New Zealand and Italian studies showed similar experiences.^{27,28} However, in Indian study, rate of pre-eclampsia 36.4%, preterm birth rate was 86.4% and perinatal mortality rate was 27.2%. This higher rate was attributed to the fact that a much larger number of women were referred in the third trimester.²⁹ This contrasted heavily with the very low figures found in a surveillance of obstetrics population in Botswana.³⁰ A Ghanaian cross-sectional study of women with hypertensive disorder in pregnancy, 8.7% of babies were admitted into the neonatal intensive care unit, 4.3% had respiratory distress, 4.3% had preterm delivery, 4.3% had still birth, and 4.3% had perinatal death.³¹ The caesarean section rate in Benin city, Nigeria was 45.5% versus 22% in the general obstetric population studied.²² This was relatively similar to 36% in Sokoto, Nigeria.²¹

Risk factors for chronic hypertension in pregnancy were essentially similar to other components of hypertensive disease in pregnancy such as pre-eclampsia, gestational hypertension, and pre-eclampsia superimposed on chronic hypertension.¹³ In a US study, specific risk factors for chronic hypertension in pregnancy include Medicaid insurance, nulliparity, and being overweight or obese. Medicaid insurance is a proxy for poverty, and the relationship between poverty and chronic medical condition is well known.³² This was not very different from a Chinese study.³³

A case control study in Maroua Cameroon linked chronic hypertension in pregnancy to family history of hypertension, early adolescence (16.4%), nulliparity (71.18%), illiteracy (48.7%) and lack of occupation.¹⁸ The risk factors for chronic hypertension in pregnancy were not different in Lome, Togo.

There has been no study to the authors' knowledge on chronic hypertension in pregnancy in our centre. This study was therefore carried out to determine the prevalence and evaluate fetomaternal outcome of chronic hypertension in pregnancy in Port Harcourt, south-south, Nigeria.

MATERIALS AND METHODS

This was a descriptive retrospective study of booked antenatal patients with chronic hypertension in pregnancy managed at the UPTH, Port Harcourt between 1st of January 2012 and 31st of December 2016. Their folders were retrieved from the medical records department and studied. Data on their age, educational status, occupation, parity, gestational age at presentation, duration of diagnosis of hypertension, booking status, history of antihypertensive use, family history of hypertension and diabetes mellitus, body mass index, alcohol and smoking history, maternal and fetal complications and pregnancy outcome were extracted and analyzed using SPSS version 20. The results were presented in simple percentages, frequency tables and figures. Relevant descriptive statistics using frequency and percentage were computed for presentation of categorical variables, while continuous variables were presented using mean and standard deviation. The Chi-square test and Fisher's exact test were used to compare categorical variables with a p value of 0.05 or less taken as being significant.

Exclusion criteria: All folders on chronic hypertension in pregnancy managed at UPTH within the period stated that do not contain the complete information for the study were excluded during data collection. All unbooked pregnant women were also excluded from this study as data was not collected from their folders.

Ethical clearance: Ethical clearance for this study was obtained from the ethical committee of the university of Port Harcourt teaching hospital.

RESULTS

Within the study period, a total of 13,285 pregnant women were seen at the ante-natal clinic, of the UPTH, Port Harcourt, 54 had chronic hypertension in pregnancy, giving a prevalence of 0.4%.

The mean gestational age in weeks at booking, of women with chronic hypertension in pregnancy in this study was 16.05 ± 5.71 SD and the range was 7-28 weeks. The mean duration of diagnosis of hypertension in years, among the women was 2.46 ± 2.05 SD and range (0.3-10) years.

Thirty three (61.1%) of the women with chronic hypertension in pregnancy, were in the less than 35 years age range. Forty (74.1%) of these women had tertiary education. Only eight (14.8%) of them were unemployed.(Table 1)

Women who presented at fetal gestational age of less than 12 weeks were 18(33.3%), those between 13-27 weeks were 35(64.8%) while one pregnant mother presented after 28 week.

