

Effectiveness of Low Birth Weight Prevention Programme on Maternal and Neonatal Outcome of High Risk Pregnant Women

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Abstract

Low birth weight is the single most important factor determining the survival chances of the child. The infant mortality rate is about 20 times greater for all low birth weight babies than other babies. By reducing the birth of low birth weight infants, the health of infant improves. Low birth weight could be reduced if key interventions are systematically applied during antenatal period. The present study using quasi-experimental time series non-equivalent control group design was conducted on 291 sample subjects in a selected hospital of Kashmir (J&K, India) to determine the effectiveness of low birth weight prevention programme on the maternal and the neonatal outcome of high risk pregnant women to reduce the incidence of low birth weight babies and have better maternal and neonatal outcome. The study revealed a significant difference in maternal and neonatal outcome of experimental group of high risk pregnant women (149) as compared to control group of high risk pregnant women (142).

Low birth weight (LBW) babies are at higher risk of early neonatal complications like birth asphyxia, sepsis, respiratory complications, intracranial haemorrhage with poor survival rate (Farooq, 1996). It is an important determinant of infant mortality in Kashmir Valley.

Women whose pregnancy may be complicated by any medical or behavioural disorder, deliver the baby before completion of appropriate gestational period (pre-term) or if born at appropriate gestational period (full term) are usually weak and underweight i.e., less than 2500 gm. These medical disorders may include anaemia, hypertension and diabetes. High incidence of low birth weight (48.48%) and pre-term birth (24.24%) from Srinagar with one or more risk factors including anaemia, hypertension and diabetes has been reported. Pre-term birth and low birth weight is preventable if the pregnant woman is studied during the entire pregnancy specifically at 20th to 36th week, educated individually or in groups, cared closely by obstetrician, physician, nurse and nutritionist and encouraged for regular check-ups and timely reporting of any danger signs. In this context, it is imperative to develop LBW prevention programme, which could be implemented during an-

tenatal period and assess its effectiveness on pregnancy outcome. The present study was therefore undertaken.

Objectives

This study had the following objectives:

1. To compare maternal and neonatal outcomes of high risk pregnant women of experimental group with that of control group of high risk pregnant women;
2. To associate maternal and neonatal outcome with (a) selected risk factors of pregnant women and (b) associate maternal and neonatal outcome with demographic factors of high risk pregnant women.

Hypotheses

H₁ There is significant difference in the maternal outcome of experimental group as compared to control group of high risk pregnant women after implementation of LBW prevention programme at 0.05 level of significance.

H₂ There is significant difference in the neonatal outcome of experimental group as compared to control group of high risk pregnant women after implementation of LBW prevention programme at 0.05 level of significance.

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H₃ There is significant association of maternal and neonatal outcome with selected risk factors of pregnant women at 0.05 level of significance.

H₄ There is significant association between maternal and neonatal outcome and selected demographic characteristics of high risk pregnant women at 0.05 level of significance.

Review of Literature

Mufti (2004) studied correlation of high risk pregnancy with perinatal outcome on 400 women in Srinagar hospital, India. She revealed that the incidence of LBW increased from 1.5 percent in no risk group to 12.3 percent in low risk; 17.64 percent in moderate risk and 48.48 percent in high risk group. The incidence of low birth weight babies in women with risk factors was 17.11 times more than in women with no risk and this association was significant ($p < 0.00002$). The incidence of LBW babies in women of high risk group was 61.8 times higher. The incidence of pre-term births increased from 2 percent in control group to 12.32 percent in low risk group to 15.68 percent in moderate risk and 24.24 percent in high risk group; 44 babies in case group and 2 babies in control group had Apgar score < 7 and majority of women delivered by instrumental vaginal or caesarean section. Regarding perinatal mortality, it was found high in low (< 16 years) or high age group (above 35 years), in grand multiparas (25%). The most common causes reported for perinatal morbidity and mortality were low birth weight (20.6%), birth asphyxia (17.3%) and prematurity (16.3%).

Roy & Chakraborty studied maternal and perinatal outcome among severe anaemia in West Bengal and showed that haemoglobin of < 10 gm % had increased the incidence of low birth weight by 46.31 percent. Mothers with severe anaemia (< 6 g%)

needed blood transfusion in higher proportion as compared to women whose haemoglobin was > 8 gm %.

