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Original Research Article

A study of risk score assessment in antenatal women and their neonatal outcome in a tertiary care hospital

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ABSTRACT

Introduction: A high-risk pregnancy is any condition associated with a pregnancy where there is an actual or potential risk to the mother or fetus. Risk assessment is a key component of antenatal care (ANC) and has demonstrated benefits in improving maternal and perinatal outcomes.

Objectives: To assess maternal complications that occurs in antenatal women and their neonatal outcomes in a tertiary care hospital.

Materials and Methods: 200 antenatal women, admitted to obstetrics & gynaecology department from 16-09-2020 to 15-03-2021 were evaluated. Antenatal women with maternal complications (Gestational hypertension, preeclampsia, Gestational diabetes, Hypothyroid, Anaemia, Asthma and oligohydramnios) were taken into study group and women with no complications were taken into control group. The risk factors were assessed and risk scores were determined by Dutta and Das scoring system and Hobel risk scoring system.

Results: It was found that there was a significant association between poor neonatal outcome and high-risk pregnancies. The incidence of preterm births is higher in the study group (34.1%) when compared with the control group (13.7%). Mode of delivery was predominantly by caesarean section in the study group ($p < 0.005$). Neonatal complications were significantly more ($p < 0.05$) in study group and fetal distress was exclusively seen in the study group ($p < 0.0005$). Maternal complications such as eclampsia correlated significantly with the risk score ($p = 0.005$). Neonatal outcomes such as Low birth weight ($p < 0.0001$) were higher in the high-risk category when compared to the low risk and moderate risk category.

Conclusion: There was a significant correlation between high-risk antenatal and poor neonatal outcome. Scoring systems, such as the one used in our study, can be adopted at primary and rural health centres even by a non-medical counsellor as a screening tool to predict pregnancies at high risk for poor neonatal outcome, thereby facilitating early referral of these women to tertiary care centres.

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1. Introduction

Modern medicine has made labor and delivery much safer for both the mother and the baby, but complications still occur.¹ Most pregnancy-related medical complications appear to resolve at delivery or shortly thereafter. Common

examples are preterm labor, preeclampsia and gestational diabetes. Women who developed such complications are known to be at increased risk of developing similar complications in future pregnancies. Women who delivered prematurely are at increased risk of recurrent preterm labor, those who had preeclampsia in subsequent pregnancies, women who developed gestational diabetes (GDM) are

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likely to develop it again, as are women who experienced a placental abruption, fetal growth impairment, etc.² A high risk pregnancy is one in which antenatal women; neonate is at increased risk of morbidity or mortality before or after delivery.³ Risk scoring system provides a formalized method of recognizing, documenting and cumulating antepartum, intrapartum and neonatal risk factors in order to predict the later complications for mother and her fetus. A high-risk pregnancy may be identified by using a scoring system such as the system developed by Dutta and Das for identification of high risk mothers and Hobel for Prenatal and intrapartum high-risk screening.⁴ The present study was intended to use one such simple, less invasive, cost effective and easily accessible scoring system for detection of high risk pregnancy and to find the correlation between perinatal outcome and various degrees of risk.⁵

2. Materials and Methods

2.1. Study design

Prospective analytical study carried out for a period of 6 months from September 2019 to march 2020.

2.2. Study population

The study was conducted in inpatients from department of OBS & GYNC at GSL medical college and hospital, a tertiary care hospital in rajanagaram.

2.3. Sample size

A total of 200 Inpatient of pregnant women with maternal complications were taken with following inclusion and exclusion criteria.

