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ORIGINAL ARTICLE

PATTERNS OF HYPERTENSIVE DISORDERS OF PREGNANCY AND ASSOCIATED FACTORS AT DEBRE BERHAN REFERRAL HOSPITAL, NORTH SHOA, AMHARA REGION

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ABSTRACT

Background: *Hypertensive Disorders of Pregnancy (HDP) represent the most common medical complication in pregnancy associated with significant maternal and perinatal morbidity and mortality worldwide. Identification of common maternal and perinatal morbidities associated with hypertensive disorders of pregnancy is important for policy makers to plan to alleviate the problem.*

Objective: *To assess the patterns of hypertensive disorders of pregnancy and associated factors in Debre Berhan Referral Hospital.*

Method: *Institution-based retrospective cross sectional study was conducted by reviewing logbooks and patients charts.*

Result: *Among 8626 women who got services in the hospital 340(3.9%)had hypertensive disorders.. The proportion of HDP shows an increasing trend from 1.8% in 2011 to 5.7% in 2014. Preeclampsia accounts for 67.4% of all case followed by eclampsia which account for 27.8%. In this study, HDP was associated with 35.4% preterm delivery, 30.8% fetal death, 39.4% low birth weight, 38.4% low APGAR score and 8.5% IUGR. About 15.8% of newborns born from mothers with HDP mothers needed resuscitation and 40.1% ICU admission. Maternal death occurs in 2.5% mothers who had HDP with the case fatality rate for eclampsia being 6.67%. HDP contributed for 35% of all maternal deaths. Of all mothers with HDP, 58% were primi-gravida ladies.*

Conclusion: *the prevalence of HDP shows an increasing pattern over the last years. Preeclampsia and eclampsia together take the lion-share of HDP. Primi-gravida women are affected more frequently than multi-gravida women with hypertensive disorders of pregnancy. HDP was associated with major adverse perinatal and maternal outcome .*

Key words*: Preeclampsia, eclampsia, Hypertensive disorders, pregnancy .*

INTRODUCTION

Hypertensive disorders of pregnancy are a significant public health burden among obstetric population in both developed and developing nations contributing greatly to maternal and perinatal morbidity and mortality globally. But the impact is worse in developing countries, where unlike other prevalent obstetric complications constituting the deadly triads (hypertension, obstetric hemorrhage and sepsis), medical interventions may be ineffective during late presentation of cases (1, 2).

There has been a controversy as to the terminology and classification of hypertensive disorders of pregnancy. In 2001, the National High Blood Pressure Education Program Working Group report on High Blood Pressure in pregnancy classified hypertensive disorders of pregnancy into four classes (3). The importance of classifying in such a way lies in the fact that the various classes of hypertensive disorders of pregnancy (HDP) are different in perinatal and ma-

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ternal outcomes as well as somewhat different management options: gestational hypertension, preeclampsia-eclampisa, sever preeclampsia, chronic hypertension, superimposed preeclampsia (1, 4).

Globally, at least 585,000 women die each year due to complications of pregnancy and child birth with more than 70% of these deaths being due to complications of hemorrhage, HDP, sepsis, obstructed labor and unsafe abortion (5). Different Studies showed that HDP prevalence in the world varies from 1.5% in Sweden to 6.4% in African American (6, 7), whereas in West Africa it accounts 0.64 per 100 deliveries (8). Studies in Ethiopia showed the prevalence of HDP ranges from 2.2% to 8.48% (4, 9, 10). In South Africa hypertensive disorders for pregnancy is number one cause of maternal deaths accounting for 20% of pregnancies (7). In developing countries, the burden of HDP is even higher as it was estimated by WHO at least one woman die every seven minutes from complications of hypertensive disorders of pregnancy (11). The mortality is closely associated with severity of hypertension; being more evident in patient with eclampsia (4, 5, 12). In a review done from different studies conducted in Ethiopia, the prevalence of maternal death associated with HDP was 35.7% (5).

Hypertensive disorder of pregnancy is associated with adverse maternal and perinatal outcomes: increased maternal mortality, increased risk of cerebrovascular accidents, renal failure, and pulmonary edema, increased risk of placental abruption (1, 2, 13, 14); even more pronounced with severe hypertension, increased risk of caesarian delivery (15), and the risk of maternal near-miss cases are also more common (16). The perinatal outcomes include: low birth weight, IUGR, need for resuscitation, low neonatal Apgar score(11, 14, 17–19).

