

ORIGINAL RESEARCH

Birth outcomes among women with coexisting hypertension and diabetes mellitus: A single centre retrospective clinical observation

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ABSTRACT

Background: Prevalent illnesses including gestational diabetes mellitus (GDM) and hypertensive disorders of pregnancy (HDP) can complicate pregnancies and cause birth abnormalities. **Objective:** Evaluation of the birth outcomes in pregnant women who also have gestational diabetes mellitus (GDM) and hypertensive disorders of pregnancy (HDP). **Methods:** 1170 females who were pregnant were evaluated in the past for the data. In order to determine which pregnant women were hypertensive and went on to acquire gestational diabetes, we first identified them. There were three groups created: the control group, the gestational diabetes with HDN group, and the normal comparison group. Initial demographics were assessed, along with comorbidities and birth results. **Results:** 186 of them later developed gestational diabetes, and 352 of the women showed signs of pregnancy-related hypertension. These three groups' demographic traits were comparable. In comparison to the non-HDN+GDM group, the rate of caesarean deliveries was considerably greater in the HDN and GDM+HDN groups. Similar to this, the rates of all 11 negative infant outcomes all rose significantly more and were all greater in the HDP/GDM group than in the comparison group. Premature births were significantly more common in women with preeclampsia or eclampsia than in women with only HDP or the healthy control group. **Conclusion:** Risk of adverse outcomes for the unborn child in pregnant women with HDP, HDP/GDM, preeclampsia, or eclampsia is continuously rising. Early delivery is frequently suggested in order to lower maternal morbidity and mortality in such cases.

Keywords: Hypertension, Gestational diabetes, Birth outcomes, Eclampsia, Indian Population

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INTRODUCTION

Both gestational diabetic mellitus (GDM) and hypertensive disorders of pregnancy (HDP) are significant global public health issues that can cause difficulties for both expectant mothers and newborns. With a cumulative rise of 10.92% from 1990 to 2019 [1], the incidence of hypertensive disorders of pregnancy increased from 16.30 million to 18.08 million in the world. Globally, the prevalence of GDM varies greatly, primarily as a result of various diagnostic standards. According to the most recent meta-analysis by Saedi et al. (2021), which employed the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria, the

most common screening method globally [2], the prevalence of GDM was 14.7% worldwide. Preeclampsia and eclampsia are the main causes of maternal and foetal morbidity and mortality worldwide, complicating 10% of all pregnancies [3]. The prevalence of pregnancy-induced hypertension (PIH), one of the hypertensive disorders of pregnancy, is likewise estimated to be between 5 and 8 percent globally [4] (BP 140/90 mmHg, taken after a period of rest on two occasions). After 20 weeks of pregnancy, women with gestational hypertension (GHT) may develop preeclampsia and eclampsia, along with proteinuria, edoema, and tonic-clonic convulsions. Proteinuria and hypertension serve as

wide definitions [5]. Pre-eclampsia with convulsions presents that are not related to another neurologic condition is considered to have eclampsia. Premature birth, intrauterine growth retardation (IUGR), acute liver rupture, chronic kidney disease, vision loss, abruption placentae, intrauterine death, as well as maternal morbidity and mortality, are all severe pregnancy complications related with PIH [6,7]. Additionally, it may increase the fetus's likelihood of experiencing unfavourable delivery outcomes [8].

Similar to GD, it can be harmful to both the mother and the foetus. Unfavourable foetal outcomes and an increased risk of obstetrical problems are linked to GD. Preeclampsia, Caesarean sections, stillbirths, macrosomia, and hypoglycemia are a few of these [9]. Additionally, a history of GD is linked to an increased risk of GD in subsequent pregnancies, type 2 diabetes, and cardiovascular disease in later life [10].

Neonatal patients born to moms with preeclampsia or GHT are 2.9 times more likely to require critical care than those delivered to normotensive mothers, according to multicenter research conducted in the US [11]. Unmanaged GDM increases the risk of problems during pregnancy, delivery, and the postpartum period for women [12] and increases the chance of negative infant outcomes [13]. Both HDP and GDM can occur in pregnant women [14]. After giving birth, women with HDP or those who have both HDP and GDM are more likely to develop hypertension and diabetes [14]. The problems and poor delivery outcomes linked to co-existing GDM and HDP, however, have seldom ever been examined in prior research. Only one of these illnesses has been studied in the majority of investigations on pregnant women. exclusively one investigation, which exclusively included patients from Taiwan, showed unfavourable birth outcomes in pregnant women with concurrent hypertension illnesses and diabetes mellitus [15]. these women and their unborn children may be more severely affected by these illnesses if they are present during pregnancy. Because there hasn't been a study of this kind in the Indian community, we looked at how co-existing diabetes and hypertension affect pregnancy outcomes.