Barker (2011) studied relation of type 2 diabetes mellitus, hypertension and hyperlipidaemia to reduced foetal growth which they revealed to occur due to placental insufficiency depriving the foetus of essential nutrients. The incidence of intra uterine growth retardation related to diabetes was 16.87 percent and to hypertension was 43.12 percent.

Sushila (2007) studied effectiveness of self-care strategies on pregnancy induced hypertension, maternal and perinatal outcome among primigravidae in Chennai from 2003-2007. In study group 8.7 percent mothers had PIH but in control group 15.3 percent had PIH with associated complications more than study group. Though the perinatal outcome between the groups did not show any significant difference but intra-uterine growth retardation (IUGR) incidence was high in control group.

Conceptual framework of the study was based on Roy's Adaptation Theory (Fig 1).

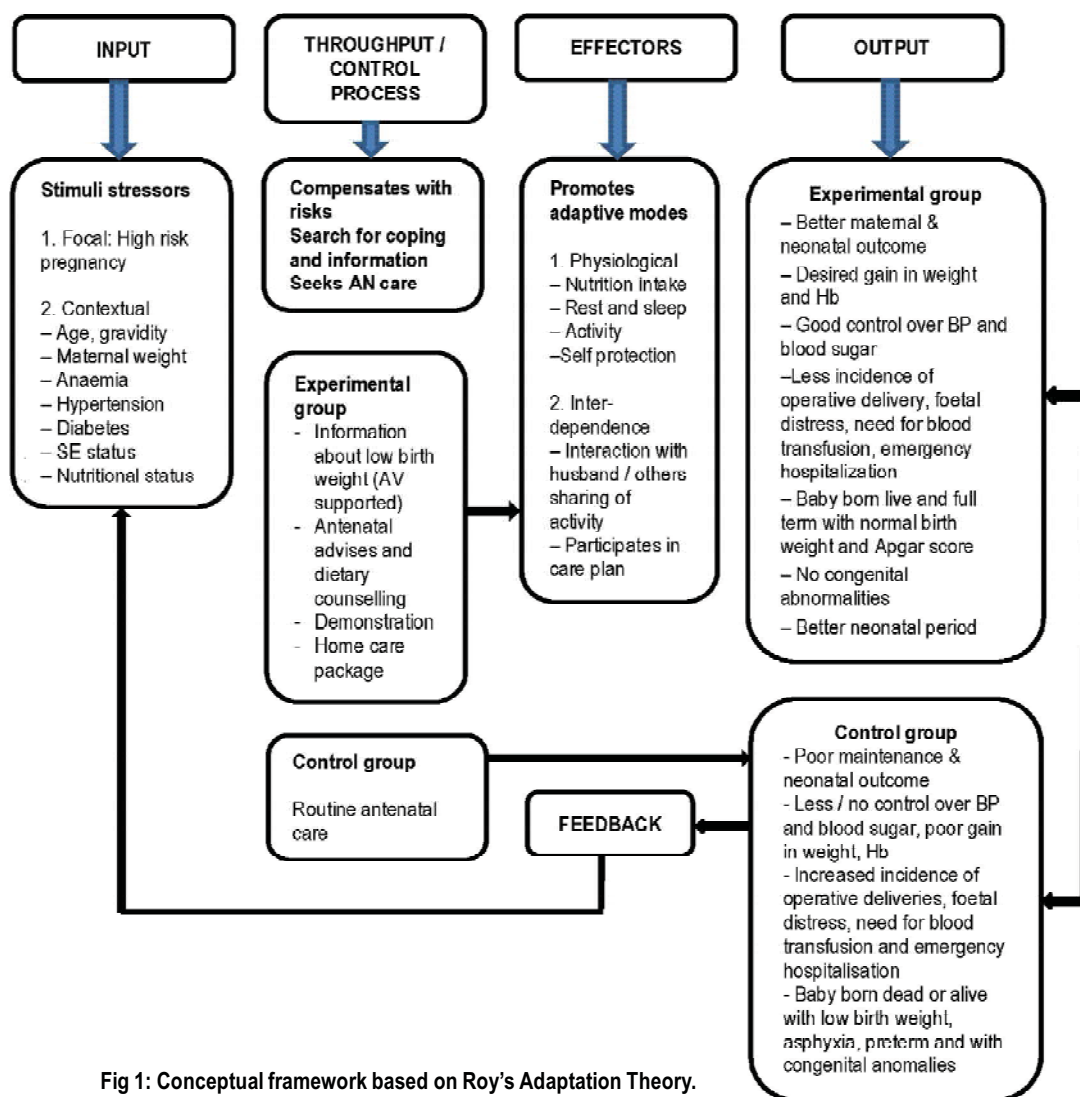


Fig 1: Conceptual framework based on Roy's Adaptation Theory.

