International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article.

Assessment of Hobel's Scoring System in High Risk Pregnancy and Its Correlation with Perinatal Outcome in a Tertiary Care Centre

Manish Agrawal[1], Virendra Yadav[2*], Kriti Bhatnagar[3]

[1]Associate Professor, Department of Pediatrics,
Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India.
[2*]Assistant Professor, Department of Pediatrics,
Santosh Medical College & Hospital, Ghaziabad, Uttar Pradesh, India.
[3]Professor, Department of Obstetrics & Gynaecology,
Muzaffarnagar Medical College & Hospital, Muzaffarnagar, Uttar Pradesh, India.

ABSTRACT

Introduction: The perinatal mortality rate has often been used as an index of the level of development in a community. Awareness of the special vulnerability of the cohort of mothers with 'high risk factor' has led to the popular recognition of 'risk approach', involving the optimal use of existing MCH services, providing essential obstetrical care for all with early detection of complications and emergency services for those who need it, thus reducing the need for intensive care along with reduction in perinatal mortality.

Objective: To assess Hobel's antenatal/intrapartum risk scoring system in pregnant women in hospital admissions and its correlation with perinatal mortality.

Materials & Methods: The present study was carried out on 2050 consecutive deliveries from 1st April 2015 to 31st March 2016 at Department of Obstetrics and Gynecology and Department of Pediatrics, Muzaffarnagar Medical College, Muzaffarnagar. All the pregnant women were interviewed and examined in detail at the onset of labor regarding various bio-socio-economic, physical & family characteristics, history of past and present medical and obstetrical complications. A high risk pregnancy screening system devised by Calvin J Hobel et al (1973) was used as an antenatal and intrapartum predictor of perinatal mortality & morbidity. The patients were divided in low (0-9) and high (≥ 10) risk groups. Finally, neonatal outcome as birth weight, gestational age, one minute and five minute apgar scores, and occurrence of morbidity and/ or mortality was evaluated in relation to this score to judge the validity of this high risk pregnancy screening system in prediction of neonatal mortality and morbidity in our set up.

Results: The PNMR (93.66/1000 birth) observed in present study was still at a higher level. Hobel's high risk scoring system was found to be significant at a cut- off score mark of 10 and 15, the sensitivity being higher at 10. This scoring system was though highly sensitive (96.35% and 90.80% for PNM and NNMB respectively) with only 3.65 and 9.2% inclusion of false negative mothers in low risk group but it was not very specific (98.7, 96.16% for PNM and NNMB respectively) with inclusion of high number of false positive mothers (66.14%, 68.0%), who although grouped as high risk, did not show a significant perinatal mortality or neonatal morbidity.

Conclusion: Hobel's scoring system being a screening test for its application in community is still significant and helpful with a high degree of sensitivity and almost rules out neonatal risk in low risk group of mothers. Hobel's scoring system is also significantly correlated with other parameters of neonatal morbidity and perinatal mortality viz. gestational age, birth weight, one and five-minute apgar scores.

Key words: Perinatal Mortality, Neonatal Mortality, Risk Score, Birth Asphyxia, Maternal Risk Factors, High Risk Approach.

***Correspondence to:**

Dr. Virendra Yadav,
Assistant Professor,
Department of Pediatrics,
Santosh Medical College,
Ghaziabad, Uttar Pradesh, India.

Article History:

Received: 24-07-2018, **Revised:** 19-08-2018, **Accepted:** 03-09-2018

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2018.4.5.052	

INTRODUCTION

The perinatal mortality rate has often been used as an index of the level of development in a community. It not only reflects the socio-economic status, educational level and cultural background of the mother but also comments on the quality of medical care provided to the mother and her neonate. Though India has made considerable progress over the last two decades in the area of maternal and child health through innovative and comprehensive health packages that covers the spectrum of Reproductive Child Health (RCH) but despite recent advances in modern obstetrics and neonatal care, India is still facing a high (46/1000) perinatal

mortality rate.[1,2] Awareness of the special vulnerability of the cohort of mothers with 'high risk factor' has led to the popular recognition of 'risk approach', involving the optimal use of existing MCH services, providing essential obstetrical care for all with early detection of complications and emergency services for those who need it, thus reducing the need for intensive care along with reduction in perinatal mortality.[3-5]