2.4. Inclusion criteria

1. Maternal age of 19 to 35 years
2. Greater than 28 weeks of gestational age was included
3. Assisted Reproductive technology (ART) is included in this study
4. Preexisting maternal disorders was included

2.5. Exclusion criteria

1. Women who had abortion
2. Women who had ectopic pregnancy and molar pregnancy
3. Outpatients were not taken

200 antenatal women, more than 28 weeks admitted to obstetrics & gynaecology department from 16-09-2019 to 15-03-2020 were recruited. n=120 pregnant women, who had any kind of maternal complications, were taken in the study group. A similar group of n=80 antenatal women

with no complications were taken in the control group. To describe mothers and neonates "at risk", a numerical scoring system based on the combination of the scoring system suggested by Dutta and Das and Hobel was used. A well-designed questionnaire was used to collect data. (Tables 1 and 2). The questionnaire covered variables related to socio demographic factors, family history, medical history, maternal complications. The study group were classified as low risk (1-2), moderate risk (3-5) and high risk (6 and above) based on the cumulative total of their respective scores. The antenatal women were followed till delivery and the various complications encountered and treatment given was noted. Similarly, Hobel risk scoring system was done for the neonates, and they were classified as High risk and Low risk. Neonatal parameters like birth weight, Apgar score, Neonatal intensive care unit [NICU] admissions and complications were noted. Chi-square analysis was performed to test for differences in the proportions of categorical variables between the two groups. The level $p < 0.05$ was considered as statically significant.

Dutta and Das Scoring system for the patients were classified into 3 groups:

Low risk (1-2), Moderate risk (3-5) and High risk (6 or above)

Hobel risk scoring system for the neonates, and they were classified as High risk and Low risk. The scoring range was given by points 1-10. If the points were < 10 considered as low risk and if the points were ≥ 10 considered as high risk.

3. Results

According to Dutta and das scoring 13 women (10.8%) are low-risk and 38 women (31.7%) are moderate risk and 69 women (57.5%) are high risk. (Figure 1). Similar Demographic variables were used both in study and the control group. Majority of the antenatal women were in the age group of 19-25 years i.e., 75 patients (62.5%) with mean age being 39.6 ± 32.6 years in study group and 44 patients (55%) with mean age being 26.3 ± 17.5 years in control group (Table 3). Majority of the women were primigravida in both study group (57.1%) and control group (42.9%). Mode of delivery was predominantly by caesarean section in the study group which is statistically significant ($p < 0.005$) (Table 4). When maternal and neonatal high-risk score are compared, we found that maternal high risk directly reflects fetal high risk. (Table 5) (Figure 2). Babies in study group had perinatal morbidity in the form of Jaundice, fetal distress, RDS and sepsis when compared to control group which was statically significant (Table 6). As per our study, number of NICU admissions in the study group was high 91(75.1%) when compared to 28 (35%) in control group which was statically significant $p = < 0.0001$ (Table 7). The likelihood of having low birth weight babies is high in study group which is statistically significant $p = < 0.0001$ (Table 8). The neonates with a high-risk score had high incidence of