Table 1: Distribution of Subjects among Experimental Group and Control Group according to Demographic Characteristics (N=291)

Demographic Characteristics	Experimental Group N=149	Control Group N=142	p-Value
1. Age (mean $\pm$ SD)	29.77 $\pm$ 5.40	28.98 $\pm$ 5.81	0.229
Less than 20 years	7 (4.69%)	8 (5.63%)	
20-30 years	73 (49%)	76 (53.52%)	
More than 30 years	69 (46.31%)	58 (40.85%)	
2. Socio economic status			0.443
High	19 (12.75%)	14 (9.86%)	
Middle	90 (60.40%)	81 (57.04%)	
Low	40 (26.85%)	47 (33.10%)	
3. Exposure to smoke			0.242
Mild	40 (26.85%)	32 (22.54%)	
Moderate	103 (69.13%)	108 (76.05%)	
Severe	06 (4.02%)	02 (1.41%)	
4. Nutritional status			0.175
Good	30 (20.13%)	40 (28.17%)	
Average	78 (52.35%)	73 (51.41%)	
Fair	41 (27.52%)	29 (20.42%)	
5. No. of living children			0.001**
None	86 (57.72%)	94 (66.20%)	
One	36 (24.16%)	35 (24.64%)	
Two	25 (16.78%)	04 (2.82%)	
Three and above	02 (1.34%)	09 (6.34%)	
6. Gravidity			0.26
Primigravida	66 (44.29%)	79 (55.64%)	
Second gravida	35 (23.49%)	34 (23.94%)	
Multigravida	43 (28.86%)	21 (14.79%)	
Grand multigravida	05 (3.36%)	08 (5.63%)	

** Significant at 0.01 level

Methodology

A quantitative research approach and quasi-experimental time series non-equivalent control group design was used. The study was conducted in ANC, LR, post-natal wards, NICU of SKIMS, Srinagar. Sample consisted of 291 pregnant women with anaemia, hypertension or diabetes with gestational age of 16 weeks. Purposive sampling technique was used to select the sample of high risk pregnant women, however simple random sampling was utilised to draw the study subjects from each of the selected high-risk category of pregnant women.

Data Collection

Permission was taken to utilise a separate room in antenatal clinic for collecting data and implementing the intervention. At week 16 of gestation, high risk pregnant women were identified, explained about the purpose of the study, consent obtained and a list of women with number name i.e. Anaemia (A₁, A₂...), Hypertension (H₁, H₂...) and Diabetes (D₁, D₂....) was prepared, wrote these number names on a chit of paper, placed them in a bowl and then 60 percent chits were drawn every day. The 150 pregnant women selected first were assigned to experimental group and next 150 pregnant women to control group. A minimum number of six and maximum number of eight subjects were studied per day.

Data was collected and baseline assessment was done using interview schedule and assessment proforma. Intervention was administered systematically only on experimental group during 16th and 20th weeks of gestation which included information about low birth weight and pre-term birth (audio-visual supported); antenatal and dietary advises with use of a pictorial flip chart; demonstrations; and homecare-package according to their respective high risk factor.

Control group was given routine care only. The researcher recorded and preserved their contact numbers as well, to ensure follow-up at 24th, 28th, 32th and 36th week when their parameters were reassessed to determine maternal outcome among both the groups. The neonates were assessed using observation checklist at the time of birth, for immediate neonatal outcome and then within first 24 hours of delivery for early neonatal outcome. The records were also assessed wherever needed. Due to attrition of sample, the study could be completed with 291 subjects having 149 in experimental group and 142 in control group.

