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Pregnancy with medical disorders: A prospective clinical study at a tertiary care hospital

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Abstract
Background: Pregnancy exerts profound physiological stress on virtually every organ system, potentially unmasking or exacerbating pre-existing medical disorders. Medical conditions encountered in pregnancy constitute a significant burden of maternal and perinatal morbidity and mortality, particularly in developing countries where access to specialised care is limited. Advances in obstetric, medical, and neonatal care have improved outcomes; however, the prevalence of medical comorbidities complicating pregnancy continues to rise in the context of advancing maternal age, changing lifestyle patterns, and improved survival of women with chronic illness into reproductive age.
Objectives: To study the clinical profile of pregnant women with medical disorders and to assess the feto-maternal outcomes associated with these conditions.
Methodology: This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Shri B.M. Patil Medical College Hospital and Research Centre, Vijayapura, from January 2021 to April 2022. A total of 246 pregnant women with pre-existing or antenatally diagnosed medical disorders were enrolled by consecutive sampling after obtaining written informed consent. Socio-demographic data, medical history, obstetric details, baseline investigations, and intrapartum and postpartum events were recorded. Feto-maternal outcomes including mode of delivery, ICU admissions, maternal mortality, perinatal deaths, and NICU admissions were documented and analysed using SPSS version 20. The chi-square test was applied for categorical variables, and $p<0.05$ was considered statistically significant.
Results: The mean maternal age was 26 ± 4.58 years. The majority of women were rural residents (65.9%) and multigravidae (64.6%). Hypothyroidism was the commonest medical disorder (43.9%), followed by infectious diseases (18.2%), epilepsy (10.97%), and cardiac disease (10.16%). LSCS was the predominant mode of delivery (52%). Among 246 cases, 12 (4.8%) required ICU admission, and one maternal death occurred due to pulmonary embolism in a known asthmatic. Of 247 neonates, 9 (3.65%) were IUDs, 57 (22.8%) required NICU admission, and 3 (1.2%) died perinatally. Pregnancy was found to complicate medical disorders more significantly than the disorders complicated pregnancy.
Conclusion: Medical disorders in pregnancy carry a high potential for adverse feto-maternal outcomes. Pregnancy complicated the underlying medical conditions more significantly than the medical conditions complicated the pregnancy. Early antenatal screening, pre-conception counselling, multidisciplinary management, and tertiary care referral are critical to reducing maternal and perinatal mortality and morbidity.

Keywords: Medical disorders in pregnancy, feto-maternal outcome, hypothyroidism, cardiac disease, prospective study, tertiary care

Introduction
Pregnancy is a physiological state in which virtually every organ system—including the cardiovascular, respiratory, haematological, renal, metabolic, and endocrine systems—undergoes significant adaptive changes to accommodate the growing fetus. These alterations serve as a physiological stress test that may unmask underlying chronic conditions such as diabetes mellitus, hypertension, chronic renal failure, cardiac disease, and hypercoagulable states that were previously undetected or asymptomatic [1]. Moreover, the same physiological changes can alter the clinical presentation of medical diseases, making their diagnosis challenging during pregnancy, and may necessitate modifications to standard treatment protocols [2]. Medical disorders can interfere with pregnancy's physiologic adaptations, resulting in adverse pregnancy outcomes, and conversely, pregnancy itself can exacerbate pre-existing medical conditions [2, 3].
In the modern era, the incidence of medical disorders complicating pregnancy has increased substantially. This is attributable to advanced maternal age, changing lifestyle factors such as sedentary habits and obesity, improved survival of women with congenital or acquired chronic illnesses into reproductive age, and more widespread antenatal screening enabling detection of

previously subclinical conditions [1, 4]. The pattern of medical disorders in pregnancy has also shifted over time: the prevalence of anaemia and rheumatic heart disease has declined, while gestational diabetes, autoimmune disorders, and thyroid diseases have become more common [5]. In developing countries, the maternal mortality ratio remains disproportionately high—approximately 450 per 100, 000 live births compared with 8 per 100, 000 in developed nations—with preventable medical comorbidities contributing significantly to this disparity [3].

