

## Original Research Article

**High Risk Pregnancy Scoring System to Evaluate Maternal and Fetal Outcome**Aruna Kumar<sup>1</sup>, Shubha Srivastava<sup>2</sup>, Sona Soni<sup>3</sup>, Falguni Tiwari<sup>4\*</sup><sup>1</sup>*Professor and Dean, Department of Obstetrics and Gynecology, GMC Medical College and Associated Sultania Zanana Hospital, Bhopal, MP, India*<sup>2</sup>*Associate Professor, Department of Obstetrics and Gynecology, GMC Medical College and Associated Sultania Zanana Hospital, Bhopal, MP, India*<sup>3</sup>*Associate Professor, Department of Obstetrics and Gynecology, GMC Medical College and Associated Sultania Zanana Hospital, Bhopal, MP, India*<sup>4</sup>*Resident, Department of Obstetrics and Gynecology, GMC Medical College and Associated Sultania Zanana Hospital, Bhopal, MP, India*

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**Abstract**

**Objective:** Present study evaluated high risk factors according to Dutta and Das prenatal scoring form and their effect on fetomaternal outcome. **Methods:** The present study was done over a period of 1 year from April 2018 to March 2019. Study included 500 pregnant women, they were categorized into High risk (score 5 or above), Moderate Risk (3-4), Low risk (1-2) and No risk (score 0) using Prenatal Dutta & Das scoring system. The maternal and fetal outcome were measured according to the risk scores. **Results:** Among high risk factors most frequent distribution is of Anaemia (38.8%) f/b primigravidity (38.6%) f/b albuminuria (23.2%) f/b hypertension (22.4%) f/b edema (21.6%), other significant high risk factors were h/o previous caesarian section (16%) and h/o abortion/infertility (11.6%). All maternal complications were higher in the high risk group. Most frequent complication was LSCS as mode of delivery. Blood transfusion and I CU admission f/b postpartum haemorrhage. All fetal complications were higher in high risk group, most frequent being the LBW babies (20.6%) & NICU admissions (10%). Among ICU admissions majority patients were Hypertensive (32 cases i.e 65.3%), out of which 13 cases were eclampsia patients. 4 cases of mortality was observed. Three patients had uncontrolled hypertension as the underlying cause while one patient had severe anaemia. **Conclusion:** Special care to high risk cases and creating a critical link in the continuum of care may result in decreasing fetomaternal morbidity and mortality. Thus we can reduce maternal mortality and infant mortality rates.

**Keywords:** Maternal Mortality, Fetal Mortality, High Risk Pregnancy, Timely Referral, At Risk Women, Risk Scoring System & Fetomaternal Outcome

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**Introduction**

A high risk pregnancy refers to anything that puts the mother, fetus or neonate at increased risk for morbidity or mortality during pregnancy or childbirth. All women must be considered to be at risk. All pregnancies should therefore be evaluated to know whether they have risk factors.

According to WHO, About 30% of all pregnancies in South east asia, and 20-30% in India are high risk and about 70-80% mortality, both maternal and perinatal were among high risk group [2]. Every day about 830 women die due to complications of pregnancy and child birth i.e About one woman every two minutes dies and for every woman who dies. 20 or 30 encounter serious and long lasting complications. The MMR has shown declining trends from 2000 to 2017. Good antenatal care has significantly contributed to this. [1-4]

The aims of antenatal care are:-

- To screen high risk pregnancy.
- To prevent / treat complication at earliest.
- To ensure continued medical surveillance.

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Obstetric risk scoring is a formalized way of recognizing, documenting, and cumulating antepartum and intrapartum factors to predict later complications for mother, fetus, and infant. If simple, practical, and reliable, risk scoring can be clinically useful in determining appropriate levels of care. [4-5]

A high risk pregnancy may be identified by using a risk scoring system. There are several scoring systems that have been used to relate risk factors associated and resultant outcomes. In 1973, Hobet et al investigated high risk pregnancy scoring based on prenatal & intrapartum factors [6]. In 1977, Coopland et al described a simple antenatal high risk assessment form. Dutta and Das in 1990 devised a prenatal scoring system which itself was modification of high risk scoring system as proposed by Coopland. According to Dutta and Das, Scoring system were classified into 3 groups, Low risk (score 1-2), moderate score (3-5), high risk (6 or above). They all found that High risk pregnancy yields in poor fetomaternal outcome. [5] Thus, categorizing pregnancy as high risk using a simple and feasible scoring system will help in reducing maternal and fetal morbidity and mortality by early identification of high risk pregnancy, timely referral and proper management. This study was carried out to identify at risk women using Dutta & Das risk scoring system & the fetomaternal outcome in relation to the risk score.