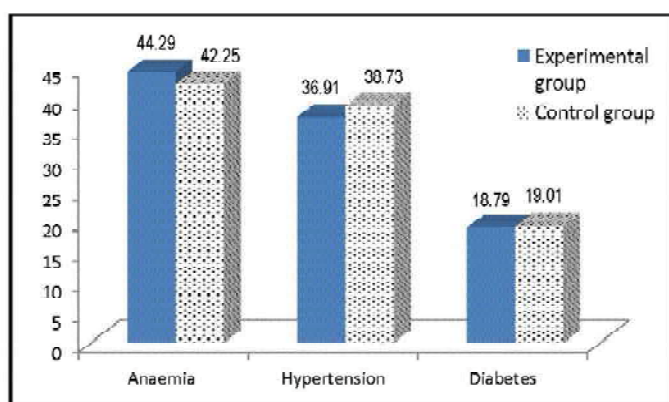
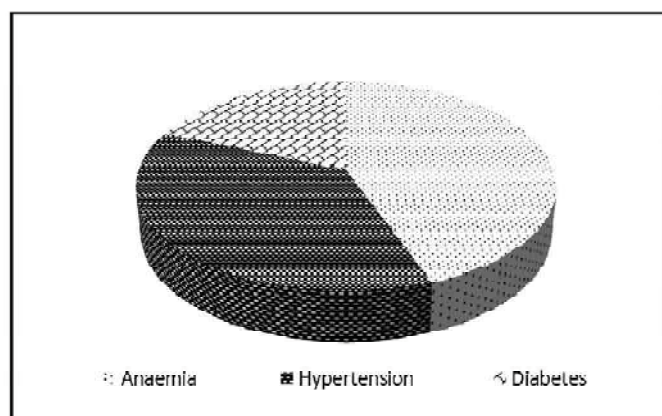


Fig 2 (A&B): Distribution of subjects in Experimental and Control Group according to risk factors of pregnancy.

Results and discussion

Mean age of subjects was 29.77 ± 5.40 years in experimental group and 28.98 ± 5.81 years in control group. Maximum number of subjects from both groups belonged to age group of 20-30 years, middle socio economic class, had moderate exposure to smoke, average nutritional status, no living child and were primigravidae (Table 1).

Majority of high risk women comprised anaemic subjects (43.3%) and hypertensive subjects (37.8%) whereas only 18.9% were diabetic (Fig 2A). Out of 291 subjects, 126 (43.3%) were anaemic, 110 (37.8%) were hypertensive and 55 (18.9%) were diabetic. Among 149 subjects of experimental group, 66 (44.29%) had anaemia; 55 (36.91%) had hypertension; and 28 (18.79%) had diabetes. Among 142 subjects of control group, 60 (42.25%) had anaemia; 55 (38.73%) had hypertension; and 27 (19.01%) had diabetes (Fig 2B).

On comparing physical and physiological parameters between subjects of two groups at various weeks of gestation, the mean weight and haemoglobin of experimental group was found to be higher, whereas mean blood pressure level and mean fasting blood sugar level of experimental group was found to be less than normal as compared to the control group ($p < 0.05$). The mean fundal height of subjects from 16-36 weeks of gestation did not show any significant difference in between the two groups. The mean foetal heart rate of subjects varied at various weeks among the groups but was within normal limits. Foetal movements were present in all the experimental subjects whereas, in control subjects, foetal movement was absent in 1.41 percent during 32nd and 10.56 percent during 36th weeks of gestation who delivered still birth babies. Similar findings were reported by Amin & Ali (2001) and Kousar (1999). For analysis of variables formulated hypotheses were stated in null form

Maternal Outcome

Majority of subjects in experimental group gained weight normally (91.95%), had good control over blood pressure (73.83%) and blood sugar (98.66%) as compared to subjects in control group (54.93%; 64.79%; 87.32% respectively; $p < 0.01$). These findings are consistent with findings of Kousar (1999), Sushila (2007), Mattoo (2007). Foetal distress was absent among majority of subjects in experimental group (85.91%) as compared to subjects in control group (47.89%). Mattoo (2007) reported similar results by showing no evidence of foetal distress in experimental group of gestational diabetic mellitus (GDM) women (86.4%) who attained normal blood pressure and glycaemia levels. Experimental group subjects needed 2.99 times

less blood transfusions and 10.65 times less emergency hospitalisation than control group ($p < 0.01$). Among experimental group of anaemic subjects, need for blood transfusion was 3.18 times less than their control subjects ($p < 0.01$). Similar results were revealed in the study of Gupta (2003).

Since all the maternal outcome variables of experimental group were better than control group and were significant at 0.05 level of significance, thus the researcher rejects the null hypothesis and accepts the research hypothesis which states that there is significant difference in maternal outcome between experimental and control group of high risk pregnant women.