Four key clinical principles govern the management of medical disorders in pregnancy: (i) medical disorders affected by pregnancy, (ii) medical disorders that affect pregnancy, (iii) physiological changes that may obscure diagnosis, and (iv) modification of treatment in the pregnant state [2]. Advances in obstetrics, neonatology, and internal medicine have considerably improved prognosis for both mother and fetus in the presence of medical comorbidities [3]. However, maternal mortality and morbidity from treatable medical conditions have not declined proportionately, underscoring the continuing need for universal antenatal screening, pre-conception counselling, early identification, and multidisciplinary management [4, 5]. The present study was therefore undertaken to delineate the incidence, clinical profile, and feto-maternal outcomes of medical disorders complicating pregnancy at a tertiary care centre.

Aims and Objectives

1. To study the clinical profile of pregnant women with medical disorders.
2. To study the feto-maternal outcomes in pregnant women with medical disorders.

Methodology

This was a prospective observational study conducted in the Department of Obstetrics and Gynaecology, Shri B.M. Patil Medical College Hospital and Research Centre, B.L.D.E. (Deemed to be University), Vijayapura, Karnataka, from January 2021 to April 2022. The study included 246 pregnant women with medical disorders diagnosed either preconceptionally or during routine antenatal screening, enrolled consecutively after obtaining written informed consent. Women with pregnancy-induced medical complications such as gestational hypertension, HELLP syndrome, cholestasis of pregnancy, acute fatty liver of pregnancy, gestational diabetes mellitus, and postpartum cardiomyopathy were excluded.

The sample size of 246 was calculated using the formula

$$n = Z^2pq/d^2$$

based on an anticipated proportion of 20% for anaemia and hypothyroidism among medical disorders in pregnancy, at 95% confidence level and 5% absolute precision. Socio-demographic data, obstetric history, medical history, physical examination findings, and baseline investigations—including complete blood count, liver function tests, renal function tests, thyroid profile, random blood sugar, HbA1c, HIV and HBsAg serology, PT/INR, obstetric ultrasonography, 2D echocardiography, and relevant speciality investigations—were documented for all participants. All women received standard medical management as per the confirmed diagnosis and were observed from hospitalisation through delivery until discharge or death. Feto-maternal outcomes including mode of delivery, ICU admissions, peripartum hysterectomy, maternal mortality, intrauterine deaths, NICU admissions, and perinatal deaths were recorded.

Data were entered in Microsoft Excel and analysed using SPSS version 20. Results were expressed as mean ± standard deviation, frequencies, and percentages. Categorical variables were compared using the chi-square test. Association between medical disorders in pregnancy and outcome was assessed with the chi-square test, and a p-value of <0.05 was considered statistically significant. WHO definitions were used for preterm birth, stillbirth, abortion, low birth weight, and maternal mortality.

Results

A total of 246 pregnant women with medical disorders were studied over a period of approximately 15 months. The study group constituted approximately 10% of the total obstetric admissions during the study period. Detailed findings are presented in the tables below.

Table 1: Socio-demographic and obstetric profile of the study population (N=246)

Socio-Demographic Parameter	Frequency (N=246)	Percentage (%)
Age Group		
18–25 years	120	48.8%
26–30 years	84	34.1%
31–35 years	34	13.8%
>35 years	8	3.3%
Mean age: 26 ± 4.58 years (range 18–38 years)		
Locality		
Rural	162	65.9%
Urban	84	34.1%
Obstetric History		
Primigravida	87	35.4%
Multigravida	159	64.6%
Period of Gestation (POG)		
28–32 weeks	7	3.6%
33–36 weeks	35	13.4%
≥37 weeks	203	82.5%
Mean gestational age: 37 ± 4.5 weeks		

The majority of women were in the age group of 18–25 years (48.8%), with a mean age of 26 ± 4.58 years (range 18–38 years) [Table 1]. Most women were from rural areas (65.9%) and were multigravidae (64.6%). The majority presented at or beyond 37 weeks of gestation (82.5%), with a mean gestational age of 37 ± 4.5 weeks.