**Materials and Methods**

**Study Design:** Hospital based Prospective analytical study.

**Duration of Study:** One year from 1<sup>st</sup> April 2018 to 31<sup>st</sup> March 2019

**Study Centre:** The study was conducted in Department of Obstetrics and Gynaecology, Gandhi Medical College and associated Sultania Zanana Hospital, Bhopal.

**Sample Size:** 500

**Inclusion Criteria:** 1. Patients admitted in the hospital after 28 weeks of pregnancy for confinement and who were willing to participate in the study.

2. Babies followed up to discharge after birth either in wards or NICU.

**Exclusion Criteria:** Patients who refused to be a part of study.

#### Method

500 Pregnant women in their second or third trimester reporting in labour room at our institute during the study period were included in the study. Careful and detailed history was elicited including their age, parity, socioeconomic status and booking status, associated diseases or complications etc. Thorough general, systemic & obstetric examination was done and relevant investigations to determine the risk factors in each case was done. The observations were recorded in Dutta and Das prenatal scoring form and individual risk scores were

calculated. Based on their total scores, the cases were classified into zero(0), low (1-2), moderate (3-4) and high risk( $\geq 5$ ) groups. Subsequently the outcome for the mother in terms of (1) Mode of delivery and (2) Complications like postpartum haemorrhage, blood product transfusions, ICU admissions and mortality was studied and complications pertaining to the risk factors identified were noted. The perinatal outcome variables studied, for the babies were (1) Birth weight (low birth weight defined as  $< 2500$  gms, including both pre-term and SGA), babies admitted to NICU, perinatal mortality (intrauterine deaths, still births and early neonatal deaths up to seven days of life). These observations were analysed according to risk scores of the mother and fetomaternal outcome.

#### Observation Chart

Present study was conducted in Department of Obstetrics and Gynaecology, Gandhi Medical College and associated Sultania Zanana Hospital, Bhopal from April 18 to March 19. Total of 500 women were included in the study and risk scoring was done according to Dutta & Das risk scoring system.

The details of observations are as follows:-

**Table 1: Distribution of study subjects according to risk score**

Risk Score	Number	Percentage (%)
Zero Score(0)	32	6.4%
Low Score(1-2)	129	25.8 %
Moderate Score(3-4)	123	24.6%
High Score( $\geq 5$ )	216	43.2%
TOTAL	500	100.0%

**Table 2: Distribution of cases according to Reproductive History**

Risk Factors	Risk Score		
	Low	Moderate	High
1. Age $< 16$ yrs	00	00	00
2. Age $> 35$ yrs	01	03	17
3. parity- 0	58	67	73
4. Parity 1-4	68	53	113
5. Parity $> 5$	02	00	13

**Table 3: Distribution of cases according to Past obstetric history**

Risk factors	Risk score		
	Low	Moderate	High
Previous H/O PIH	03	05	05
Previous Abortion/Infertility	08	22	28
Previous PPH/MRP	0	0	01
Previous history of 4 kg Baby	0	01	05
Previous LSCS	20	28	32
Prolonged Labour	03	07	08
Previous ND/SB	00	06	34

**Table 4: Distribution of cases according to Present pregnancy factors**

Risk factors	Risk score		
	Low	Moderate	High
Bleeding $< 20$ Weeks	01	02	03
Bleeding $> 20$ Weeks	00	13	21
Anaemia	44	56	94
Hypertension	00	03	109
Edema	01	02	105
Albuminuria	01	04	111
Multiple Pregnancy	00	02	07
Breech	00	06	37
Rh negative	00	05	22
Prolonged Pregnancy	00	05	05
Oligo/Poly	02	14	15
PROM	02	11	08
Small for Date	01	04	31

**Table 5: Distribution of cases according to Associated medical disorders**

Risk factors	Risk score		
	Low	Moderate	High
Diabetes mellitus (Preexisting type)	00	00	07
Cardiac disease	00	00	09
Gynaecological H/O surgery	05	03	06
Chronic renal disease	01	02	02
Pulmonary tuberculosis	00	01	02
Infective hepatitis	00	00	02
Undernutrition	01	03	06
Total	07	09	34

**Table 6: Distribution of study subjects according to Major Outcomes**

Outcomes (maternal complications & fetal outcomes)	No. Of cases(Out of 500)	Percentage
1. Mode of delivery as LSCS & Instrumental deliveries	189	37.8
2. Postpartum Haemorrhage	20	4
3. Blood transfusions	96	19.2
4. ICU admission	49	9.8
5. Mortality	04	0.8
6. LBW babies (wt<2.5kg)	105	20.6
7. NICU admissions	51	10
8. Apgar score <7	66	13.2
9. Baby back to Mother(Among referred)	40	7.85
10. Perinatal mortality	37	7.4

