IDENTIFICATION OF HIGH RISK MOTHERS BY A SCORING SYSTEM AND ITS CORRELATION WITH PERINATAL OUTCOME

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SUMMARY

In the recent years, emphasis has been given to the "risk approach" for improved mother and child health services. The risk scoring system is expected to be an aid for such endeavour. The present study was aimed at developing a simple scoring schedule which could help in identifying the risk mother for effective management. Clinical examination, such as, general examination, systemic examination and obstetric examination were made in 490 mothers attending a MCH clinic to determine the risk factors. The findings were noted in a scoring schedule which was based on the scoring system suggested by Morrison and Alsen. All the mothers were subsequently contacted after delivery and information regarding perinatal morbidity were collected. Five factors were considered e.g. age, parity, past obstetric history, associated maternal diseases and complication during present pregnancy. Numerical score was given to each of the item in the schedule. On the basis of total score mothers were divided into three risk categories i.e. low (0-2), moderate (3-5) and high (6 and above). Study of the three risk categories based on total score in relation to each of the five factors revealed that a significantly high proportion of mothers among those who had unfavourable risk factors associated with their pregnancy could be identified as risk mother. The incidence of maternal morbidity was significantly higher in high risk group and it was about 5 times greater than moderate group and 166 times greater than low risk group. Incidence of low birth weight was also significantly higher in high and moderate risk group as compared to low risk group.

The progress of any nation depends on improvement of health of mothers and children and this consideration led to the formation of special maternal and child health care service all over the world. As the problems affecting the health of mothers and children are multifactorial in origin, the strategy is to provide the MCH services as an integrated package pro-

gramme in order to achieve a greater impact. In the recent years, emphasis has been given to the 'risk approach' for improved mother and child care services. It is an established fact that a high maternal morbidity results in a high maternal mortality and has also deleterious effects on the outcome of pregnancy such as premature birth, small-for-date infants or full-term infants with low reservoir. Infant mortality and perinatal mortality rates are also very high. A study at Safdergunj Hospital, New Delhi (I.C.M.R.) has 1976 revealed that as many as 42.6 per cent of perinatal deaths could be attributed to preventable causes which were directly or indirectly related to maternal diseases, complication of pregnancy and methods of delivery.

The risk approach is a managerial tool for the flexible and rational distribution of existing resources based on the measurement of individual and community risks and for developing local strageties and determing the appropriate content of maternal and child health and family planning care. Inhernt in this approach is maximum utilization of all resources. It also promotes self reliance for health care in the community and the family particularly by mother for the dependent young child.

The present study was aimed at developing a simple risk scoring schedule which could help in identifying the risk mothers for effective management. While developing such schedule care was taken to make the scoring system simple so that the paramedical staff could make use of the same. It is needless to say that the incidence of perinatal loss and perinatal morbidity is very high in a developing country like India. It is imperative to provide proper health care for all by 2000 AD. The risk scoring system is therefore, expected to be an aid for such an endeavour.

Methods and Material

A sample of 310 mothers belonging to the low socio-economic status were selected from the antenatal clinic of Urban Health Centre, Chetla (Practice field of the All India Institute of Hygiene & Public Health, Calcutta). The size of the sample was based on total delivery in one year and available perinatal mortality rate of the study area (Perinatal mortality rate being 21.6/1000). Another set of sample of 180 mothers belonging to higher socio-economic group and attending a nearby nursing home clinic was included. The size of the sample was similarly based on yearly rate of confinement at the nursing home, and their perinatal mortality rate (Perinatal mortality rate being 34.57/1000).