Table 2: Distribution of medical conditions among study participants (N=246)

Medical Condition	Frequency (N=246)	Percentage (%)
Thyroid abnormality (Hypothyroidism 106 + Hyperthyroidism 2)	108	43.9%
Infectious diseases (HBsAg 40, Rickettsial 3, TORCH 2, Varicella 1)	45	18.2%
Epilepsy	27	10.97%
Total Cardiac diseases	25	10.16%
RVD Positive	10	4.07%
Diabetes mellitus (Type 2)	9	3.66%
Bronchial Asthma	8	3.25%
Chronic Hypertension	6	2.44%
Dengue Fever	3	1.22%
Typhoid	3	1.22%
Others (Renal disease, Hyperbilirubinemia)	2	0.81%

Thyroid disorders were the most common medical condition

(43.9%), of which hypothyroidism accounted for 43.0% (n=106) and hyperthyroidism for 0.8% (n=2) [Table 2]. Infectious diseases ranked second (18.2%), predominantly hepatitis B (n=40, 16.2%), followed by rickettsial fever (n=3), TORCH infections (n=2), and varicella (n=1). Epilepsy was present in 10.97% and cardiac diseases in 10.16% of the study group. Less common conditions included RVD (4.07%), type 2 diabetes mellitus (3.66%), bronchial asthma (3.25%), chronic hypertension (2.44%), dengue fever (1.22%), typhoid (1.22%), and others (0.81%).

Table 3: Distribution of medical conditions: preconceptionally diagnosed vs. diagnosed in antenatal period

Medical Condition	Preconceptionally Diagnosed (N=177)		Diagnosed in Antenatal Period (N=69)		Total (N=246)
	Frequency	%	Frequency	%	N
Hypothyroidism	82	33.33%	24	9.76%	106
Hepatitis B	25	10.16%	15	6.10%	40
Cardiac Disease	21	8.54%	4	1.63%	25
Epilepsy	21	8.54%	6	2.44%	27
RVD	8	3.25%	2	0.81%	10
Type 2 Diabetes Mellitus	7	2.85%	2	0.81%	9
Bronchial Asthma	6	2.44%	2	0.81%	8
Chronic Hypertension	4	1.63%	2	0.81%	6
Hyperthyroidism	1	0.41%	1	0.41%	2
TORCH Infection	2	0.81%	0	0%	2
Dengue	0	0%	3	1.22%	3
Typhoid Fever	0	0%	3	1.22%	3
Varicella Zoster	0	0%	1	0.41%	1
Rickettsial Fever	0	0%	3	1.22%	3
Others	1	0.41%	1	0.41%	2

Of 246 women, 177 (71.9%) had medical conditions diagnosed preconceptionally, while 69 (28.0%) were detected for the first time during antenatal screening [Table 3]. The association between the timing of diagnosis (preconceptional versus antenatal) and the type of medical condition was statistically significant (p=0.002). Conditions predominantly diagnosed preconceptionally included hypothyroidism (33.33%), hepatitis B (10.16%), cardiac disease (8.54%), and epilepsy (8.54%). Conditions exclusively diagnosed antenatally included dengue fever (1.22%), typhoid (1.22%), rickettsial fever (1.22%), and varicella (0.41%).

Table 3A: Distribution of cardiac diseases among study participants (N=25)

Cardiac Disease	Frequency (N=25)	Percentage (%)
Rheumatic Heart Disease (RHD) only	9	36%
RHD with Mitral Valve Prolapse	4	16%
RHD with Mitral Valve Stenosis	2	8%
Atrial Septal Defect (ASD)	5	20%
Ventricular Septal Defect (VSD)	2	8%
Ebstein Anomaly	2	8%
Aortic Regurgitation	1	4%

Among 25 women with cardiac disease, rheumatic heart disease (RHD) was the commonest lesion (Table 3A). Isolated RHD was present in 9 (36%), while RHD with mitral valve prolapse accounted for 4 (16%) and RHD with mitral valve stenosis for 2 (8%), giving a total RHD burden of 60%. Congenital heart disease constituted 40% of cases, comprising atrial septal defect (20%), ventricular septal defect (8%), Ebstein anomaly (8%), and aortic regurgitation (4%).