Table 1: High risk pregnancy scoring rate.⁶

	Score	Past obstetrical factors	Score	Present obstetrical risk factors	Score
Age less than 16	2	ART conception	1	Premature rupture of membranes (rupture of membranes before 37 completed weeks)	4
Age more than 35	2	Abortions (first trimester)	1	Preterm labour pains (contractions of four in 20 min or eight in 60 min plus progressive change in the cervix /cervical dilatation greater than 1cm /cervical effacement of 80 percent of greater)	4
Parity more than 4	3	Abortions (second trimester)	2	Polyhydramnios (AFI on ultrasound is > 24cm)	4
Maternal weight (BMI<19)	3	Preterm birth (<37 weeks gestation)	2	IUGR(foetal growth <10th centile forGA)	4
Maternal weight (BMI>28)	3	Family history of recurrent abortions	1	Rhesus isoimmunisation	4
Heart disease (symptomatic)	4	Recurrent spontaneous abortions	3	Malpresentation at term	4
Heart disease (asymptomatic)	1	Postpartum haemorrhage	3	Vaginal bleeding (First trimester)	2
Moderate –severe renal disease-(Creatinine>1.5mg/dl)	4	Hypertension/ pre-eclampsia	3	Vaginal bleeding (second trimester)	3
Chronic renal disease (Creatinine>3mg/dl)	4	Prolonged labour/difficult delivery	4	Mild anaemia (Haemoglobin <10gm %)	1
Pre GDM (insulin dependent/noninsulin dependent)	4	Still birth /neonatal death	4	Severe anemia (Haemoglobin<6gm %)	4
Chronic Hypertension (BP>140/90mmhg before pregnancy)	3	Caesarean delivery	1	Intrauterine cholestasis of pregnancy	4
Controlled epilepsy (at least 1 year free of seizures before pregnancy)	1	Foetal anomaly with heritable genetic cause	4	Minor foetal malformation	1
Uncontrolled epilepsy (recent seizure episode)	4	Foetal anomaly without heritable genetic cause	1	Major foetal malformation	4
Active immunological disease like SLE and rheumatoid arthritis	4	Radioiodine ablation within past 6 months	1	Placenta praevia	2
Immunologicaldisease (inactive for past 6 months)	2	Gynaecologicaldisease like fibroids and cysts	3	Morbid adherent placenta	4
Tuberculosis or PPD>10mm	2	Uterine malformation	3	Gestation Hypertension (blood pressure>140/90 without proteinuria	2
Pulmonary disease like asthma,pneumonia,- bronchitis,Pulmonary tuberculosis	2			Pre-eclampsia (blood pressure>140/90mmhg with proteinuria of >300mg/dl after 20 weeks of gestation)	3
Smoking	2			Eclampsia	4
Alcoholism	2			Oligohydramnios	2
UTI(culture with>10 organisms/ml)	2			Gestational diabetes (abnormal 75 glucose test,95/180/155)	3

Table 2: Hobel neonatal factors.⁷

General score	
Prematurity<2,000 grams	10
Apgar at 5 min<5	10
Resuscitation at birth	10
Fetal anomalies	10
Dysmaturity	5
Prematurity 2,000-2,500 grams	5
Apgar at 1 min<5	5
Feeding problem	1
Multiple birth	1
Respiratory	
RDS	10
Meconium aspiration	10
Congenital pneumonia	10
Anomalies of respiratory system	10
Apnoea	10
Other respiratory distress	10
Transient tachypnoea	5
Metabolic disorders	
Hypoglycemia	10
Hypocalcemia	10
Hypomagnesemia or hypermagnesemia	5
Hypoparathyroidism	5
Failure to gain weight	1
Jitteriness or hyperactivity with specific causes	1
Cardiac	
Major cardiac anomalies which require immediate Catheterization	10
Congestive heart failure	10
Persistent cyanosis	5
Cardiac anomalies not requiring immediate Catheterization	5
Murmur	5
Haematological problem	
Hyperbilirubinemia	10
Hemorrhagic diathesis	10
Chromosomal anomalies	10
Sepsis	10
Anemia	5
CNS	
CNS depression> 24 hrs	10
Seizures	10
CNS depression < 24 hrs	5

Table 3: Distribution of demographics variables

S.no	Demographical variables	Category	Study group n=120	Control group n=80
1.	Maternal age	19-25	75(62.5%)	44(55%)
		26-30	36(30%)	28(35%)
		31-35	9(7.5%)	8(10%)
		Illiterate	2(100%)	0
2.	Educational status	Primary school	33(61.1%)	21(38.9%)
		Secondary school	54(61.4%)	34(38.6%)
		Intermediate	18(52.9%)	16(47.1%)
		Degree	13(59.1%)	9(40.9%)
3.	Socioeconomic status	Lower class	38(61.3%)	24(38.7%)
		Middle class	77(62.1%)	47(37.9%)
		Upper class	5(35.7%)	9(64.3%)

complications like jaundice, respiratory distress syndrome, sepsis, fetal distress which were statistically significant $P < 0.05$ (Table 9). Following are the different medications used in various medical complications (Table 10). The incidence of preterm births is higher in the study group (34.1%) when compared with the control group which is statistically significant $P = 0.002$ (Figure 3).