The selected mothers were contacted either in the clinic or in the home after they attained 28 weeks of gestation period. Careful clinical examinations such as general examination, systemic examination and obstetric examination were made in order to determine the risk factors. To identify the mothers 'at risk', a numerical scoring system was evolved based on the scoring system suggested by Morrison & Olsen (1979) and modified to suit the local needs (Vide : Table - I). The observations in each case were recorded in a Prenatal Scoring Form together with other relevant information. Adhoc numerical score was given to each characteristics (risk factors) and at the end these were added to the total score to note the cumulative effect of the factors. The adhoc number of points for each of the characteristics had been based on local experience

TABLE - I
PRENATAL SCORING SCHEDULE

Reproductive history			Associated diseases			Present pregnancy		
Factor		Score	Factor		Score	Factor		Score
1. Age : <16	=	1	Diabetes mellitus	=	3	Bleeding <20 wks	=	1
16-35	=	0				>20 wks	=	3
>35	=	2	Cardiac diseases	=	3	Anaemia <10 gm%	=	1
2. Parity :0	=	2	Ch. Renal diseases	=	2	Hypertension	=	2
1-4	=	0	Previous gyn. surgery	=	1	Oedema	=	3
5+	=	2	Infective hepatitis	=	1	Albuminuria	=	3
3. Past Obstetric history						Multiple Pregnancy	=	3
Abortion/			Pulmonary			Breech	=	3
Infertility	=	1	tuberculosis	=	2	RH-isoimmunisation	=	3
PPH/Manual			Undernutrition	=	2			
removal	=	1	Other diseases					
Baby >4 kgs	=	1	(according to					
(4000 gms)			severity	=	1-3			
Baby <5 1/2 lbs								
(2500 gms)	=	1						
PET/Hypertension	=	1						
Previous caesarean								
Sec.	=	2						
Stillbirth/								
Neonatal death	=	3						
Prolonged labour/								
difficult labour	=	1						

and observation of workers and also the severity of complications. The numerical score allotment to each of the characteristics had been done with a view to compare the outcome of the present study with those of other studies done so far.

All the mothers were subsequently contacted soon and after the 8th day of delivery. During this visit information about maternal complication and perinatal morbidity and mortality were collected in the same questionnaire.

Results

The mothers were classified into three risk groups i.e. low (0-2 score), moderate (3-5 score) and high (6 and above) which is cumulative total of the risk scores

allotted for each of the five risk factors viz. maternal age, parity, past obstetric history, associated diseases with pregnancy and present antepartum complications. Of the total mothers studied (490) about 2/3rd (61.2%) were graded as low risk mother and the rest were high as moderate risk mothers. Only 5.0 per cent of the mothers were in the category of high risk (Table - II).

The perinatal outcome was studied in two socio-economic groups in relation to risk score and was analysed in the Table - III. The incidence of maternal morbidity was higher (50%) in high risk group as compared with moderate (10.2%) and low risk groups (0.3%) and the difference was found to be statistically significant

TABLE - II
RISK-WISE DISTRIBUTION OF MOTHERS ACCORDING TO TOTAL SCORE

Risk group	Risk score	Number of mothers in low socio-economic group	Number of mothers in high socio-economic group	Number of mothers in combined group	Mean score
Low risk	(0-2)	213 (68.7%)	87 (48.3%)	300 (61.2%)	1.07
Moderate risk	(3-5)	89 (28.7%)	77 (42.8%)	166 (33.9%)	3.9
High risk	(6 and above)	8 (2.6%)	16 (8.9%)	24 (4.9%)	7.45

(P<.001). Perinatal mortality was not found in low socio-economic group and only one case was observed in upper socio-economic group and it was due to cord round the neck of the foetus. The incidence of perinatal morbidity was high in high risk group (12.5%) as compared with moderate risk group (7.8%) and significantly low (0.3%) in low risk group (p<.01). The incidence of perinatal morbidity among high risk group of mother was same in both the socio-economic groups and no significant difference was observed in moderate risk group. The incidence of the low birth weight (<2.5 kg) among mothers in high and moderate risk groups was more or less same (20.6 and 21.7 respectively) but the incidence in the low birth weight among high risk mothers, was significantly higher in low socio-economic groups (50%) than those in the upper socio-economic groups (6.3%) (p<.05). There was no maternal death among the studied population.

Perinatal outcome was again studied in relation to risk factors as shown in Table IV. The incidence of low birth weight occurred more frequently among mothers aged less than 15 years and 36 and above. Maternal morbidity and perinatal mor-bidity and perinatal morbidity were higher among primipara and multipara (5+) mothers as compared with mothers with 1-4 parity. Low birth weight was frequently observed among mothers having 1-4 parity (10.2%) and a significant association was observed between parity and birth weight. The incidence of maternal morbidity was high among the mothers having associated diseases during pregnancy (31.2%). Similarly, low birth weight was evident among mothers who had associated diseases with pregnancy (56.3%). The incidence of maternal morbidity, perinatal morbidity and low birth weight were higher among mothers having antepartum complications than those who did not have such complications.