REVIEW OF LITERATURE

High Risk Scoring Systems

A high risk pregnancy may be identified by using a scoring systems such as the system developed by Hobel et al (1973). Risk scoring system may be defined as a formalized method of recognizing, documenting and cumulating antepartum, intrapartum and neonatal risk factors in order to predict complications for the fetus and newborn.[6]

Hobel et al. (1973) devised a 'high-risk pregnancy screening system' based on a prospective analysis of prenatal, intrapartum and neonatal factors in 738 pregnancies to predict perinatal mortality and morbidity. Total scores for prenatal, intrapartum and neonatal period were dichotomized to simplify the scoring systems by forming a low risk group (scores <10) and a high risk group (scores ≥10). In low/low risk group (score <10 during both antenatal and intrapartum periods, 46%), the incidence of high risk neonate and perinatal mortality rate was extremely low. There was no significant increase in neonatal morbidity and perinatal mortality in high/low risk group (18%), in low/high risk group (20%) and high/high risk group (16%) there was a significant increase the number of high risk neonates and perinatal mortality. By a step wise multiple regression analysis, he also showed that scores are correlated in a positive way to the infant's stay in the hospital.[6]

Gigliola Baruffi et al (1984) evaluated predictive validity of Hobel's criteria (score ≥10). He concluded that modification and validation of risk assessment methods are necessary when used in populations other than one for which they were originally developed.[7]

Dissevelt A.G. et al. (1976) described an 'antenatal card' used in Kenya since 1972, devised for ANM to facilitate detection of high risk cases. Improvement in quality of prenatal case was attributed to the use of this record. Similar type of card was developed in Dares Salaam, United Republic of Tanjania (Essex B and Everett V 1977, quoted from WHO 1984).[4]

Coopland et al. (1977) devised an 'antepartum high risk evaluation form' scoring reproductive history, medical and surgical associated conditions and present pregnancy complication. Total score between 0-2, 3-6, and ≥7 were considered as low, high and severe risk respectively. In assessment of prognostic value of this scoring method Akhtar J and Sehgal N (1980) found that out of all perinatal death, 70% occurred in 25% of patients (identified as moderate and high risk), indicating usefulness of this method in identification of high risk prenatal patient. While Edwards LE et al. (1979) found no neonatal death in low risk group and 88.6% of all perinatal deaths in high risk group.[8]

Perkin GW (1978) devised a scoring system intended for hospital use to identify the group of postpartum women most likely to be at risk in a subsequent pregnancy so that high risk group would receive contraceptive counseling and intensified Follow-up rate to ensure that contraception was continued. He found positive relation of maternal age, parity, medical and obstetrical history, birth interval and social and economic status with maternal and neonatal morbidity and mortality. Similar association was noted by Puffer R and Serrano CV (1976), Rumean Ronquette (1976), Shapiro Self et al (1965, 1980), Sogbanum M (1979) and Swenson I & Harper P (1979). – (quoted from WHO 1984).[5]

Papiernik E, (1984) gave one to ten points to various sociobiological status, previous medical history, daily habits and current pregnancy complications and score ≥10 was considered at high risk for preterm labour and perinatal mortality and morbidity.[9]

M Kabirullah, et al. (1985) in a cohort study of 432 infants in a village of Bangladesh found that infant mortality decreased with increase in level of education of parents and decrease in family size. It was high in low and high income group compared with medium income group. It was highest in farmers followed by weavers, laborer, service and business. Similar results were found in a study by S Ramji (1989).[10]

Pattison NS et al (1990) developed and applied an antepartum fetal risk scoring system to 29,101 pregnancies taking 21 past and current medical and obstetric factors in consideration. 37% women (score≥3) were found high risk and according for 90% of perinatal mortality with significant increase in perinatal mortality at score ≥7 (PNM 200/1000 live birth).[11]