Table 4: Mode of delivery (N=245)

Mode of Delivery	Term	Preterm	Total (%)
Vaginal Delivery	100	17	117 (48.0%)
LSCS	103	25	128 (52.0%)
Total	204	42	245

Of 245 deliveries (one woman had a medical termination), 128 (52.0%) were by lower segment caesarean section (LSCS) and 117 (48.0%) were vaginal [Table 4]. The commonest indication for LSCS was a previous caesarean scar (43.7%), followed by fetal distress (14.0%), PROM with severe oligohydramnios (12.5%), cephalopelvic disproportion (9.3%), severe oligohydramnios (4.6%), preeclampsia with severe oligohydramnios (4.6%), acute exacerbation of asthma (2.3%), and other obstetric indications.

Table 5: Distribution of medical conditions and maternal outcome (N=246)

Medical Condition	Total (N=246)	ICU Admission (N=12)	Improved & Discharged (N=245)	Maternal Mortality (N=1)	Intrapartum Complication / Peripartum Hysterectomy (N=2)
Hypothyroidism	106	2	106	0	0
Infectious Diseases	45	0	45	0	1 (peripartum hysterectomy)
Epilepsy	27	0	27	0	0
Cardiac Disease	25	5	25	0	0
RVD Positive	10	0	10	0	0
Type 2 Diabetes Mellitus	9	0	9	0	0
Bronchial Asthma	8	3	7	1 (pulmonary embolism)	0
Chronic Hypertension	6	1	6	0	0
Dengue Fever	3	1	3	0	1 (peripartum hysterectomy)
Typhoid	3	0	3	0	0
Hyperthyroidism	2	0	2	0	0
Others	2	0	2	0	0

A total of 12 (4.8%) women required ICU admission during the study period [Table 5]. The highest ICU admission rate was noted among women with cardiac disease (5 out of 25, 20%), followed by bronchial asthma (3 out of 8, 37.5%), hypothyroidism (2 out of 106, 1.9%), and one each with chronic hypertension and dengue fever. Two women underwent emergency peripartum hysterectomy—one with hepatitis B-associated atonic PPH and one with dengue-associated atonic PPH. There was one maternal mortality in a known asthmatic who died of cardiopulmonary arrest secondary to pulmonary embolism. The overall maternal mortality rate attributable to medical disorders was 0.4% (1 out of 246).

Table 6: Distribution of medical conditions and neonatal outcome (N=246)

Medical Condition	Total (N=246)	Live Births (N=239)	IUD (N=9)	NICU Admission (N=57)	Perinatal Death (N=3)	Improved
Hypothyroidism	106	107 (twin)	1	18	1 (septic shock)	106
Hepatitis B	40	38	1	3	1 (pulmonary hemorrhage)	38
Epilepsy	27	28 (twin)	0	12	0	28
Cardiac Disease	25	24	1	6	0	24
RVD Positive	10	10	0	3	0	10
Type 2 Diabetes Mellitus	9	6	3	3	1 (severe RDS)	5
Bronchial Asthma	8	5	3	2	0	5
Chronic Hypertension	6	6	0	3	0	6
Dengue	3	3	0	2	0	3
Hyperthyroidism	2	2	0	1	0	2
Others	9	9	0	4	0	9

Among 247 neonates (including two twin deliveries), 239 (95.1%) were live births and 9 (3.65%) were intrauterine deaths (IUD) [Table 6]. IUDs were most frequent in women with type 2 diabetes mellitus (3/9), bronchial asthma (3/8), and single cases among hypothyroidism, hepatitis B, and cardiac disease. A total of 57 neonates (22.8%) required NICU admission, with the highest rates in epilepsy (12/28 neonates, including twins), hypothyroidism (18/107), and cardiac disease (6/24). There were 3 perinatal deaths: one due to pulmonary haemorrhage in a premature neonate (29 weeks) born to a hepatitis B-positive mother, one due to septic shock (32 weeks) in a neonate born to a hypothyroid mother with severe oligohydramnios, and one due to severe RDS (28 weeks) born to a type 2 diabetic mother.