The Table V shows the distribution of mothers by birth weight of babies in two socio-economic groups. It revealed that out of 311 babies delivered by mothers in low socio-economic group (including one twin baby), 39 babies (12.6%) were under-weight (below 2.5 kg) out of whom maximum (11.6%) were weighing between 2 kg to 2.5 kg and weight of the rest was less than 1 kg. In the upper socio-economic group 22 babies (12.2%) were underweight;

TABLE - III

PERINATAL OUTCOME IN TWO SOCIO-ECONOMIC GROUP IN RELATION TO RISK GROUP

Perinatal outcome	Low socio-eonomic group			Upper socio-economic group			Combined group		
	High (n=8) score = 6 & above	Moderate (n = 89) score = 3-5	Low (n=213) score = 0-2	High (n=16) score = 6 & above	Moderate (n = 77) score = 3-5	Low (n = 87) score = 0-2	High (n=24) score = 6 & above	Moderate (n=166) score = 3-5	Low (n=300) score = 0-2
Maternal morbidity	5 (62.5)	4 (4.5)	Nil	7 (43.7)	13 (16.9)	1 (1.1)	12 (50.0)	17 (50.0)	1 (0.3)
Low birth weight (1-2.5 kg)	4 (50.0)	23 (25.8)	12 (5.6)	1 (6.3)	13 (16.9)	8 (9.2)	5 (20.8)	36 (21.7)	20 (6.7)
Perinatal morbidity	1 (12.5)	6 (6.7)	Nil	2 (12.5)	7 (9.1)	1 (1.1)	3 (12.5)	13 (7.8)	1 (0.3)
Perinatal mortality	Nil	Nil	Nil	Nil	1 (1.3)	Nil	Nil	1 (0.6)	Nil

(Figure in brackets indicate percentage)

TABLE - IV
PERINATAL OUTCOME IN RELATION TO RISK FACTORS

Risk Factors	Total mothers	Number of mothers with perinatal outcome				X^2		
		Maternal morbidity	Perinatal mortality	Perinatal morbidity	Low birth weight	Maternal morbidity	Perinatal morbidity	Low birth weight
Maternal age								
<15	3	1 (33.3)	Nil	Nil	2 (66.7)	p>.05	p>.05	p<.001
15-35	465	26 (5.6)	1 (0.2)	14 (3.0)	51 (11.4)			
>36	22	3 (13.6)	Nil	3 (13.6)	8 (36.4)			
Parity								
0	207	21 (10.1)	1 (0.3)	10 (4.8)	26 (12.6)	p<.005	p>.05	p<.05
1-4	245	7 (2.9)	Nil	5 (2.0)	25 (10.2)			
5+	38	2 (5.3)	Nil	2 (5.3)	10 (26.3)			
Past Obstetric History								
Poor	97	3 (3.1)	1 (1.0)	4 (4.1)	11 (11.2)	p>.05	p>0.05	p<.05
Normal	393	27 (6.9)	Nil	13 (3.3)	50 (12.7)			
Associated diseases								
Present	32	10 (31.2)	Nil	3 (4.9)	18 (56.3)	p<.001	p>.05	p<.001
Absent	458	20 (4.4)	Nil	14 (3.1)	43 (9.4)			
Antepartum Complications								
Present	152	23 (15.1)	Nil	11 (7.2)	34 (22.4)	p<.001	p<.05	p<.001
Absent	338	7 (2.1)	Nil	6 (1.8)	27 (8.0)			
Total	490	30 (6.1)	1 (0.2)	17 (3.5)	61 (12.4)			