Dutta and Das (1990) developed a prenatal scoring system based on reproductive history factors, past obstetric history, associated disease factors and present pregnancy factors (individual factor score 0-3). Based on their total scores, the cases were divided into low (0-3), moderate (3-5) and high risk (≥ 6) groups. Subsequently the perinatal outcome variables like birth weight, APGAR score at one and five minutes, birth asphyxia and perinatal mortality were compared with the respective risk scores of the mother.[12,13]

MATERIALS & METHODS

With this view, the present study was carried out on 2050 consecutive deliveries from 1st April 2015 to 31st March 2016 at Department of Obstetrics and Gynecology and Department of Pediatrics, Muzaffarnagar Medical College, Muzaffarnagar. All the pregnant women were interviewed and examined in detail at the onset of labor regarding various bio-socio-economic, physical& family characteristics, history of past and present medical and obstetrical complications.

The statistical analysis consisted of comparison and association of perinatal mortality with various biosocial, antenatal, intrapartum and postnatal variables.

Hobel's High Risk Screening System

A high risk pregnancy screening system devised by Calvin J Hobel, Marcia A Hyvarinen, Donald M, Okada and William OH (1969-1971), published in 1973 was used as a antenatal and intrapartum predictor of perinatal mortality and morbidity.[6]

With slight but essential modifications this scoring technique was applied. A final score in each category was sum of score of factors in that category and thus obtained antenatal and intrapartum scores were divided into low risk and high risk groups. Originally, Hobel used a score of 10 as an arbitrary division line to divide into low (0-9) and high (≥ 10) but Baruffi (1984) found that prognostic ability of Hobel's method was improved when a score of 15 was used as division line. The patients were divided in low and high risk groups using both of these definitions (i.e. low <10, high ≥10

by 1st and low <15 and high ≥15 by 2nd definition). Both definitions were separately evaluated in prediction of neonatal risk and perinatal mortality and morbidity.

Table 1: Pregnancy Risk Assessment (Modified Hobel Score)

OB History Risk Factor	Points
Previous stillbirth	10
Previous neonatal death	10
Previous premature infant	10
Post-term > 42 weeks	10
Fetal blood transfusion for hemolytic disease	10
Repeated miscarriages	5
Previous infant> 10 pounds	5
Six or more completed pregnancies	5
History of eclampsia	5
Previous cesarean section	5
History of preeclampsia	1
History of fetus with anomalies	1
Medical History Risk Factor	**Points**
Abnormal PAP test	10
Chronic hypertension	10
Heart disease NYHA Class II-IV (symptomatic)	10
Insulin dependent diabetes (≥A2)	10
Moderate to severe renal disease	10
Previous endocrine ablation	10
Sickle cell disease	10
Epilepsy	5
Heart disease NYHA Class I (no symptoms)	5
History of TB or PPD>= 10mm	5
Positive serology (for syphilis)	5
Pulmonary disease	5
Thyroid disease	5
Family History	**Points**
Family History of diabetes	1
Physical Risk Factor Risk Factor	**Points**
Incompetent cervix	10
Uterine malformations	10
Maternal age 35 and over or 15 and under	5
Maternal weight < 100 pounds or >200 pounds	5
Small pelvis	5
Current Pregnancy Risk factor	**Points**
Abnormal fetal position	10
Moderate to severe preeclampsia	10
Multiple pregnancy	10
Placenta abruptio	10
Placenta previa	10
Polyhydramnios or oligohydramnios	10
Excessive use of drugs/alcohol	5
Gestational diabetes (A1)	5
Kidney infection	5
Mild preeclampsia	5
Rh sensitization only	5
Severe anemia (<9 g/dL hemoglobin)	5
Severe flu syndrome or viral disease	5
Vaginal spotting	5
Bladder infection	1
Emotional Problems	1
Mild anemia (>9 g/dL hemoglobin)	1
Moderate alcohol use	1
Smoking ≥ 1 pack per day	1

Using this system, four groups of patients were defined:

Group I: (Low/ low risk) - negative antenatal and intrapartum scores.

Group II: (High/ low risk) - positive antenatal and negative intrapartum scores.

Group III: (Low/ high risk) - negative antenatal and positive intrapartum scores.

Group IV: (High/ high risk) - positive antenatal and intrapartum scores.