TABLE 1: DEMOGRAPHIC /CLINICAL CHARACTERISTICS OF WOMEN WITH CHRONIC HYPERTENSION IN PREGNANCY

Socio-demographic characteristics of study population (N=54)

Variables	Frequency	Percentage
Age category		
<35 years	33	61.1
>35 years	21	38.9
Educational level		
Secondary and below	14	25.9
Tertiary	40	74.1
Occupational status		
Unemployed	8	14.8
Employed	20	37.0
Self-employed	26	48.1
Parity		
Nulliparous	12	22.2
Para 1	22	40.7
Para 2-4	18	33.3
Para ≥5	2	3.7

More than half of the women 31(57.4%) had no adverse maternal outcome.

However, 23(42.6%) of the women studied had mild pre-eclampsia, 40.7% (n=22) had severe pre-eclampsia while 37% (n=20) had acute kidney injury.

Majority of the women had adverse fetal outcome, 72.2% (n=39). Thirty-seven percent (n=20) had intrauterine growth restriction, and 37%(n=20) had low birth. (Figure1)

Women with a family history of hypertension were 46.3% (n=25) and 22.2% (n=12) had a family history of diabetes mellitus. (Table2)

The mean body mass index of women with chronic hypertension in pregnancy was 35.38 ± 10.9 SD, the median BMI was 33.10, with a range of 24.00-100.70. Thirty-seven (68.5%) were obese, 29.6% (n=16) were overweight, while 1.9% (n=1) had a normal weight.

FIGURE 1: FETAL OUTCOME OF WOMEN WITH CHRONIC HYPERTENSION IN PREGNANCY (SOME FACTORS HAVING MORE THAN ONE ADVERSE OUTCOME);