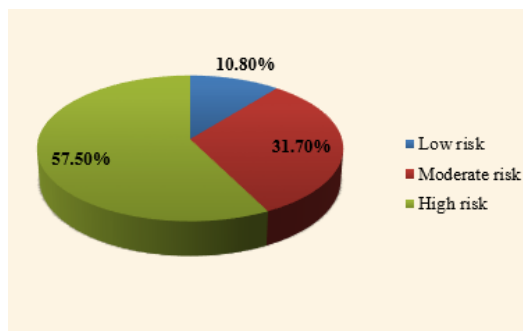


Fig. 1: Risk assessment of the study group according to the Dutta and Das scoring system.

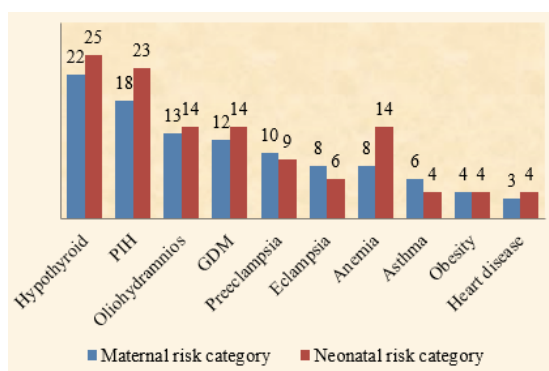


Fig. 2: Mirroring of maternal high risk to neonatal high risk.

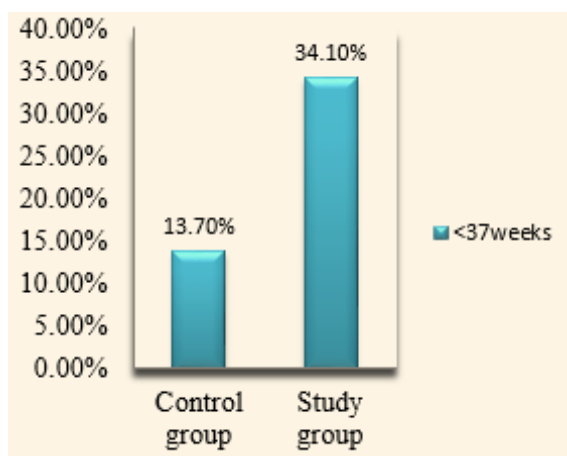


Fig. 3: Relation of maternal risk with incidence of preterm.

4. Discussion

High risk pregnancy is an important contributor for maternal and fetal morbidity and mortality. The purpose of the study was to identify the key risk factor and decrease the complications. Incidence of high risk is more in our study as compared to similar studies conducted by (Samiya et-al. and Vasavi et-al.)⁵⁻⁸ probably because this study is conducted in a tertiary care center where many cases were referred. (Table 11)

The mean duration of delivery was < 37 weeks in the study group with significant ($p < 0.002$) Mode of delivery was predominantly by caesarean section in the study group than the control group ($p < 0.005$). The complications in which caesarean section were preferred are repeat caesarean section, hypertension, eclampsia and fetal complications like non-reassuring fetal heart rate. When neonatal complications were compared, Jaundice was significantly more ($p < 0.05$) in study group and fetal distress was exclusively seen in the study group ($p < 0.005$) which again emphasize the effect of maternal complications on the developing fetus and its neonatal outcomes. In terms of neonatal intensive care unit [NICU] admissions, babies in the study group were admitted more frequently for prolonged duration which is statistically significant ($p < 0.05$). The different risk categories from the high risk scoring systems were significantly related to the severity of the disease. For example: — Eclampsia scored a higher risk when compared to the moderate risk like mild anaemia. This concludes that comprehensive risk stratification can be done with a simple risk scoring system namely Dutta and Das which is appropriate for the hospital and feasible to the staff. Furthermore, it can be introduced as a valid tool to categorise and identify all high-risk patients even without the presence of qualified physicians. We have also observed a neonatal high-risk score given by Hobel scoring system, detects all the neonates who need NICU admission and treatment. Babies with birth weight $< 2.5\text{kg}$'s were significantly ($p < 0.0001$) at high risk when compared to the low risk and moderate risk. This 'finding is in concurrence with previous studies conducted by (Samiya et-al. and Vasavi et-al.)⁵⁻⁸. Hence these scoring systems are used as a tool to screen all high-risk mothers and neonates and refer them to tertiary centers facilities to manage the neonates with low birth weight are available. As we know neonates with low birth weight is the main contributor for neonatal mortality and infant mortality. (Table 12).