Finally, neonatal outcome as birth weight, gestational age, one minute and five minute apgar scores, and occurrence of morbidity and/ or mortality was evaluated in relation to this score to judge the validity of this high risk pregnancy screening system in prediction of neonatal mortality and morbidity in our set up.

OBSERVATIONS

Out of total 2050 births registered, there were 1992 singleton deliveries (97.17%) and 58 twin deliveries (2.83%). Overall perinatal mortality rate (PNMR) was 93..66/1000 births, comprising of Still birth rate of 59.03/1000 births and Early neonatal mortality rate of 34.63/1000 births).In twin pregnancies a perinatal mortality rate of 241.3/1000, still birth rate of 103.4 and early neonatal mortality rate of 137.9/1000 was observed. These values are approximately three times higher than singleton deliveries. Approximately 71 % of total subjects were high risk mothers having perinatal mortality rate of 143.9/1000 as compared to perinatal mortality rate of 47.7/1000 in low risk mothers. Hobel's high risk scoring system was found to be significant at a cut- off score mark of 10 and 15, the sensitivity being higher at 10. This scoring system was though highly sensitive (96.35% and 90.80% for PNM and NNMB respectively) with only 3.65 and 9.2% inclusion of false negative mothers in low risk group but it was not very specific (98.7, 96.16% for PNM and NNMB respectively) with inclusion of high number of false positive mothers (66.14%, 68.0%), who although grouped as high risk, did not show a significant perinatal mortality or neonatal morbidity. Intrapartum score was showing more significant association with perinatal mortality and morbidity then antenatal score. A very high perinatal mortality and morbidity was observed in high/high risk group in comparison to low/low risk group.

Table 4 shows a statistically significant inverse relation between antenatal/intrapartum risk score and birth weight. No baby had low birth weight in low/low risk group while approximately 80% babies weighing < 1500 gms were in high/high risk group.

DISCUSSION

The PNMR (93.66/1000 birth) observed in present study was still at a higher level and comparable to that in other studies done by various authors in past in this region.[1,2,3,12,13]

The ten most common prenatal factors observed by Hobel in order of frequency, were family h/o diabetes, mild toxaemia (pre-eclampsia), h/o cystitis, weight < 100 pounds, or > 200 pounds, mild anemia, smoking ≥ 1 pack/day, h/o pyelitis, flu syndrome, previous premature infant and multiparity > 5. While in present study mild anemia (Hb 9.1-11.0 gm%), weight < 40 kg, previous caesarean section, fetal malposition, age ≥ 35 years, severe anemia (Hb < 9 gm%), abortion >1, multiparity, multiple pregnancy and previous perinatal death were found to be ten most common factors.[4,5]

Table 2: Basic Information

Characteristics	Number	Corresponding Rate
Total birth registered after delivery	2050	NA
Singleton deliveries	1992	97.17 %
Twin deliveries	58	2.83 %
Still birth	121	59.03/1000 birth
Early neonatal mortality	71	34.63/1000 birth
Perinatal mortality	192	93.66/1000 birth
High risk mothers	1451	70.78 %

Table 3: Hobel's Scoring System And, Perinatal And Neonatal Outcome (Low 0-9, High ≥ 10)

Hobel's Antenatal/ Intrapartum Risk Score	Total No. (%)	Still Birth		Early Neonatal Mortality		Perinatal Mortality		Neonatal Morbidity	
		No. (%)	Rate (/1000)	No. (%)	Rate (/1000)	No. (%)	Rate (/1000)	No. (%)	Rate (/1000)
Low/Low	599 (29.22)	5 (4.13)	8.3	2 (2.82)	3.3	7 (3.65)	11.6	23 (9.20)	38.4
High/Low	314 (15.32)	14 (11.57)	44.6	3 (4.22)	9.5	17 (8.85)	54.1	12 (4.80)	38.2
Low/High	471 (22.97)	25 (20.66)	53.1	19 (26.76)	40.3	44 (22.92)	93.4	70 (28.00)	148.6
High/High	666 (32.49)	77 (63.64)	115.6	47 (66.20)	70.6	124 (64.58)	186.2	145 (58.00)	217.7