Table 7: Medical condition complicating pregnancy — maternal and fetal complications

Medical Condition (Total)	Complicating Pregnancy	Associated Maternal Complication	Fetal Complication
Bronchial Asthma (8)	5 (62.5%)	Severe anemia (1), PIH (2)	Preterm delivery (2), IUD (3), LBW (1)
Epilepsy (27)	2 (7.4%)	None	Preterm delivery (2)
Chronic Hypertension (6)	4 (66.6%)	Superimposed PE (2)	Preterm delivery with FGR (3), IUD (1)
Cardiac Disease (25)	8 (32.0%)	Functional deterioration (6), Pulmonary edema (4)	Preterm delivery (5), LBW (3), IUD (1)
Hypothyroidism (106)	25 (23.1%)	Severe anemia (3), PIH (12)	Preterm delivery (18), IUD (1), Perinatal death (1)
Type 2 Diabetes Mellitus (9)	6 (66.6%)	Bad obstetric history (2), PIH (3)	Preterm delivery (3), IUD (3), Perinatal death (1)
RVD (10)	2 (20.0%)	None	Preterm delivery (2)
Dengue Fever (3)	2 (66.6%)	Thrombocytopenia (2), Peripartum hysterectomy (1)	Preterm delivery (2)
Infectious Disease / Hepatitis B (45)	6 (13.0%)	Peripartum hysterectomy (1, atonic PPH)	Preterm delivery (4), Perinatal death (1, pulmonary hemorrhage)

Medical conditions complicated pregnancy most significantly in chronic hypertension (66.6%), type 2 diabetes mellitus (66.6%), dengue (66.6%), and bronchial asthma (62.5%) [Table 7]. Among hypothyroid women, 23.1% developed complications including PIH (n=12) and severe anaemia (n=3), with associated preterm deliveries (n=18) and one IUD. Cardiac disease was complicated by pregnancy in 32.0%, with functional deterioration (24%) and pulmonary oedema (16%) being predominant maternal complications.

Table 8: Pregnancy complicating medical disorders — exacerbation and unmasking of pre-existing conditions

Medical Condition (Total)	Pregnancy Complicating Medical Disease	Nature of Complication	ICU Admission	Improved
Bronchial Asthma (8)	5 (62.5%)	Acute exacerbation (preconceptional 3, antenatal newly diagnosed 2)	3	4
Cardiac Disease (25)	8 (32.0%)	NYHA class 3 / palpitation in preconceptional (4); new murmur in antenatal (4)	5	10
Epilepsy (27)	9 (33.3%)	Convulsion: preconceptional (3), 1st trimester onset (6)	0	9
Chronic Hypertension (6)	4 (66.6%)	Uncontrolled BP: preconceptional (2), newly diagnosed antenatal (2)	1	4
Hypothyroidism (108)	29 (26.8%)	TSH >10 preconceptional (5); new antenatal cases with TSH >10 (24)	2	2
Type 2 Diabetes Mellitus (9)	7 (77.7%)	Uncontrolled diabetes HbA1c >6.5%: preconceptional (5), new cases (2)	0	7

Pregnancy was found to complicate the underlying medical disorder by exacerbating or unmasking the condition in a significant proportion of cases [Table 8]. The highest rates of pregnancy-related aggravation were seen in type 2 diabetes mellitus (77.7%), chronic hypertension (66.6%), epilepsy (33.3%), bronchial asthma (62.5%), hypothyroidism (26.8%),

and cardiac disease (32.0%). The association indicating that pregnancy complicating medical disorder was statistically more significant than medical disorder complicating pregnancy ($p<0.05$), suggesting that the pregnancy itself contributes substantially to the worsening of the underlying medical conditions.

Discussion

This prospective observational study included 246 pregnant women with medical disorders, constituting approximately 10% of total obstetric admissions during the study period. The mean age of 26 ± 4.58 years was consistent with findings by Chaudhary *et al.* [6] and Shrivastava *et al.* [7], who reported a mean age of approximately 25 years with more than 50% of women presenting at or after 37 weeks and the majority residing in rural areas. The predominance of multigravidae (64.6%) and rural background (65.9%) in our cohort reflects the regional demographic pattern. Notably, 55.5% of type 2 diabetes cases were from urban areas, reflecting the contribution of urbanisation, sedentary lifestyle, and delayed marriage to the increasing prevalence of type 2 diabetes in the reproductive age group [8]. Hypothyroidism emerged as the most prevalent medical disorder (43.9%), with statistical significance ($p<0.00001$, $Z=11.18$), a finding attributable to the widespread adoption of universal thyroid screening during antenatal care. Complications associated with hypothyroidism in our study—including PIH (11.3%), preterm delivery (16.9%), and IUD (0.9%)—were comparable to findings reported by Sahu *et al.* [9] and Ajmani *et al.* [10], and reinforce the importance of early thyroid screening and treatment in pregnant women, particularly in India where undetected thyroid disorders are prevalent. The prevalence of hepatitis B (16.2%) in our study was higher than previously reported rates from Bangalore (7.8%) and Krishnagiri (5.1%), likely reflecting the impact of enhanced antenatal screening [11, 12]. Preterm delivery among HBsAg-positive women in our study (10%) was lower than the 21% reported by Reddikh *et al.* but comparable to the 4.7% by Tse *et al.* [13].