Hypertension in pregnancy has no known etiology. Various studies were conducted to assess the possible risk factors for hypertensive disorders of pregnancy. A retrospective case control study done in Iran showed only preexisting preeclampsia was considered a risk factor. Patients with Preexisting diabetes, preexisting hypertension and urinary tract infection (UTI) had increased risk of preeclampsia although they were not statistically significant. In this similar study, parity more than three, and maternal anemia were found to be protective for preeclampsia (20). Some studies also showed that HDP, especially preeclampsia, was found to occur more frequently in young primi-gravida, first pregnancy from a new partner, in mother over 35 years of age, mothers with molar pregnancy, multifetal gestation, mothers with preexisting diabetes and hypertension, Kidney diseases, anti-phospholipid antibody syndrome, vascular connective tissue disease, obesity and being African-American race are also other risk factors for HDP (1, 2, 4, 12). Most causes of maternal mortality related to hypertensive disorders of pregnancy can be avoided by instituting timely and effective management of women presented with such complications (21). With HDP being one of the major causes of maternal mortality, a detailed analysis of the problem and its associated factors like risk factors, maternal morbidities and perinatal outcomes is important. This research assessed the pattern of hypertensive disorders of pregnancy and its associated factors among women admitted to Debre Berhan Hospital from Sep 2011 to August 2014.

MATERIALS AND METHODS

Institution-based retrospective cross sectional study was conducted in Debre Berhan Referral Hospital, located 130km north of Addis Ababa, the capital of Ethiopia. Log book and patient medical records were reviewed to assess the patterns of hypertensive disorders of pregnancy from September 2011-August 2014. Data collection and analysis were held from November 2014 to March 2014.

All women who were diagnosed to have hypertensive disorders of pregnancy and registered at labor and delivery ward during the period September 2011-August 2014 were the study population, but those who were admitted to the ward and fulfill the inclusion criteria were included in the study. A total of 340 mothers with hypertensive disorders of pregnancy were admitted to GYN-OBS Ward. The inclusion criteria were: all pregnant ladies admitted to gynecology obstetrics ward with SBP>=140mmHg or DBP>=90mmHg, whose cards was able to be retrieved and contained basic history and physical examination; pregnant mothers who were already on antihypertensive drug irrespective of their blood pressure level were also included in the study. The independent variables were: age of the mother, parity, gravidity, previous history of hypertension, history of diabetes mellitus, history of cardiac disease and history of renal disease; and that of the dependent variables were: hypertensive disorders of pregnancy, and perinatal and maternal complications. Checklist was used to collect information from delivery registration, HMIS logbooks and client charts. Medical record number of those pregnant ladies who were admitted to gynecology obstetrics ward with

hypertensive disorders of pregnancy were taken from the delivery registration logbook, cards were retrieved from card rooms, and data was collected using check list from client charts by data collectors. The data collectors were two medical doctors. Before data collection was started, the data collectors were briefed about the checklist. The data was checked for completeness and consistency daily.

Data was checked for completeness and entered with EPI Info version 7.1.4 and transferred to SPSS version 20. Then it was cleaned and analyzed. Chi-square test, and bivariate analysis was conducted to examine association among dependent and independent variables. The result was presented in the form of statement, tables, percentage and graphs. Data were collected after permission was obtained from the department of Gynecology and Obstetrics of Debre Berhan Referral Hospital and Amhara Regional Ethical Review Committee. Patients' information was, and will be, kept secret by the data collectors and the principal investigator.

RESULTS

Among 8,626 women who got services in gynecology and obstetrics ward of Debre Berhan Referral Hospital during the study period, a total of 340 patients were cases of hypertensive disorders of pregnancy (HDP). 270 cases were included in the study; 40 patients' record cards could not be retrieved; and the remaining 30 cards did not fulfill the inclusion criteria and hence were excluded. There were a total of 20 maternal deaths from all causes during the study period.

About 37.8%mothers with HDP were less than eighteen years, and more than half of them (53.3%) were between 18-34 years old. The mean age of the patients was 25.4 years with a range between 15 and 40 years (Table 1).