	Predictive Value						
	Sensitivity	Specificity	+ve test	-ve test	X2	d.f.	P value
For PNM	96.35%	31.86%	12.75%	98.7%	120.36	3	0.00000000
For NNMB	90.80%	32.00%	15.64%	96.16%	199.78	3	0.00000000

Table 4: Hobel's Risk Scoring System & Birth Weight (Low 0-9, High ≥ 10)

Hobel's Antenatal/ Intrapartum Risk Score	Total No. (%)	0-999 gms		1000-1499 gms		1500-2499 gms		2500-3999 gms		>4000 gms	
		No. (%)	%	No. (%)	%	No. (%)	%	No. (%)	%	No. (%)	%
Low/Low	599 (25.32)	0 (0.0)	0.0	0 (0.0)	0.0	0 (0.0)	0.0	595 (42.11)	99.33	4 (36.36)	(0.67)
High/Low	314 (15.32)	1 (3.70)	0.32	0 (0.0)	0.0	0 (0.0)	0.0	312 (22.08)	99.36	1 (9.09)	(0.32)
Low/High	471 (22.97)	5 (18.52)	1.06	9 (20.45)	1.91	263 (47.39)	55.84	192 (13.59)	40.76	2 (18.18)	(0.43)
High/High	666 (32.49)	21 (77.78)	3.15	35 (79.55)	5.26	292 (52.61)	43.84	314 (22.22)	47.15	4 (36.36)	(0.60)
Total	2050	27	1.31	44	2.15	555	27.07	1413	68.93	11	0.54

Significance: $x^2 = 760.68$, df = 12, p = 0.00000000

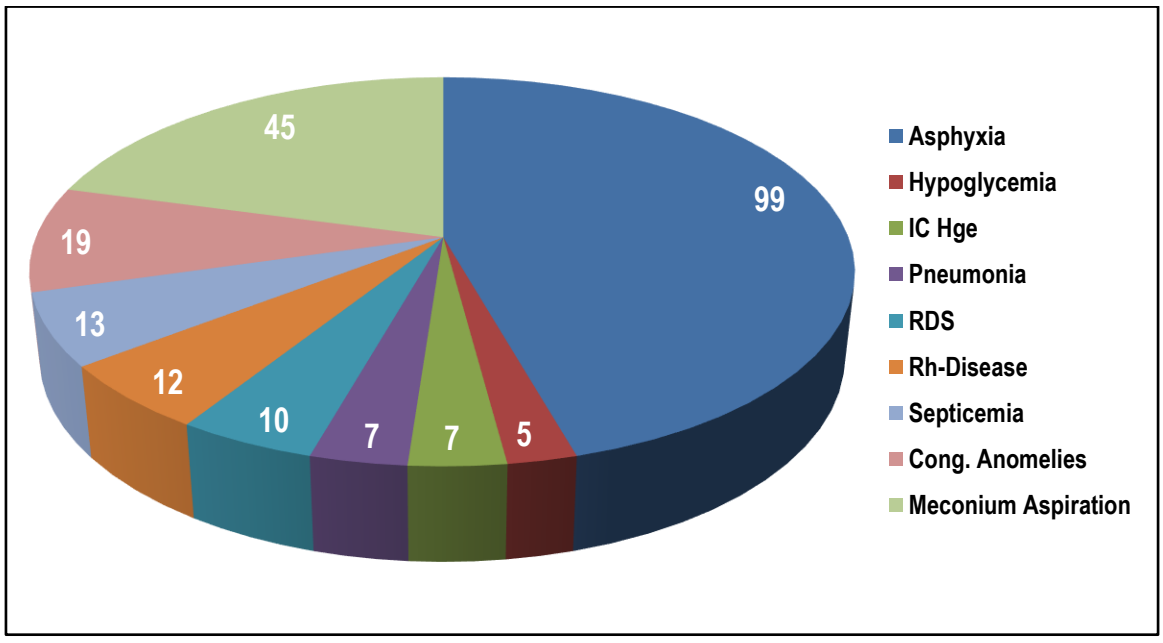

Fig 1: Morbidity/ Mortality Pattern of Neonates in Present Study [Excluding Prematurity (n=145)]