Among the cardiac disease cohort (n=25), RHD was the commonest diagnosis (60%), consistent with findings from Murali Subbaiah *et al.* [14] (64%) and Saima Salam *et al.* [15] (56.6%), though our proportion of congenital heart disease (40%) was higher than these series, reflecting improved diagnosis and survival of girls with congenital lesions to childbearing age. Fetal outcomes in cardiac disease—preterm delivery (20%), LBW (12%), and IUD (4%)—were broadly comparable to those reported by Verena Stangl *et al.* [16], and maternal morbidity was significant, with 24% developing functional deterioration and 16% pulmonary oedema. For epilepsy, our preterm delivery rate (7.4%) was lower than the 11.4% reported by Raji *et al.* [17], and pregnancy outcomes were generally favourable, corroborating observations that well-managed epilepsy need not adversely impact obstetric outcomes. For asthma, our findings showed higher rates of acute exacerbation (66%) and PIH (25%) compared with other studies [18, 19], along with a maternal mortality due to pulmonary embolism, underscoring the serious morbidity risk posed by poorly controlled asthma in pregnancy. For type 2 diabetes, the rates of PIH (33.3%), preterm delivery (33.3%), and IUD (33.3%) were higher than reported by Gunton *et al.* [20] (PIH 36%, preterm 27.3%, IUD 5.3%), and perinatal mortality (10%) exceeded the 4.16% noted by Banerjee *et al.* [21], reflecting the severity of hyperglycaemic complications in our cohort. Chronic hypertension was associated with a 50% preterm delivery rate, exceeding the 33% reported by Sibai *et al.* [22] but aligned with the 52% by Chun Ye *et al.* [23].

A critical finding of this study was that pregnancy significantly aggravated the underlying medical condition in a high proportion of cases—particularly type 2 diabetes (77.7%), chronic hypertension (66.6%), bronchial asthma (62.5%), and epilepsy (33.3%)—and this pregnancy-complicating-disease effect was statistically more significant than the disease-complicating-pregnancy effect. This bidirectional relationship has important implications for clinical management: preconception counselling, early diagnosis, optimisation of medical control prior to conception, and close antenatal monitoring are essential to minimise adverse outcomes. Studies by Baral *et al.* [24] and Bhaskar Narayan *et al.* [25] similarly concluded that hypertensive disorders and other medical comorbidities constitute the leading causes of maternal morbidity, and that treatable conditions-related mortality has not declined proportionately despite overall improvements, advocating for structured training and interdisciplinary management pathways.

Conclusion

Medical disorders in pregnancy are associated with significant feto-maternal morbidity and mortality. In the present study, pregnancy was found to complicate the underlying medical condition—by exacerbating or unmasking it—more significantly than the medical condition complicated the pregnancy per se. The commonest medical condition encountered was hypothyroidism, followed by infectious diseases, epilepsy, and cardiac disease. The highest rates of maternal and perinatal adverse outcomes were observed in women with type 2 diabetes mellitus, bronchial asthma, chronic hypertension, and cardiac disease. Overall maternal mortality attributable to medical disorders was 0.4%, with one death due to pulmonary embolism in an asthmatic, and perinatal mortality was 1.2%.

Pre-conception counselling, universal antenatal screening for thyroid disorders, diabetes, and infections, optimisation of medical control before and during pregnancy, and prompt recognition of complications are essential strategies for reducing adverse outcomes. All pregnant women with significant medical comorbidities should be referred to a tertiary care centre for multidisciplinary management, including specialist obstetric, medical, and neonatal care, to achieve the best possible feto-maternal outcomes and decrease preventable maternal and perinatal mortality.

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