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Study on the socio-demographic profile and clinical history of pregnant with hypertensive disorders and cardiomyopathy

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Abstract

Introduction: The onset of hypertension and proteinuria beyond 20 weeks of pregnancy are hallmarks of preeclampsia, a multiorgan disease syndrome of unknown cause. Several theories have been presented to explain its emergences, such as immunologic intolerance and vascular endothelial damage. Primiparaty, numerous pregnancies, persistent hypertension, and maternal age over 40 are all risk factors for preeclampsia.

Aims and objectives: This research aimed to understand better the demographics and medical background of hypertensive pregnant women.

Methods: This prospective cohort study examined gestational hypertension, preeclampsia, and eclampsia as potential risk factors for Peripartum cardiomyopathy (PPCM) in pregnant women with elevated blood pressure. Patients with PPCM were examined during their hospital stays and again at 1-, 3-, and 6-months during follow-up visits to an outpatient clinic, all with the participants' informed agreement. The primary objective of this study was to evaluate the clinical characteristics and cardiac health of hypertensive pregnant women over the long term.

Results: There was no statistically significant difference in the mean number of leucocytes between this study's oldest and youngest individuals (p=0.799). There was also no statistically significant variation in the distribution of participants' jobs (p=0.99). There were, however, statistically significant variations in the incidence of abortions (p=0.31), the prevalence of

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paternal hypertension (p=0.76), the incidence of previous PPCM (p=0.001), and the severity of preeclampsia (p=0.03).

Conclusion: The study has concluded no statistically significant differences between PPCM and non-PPCM women regarding leucocyte counts or employment status.

Keywords: Pregnancy, Cardiomyopathy, Peripartum, Leucocytes.

Introduction

Pregnant women who used to be normotensive and proteinuric but suddenly have hypertension at least 140/90 mmHg & proteinuria develop preeclampsia during the 20th week of pregnancy. This multisystem sickness has an unknown aetiology. Preeclampsia is associated with intrauterine growth restriction and maternal and newborn mortality [1]. The prevalence of the illness varies between 2 and 10% depending on many criteria, such as the population studied and how preeclampsia is classified. It affects 4-7% of pregnant women globally. Ninety-nine of all pregnancy-related deaths occurs in developing nations when more than 500,000 women a year experience related mortality [2]. A woman's lifetime risk of dying from pregnancy-related causes is 1 in 4000 - 1 in 1000 in industrialized countries, compared to 1 in 15 - 1 in 50 among women in poor countries. Despite being rare, preeclampsia causes eclampsia, which leads to 50,000 maternal fatalities annually. One of these countries is India, which has a maternal mortality rate of 301 per 100,000 live births. The most common causes of maternal mortality in this country are haemorrhage, septicemia, hypertension, obstructed labour, abortion, & an assortment of other illnesses [3,4]. 5 percent of maternal deaths in India are caused by hypertension, which may be a sign of preeclampsia. Preeclampsia, conversely, is referred to as the "Disease of Theories" since little is understood about its causes and risk factors. Mothers are assumed to have been at risk for preeclampsia if they have diabetes, obesity, primiparity, multiple pregnancies, a family or personal record of this condition, and chronic hypertension [5]. There is little proof that these factors cause preeclampsia in developing countries. To assess preeclampsia risk at antenatal booking, an investigation of preeclampsia risk factors might be used. Because there is a death of knowledge on pre-eclampsia-associated variables in Karnataka, India, a study was conducted to identify them [6].

After 20 weeks of pregnancy, preeclampsia, a multiorgan disease condition with uncertain aetiology, begins to emerge and is characterized by the onset of hypertension & protein uria [7].

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There are several hypotheses about how preeclampsia develops. The immunologic explanation is the most common. Maternal spiral arteries enlarge into large, flaccid vessels during normal pregnancy as foetal syncytial trophoblasts enter and remodel them. This remodeling allows for the substantially greater maternal blood flow required for proper placental perfusion. Due to the placenta's inability to adhere correctly to the mother's blood vessels during preeclamptic pregnancies, the fetus experiences intrauterine growth restriction and other preeclamptic symptoms. Researchers believe the observed insufficient placentation is caused by maternal immunologic intolerance to alien fetal DNA [8,9]. Preeclampsia is more likely to happen during the first pregnancy and becomes less common the longer a woman has lived with her father before getting pregnant, which lends credence to this idea.