MATERIALS AND METHODS

STUDY DESIGN

This investigation was carried out in an Indian tertiary referral facility averaging 620 deliveries each year over the research period. At this facility, a variety of antenatal care styles are used, including midwifery-led care, GP-obstetric shared care, and obstetrician-led care. We provide facilities for managing high blood pressure, gestational diabetes with increased insulin needs, and other numerous medical or obstetric comorbidities. The design of this investigation was retrospective.

POPULATION

For a period of two years, we collected data on all expectant mothers who went to our reference centre and received care for their pregnancies from the first trimester until the baby was delivered. We examined 1170 females. We started by identifying pregnant women who had hypertension. The index date was established as the day that HDP was diagnosed. We do not include people with hypertension who had HDP diagnosed six months prior to conception, had a history of diabetes, were younger than 18 or older than 45, or had multiple foetuses. 352 pregnant women who had gestational hypertension were found. 186 of them were recognised as the HDP/GDM cohort, who also had GDM during pregnancy.

POPULATION STATISTICS, BIRTH RESULTS, AND RELATED FACTORS

We gathered information on age (19–28, 29–37, and 38–45 years), urbanisation level, and occupation from the data. We also looked for comorbidities such stroke, heart failure, ischemic heart disease, renal illness, placental abruption, and obesity that may be related to obstetric delivery outcomes. Prior to the index date, all baseline comorbidities were established. We looked at both natural deliveries and caesarean sections for each patient. Preterm delivery, low birthweight (small for gestational age), large babies, birth injuries, stillbirths, patent ductus arteriosus, patent foramen ovale/atrial septal defect, ventricular septal defect, jaundice, respiratory distress syndrome, and neonatal hypoglycemia were among the negative neonatal outcomes we noted from the birth records.

ANALYTICAL STATISTICS

The data analysis for this investigation was carried out using SAS software version 9.4 (SAS Institute Inc., Cary, NC), with a p-value of 0.05 being considered statistically significant. Age, urbanisation level, occupation, and comorbidities were among the categorical characteristics that were compared between the HDP, HDP/GDM, and comparator groups using the Chi-square test and Fisher's exact test. ANOVA was used to determine how the three groups' mean ages varied from one another.

RESULTS

DEMOGRAPHICS CHARACTERISTICS OF STUDY GROUPS

We examined the registry's data on 1170 expectant mothers. 352 of them women exhibited indications of pregnancy-related hypertension. The remaining 818 women, whose pregnancies were regarded as normal, were included in the study as a comparison group. Out of 352 women who were deemed to have hypertension (Hypertension and diabetes during pregnancy group), 186 developed gestational diabetes. Women were separated into three age groups, and there was no discernible difference in the mean age of

the women in any of the categories. In comparison to the rural population, there were more women from the urban population in the comparison group and the hypertension alone group. The proportion of women from urban and rural areas in the HDN+GDM category was comparable. In all three groups, there

were more women who were housewives, followed by those who had private jobs and those who worked shifts. Additionally, comorbidities were noted in each group. We observed that all three groups had concomitant conditions such as ischemic heart disease, heart failure, obesity, and anaemia.

Table 1: Demographic characteristics

Total evaluated (N=1170)	No Hypertension during pregnancy (N=818)		Hypertension during pregnancy (N=352)		Hypertension and Diabetes during pregnancy (N=186)	
	N	%	N	%	N	%
Age (years)						
19–28	257	31.42	108	30.68	62	33.33
29–37	389	47.56	146	41.48	81	43.55
38–45	172	21.03	98	27.84	43	23.12
Mean±SD	31.78±4.87		33.51±4.12		33.89±3.98	
Residential						
Urban	567	69.32	241	68.47	102	54.84
Rural	251	30.68	111	31.53	87	46.77
Occupation						
Housewife	437	53.42	187	53.13	96	51.61
Private job	188	22.98	67	19.03	43	23.12
Government Job	75	9.17	12	3.41	6	3.23
Shift-wise job	118	14.43	86	24.43	41	22.04
Comorbidities						
Ischemic heart disease	12	1.47	3	0.85	2	1.08
Heart failure	14	1.71	4	1.14	2	1.08
Renal disease	6	0.73	7	1.99	5	2.69
Obesity	15	1.83	12	3.41	11	5.91
Placental Abruption	3	0.37	1	0.28	0	0.00
Anemia	22	2.69	13	3.69	11	5.91
Stroke	2	0.24	1	0.28	0	0.00

OBSTETRIC AND NEONATAL ADVERSE OUTCOMES

According to Table 2, the odds of delivering babies through caesarean section (C-section) were roughly two times higher in the HDP/GDM and HDP groups than in the comparisons (75.3% and 76.3% versus 33.9%, respectively). Adverse newborn outcome rates increased even more in the HDP/GDM group and were all higher in the HDP group than in the comparator group. In the HDP and HDP/GDM group, the rates of low birth weight, big birth weight, birth trauma, jaundice, and neonatal hypoglycemia were all considerably greater.