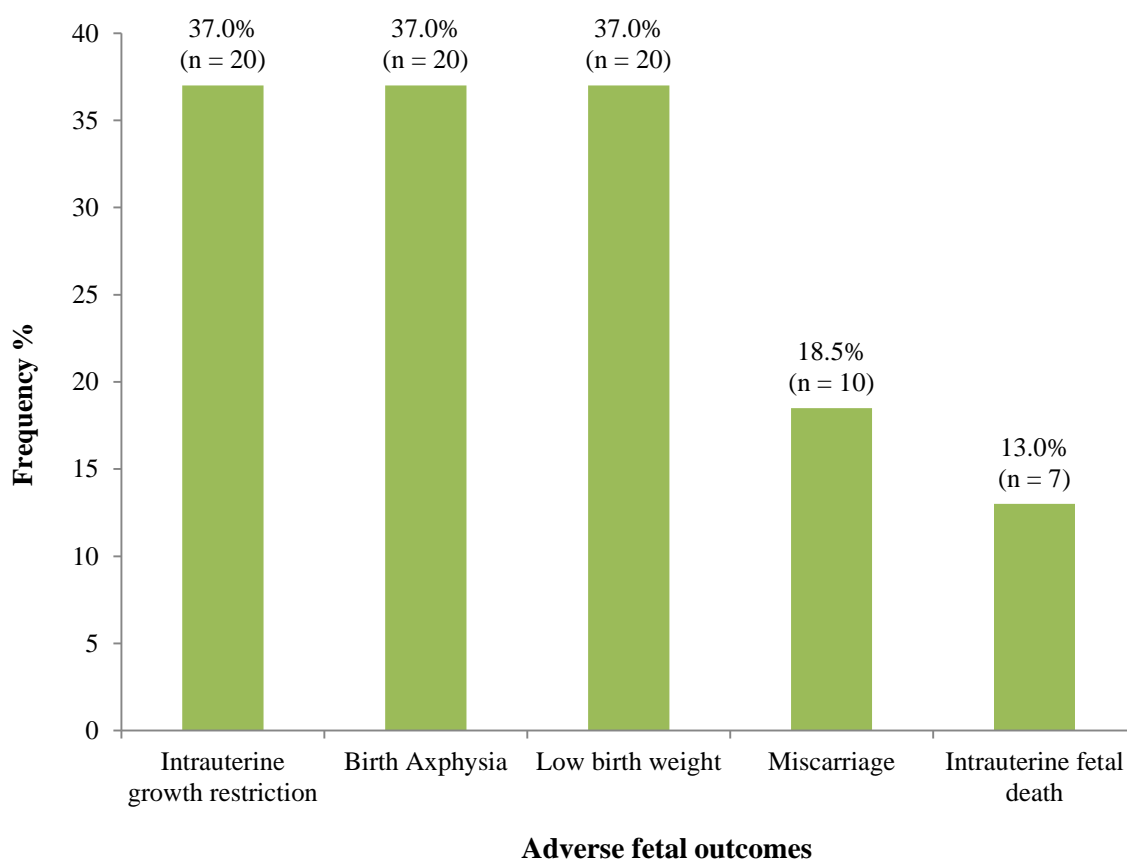


TABLE 2: MEDICAL AND SOCIAL HISTORY OF WOMEN WITH CHRONIC HYPERTENSION IN PREGNANCY/RISK FACTORS

Variables	Frequency	Percentage
Medical history		
Duration of HTN diagnosis		
<1 year	6	11.1
1 – 5 years	43	79.6
>5 years	5	9.3
Family history of HTN		
Yes	25	46.3
No	29	53.7
Family history of DM		
Yes	12	22.2
No	42	77.8
History of antihypertensive use		
Yes	51	94.4
No	3	5.6
Social history		
History of alcohol intake		
	Frequency	Percentage
Yes	2	3.7
No	52	96.3

None of the respondents had history of smoking

HTN – Hypertension DM – Diabetes Mellitus

As illustrated in table 3 below, there was no statistically significant relationship between age, educational level, employment status and body mass index among women with chronic hypertension in pregnancy and adverse maternal outcome in this study. However, the rate of adverse fetal outcome increased with increased gestational age at presentation, with the highest prevalence noticed in those who presented at 28 weeks and above, followed by those presenting between 13-27 weeks gestation and the least were those who presented at a gestational age less than or equal to 12 weeks gestation. The differences in proportion were statistically significant, p-value = 0.03. (Table 4)

The relationship between duration of diagnosis of hypertension, family history of hypertension, family history of diabetes mellitus, history of alcohol intake, and use of antihypertensive among women with chronic hypertension in pregnancy in this study and adverse maternal outcome as well as adverse fetal outcome respectively, were not statistically significant. (Table 5)

TABLE 3: DEMOGRAPHIC FACTORS AND ADVERSE MATERNAL/FETAL OUTCOME AMONG WOMEN WITH CHRONIC HYPERTENSION IN PREGNANCY

Variables	Total n (%)	Adverse maternal outcome		Adverse fetal outcome	
		Yes n (%)	No n (%)	Yes n (%)	No n (%)
Age category					
Below 35 years	33 (100.0)	12 (36.4)	21 (63.6)	23 (69.7)	10 (30.3)
35 years and above	21 (100.0)	11 (52.4)	10 (47.6)	16 (76.2)	5 (23.8)
		<i>Chi square = 1.347; p-value = 0.246</i>		<i>Chi square = 0.270; p-value = 0.604</i>	
Educational level					
Secondary and below	14 (100.0)	8 (57.1)	6 (42.9)	11(78.6)	3 (21.4)
Above secondary	40 (100.0)	15 (37.5)	25 (62.5)	28 (70.0)	12 (30.0)
		<i>Chi square = 1.636; p-value = 0.201</i>		<i>Fisher's exact p-value = 0.733</i>	
Employment status					
Unemployed	8 (100.0)	2 (25.0)	6 (75.0)	6 (75.0)	2 (25.0)
Employed	46 (100.0)	21 (45.7)	25 (54.3)	33 (71.7)	13 (28.3)
		<i>Fisher's exact p-value = 0.443</i>		<i>Fisher's exact p-value = 1.000</i>	
BMI classification					
Obese	37 (100.0)	18 (48.6)	19 (51.4)	28 (75.7)	9 (24.3)
Not obese	17 (100.0)	5 (29.4)	12 (70.6)	11 (64.7)	6 (35.3)
		<i>Chi square = 1.763; p-value = 0.184</i>		<i>Fisher's exact p-value = 0.516</i>	