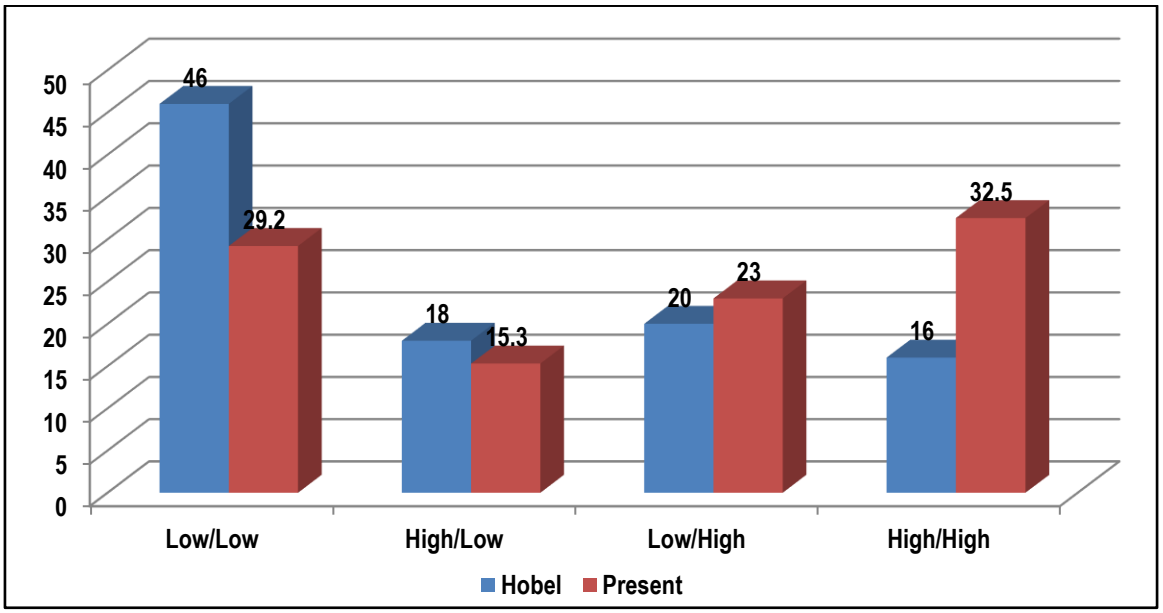

Fig 2: Total Cases (%); Hobel Vs Present Study

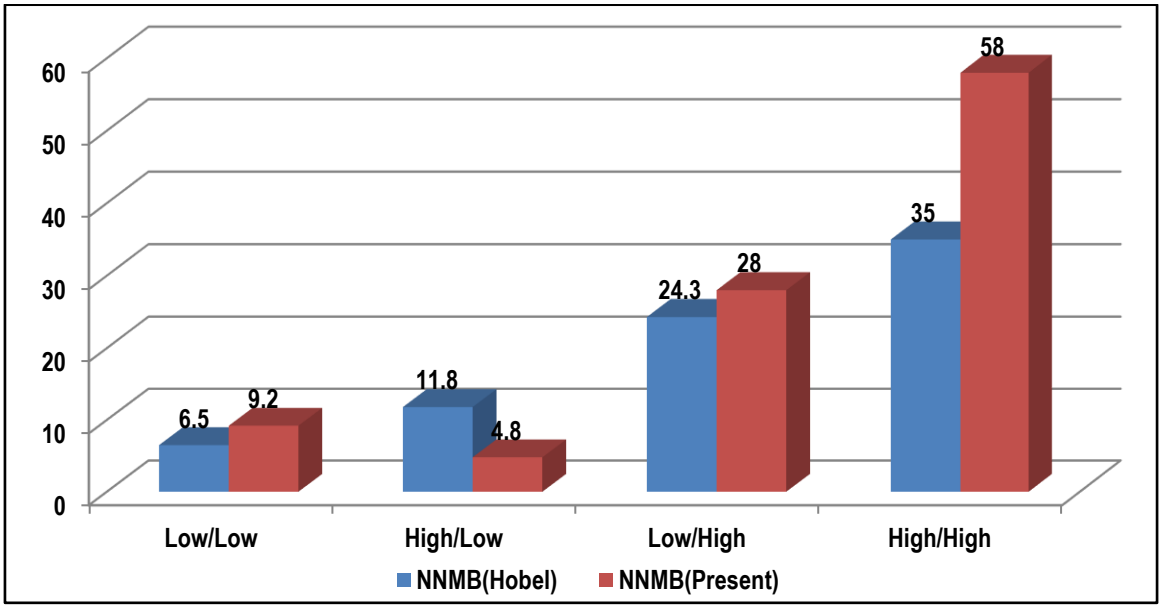

Fig 3: Neonatal Morbidity; Hobel Vs Present Study

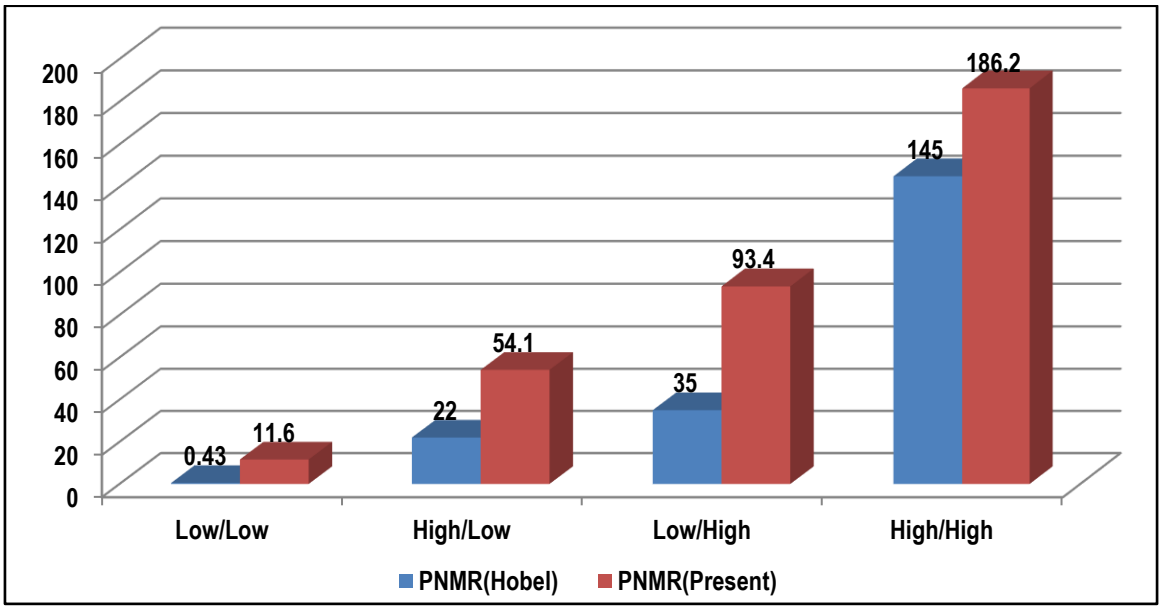

Fig 4: Perinatal Mortality; Hobel Vs Present Study

The ten most common intrapartum items in Hobel's study, in order of frequency, were outlet forceps, mild toxemia, oxytocin augmentation, precipitous labour < 3 hours, prolonged latent phase of labour, medical induction, meconium stained liquor, operative forceps, premature rupture of membranes > 12 hours, and secondary areest of dilatation. While the ten most frequently occurring intrapartum items in our study, in order of frequency, were primary caesarean section, acute fetal distress, leaking PV > 12 hours, meconium staine amniotic fluid, repeat caesarean section, fetal weight , 2500 gms, outlet forceps, breech delivery, prolong labour and antepartum hemorrhage.[4,5]

Morbidity/ Mortality Pattern of Neonates in Present Study

Ten most important neonatal factors in our study were prematurity, asphyxia, meconium aspiration syndrome, congenital anomalies (major), septicemia, Rh hemolytic disease, respiratory distress syndrome, pneumonia, intracranial hemorrhage and symptomatic hypoglycemia.