Table 2: Pregnancy outcomes in HDP women with and without GDM

Outcomes	No Hypertension during pregnancy (N=818)		Hypertension during pregnancy (N=352)		Hypertension and Diabetes during pregnancy (N=186)	
	N	%	N	%	N	%
Cesarean Section	278	33.99	265	75.28	142	76.34
Preterm Delivery	235	28.73	136	38.64	71	38.17
Low Birth Weight	34	4.16	53	15.06	41	22.04
Large Baby Weight	5	0.61	13	3.69	8	4.30
Birth Trauma	8	0.98	11	3.13	6	3.23
Still Birth	0	0.00	1	0.28	2	1.08
Patent ductus arteriosus	6	0.73	9	2.56	4	2.15
Foramen ovale/atrial septal defect	3	0.37	2	0.57	1	0.54
Ventricular septal defect	1	0.12	1	0.28	1	0.54
Respiratory distress syndrome	2	0.24	5	1.42	3	1.61
Jaundice	8	0.98	15	4.26	12	6.45
Neonatal hypoglycemia	6	0.73	6	1.70	4	2.15

The highest C-section delivery rate, of 76.9% in eclamptic women, climbed progressively increasing hypertension status. Women with preeclampsia or eclampsia had a considerably higher rate of premature births (32.1 or 28.8% versus 20.2% and 10.21%, respectively) than women with only HDP or the normal comparison group. Higher chances of preterm delivery, small gestation age (SGA), patent ductus arteriosus (PDA), patent foramen oval (PFO) (ASD), RDS, and newborn hypoglycemia were also associated with eclampsia or preeclampsia. The HDP/GDM group had higher rates of all unfavourable neonatal outcomes than the HDP group did. The majority of these unfavourable outcomes rose even more in HDP/GDM women with eclampsia or preeclampsia, reaching levels higher than those in HDP women with eclampsia or preeclampsia. Women with HDP/GDM and preeclampsia had a greater probability of having an LGA baby than other women.

DISCUSSION

In our cohort, there was evidence that women with GDM were at an elevated risk of a variety of unfavourable maternal and newborn outcomes. There is a higher risk of following harmful maternal and newborn health issues when HDP and GDM coexist. Our study demonstrated that HDP is linked to more C-section deliveries, more preterm births, and 12 worse newborn outcomes when compared to comparisons without HDP. In our study, the prevalence of HDP was 30.09%. According to recent Canadian statistics, 7.0% of pregnant women have hypertension [16]. 15.9% of the women in our sample had both HDP and GDM concurrent diagnoses, according to our research. Pregnancy complications were more likely to occur when HDP and GDM were present together than when HDP was present alone. Women in the HDP group and the HDP/GDM group who had preeclampsia or eclampsia developed at higher levels of risk for the majority of unfavourable outcomes.

The impact of HDP on expectant mothers varies depending on the demographic. In the study population, there may not be a larger risk of HDP than in other populations. According to our study, preterm birth rates among women with HDP were higher than average. According to a previous US study, women with HDP had an adjusted relative risk of preterm delivery of 1.87 when compared to references [17]. Low birth weight was shown to be the neonatal result that affected HDP mothers the most frequently, followed by jaundice, large baby weight, and birth trauma. We discovered that compared to children born to mothers with HDP, those born to women with HDP/GDM had a higher frequency of severe neonatal outcomes. GDM-positive pregnant mothers are known to have an increased risk of adverse infant outcomes. It appears that diabetes and hypertension may interact to enhance the risk of poor newborn outcomes in expectant mothers.

Our findings also demonstrated that, in addition to the risk of preterm delivery and low birth weight, the majority of other unfavourable neonatal outcomes evaluated were increased in women with preeclampsia or eclampsia; the implications were much greater in the HDP/GDM group than in the HDP group. Both the HDP group and the HDP/GDM group had significant percentages of women who developed preeclampsia and eclampsia. Similar results have not before been reported [18]. Studies have linked congenital abnormalities, such as congenital heart malformations, and GDM and hypertensive diseases, notably in women with preterm preeclampsia [19,20]. In both the HDP group and the HDP/GDM group, our study identified heightened risks of patent ductus arteriosus and foramen ovale/atrial septal defect, which rose further in women with preeclampsia/GDM. Without more follow-up testing for these kids, we are unable to determine whether the neonatal anomalies identified were congenital problems.

Our findings highlight the importance of prenatal treatment for pregnant women with HDP, especially for those who also have GDM. In instance, in individuals with preeclampsia or eclampsia, obstetricians may need to check pregnant women with these diseases for foetal abnormalities. To prevent obstetrical problems and undesirable newborn outcomes, it is crucial to identify and treat HDP and GDM early. Strict glycemic control and hypertension management are also wise. For women with HDP and/or GDM, future research must assess the risks and advantages of labour and caesarean birth.

CONCLUSION

According to this study, pregnant women with HDP, HDP/GDM, preeclampsia, or eclampsia run a steadily increasing risk of having an unfavourable result for the baby. Early delivery is typically advised due to the progressive nature of HDP and GDM in order to reduce maternal morbidity and death, particularly in cases of more severe HDP or GDM presentations like preeclampsia and eclampsia.

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