Table 1: Demographic and obstetric history of women with hypertension disorders of pregnancy admitted to Gynecology obstetrics ward in Debre Berhan Referral Hospital, September 2011-August 2014

Variables	Number
Age (years)	
<18	**102(37.8%)**
18-35	**144(53.3%)**
>35	**24(8.9%)**
Gravidity	
Primi gravida	156(58.0%)
Multigravida	113(42.0%)
Parity, N=269	
Nulliparous	160(59.5%)
Primi parous	61(22.7%)
Multipara	48(17.8%)
ANC follow up	
Yes	172(77.8%)
No	49(22.2%)
Place of delivery	
Institutional delivery	254(94.4%)
Home delivery	15(5.6%)
Onset of labor	
Spontaneous	101(39.1%)
Induced	157(60.9%)
Mode of delivery	
Spontaneous vaginal delivery	158(59%)
Instrumental delivery	93(34.7%)
Emergency C/S	17(6.3%)

More than 3 out of 10 pregnancies (30.8%) ended up in fetal death; whereas, among HDP cases admitted, seven mothers (2.6%) died over a three-year period. More than a third of deliveries (35.4%) were preterm deliveries; less than one in ten pregnancies (8.5%) ended up in Intrauterine Growth Retardation (IUGR) (Table 2).

Out of 270 HDP cases, preeclampsia accounted for 67.4% followed by eclampsia, and together they accounted for 95.2% of HDP (Figure 1). Severe preeclampsia was the commonest type of preeclampsia accounting for 94.5% of all cases. Although superimposed preeclampsia accounted for 2.9% of the cases, all had at least one severity sign or symptom: headache (48.9%) being the most frequently reported symptom, followed by blurring of vision (28.2).

The number of HDP cases increased over the study period from 1.8% in 2011 to 5.7% in 2014 (Figure 2). Dipstick determination of urine protein for 254 mothers showed 89.3% of them had+1 or more protein reading while the remaining had trace or negative protein.

Preterm delivery occurred in 35.4% of the cases of HDP; 78.6% of them were in women with severe preeclampsia (Table3). Other complications encountered in cases of HDP included: low birth weight (39.4%), 73.0% of which were in women with severe preeclampsia; fetal death (30.8%), 54.3% and 38.3% of which occurred in severe preeclampsia and eclampsia respectively; IUGR (8.5%), 82.4% of which was seen in severe preeclampsia and maternal death (2.5 %), 71.4% of which occurred in women with eclampsia.

HDP was related to 35% of all maternal deaths in the study period. Preterm delivery, low birth weight, and IUGR have no statistically significant association with the type of HDP while fetal death was associated with the type of HDP (P=0.03). The type of HDP had no statistically significant association with age of the mother, parity and antenatal care (ANC) follow up (Table 3).

Table 2: Complications of women with hypertension disorders of pregnancy admitted to Gynecology obstetrics ward in Debre Berhan Referral Hospital, September 2011-August 2014

Variables	Number
Preterm delivery, n=158	
Yes	56(35.4%)
No	102(64.6%)
Low birth weight, n=226	
Yes	89(39.4%)
No	137(60.6%)
Fetal death, n=263	
Yes	81(30.8%)
No	182(69.2%)
IUGR, n=201	
Yes	17(8.5%)
No	184(91.5%)
Maternal death, n=270	
Yes	7(2.6%)
No	263(97.4%)