Total Cases (%)- Hobel Vs Present Study

In Hobel's study maximum cases (46%) were in low/low risk group while in our study maximum cases (32.5%) were in high/high risk group.

Neonatal Morbidity- Hobel Vs Present Study

In low/low group neonatal morbidity was comparable in both Hobel's and present study, showing a very low morbidity (< 10%) while a very high neonatal morbidity was observed in high/high group in our study (58%) than in Hobel's study (35%).

Perinatal Mortality- Hobel Vs Present Study-

Perinatal mortality rate was comparable in both Hobel's and present study, increasing with increase in antepartum/intrapartum risk factors.

Hobel's high risk scoring system was found to be significant at a cut- off score mark of 10 and 15, the sensitivity being higher at 10. This scoring system was though highly sensitive (96.35% and 90.80% for PNM and NNMB respectively) with only 3.65 and 9.2% inclusion of false negative mothers in low risk group but it was not very specific (98.7, 96.16% for PNM and NNMB respectively) with inclusion of high number of false positive mothers (66.14%, 68.0%), who although grouped as high risk, did not show a significant perinatal mortality or neonatal morbidity. Intrapartum score was showing more significant association with perinatal mortality and morbidity then antenatal score. A very high perinatal mortality and morbidity was observed in high/high risk group in comparison to low/low risk group.

CONCLUSION

Hobel's scoring system being a screening test for its application in community is still significant and helpful with a high degree of sensitivity and almost rules out neonatal risk in low risk group of mothers. Hobel's scoring system is also significantly correlated with other parameters of neonatal morbidity and perinatal mortality viz. gestational age, birth weight, one and five-minute apgar scores. Simple training of the grass root workers for identification of these simple but 'high risk determinants should form an integral part of I.E.C. (Information Education and Communication) activities.

ETHICAL CLEARANCE

Taken from Institutional ethical committee.

REFERENCES

1. State of India's Newborns (SOIN) 2014- a report. (Eds) Zodpey S and Paul VK. Public Health Foundation of India, All India Institute of Medical Sciences and Save the Children. New Delhi, India.
2. World bank data on NMR, 2011-15.
3. WHO (2014). The risk approach in public health care, WHO public health paper No.96, 2014.
4. Dissevelt AG (1976). The risk approach in public health care, Quoted from WHO Public Health Paper no. 96, 1984.
5. Perkin GW (1978). The risk approach in public health care, Quoted from WHO Public Health Paper no. 96, 1984.
6. Hobel CJ, Myvarinen MA, Odada DM and Oh W. Prenatal and intrapartum high risk screening I. Prediction of high risk neonate. Am J obs Gyn 117, 1-9, 1973.
7. Baruffi Gigliola et al. Definitions of high risk in pregnancy and evaluation of their predictive validity. Am J Obs Gyn 148, 781-786, 1984.
8. Coopland et al. High risk evaluation form. Cand Medical College Asso J 116, 999-1001, 1977.
9. Papiernik E. Scoring System to identify patients at high risk for preterm labour. Clin Obst Gynae, 11, 315, 1984.
10. M Kabirullah, et al. (1985). Social factors influencing infant mortality. Indian Pediatrics 22, 207-213, 1985.
11. Pattison NS et al (1990). Obstetric risk factors: Can they predict fetal mortality and morbidity? N Z Med J 103(891), 257-259, Jun 13, 1990.
12. Dutta S and Dutta KS. Identification of high risk pregnancy by a simple scoring system. J Obstet Gynecol India 37, 639-642, 1990.
13. Kolluru V and Reddy A. Study of high risk scoring in pregnancy and perinatal outcome. Ind J of Obs & Gyn Research 3(4), 407-409, 2016.

Source of Support: Nil.

Conflict of Interest: None Declared.

Cite this article as: Manish Agrawal, Virendra Yadav, Kriti Bhatnagar. Assessment of Hobel's Scoring System in High Risk Pregnancy and Its Correlation with Perinatal Outcome in a Tertiary Care Centre. Int J Med Res Prof. 2018 Sept; 4(5):229-34.
DOI:10.21276/ijmrp.2018.4.5.052