Additionally, multiparous women that become pregnant via a new partner are at a higher risk. Vasoconstriction, cardiovascular adaptation problems & blood flow, inherited susceptibility (maternal, paternal, thrombophilias), & angiogenic factors (increased sFlt-1, decreased development of placenta hormone levels) are further explanations for the aetiology of preeclampsia [10,11]. Vascular endothelial injury or dysfunction, platelet activation, and immunologic intolerance between fetoplacental and maternal tissue [12]. Antiphospholipid antibody syndrome, persistent hypertension, chronic kidney disease, raised weight, a mother's age of over 40, pregnancy complications, nulliparity, preeclampsia in previous pregnancies (especially if serious or before 32 weeks of gestation), as well as pregestational insulin resistance, constitute a few of the potential risk factors for preeclampsia. Calcium supplements help patients with poor dietary calcium intakes and high-risk women reduce their likelihood of becoming pregnant. It is ineffective to prevent this condition by regularly taking supplements of magnesium, omega-3 fatty acids, antioxidant vitamins, or calcium [13].

Materials and Methods

Research design

This prospective cohort study aims to determine risk variables for PPCM in hypertensive pregnant women. Researchers in the B.L.D.E. Department of Obstetrics and Gynecology was conduct a study from November 2018 through April 2020. This prospective study aimed to learn more about cardiomyopathy and its symptoms in women with gestational hypertension, preeclampsia, or eclampsia. Participants in these trials and any subsequent follow-ups provided

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informed consent. Shortness of breath, pedal oedema, tachycardia, and decreased oxygen saturation (Spo2) were some of the symptoms of peripartum cardiomyopathy (PPCM) that patients were evaluated for during their week-long hospital stays. A 2D ECHO was done whenever these signs were present. Those who did not develop cardiac symptoms were discharged and followed up at the outpatient clinic after 1, 3, and 6 months. Patients who missed their follow-up sessions were called to inquire about any potential PPCM-related symptoms they may be experiencing. A follow-up ECHO test was offered to those previously reported experiencing symptoms. This study assessed the clinical features and cardiac health of pregnant women with hypertension problems over time.

Inclusion and exclusion criteria

Inclusion

- All patients diagnosed with hypertensive disorders of pregnancy (gestational hypertension, preeclampsia, eclampsia, i.e. antepartum and postpartum eclampsia) who is in labour or the delivery is planned within 24 hours.
- Gestational age > 24 weeks.
- Patients give informed and written consent for investigations and follow-ups.

Exclusion

- Gestational Diabetes Mellitus
- Preexisting Cardiac Disorders
- Chronic Hypertensive Patients
- Patients with Hemoglobin levels less than 7gm/dl.

Statistical Analysis

The study has used SPSS 25 for effective statistical analysis. The continuous data has been written in mean ± standard deviation while the discrete data has been presented as frequency and its respective percentage. The study as employed ANOVA as the statistical tool for its analysis. The level of significance was considered to be $P<0.05$.

Ethical approval

The Institutional Ethics Committee of the Obstetrics and Gynecology Department at B.L.D.E. (Deemed To Be University) Shri B.M. Patil's Medical College, Hospital, and Research Centre in

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Vijayapura has approved this study. Ethical approval guarantees that the study will comply with accepted ethical rules and principles, protecting the participants' safety, privacy, and anonymity.

Results

The results of a comparison of the leucocyte counts of the participants in the study, broken down by age group, are presented in Figure 1. The following table provides information regarding the number of participants in each age group who did not have peripartum cardiomyopathy (No PPCM) and those who did have peripartum cardiomyopathy (PPCM). According to the statistical analysis findings, no significant difference in the number of leucocytes found in either of the two groups across any age category ($p = 0.799$). The overall number of people who participated in the study and were assigned to each group is listed in the table for your convenience.