TABLE 4: OBSTETRIC FACTORS AND ADVERSE MATERNAL/FETAL OUTCOME AMONG WOMEN WITH CHRONIC HYPERTENSION IN PREGNANCY

Variables	Total n (%)	Adverse maternal outcome		Adverse fetal outcome	
		Yes n (%)	No n (%)	Yes n (%)	No n (%)
Parity					
Nulliparous	12 (100.0)	3 (25.0)	9 (75.0)	8 (66.7)	4 (33.3)
Non-nulliparous	42 (100.0)	20 (47.6)	22 (52.4)	31 (73.8)	11 (26.2)
		<i>Chi square = 1.953; p-value = 0.162</i>		<i>Fisher's exact p-value = 0.719</i>	
Gestational age at presentation					
≤12 weeks	18 (100.0)	6 (33.3)	12 (66.7)	9 (50.0)	9 (50.0)
13 – 27 weeks	35 (100.0)	16 (45.7)	19 (54.3)	29 (82.9)	6 (17.1)
≥28 weeks	1 (100.0)	1 (100.0)	0 (0.0)	1 (100.0)	0 (0.0)
		<i>Fisher's exact test = 2.020; p-value = 0.380</i>		<i>Fisher's exact test = 6.475; p-value = 0.030*</i>	
Booking status					
Booked	54 (100.0)	25 (46.3)	29 (53.7)	37(68.5)	17 (31.5)
		<i>Fisher's exact p-value = 0.253</i>		<i>Fisher's exact p-value = 0.552</i>	

TABLE 5: RELATIONSHIP BETWEEN CLINICAL HISTORY AND ADVERSE MATERNAL/FETAL OUTCOME AMONG WOMEN WITH CHRONIC HYPERTENSION IN PREGNANCY

Variables	Total n (%)	Adverse maternal outcome		Adverse fetal outcome	
		Yes n (%)	No n (%)	Yes n (%)	No n (%)
Duration of HTN diagnosis					
≤1 year	24 (100.0)	11 (45.8)	13 (54.2)	16 (66.7)	8 (33.3)
>1 year	30 (100.0)	12 (40.0)	18 (60.0)	23 (76.7)	7 (23.3)
		<i>Chi square = 0.186; p-value = 0.667</i>		<i>Chi square = 0.665; p-value = 0.415</i>	
Family history of HTN					
Yes	25 (100.0)	11 (44.0)	14 (56.0)	19 (76.0)	6 (24.0)
No	29 (100.0)	12 (41.4)	17 (58.6)	20 (69.0)	9 (31.0)
		<i>Chi square = 0.038; p-value = 0.846</i>		<i>Chi square = 0.331; p-value = 0.565</i>	
Family history of DM					
Yes	12 (100.0)	4 (33.3)	8 (66.7)	9 (75.0)	3 (25.0)
No	42 (100.0)	19 (45.2)	23 (54.8)	30 (71.4)	12 (28.6)
		<i>Chi square = 0.541; p-value = 0.462</i>		<i>Fisher's exact p-value = 1.000</i>	
History of antihypertensive use					
Yes	51 (100.0)	23 (45.1)	28 (54.9)	36 (70.6)	15 (29.4)
No	3 (100.0)	0 (0.0)	3 (100.0)	3 (100.0)	0 (0.0)
		<i>Fisher's exact p-value = 0.253</i>		<i>Fisher's exact p-value = 0.552</i>	
History of alcohol intake					
Yes	2 (100.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)
No	52 (100.0)	22 (42.3)	30 (57.7)	38 (73.1)	14 (26.9)
		<i>Fisher's exact p-value = 1.000</i>		<i>Fisher's exact p-value = 0.482</i>	