Since we have conducted this study in a tertiary care hospital and all the babies were appropriately managed. There was no neonatal mortality except in one case where there is intrauterine fetal demise due to maternal eclampsia. A varied spectrum of medications, oral and parenteral was administered as per the protocols of the institutes and it was observed that no patient develops adverse effects to any of the medications which are mentioned in the annexure. The

Table 4: Distribution of obstetrics variables

SI.no	Obstetrics variables	Category	Study group n=120	Control group n=80	P value
1.	Parity	Primi	64 (57.1%)	48 (42.9%)	0.3
		Multi	56 (63.6%)	32 (36.4%)	
2.	Mode of delivery	LSCS	79 (73.1%)	29 (26.9%)	0.000
		Vaginal delivery	41 (44.6%)	51(55.4%)	

Table 5: Maternal risk category of maternal complications in study group.

Maternal complications	High risk	Moderate risk	Low risk	P value
Hypothyroid	22 (64.7%)	10 (29.4%)	2 (5.9%)	0.4
Hypertension	18 (52.9%)	13 (38.2%)	3 (8.8%)	0.6
Oligohydramnios	13 (56.5%)	8(34.8%)	2 (8.7%)	0.8
Gestational diabetes	12 (66.7%)	3 (16.7%)	3 (16.7%)	0.2
Preeclampsia	10 (62.5%)	6 (37.5%)	0	0.3
Eclampsia	8 (66.7%)	0	4 (33.3%)	0.005
Anemia	8 (57%)	6 (42.9%)	0	0.8
Asthma	6 (85.7%)	1 (14.3%)	0	0.2
Obesity	4 (66.7%)	2 (33.3%)	0	0.6
Heart disease	3 (75%)	0	1 (25%)	0.3

Table 6: Comparison of perinatal morbidity between study group and control group

S.no	Perinatal morbidity	Study group	Control group	P value
1.	Jaundice	64(74.4%)	22(25.6%)	0.0001
2.	Fetal distress	11(100%)	0	0.005
3.	Respiratory distress	19(73.1%)	7(26.9%)	0.1
4.	Sepsis	12(66.7%)	6(33.6%)	0.5

Table 7: Comparative analysis of neonatal outcomes between study group and control group in NICU.

Neonatal outcomes	Study group	Control group	P value
Stay in NICU			
0 days	26(21.6%)	52(65%)	<0.0001
1-7 days	91(75.1%)	28(35%)	
>7 days	3(2.5%)	0	

Table 8: Relations between various risk groups and the birth weight

Risk Group	Score	Birth weight		P value
		<2.5 kg	>2.5 kg	
Control group	0	4(5%)	76(95%)	< 0.0001
Low risk	1-2	5(4.16%)	9(0.13%)	
Moderate risk	3-5	14(11.6%)	24(20%)	
High risk	6 andabove	35(29%)	34(28.3%)	

Table 9: Neonatal outcomes based on hobel risk scoring system.

Neonatal outcomes	High risk	Low risk	P value
Jaundice	64 (74.4%)	3 (25.6)	0.0001
RDS	19 (73.1%)	0	0.003
Sepsis	12 (66.7%)	0	0.003
Fetal distress	11 (100%)	0	0.004
IUGR	6(85.7%)	3 (14.3%)	0.6

Table 10: Medications for maternal complications.