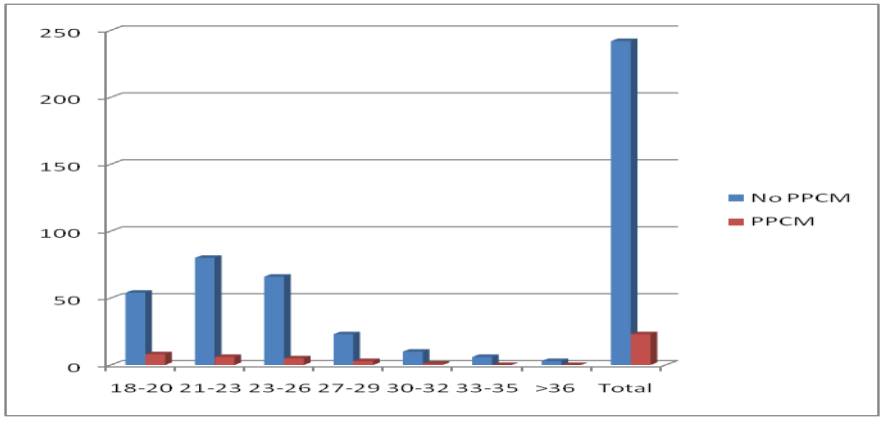

Table 1: Comparison of leucocyte count among the study participants

The study participants are divided into their respective occupations, and the results are displayed in Table 1. The following table provides information regarding the number of participants in each occupation group who did not suffer from peripartum cardiomyopathy (No PPCM) and the percentage of participants who did suffer from peripartum cardiomyopathy (PPCM). According to the findings of the statistical study, there is not a statistically significant difference between the two groups in terms of the distribution of occupations ($p=0.99$). For your convenience, the table breaks down the number of people who participated in the study according to their occupations.

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Table 1: Distribution of study participants as per their occupation

Occupation	No PPCM		PPCM		P-Value
	No. of study participants	Percent	No. of study participants	Percent	
Housewife	214	89.0	20	86.96	0.99*
Teacher	10	4.1	1	4.35	
Labourer	6	2.5	1	4.35	
Daily wage Worker	4	1.7	0	0.00	
Asha	1	.4	0	0.00	
Farmer	2	.8	0	0.00	
Bidi worker	1	.4	0	0.00	
Worker	1	.4	0	0.00	
Engineer	2	.8	1	4.35	
Nurse	1	.4	0	0.00	
Total	242	100.0	23	100.0	

Table 2 shows the breakdown of research participants by demographic characteristics such as parity (number of previous pregnancies), abortion history, gestational age, maternal hypertension, and paternal hypertension. Those who did not develop peripartum cardiomyopathy (No PPCM) or did develop PPCM are listed in the table, along with their respective numbers and percentages. The research shows a statistically significant difference in the prevalence of abortions (p=0.31) and paternal hypertension (p=0.76). On the other hand, we found no associations between maternal hypertension (p=0.05) or paternal hypertension (p=0.76) and either parity (p=0.00) or gestational age (p=0.38). Each group's total number of study participants is listed.

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Table 2: Distribution of study participants as per parity, abortion, gestational age and hypertension

Parity	**No PPCM**		**PPCM**		**P-Value**
	No. of study participants	**Percent**	**No. of study participants**	**Percent**	
0	105	43.4	1	4.3	0.00
1.0	87	36.0	16	69.6	
2.0	36	14.9	3	13.0	
3.0	10	4.1	3	13.0	
4.0	4	1.7	0	0	
Total	242	100.0	23	100.0	
Abortion	**No. of study participants**	**Percent**	**No. of study participants**	**Percent**	0.31*
Yes	32	13.2	5	21.7	
No	210	86.8	18	78.3	
Total	242	100.0	23	100	
Gestational age (Weeks. Days)	**No. of study participants**	**Percent**	**No. of study participants**	**Percent**	0.38
25-28.1	3	1.2	1	4.3	
28.2-31.3	17	7.0	0	0	
31.4-34.5	26	10.7	5	21.7	
34.6-37.7	59	24.4	5	21.7	
37.7-40.8	126	52.1	11	47.8	
40.9-44	11	4.5	1	4.3	
Total	**242**	**100.0**	**23**	**100.0**	

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P/H/O Hypertension	**No. of study participants**	**Percent**	**No. of study participants**	**Percent**	
Yes	9	3.7	4	17.4	
No	233	96.3	19	82.6	
Total	242	100.0	23.0	100	0.02
Hypertension in mother	**No. of study participants**	**Percent**	**No. of study participants**	**Percent**	
Yes	7	2.9	3	13.04	
No	235	97.1	20	86.95	0.05
Total	242	100	23.0	100	
Hypertension in Father	**No. of study participants**	**Percent**	**No. of study participants**	**Percent**	
Yes	8	3.3	0	0	
No	234	96.7	23	100	0.76*
Total	242	100	23.0	100	

p-value<0.05; ANOVA was conducted between the groups

The distribution of study subjects by the history of PPCM, hypertension morbidity, prenatal hypertension severity, preeclampsia presence, and eclampsia severity are shown in Table 3. The total number of people with PPCM and the percentage without it is in the table below. The prevalence of prior PPCM (p = 0.001) and the severity of preeclampsia (p = 0.03) are statistically significantly different between the two groups. Systolic and diastolic blood pressure morbidity, gestational hypertension, and the presence of eclampsia were not significantly different. For blood pressure readings, we give the mean, median, standard deviation, mean difference, standard error difference, t-value, df, and p-value. We also include the total number of study participants in each group for convenience.