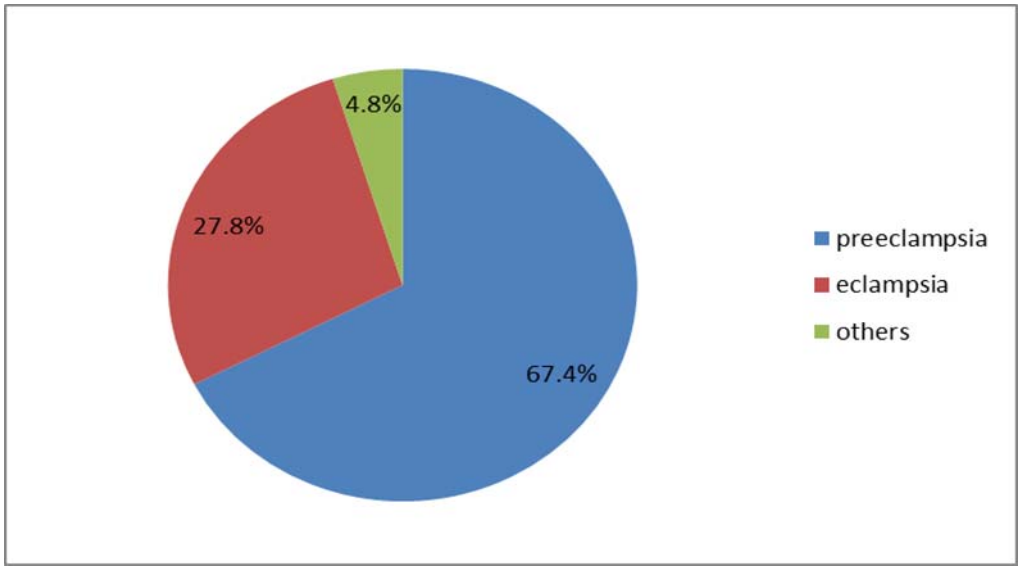

Figure 1: Hypertensive Disorders of Pregnancy diagnosed in current pregnancy among mothers admitted to OBY-GYN ward in Debre Berhan Referral Hospital.

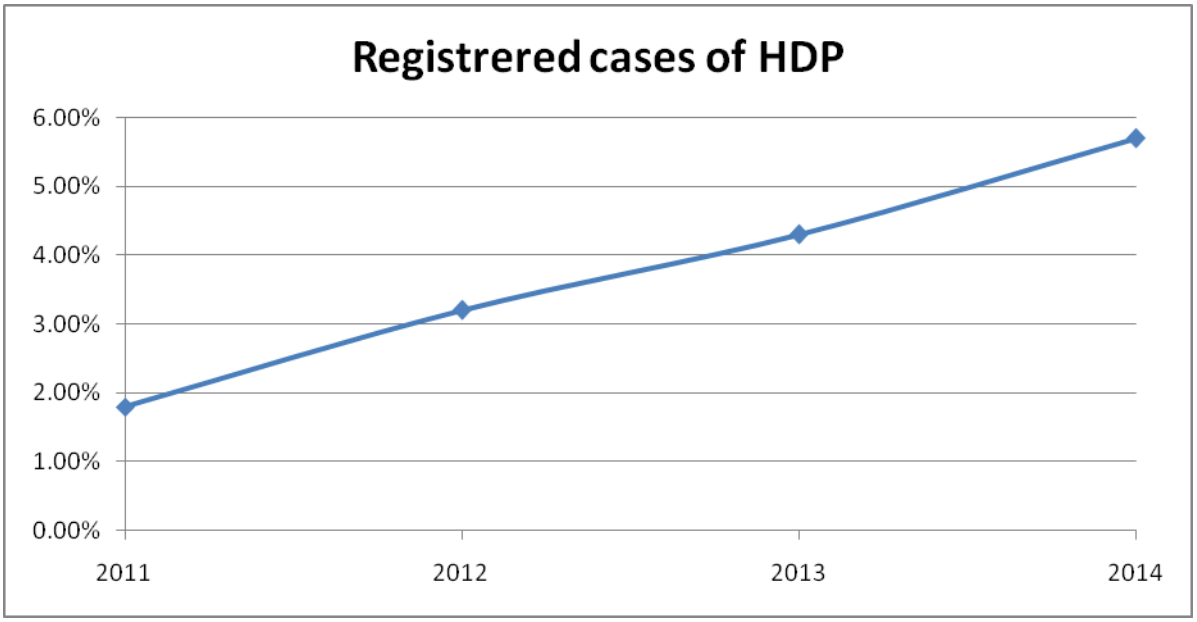

Fig 2: The pattern of Hypertensive disorders of pregnancy admitted to Gynecology obstetrics ward in Debre Berhan Referral Hospital, September 2011- August 2014.

Table 3: Association between parity, age of the mother and ANC follow up with type of Hypertensive disorders of pregnancy among women admitted to gynecology and obstetrics ward in Debre Berhan Referral Hospital, September 2011- August 2014.