Complications	Class	Drugs	ROA	No. of drug used	Common Dose Range
Pregnancy induced hypertension	Beta-blockers	Labetalol	Oral,IV	37(20.6%)	100mg 200mg
		Metoprolol	Oral	13(7.2%)	25mg
	Calcium channelblockers	Nifedipine	Oral	1(0.5%)	10mg
		Amlodipine	Oral	2(1.1%)	2.5mg,5-10mg
Gestational diabetes	Fast acting insulin	Human insulin	SC	21(55.2%)	6 units
	Fast and long-acting insulin	Soluble insulin and isophane insulin	SC	3(7.8%)	1.0 IU/kg
	Intermediate acting insulin	NPH	SC	1(2.6%)	8-12units
	Biguanides	Metformin	Oral	4(2.2%)	250mg
Eclampsia	Lactum anticonvulsants	Levetriacetam	Oral	4(2.2%)	500mg
	Benzodiazepam	Diazepam	Oral	4(2.2%)	2- 10mg
	Anticonvulsants	Mgso4	Oral	4(2.2%)	40mg/ml (injectable solution), 1 gm/100ml (infusion solution)
Anemia	Iron supplements	Folic acid and Ferrous Fe/bc/ca	Oral	4(2.2%)	-
Hypothyroidism		Thyroid supplement hormone	Levothyroxine	Oral	64(35.7%)
Asthma	Adernal glucocorticoid	Budesonide	Oral	4(2.2%)	0.5mg
	Anti- asthmatic	Betamethasone	IM	10(26.3%)	12mg
		Salbutamol	Oral	4(2.2%)	4mg

Table 11: Comparison of incidence of high-risk cases.

Study	No. of cases	Incidence of High-risk pregnancy
Present study	200	57.5%
Samiya M et al. (2005)	400	15 %
Vasavi(2016)	200	20 %

Table 12: Risk of low birth weight.

Study	Low risk	Moderate risk	High risk
Present study	5 (4.16%)	14(11.6%)	35(29%)
Samiya M et al.	9 (12.3%)	18(17.64%)	16(48.48%)
Vasavi	6 (3 %)	6(3%)	8 (4%)

objective of our study was to identify high-risk pregnancy by using Dutta and Das scoring system and to prevent or at least positively modify the suboptimal perinatal outcome. The scoring system was found to have high sensitivity for predicting low birth weight, preterm births and perinatal mortality in high -risk group but low sensitivity in low -risk group. The results obtained were comparable with studies done elsewhere.

5. Conclusion

This study suggested that there was a significant correlation between high-risk antenatal and poor neonatal outcome. So, scoring systems, such as Dutta and Das scoring system for maternal complications and Hobel Scoring system for neonatal outcomes can be adopted, as these are valid and appropriate, non-invasive, easy and cheap tools which can be utilised even by a non-medical counsellor as a screening tool to predict pregnancies at high risk for poor neonatal outcome thereby facilitating early referral of these women to tertiary care centres. As majority of study group were in

their 3rd trimester for reducing high risk pregnancies the most powerful interventions included education of women along with motivation and health care professionals for safe delivery. Early diagnosis and treatment through regular antenatal check-up and referral to the appropriate centre for the better well-being of mother and fetus is necessary because a “Stich in Time Saves Nine”.

6. Summary

This study was undertaken to assess the feasibility and reliability of simple scoring systems for maternal and fetal risk factors and apply them in low-resource settings. 200 women attending a tertiary care centre were screened and assigned to either study group or control group. A maternal high-risk scoring Dutta and Das score and a fetal high risk scoring Hobel score was calculated in both the groups, and they were followed till delivery and neonatal period. We came to a conclusion that these scoring systems were reliable in the prediction of high risk and can be applied in low-resource setting for timely referral.

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8. Abbreviations

1. BMI- body mass index
2. CNS- central nervous system
3. GDM- gestational diabetes mellitus
4. IUGR- intrauterine growth restriction
5. NICU- Neonatal intensive care unit
6. RDS- respiratory distress syndrome
7. UTI- urinary tract infection

9. Source of Funding

None.

10. Conflict of Interest

None.

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