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Table 3: Distribution of study participants as per the history of PPCM, hypertension, eclampsia

H/O PPCM	**No PPCM**		**PPCM**		**Value**	**Df**	**P Value**
Yes	1	.4	3	13.04	14.84	1	0.001
No	241	99.6	20	86.9			
Total	**242**	**100**	**23.0**	**100**			

Blood Pressure	**Morbidity**	**N**	**Mean**	**Median**	**SD**	**Mean diff**	**Std. Error Difference**	**t**	**Df**	**P Value**
Systolic	PPCM	23	143.565	150	11.7544	2.04	2.31	0.88	263	0.38
	No PPCM	242	141.529	140	10.4929					
Diastolic	PPCM	23	91.304	90	3.4435	**-1.67**	1.09	-1.54	263.00	0.13
	No PPCM	242	92.975	90	5.0957					

Gestational Hypertensi	**No PPCM**		**PPCM**		**Value**	**Df**	**P Value**
Yes	24	9.9	2	8.7	0.035	1	0.85
No	218	90.1	21	91.3			
Total	242	100.0	23	100			
Preeclampsia							
Mild	58	42	2	11.8	4.64	1	0.03
Severe	80	57.6	15	88.2			
Total	138	99.3	17	100.0			
Eclampsia	No. of participants	Percent	No. of particip	Percent	Value	df	P Value
Yes	74	30.6	4	17.4	2.566		0.46
No	162	66.9	19	82.6			
Eminent	4	1.7	0	0.0			

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Antepartum	2	.8	0	0.0		3	
Total	**242**	**100**	**23**	**100**			

SD- Standard deviation

Table 5 shows the breakdown of research participants by delivery method, delivery location, and the presence or absence of complications. PPCM cases and controls are categorized in the table below. The two groups significantly differ between the delivery technique and the baby's location (p = 0.04). The PPCM group had a lower rate of vaginal births than the non-PPCM group. Participants with various issues such as abnormal Doppler, placental abruption, "acute fatty liver of pregnancy (AFLP)", acute pulmonary oedema, intrauterine growth restriction (IUGR), oligohydramnios, and more are also represented in the data. The total number of people who fell into each group during the study is listed.

Table 4: Distribution of study subjects as per mode of delivery, delivery place and complications

Mode of delivery	**No PPCM**		**PPCM**		**P Value**
	No. of participants	**Percent**	**No. of participants**	**Percent**	
Vaginal	82	33.9	2	8.7	0.04
LSCS	154	63.6	19	82.6	
Instrumental	4	1.7	2	8.7	
Total	240	99.2	23	100	
Mother side	109	45.0	3	26.1	0.04
NICU	90	37.2	13	43.5	
Mortality	43	17.8	7	30.4	
Total	242	100	23	100	

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Any Other Complication		
Abnormal Doppler	2	1
Abruption Placenta	2	1
AFLP	0	1
APH	1	0
HELLP	7	1
IUD	4	0
IUD , Abruption	0	1
IUGR	10	2
Oligohydraminos	8	1
Oligohydrominos	3	0
Oligohydromnios, IUGR	3	0
Pulmoanry Edema	0	1
Twins	1	1
Total	46	**12**

The study found that there were 46 participants with complication in PPCM group while 12 participants with difficulties in participants without PPCM. Again, 196 participants had no complications in PPCM group while only 11 participants had no complications without PPCM. Figure 2 shows the details.

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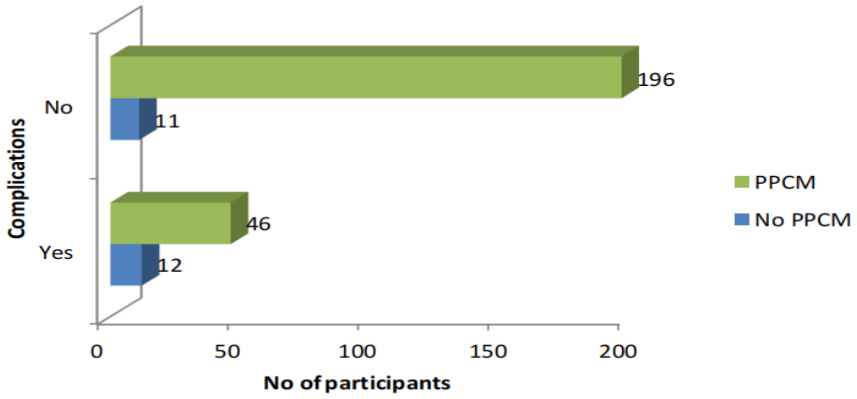