Variables	Types of HDP				
	Mild PE N (%)	**Severe PE N (%)**	**Eclampsia N (%)**	**Other types* N (%)**	**P value**
Age (N=270)					
<18years	4(1.5)	57(21.1)	38(14.1)	3(1.1)	0.672
18-34years	6(2.2)	99(36.7)	32(11.8)	7(2.6)	
>34years	0	16(5.9)	5(1.8)	3(1.1)	
Gravidity (N=269)					
Primigravida	5(1.8)	93(34.6)	54(20.1)	4(1.5)	0.346
Multigravida	5(1.8)	79(29.3)	20(7.4)	9(3.3)	
Parity (N=269)					
Nulliparous	5(1.8)	102(37.9)	47(17.5)	6(2.2)	
Primiparous	4(1.5)	38(14.1)	15(5.6)	4(1.5)	0.953
Multipara	1(0.4)	32(11.9)	12(4.5)	3(1.1)	
ANC follow-up (N=221)	9(4.1)	119(53.8)	32(14.5)	12(5.4)	
Yes	1(0.4)	26(11.8)	21(9.5)	1(0.4)	0.096
No					

*Others=gestational hypertension, chronic hypertension and superimposed preeclampsia

Induced labor had higher rate of fetal complication than spontaneous labor: 63 (80.8%) of all fetal deaths,43 (81%) of all preterm deliveries, 60 (70.6%) of all low birth weight newborns and 69 (78.4%)of all neonates with low fifth minute APGAR were born to mothers that had induced labor. Compared to spontaneous labor, induced labor had statistical association with fetal death OR 3.64 (95% CI 1.94-6.92), preterm delivery OR 3.3 (95% CI 1.49-7.31), fifth minutes APGAR score OR 1.51 (95% CI 1.25-1.84), and low birth weight OR 1.82 (95% CI 1.01-3.25) (Table 4).

Of all mothers with HDP, 82.6% got treatment for hypertension, Hydralazine being the commonly prescribed antihypertensive drug (56.3%). Magnesium sulfate was given in 96.6% of mothers for prophylaxis or treatment for convulsion.

In this study, 94.3% of the cases were singleton pregnancy where as 5.7% were twins. Of all newborns, 15.8% required resuscitation; and the resuscitated newborns were born to mothers with preeclampsia, eclampsia and superimposed preeclampsia. In addition, 40.1% neonates required admission to neonatal ICU of which 98.4% where born to mothers with preeclampsia (77.1%) and eclampsia (21.3%).

The mean duration of hospital stay for a mother with HDP was 0.86 and 3.62 days before and after delivery respectively.

Table 4: Association between perceived complications and type of Hypertensive disorders of pregnancy among women admitted to gynecology and obstetrics ward in Debre Berhan Referral Hospital, September 2011- August 2014.

Variables		Type of HDP				p-value
		Mild PE N (%)	**Severe PE N (%)**	**Eclampsia N (%)**	**Others N (%)**	
Preterm (n=158)	Yes	2(1.3)	44(27.8)	9(5.7)	1(0.6)	0.99
	No	7(4.4)	79(50)	9(5.7)	7(4.4)	
Low birth Wt (n=226)	Yes	2(0.9)	65(28.7)	19(8.4)	3(1.3)	0.343
	No	8(3.5)	87(38.5)	34(15)	8(3.5)	
Fetal death (n=263)	Yes	1(0.4)	44(16.7)	31(11.7)	5(1.9)	0.003
	No	9(3.4)	127(48.3)	38(14.4)	8(3)	
IUGR (n=201)	Yes	1(0.5)	14(7.0)	2(1)	0	0.155
	No	9(4.5)	124(61.7)	39(19.4)	13(6.5)	
Maternal death (n=270)	Yes	0	2(0.7)	5(1.8)	0	
	No	10(3.7)	170(62.9)	70(25.9)	13(4.8)	

Table 5: Association between onset of labor with fetal death, preterm, fifth minutes APGAR score and birth weight among women with HDP admitted to gynecology and obstetrics ward in Debre Berhan Referral Hospital, Ethiopia, September 2011- August 2014.