DISCUSSION

Chronic hypertension in pregnancy is a public health concern throughout the world.⁷The prevalence of 0.4% in this study is less than 6% reported in Sokoto, Northern Nigeria,²¹ and 4.5% in Benin city, Southern Nigeria,²²as well as a prevalence of 1.5% from a small number of population based studies in America.⁷ The reduced prevalence in this study may be due to the younger age of the mothers at child birth, as it has been shown that in population with increasing maternal age at child birth, the association of hypertension with advancing age contributes to a greater prevalence of chronic hypertension.³⁵

The number of women, with chronic hypertension in pregnancy in this study that eventually developed pre-eclampsia is higher than that seen in the UK,²³USA²⁶ and India.²⁹ Identification of superimposed pre-eclampsia remains difficult, as several studies did not report diagnostic criteria, while others used varying, though valid definitions of superimposed pre-eclampsia, as such, lack of consistency is likely to affect the heterogeneity of outcomes across studies, which again explains the difference in prevalence of pre-eclampsia found in this study from others elsewhere.⁷

Thirty seven percent of mothers had acute kidney injury in this study, contrastingly, 21% had acute renal failure in a study in USA.¹⁰The higher incidence of acute kidney injury seen in this study may be attributable to a high proportion of women who developed pre-eclampsia, as acute renal failure was strikingly commoner among women with gestational hypertension with proteinuria, in a Canadian study.³⁶

Intrauterine growth restriction, birth asphyxia, and low birth weight were the commonest adverse fetal outcome in this study, at variance with other studies.^{23,24,26,29,30} This is attributable to the late gestational age of presentation by the women for care, as the adverse events had started taking effect before medical intervention.

Obesity and negroid race are marginally associated with chronic hypertension as found in most studies.³²⁻³⁴ The role of parity in chronic hypertension in pregnancy is not clear. In this study, low parity was more associated with chronic hypertension in pregnancy. However, while some studies associated chronic hypertension with high parity, others

found low parity.³²⁻³⁴ In all, parity is not a significant risk factor for adverse effect of chronic hypertension in pregnancy.

Studies have shown that women who experience hypertension in pregnancy are diagnosed with hypertension much earlier in life as opposed to women who do not experience this complication.³⁷ However, the incidence of chronic hypertension in pregnancy, increases with increasing maternal age.¹³ This study did not show any relationship between maternal age and chronic hypertension.¹⁸ Contrastingly, most of the women with chronic hypertension in pregnancy in a Chinese study were aged greater than 35 years.³³

The differences in age category, educational level ($P=0.201$), employment status ($P=0.443$), and body mass index ($P=0.184$) and their relationship to adverse maternal outcome, were non-significant in this study. Other obstetric factors like parity ($P=0.162$), gestational age at presentation ($P=0.380$), and booking status ($P=0.253$), were not significant causes of adverse maternal outcome as well. The reason for this is unclear, but may be related to the fact that a higher percentage of women in this study (74.1%) had above secondary level of education which may have influenced their health seeking behaviour and as such may have had optimal blood pressure control, which reduced the adverse outcome.¹⁴

However, there is substantial diversity of reported adverse outcome with respect to age category and obesity, although randomized control trials were more consistent than other study design, there were no systematic difference in mean event rates to explain the disparities in outcomes.⁷

There were no significant demographic factors associated with adverse foetal outcome among women with chronic hypertension in pregnancy similar to the reason above.^{7,14}

It is important to note that the rate of adverse fetal outcome decreased with a decreasing gestational age at presentation in this study, hence there is statistical significance with a p-value of 0.03. This is in keeping with the findings in most studies.^{13,18,22}

CONCLUSION:

The prevalence of chronic hypertension in pregnancy in this study is low and this seems to be a global trend. However, adverse effect following chronic hypertension is high. Early booking and optimal blood pressure control in pregnant women with chronic hypertension were shown to improve both maternal and fetal outcome.

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