**Table 7: Distribution of fetal birth weight according to risk scores**

Fetal status Baby Weight (fetal status)	Risk Score			Total	Chi Square Value	Significance 'p' Value
	Zero & Low Score N=161	Moderate Score N=123	High Score N=216			
<1.5 kg	0(0%)	4(3.25%)	3(1.38%)	7(1.37%)	46.0	<0.001(HS)
1.5- 2.5 kg	09(5.5%)	20(16%)	69(31.9%)	98(19.2%)		
≥ 2.5 kg	153(94.5%)	99(80%)	152(70%)	404(79.3%)		

**Table 8: Distribution according to NICU admissions and risk score**

NICU admissions	Number of cases	Percentage
High Risk	26	51 %
Moderate Risk	23	45 %
Zero or Low Risk	02	3.9 %
Total	51	100 %

**Table 9: Perinatal mortality according to risk score**

Perinatal	Number of cases	Percentage
High Risk	30	86 %
Moderate Risk	4	11%
Zero or Low Risk	1	3 %
Total	35	100 %

## Results

- In present study, mean age group is 26 years (range 19 -40 years), majority between 19 -35 years, only 21 cases beyond 35 yrs of age group. Most patients had parity 0 to 4, only 15 subjects had parity >5.
- Most patients had full term gestation(37 to 42 weeks), only 69 had preterm(<37 weeks) and 10 were postterm(>42 weeks). Maximum cases belong to high risk i.e 43.2% cases, 24.6% moderate cases , 25.8% low risk cases and 6.4% zero risk cases.
- High and moderate risk cases had 41.2% and 45.2% caesarian section rates compared to low risk and zero risk which had 29% and 9.3% caesarian section.
- Mean birth weight of babies was found to be 2.6 kg ( range 0.8 kg -4.5 kg).High and moderate risk cases carried high incidence of low birth weight babies compared to low risk and zero risk cases. There was only 9 LBW and no VLBW babies in low & zero risk categories.
- Among high risk factors most frequent distribution is of Anaemia (38.8%) f/b primigravidity (38.6%) f/b albuminuria (23.2%) f/b hypertension (22.4%)f/b edema(21.6%), other significant high risk factors were h/o previous caesarian section(16%) and h/o abortion/infertility(11.6%).
- All maternal complications were higher in the high risk group. Most frequent complication was LSCS as mode of delivery, Blood transfusion and I CU admission f/b postpartum haemorrhage. All fetal complications were higher in high risk group, most frequent being the LBW babies (20.6%) & NICU admissions (10%).
- Among ICU admissions majority patients were Hypertensive (32 cases i.e 65.3%),out of which 13 cases were eclampsia patients,4 cases of mortality was observed. Three patients had uncontrolled hypertension as the underlying cause while one patient had severe anaemia.

### Statistical Analysis

Data was compiled using MS excel 2007 and analysis was done with the help of Epi-Info 7 software. Frequency and percentage were calculated & statistical test (Chi Square) was applied wherever applicable;  $p < 0.05$  was taken as statistically significant.

### Discussion

The present study was done in Department of Obstetrics & Gynaecology, Sultania Zanana Hospital & Gandhi medical college over a period of 1 year. Study included 500 pregnant women, were categorized into High risk (score 5 or above), Moderate Risk (3-4), Low risk (1-2) and No risk (score 0). The maternal and fetal outcome were measured according to the risk scores. The concept of the high-risk pregnancy is important in obstetrics. The ability to predict the birth of a jeopardized infant before its delivery means that decisions about the optimal management of the pregnancy can be made, and the chances of a favorable outcome can be increased. By a stepwise multiple regression analysis, actual intrapartum scores are most predictive of neonatal risk (days in hospital) followed by actual prenatal scores. Identifying a population as to their risk status for both the prenatal and intrapartum period has added depth to the understanding of the continuum of risk which exists within the framework of the perinatal period. Hobel CJ et al did prenatal and intrapartum high-risk screening and predicted high-risk neonate. They developed screening system based on a prospective analysis of prenatal, intrapartum, and neonatal factors which could predict perinatal morbidity and mortality. Factors were assigned with weighted values according to their assumed risk. Similar studies were done by Fortney JA et al in the development of an index of high-risk pregnancy childbirth in developing countries. Anderson and colleagues have shown, for example, that neonatal morbidity is significantly reduced (and the cost of hospitalization approximately halved) if patients are referred before delivery rather than after. Similarly Lin CC et al studied fetal outcome in hypertensive disorders of pregnancy. [6-8] Nesbitt Jr RE et al told the value of semiojective grading system in identifying the vulnerable group. Abnormal conditions were grouped into eight categories and degrees of anticipated perinatal vulnerability were expressed as a numerical value resulting from the sum of all such penalties subtracted from a perfect score of 100. Gradations of risk occur even within socially deprived groups and the use of a simple, relatively sensitive screening device of the type presented permits a sharper focus of attention and intensification of effort upon the most vulnerable minority. Something similar was also done by Kuru A et al. Morrison I et al made a simplified intrapartum numerical scoring system for prediction of high risk in labor. Perinatal mortality, neonatal morbidity, and the rate for operative intervention were all significantly greater for the high-risk group ( $p < 0.0001$ ). The limitations of intrapartum scoring systems are discussed, particularly with respect to their design, the prediction of preventable deaths, and the category of hospital for which they might prove most useful. [9-11]. Various other studies were done enumerating factors of maternal and foetal outcome during pregnancy. Bauer CR et al did a Maternal Lifestyle Study on drug exposure during pregnancy and short-term maternal outcomes. Levy-Shiff R et al studied maternal adjustment and infant outcome in medically defined high-risk pregnancy. Biological and psychosocial risk factors in high-risk pregnancy and their relation to infant developmental outcomes were explored. Questionnaires on coping and resources as well as well-being and distress during the 2nd trimester were administered. Infant outcomes in the maternal diabetic groups were associated with maternal metabolism. Maternal coping and resources differed in the 3 groups and differentially predicted infant development. Mohllajee AP et al did a study on pregnancy intention and its relationship to birth and maternal outcomes. Pregnancy intention, specifically unwanted and ambivalent, may be an indicator of increased risk for some poor birth and maternal outcomes and should be considered in interventions aimed at improving the health of the mother and child. [12-14]