Variables		Onset of labor		p-value, OR
		Spontaneous	**Induced**	
Fetal death (n=252)	Yes	15(5.9%)	63(25%)	<0.001, 3.66
	No	81(32.1%)	93(36.9%)	
Preterm delivery (n=152)	Yes	10(6.6%)	43(28.3%)	0.003, 3.30
	No	43(28.3%)	56(36.8%)	
Fifth minutes APGAR (n=229)	Low APGAR	19(8.3%)	69(30.1%)	<0.001, 1.51
	Good APGAR	68(29.7%)	73(31.8%)	
Low birth Weight (n=215)	Yes	25(11.6%)	60(27.9%)	0.044, 1.82
	No	56(26.0%)	74(34.4%)	

DISCUSSION

The proportion of hypertensive disorders of pregnancy was 3.9% of all pregnancies in this study, slightly lower than the lower limit of worldwide prevalence (14) and from study results in Tikur Anbessa Hospital and Jimma University Specialized Hospital (4, 10). The lower occurance in this study may be explained by these hospitals are tertiary hospitals in which many cases may be seen by referral to nearby centers. Trend od HDP increase from1.8% in 2011 to 5.7% in 2014 the latter being almost equivalent to the result in Addis Ababa. Preeclampsia accounts for 67.4% followed by eclampsia occurring in 27.8% of cases and the result is almost similar to other studies conducted in Ethiopia (4, 10).

About (53.3%) of women with hypertensive disorders of pregnancy were in the age of 18-34 years. But eclampsia was found to more prevalent among those younger than 18 years. This is a similar finding with a study in Jimma(4). Primi-gravida women were affected with HDP more than multi-gravida women did. Those who had ANC follow up were also affected more than those who had no ANC follow up. Maternal age, gravidity, parity and ANC follow up had no statistically significant association with the type of HDP.

Hypertensive disorders of pregnancy were associated with perinatal complications. Preterm delivery was found in 35.4% of the cases, of which the majority (82.1%) were seen in preeclamptic mothers, but the association between the type of HDP and preterm delivery fail to show statistical significance. This finding is similar to other studies conducted in Ethiopia (4, 10). Fetal death occurred in 30.8% of the cases which is a similar finding to a study in Jimma (4). It has a statistically significant association with the type of HDP with more deaths occurring in women with eclampsia and severe preeclampsia.

Low birth weight and IUGR were other complications seen in women with HDP. Low birth weight was seen in 39.4%, almost similar with the finding in Jimma (4). IUGR occurred in 8.5% of the cases, but a study conducted in Pakistan showed 27.5% (17); the variability may partly be explained by the different geographic location and partly by the study design; retrospective cross sectional study with case poor documentation may affect the validity of this study. There were 26 newborns (15.8%) and 61 newborns (40.1%) that required resuscitation and admission to neonatal ICU respectively. The prevalence of need for resuscitation was similar to the finding in Jimma (4).

In 60.9% of mothers, labor was initiated by induction for an indication of hypertensive disorders of pregnancy. Almost all inductions were for mothers with preeclampsia, eclampsia and superimposed preeclampsia; more than what the Jimma study revealed (36.6%). The association between onset of labor with low birth weight, fetal death and preterm delivery was significant. This shows these perinatal complications are indirectly associated with the severity of hypertension.

Maternal death occurred in 2.5% of women with HDP with majority (71.4%) seen in women with eclampsia and the case fatality rate of eclampsia was 6.67%. But no statistical model was valid to test association between type of HDP and maternal death. Probably we may need a larger sample size to make it valid. In this study, HDP was found to be responsible for 35% of all maternal deaths. The finding was similar to other studies in Ethiopia (5).

Some of the patient cards could not be retrieved from the card room due to improper registration of card numbers; important history and physical examination findings as well as delivery note was not properly documented; necessary laboratory investigations were not attached to the charts.

Conclusions: Hypertensive disorders of pregnancy shows increasing trend from the previous years and preeclampsia and eclampsia were the prevalent types of H0DP. Primi-gravida ladies were affected more than multi-gravida ones. HDP is was associated with fetal death, preterm delivery, low birth weight, low fifth minutes APGAR score, and increased need for resuscitation and neonatal ICU admission. Perinatal complications were more common with severe forms of HDP. In addition, HDP was also associated with maternal deaths, need for induction to initiate labor which in turn adversely affects the new born.

Improving the care of pregnant ladies with HDP, improving and creating a functional referral system will enable early detection and treatment thereby preventing both maternal and perinatal complications.

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