TABLE - V
DISTRIBUTION OF MOTHERS BY BIRTH WEIGHT OF BABIES IN TWO SOCIO-ECONOMIC GROUPS

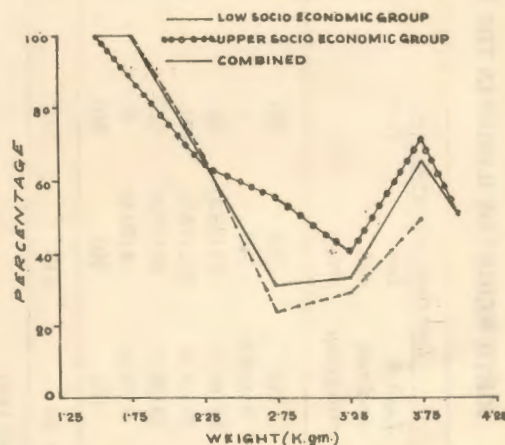| Birth weight (In Gms)	Low socio-economic group	Upper socio-economic group	Combined group
1000-1499	Nil	1 (0.5)	1 (0.2)
1500-1999	3 (1.0)	Nil	3 (0.6)
2000-2499	36 (11.5)	21 (11.7)	57 (11.6)
2500-2999	201 (54.6)	68 (37.8)	269 (54.8)
3000-3499	65 (20.9)	74 (41.1)	139 (28.3)
3500-3999	6 (1.9)	14 (7.8)	20 (4.1)
4000+	Nil	2 (1.1)	1 (4.1)
Total	311*	180	491
Mean Birth weight	2.7	2.9	2.8

* including one twin.

again, there were 1.1 per cent babies weighing 4 kg and above.

The birth weight of babies in two socio-economic groups were analysed in relation to risk score as shown in Table VI. It was observed that proportionately mothers who delivered low birth weight babies were greater in high and moderate risk groups compared to those in low risk group. This proportion sharply declined with the increase in the birth weight upto 3.5 kg and increased thereafter. The bottom of the curve (Figure I) suggested that the proportion of high and moderate risk mothers who delivered normal weight baby was minimum and these mothers delivered both underweight as well as overweight babies depending on risk factor. Since birth weight had also been considered as a cause variable factor for a risk scoring when the same was again treated as effect variable (pregnancy outcome).

The mean birth weight of babies in two socio-economic groups was again stud-ied in relation to total score as shown in Table VII. It revealed that the mean birth weight remained insensitive to the variation in the score from 0-2 (low risk group) and shows a declining tendency with the increase in the risk score 3 and thereafter

Birth weight of babies delivered by high and moderate risk mothers shown as percentages to total mothers

TABLE - VI
BIRTH WEIGHT OF BABIES IN THE TWO SOCIO-ECONOMIC GROUPS IN RELATION TO RISK SCORE

Birth Weight (in kg)	Low Socio-economic group			Upper Socio-economic group			Combined group		
	High & moderate risk group	Low risk group	Total	High & moderate risk group	Low risk group	Total	High & moderate risk group	Low risk group	Total
<1.5	Nil	Nil	Nil	1 (100.0)	Nil	1	1 (100.0)	Nil	1
1.5-1.9	3 (100.0)	Nil	3	Nil	Nil	Nil	3 (100.0)	Nil	3
2.0-2.4	24 (66.7)	12 (33.3)	36	13 (61.9)	8 (88.1)	21	37 (64.9)	20 (35.1)	57
2.5-2.9	49 (24.4)	152 (75.6)	201	38 (55.9)	30 (44.1)	68	87 (31.2)	182 (68.8)	269
3.0-3.4	19 (29.2)	46 (70.8)	65	30 (40.5)	44 (59.5)	74	49 (35.3)	90 (64.7)	139
3.5-3.9	3 (50.0)	3 (50.0)	6	10 (71.4)	4 (28.6)	14	13 (65.0)	7 (35.0)	20
4.0+	Nil	Nil	Nil	1 (50.0)	1 (50.0)	2	1 (50.0)	1 (50.0)	2
Total mother	90	213	311*	93	87	180	191	306	491

* including one twin.