Haverkamp AD et al stressed on the evaluation of continuous fetal heart rate monitoring in high-risk pregnancy. The infant outcome was measured by neonatal death, Apgar scores, cord blood gases, and neonatal nursery morbidity but the presumptive benefits of electronic fetal monitoring for improving fetal outcome were not found in this study. Alfirevic Z et al studied biophysical profile for fetal assessment in high risk pregnancies. Biophysical profile usually includes ultrasound monitoring of fetal movements, fetal tone and fetal breathing, ultrasound assessment of amniotic fluid volume and assessment of fetal heart rate by electronic monitoring. There is not enough evidence from randomised trials to evaluate the use of biophysical profile as a test of fetal well-being in high risk pregnancies. [15-17] Alfirevic Z et al used doppler ultrasound for fetal assessment in high risk pregnancies. Yeh SY et al studied relationship between Goodwin's high-risk score and fetal outcome. The correlation coefficients between Goodwin's score and Apgar scores were  $-0.3178$  for one-minute Apgar scores and  $-0.2668$  for five-minute Apgar scores. Both are significant at the level of  $p < 0.001$ . Therefore, Goodwin's high-risk scoring system is simple and useful in the selection of potential risk patients. In a similar study Sokol RJ et al clinically applied high-risk scoring on an obstetric service. These results suggest that this risk scoring system can be used effectively in a clinical setting to identify patients at increased risk for neonatal depression and perinatal death. [18-20] In other related studies, Hobel CJ et al suggested prenatal and intrapartum high-risk screening for prediction of the high-risk neonate. Goodwin JW et al did antepartum identification of the fetus at risk. Gradations of risk occur even within socially deprived groups and the use of a simple, relatively sensitive screening device of the type presented permits a sharper focus of attention and intensification of effort upon the most vulnerable minority. Morrison I et al related perinatal mortality and antepartum risk scoring. On the other hand, Aubry RH et al did identification and evaluation of high-risk pregnancy. It was seen that by a stepwise multiple regression analysis, actual intrapartum scores are most predictive of neonatal risk (days in hospital) followed by actual prenatal scores. Identifying a population as to their risk status for both the prenatal and intrapartum period has added depth to the understanding of the continuum of risk which exists within the framework of the perinatal period. [21-24] Identification of high risk pregnancy (HRP) plays a significant role in fetomaternal outcome and risk assessment is a part of regular antenatal care. Dutta and Das prenatal scoring form is a simple valid tool that can be used to identify High Risk Pregnancy. Scores are easy to calculate and categorization can be done. The above studies are in close relation to what we have inferred from this study and thus supports our findings and conclusions.

### Conclusion

High risk factors used for calculation can be easily identified by clinical history related to present pregnancy, past reproductive events and associated disease factors & thorough clinical examination & simple routine blood and urine laboratory tests. Obstetric risk scoring is a formalized way of recognizing, documenting, and cumulating antepartum and intrapartum factors to predict later complications for mother, fetus, and infant. If simple, practical, and reliable, risk scoring can be clinically useful in determining appropriate levels of care.

### What this Study add To Existing Knowledge

Majority patients were unaware of high risk factors and were referred cases from various health centers, identification and early detection of high risk factors and close surveillance and appropriate management by specialist may result in better fetomaternal outcomes. Special care to high risk cases creates a critical link in the continuum of care, and may result in decreasing fetomaternal morbidity and mortality. Thus we can reduce maternal mortality and infant mortality rates.

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