Figure 2: Association of Obstetric Complications with PPCM

Discussion

One of the primary causes of maternal & newborn mortality as well as morbidity globally is preeclampsia. A combination of environmental and genetic risk factors causes this condition's aetiopathogenesis. The study aimed to identify sociodemographics alongside additional preeclampsia risk variables [15,16]. A case-control study was conducted in Karnataka at a university medical hospital, including 100 preeclampsia cases and 200 controls with preeclampsia. With a non-probability intentional sampling method, the study participants were selected. The information was gathered using a pre-tested semi-structured questionnaire about sociodemographic details and well-known preeclampsia risk factors. Interviews with research participants and reviewing case files, respectively, were used as the major and secondary data collection methods. Preeclampsia screening might be done using the important risk factors when registering for pregnancy [17].

Maternal and newborn health are seriously impacted by pregnancy-induced hypertension, a critical obstetric issue that can affect women with primary or secondary hypertension or those without it [18]. Pregnancy-related hypertension and sociodemographic factors, such as the mother's age, blood pressure, and family history of hypertension, do correlate. In this group of 100 women, the main risk variables were high blood pressure, a family history of PIH, and chronic hypertensive disorders. Although there is a link between anxiety and depressive symptoms and pregnancy-related hypertension problems, this link is not fully understood. We aimed to examine pregnancy-associated hypertension and its different types (chronic hypertension, hypertension during gestation, & preeclampsia). We also wanted to see if any

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associations might be explained by how closely mental symptoms are related to pregnancy. Our findings imply a prenatal connection exists between maternal chronic hypertension and depressive/anxiety symptoms. Preeclampsia risk factors may include a prenatal history of depression or anxiety symptoms [19].

Disorders of hypertension caused by pregnancy are a critical health concern among the obstetric community since They are a few of the main factors in maternal and infant mortality and morbidity. According to the World Health Organisation, or WHO, at least one pregnant woman passes away every seven minutes due to hypertension-related issues [20]. This study aims to evaluate pregnancy-induced hypertension & the factors that contribute to it in women who will have babies at Tepi General Hospital, Gebretsadikshawo Hospital, & Mizan-Tepi University Teaching Hospital. Among women who attended delivery services, the prevalence of pregnancy-related hypertension was 7.9%. Pregnancy-induced hypertension was predicted by gestational age, chronic renal disease, and family history [21].

The most frequent medical problems associated with pregnancy are hypertensive diseases, which are said to occur anywhere from five to ten per cent of the time. These illnesses are essential factors affecting mothers' and babies' mortality [22]. A study was done to understand the pattern and results of pregnancies complicated by hypertension illnesses. Poor outcomes for moms and babies are caused by pregnancies complicated by hypertension diseases, and rural women are significantly affected. Pregnancy-related hypertension problems must be identified early and managed with high-quality antenatal care services and excellent obstetric & neonatal care during birth [23].

"hypertensive disorders in pregnancy" (HDP) refers to some ailments connected to elevated blood pressure during pregnancy. It contributes significantly to feto-maternal mortality and morbidity, especially in underdeveloped nations [24]. The study aimed to assess the prevalence of hypertension disorders in women presenting to the maternity clinics at “Usmanu Danfodiyo University Teaching Hospital (UDUTH)” in Sokoto, as well as the risk factors connected to them. The study group had a significant prevalence of HDP. Therefore, monitoring potential risk factors will ensure early detection and prevent the progression of the illness and side effects.[25].

Conclusion

The study has concluded no statistically significant differences between PPCM and non-PPCM women regarding leucocyte counts or employment status. "PPCM" risk variables in hypertensive

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pregnant women were studied in this prospective cohort study. There were, however, statistically significant correlations between PPCM and both prior PPCM and the severity of preeclampsia. These results advance our knowledge of PPCM and can guide future studies and clinical practice on treating hypertensive problems in pregnancy. The risk factors for PPCM need to be further investigated, and preventative measures must be developed. There are a few limitations in this study. Firstly, the sample size required to be higher, which could restrict the validity of the results.

Furthermore, the study only included pregnant women with hypertension. Thus, the findings may not apply to women who do not have hypertension. Self-reported data may have introduced recall bias into the study. Furthermore, the study did not consider other risk factors for PPCM, such as genetics and preexisting heart problems. Finally, the long-term results of PPCM were not evaluated because of the short follow-up time. For a fuller comprehension of PPCM, future research should aim to overcome these obstacles.

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