TABLE - VII
MEAN BIRTH WEIGHT OF BABIES CLASSIFIED ACCORDING TO TOTAL RISK SCORE OBTAINED

Total Risk Score	Low Socio-economic group			Upper Socio-economic group			Combined group		
	No. of mother	Mean birth weight (kg)	S.D.	No. of mother	Mean birth weight (mg)	S.D.	No. of mother	Mean birth weight (kg)	S.D.
0	100	2.78	0.26	17	2.96	0.29	117	2.83	0.28
1	33	2.75	0.26	13	2.95	0.31	46	2.80	0.30
2	80	2.76	0.28	57	2.88	0.42	137	2.81	0.35
3	36	2.70	0.35	32	2.89	0.39	38	2.79	0.38
4	30	2.64	0.35	16	2.78	0.49	46	2.69	0.41
5	24*	2.49	0.34	29	2.89	0.51	53	2.70	0.48
6	4	2.56	0.70	6	3.05	0.36	10	2.90	0.50
7+	4	2.46	0.58	10	3.26	0.47	14	3.03	0.56
Total	311	2.67	0.31	180	2.91	0.43	491	2.77	0.38

*including one twin baby.

(r=69) in low economic group. But in upper socio-economic group, the declining tendency halted at score 5 and started increasing.

Discussion

This study was aimed at developing a simple risk scoring schedule which could help in identifying the risk mothers for effective management. In order to develop the scoring system and to correlate the perinatal outcome with the risk score for testing its validity, 490 pregnant mothers were included in the study. Of the total mothers studied, about 2/3rd (61.2%) were graded as low risk and the rest were high or moderate risk mothers. Only 5 per cent of the mothers were in the category of high risk. Nesbitt and aubry (1969) observed high percentage of high risk mothers (29%), Walter (1980) while following up 328 women identified 20 per cent women at risk.

Risk factors are, in fact, characteristics that have significant association with a defined end point i.e. outcome for which each risk factor or a group of factors is sought. Identification of risk factors, therefore, begins with the observations of its association with undesired outcome. The purpose of the scoring was to classify individuals or groups into different risk categories, on the babies of allotted scores for each of the risk factors, who were expected to contribute disproportionately to undesired outcome. Evaluation of the scoring system was therefore, one of the primary objectives of the study. The most important and ultimate outcome of pregnancy was the 'perinatal outcome' comprising of maternal morbidity and mortality, perinatal morbidity and mortality and low birth weight. The incidence of maternal morbidity was significantly higher in high risk group and it was about 5 times greater than moderate risk group and 166 times greater than low risk, indicating that the chance of maternal morbidity among low risk mother was negligible. Similar results were also obtained by Nesbitt and Aubry (1969) and Morrison and Oslea (1979). The incidence of perinatal morbidity was also significantly greater in the high risk group as compared to moderate and low risk group and 42 times greater than low risk group. The incidence of low birth weight was also significantly higher in high and moderate risk groups as compared to low risk group. The incidence of low birth weight in high and moderate risk groups was about 3 times greater than low risk group as only 6.7 per cent of mothers in the low risk group delivered under weight babies as compared to 21.4 per cent in high moderate risk groups. Savita Rani et al. (1980) observed that incidence of low birth weight increased with increase of risk. Nesbitt and Aubry (1969), however, reported a higher incidence (10%) of low birth weight baby among low risk mothers. Giffons (1981) emphasised that the incidence of low birth weight could be reduced by taking proper steps in reducing the risk.

A comparative study of the two socio-economic groups with regard to the body weight showed that incidence of low birth weight was higher in the high risk group of mother belonging to the low socio-economic group. Saigal and Srivastava (1969) observed significantly higher incidence of low birth weight in women with low socio-economic group.

From the above study it may be concluded that the factors included in the risk scoring system were relevant for determining the risk groups through scoring.

As the success of the scoring system depends on its validity, the result of the present study showed that through scoring it was possible to identify mothers who were expected to contribute disproportionately to poor pregnancy outcome since a consistant trend was noted with the higher score to yeild the poorest obstetric results. These finding were in corroboration of similar findings where association between pregnancy outcome and individual risk factors were studied.

The main objective of the "At risk" approach is the optimal use of existing resources for the benefit of the majority. Through identification of mothers at risk, the minimum care for all could be ensured while providing guidelines for the diversion of limited resources to those who most need them.

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