Neonatal Outcomes

Majority of subjects in experimental group delivered babies by normal vaginal delivery (79.87%), live babies without distress (97.31%), normal birth weight babies with normal Apgar score (83.22%), had good condition during early neonatal period of first 24 hours (90.60%) as compared to control group (55.63%, 49.29%, 66.90%, 47.89%, respectively; $p < 0.01$). Majority of subjects in control group delivered both pre-term (18.31%) and very pre-term babies (3.52%); low birth weight (22.54%) and very low birth weight babies (10.56%) or large babies (by diabetic subjects-33.33%); delivered babies with mild asphyxia (32.39%) or severe asphyxia (19.72%); thus showing that intervention was effective. Sushila (2007) also observed higher number (42.7%) of operative interventions in control group than study group (19.7%). China (2006) and Mani (2000) reported increased incidence of caesarean section.

Since all the neonatal outcome variables of experimental group were better than control group and were significant at 0.05 level of significance, the researcher rejected the null hypothesis and accepts that there is significant difference in neonatal outcome between experimental and control group of high risk pregnant women.

Association of maternal and neonatal outcome with selected risk factors of pregnant women

Multivariate logistic regression was done to associate maternal and neonatal outcome with risk factors of pregnancy. The findings revealed significant association of gain in weight with diabetic subjects, control over blood pressure with hypertensive and diabetic who needed fewer blood transfusions than anaemic subjects. These findings are consistent with those of Sushila (2007). Hypertensive subjects delivered less pre-term and low birth weight babies than anaemic subjects thus their neonates showed

good neonatal condition in early neonatal period of 24 hours. These findings are consistent with those of Farooq (1996).

Since there was a significant association of some maternal and neonatal outcome variables with risk factors of pregnant women null hypotheses is partially rejected and partially accepted.

Association of maternal and neonatal outcome with selected demographic characteristics of high risk pregnant women

Multivariate logistic regression is done to associate maternal and neonatal outcome with demographic characteristics of high risk pregnant women. There was highest association of gain in weight in subjects with good nutritional status and with age group of 20-30 years in comparison to age group of > 30 years of subjects ($p < 0.05$). The findings are consistent with the findings of studies conducted by Kousar (1999) and Mattoo (2007).

Association of neonatal outcome with demographic characteristics in terms of mode of delivery, birth status, gestational age, birth weight and early neonatal condition was found to be significant at 0.05 level ($p < 0.05$). Similar observations were made by Kousar (1999) Mattoo (2007).

Since there was a significant association of some maternal and neonatal outcome variables with demographic characteristics of high risk pregnant women, null hypotheses was partially rejected and partially accepted.

Implications

The maternal, perinatal and neonatal deaths related to low birth weight, prematurity, asphyxia etc. can be prevented by early identification and screening of high risk factors and adoption of prompt and appropriate measures including nursing interventions. Implementing such programs during prenatal period enhances better health practices and improves pregnancy outcome. Nurses working in antenatal OPDs can intensify their efforts to inform pregnant women especially high risk women and motivate them to modify their practices during crucial antenatal period. They can use this intervention package at different gestational weeks and can assess them at every visit so that pregnant women is further reinforced for adopting better antenatal practices.

Low birth weight prevention programme can be conducted in community setting as well and it should be made available to women on each visit and whenever required. Information booklet is the cheapest and best way to enhance the accessibility, availability and quality of services. The clinical teachers

should be well prepared for training and supervising students' clinical teaching, guiding them in preparing audio visual aids and self-learning material for mothers with different educational background, building flexibility in the system to use most suited teaching strategies and to use active nursing interventions for high risk pregnant women.

There is need to prepare clinical nurse specialists and independent nurse midwifery practitioners and make them skilful who can serve as resource persons for other nurses, clients and their families. Their availability can make antenatal services cost effective.

Recommendations

- ❑ A similar study can be replicated on pregnant women with other risk factors of pregnancy.
- ❑ A comparative study can be conducted on pregnant women from rural and urban area.
- ❑ A similar study can be conducted on staff nurses to find out their knowledge about low birth weight and its prevention.
- ❑ Prospective study can be conducted on pregnant women who had past history of low birth weight babies or high risk pregnancy to find out their perinatal, neonatal and infant status.

Conclusion

Since there was significant difference in all the maternal and neonatal outcome variables between experimental and control group subjects, it is clear that nurses are unable to address to the problems of high risk group of women in highly crowded antenatal clinics and cannot counsel them, which may be probably due to posting of one staff nurse in antenatal clinic who remains busy in immunising and giving iron infusions.

The subjects with high socio economic status delivered babies more by caesarean section which may be related to their sedentary life style. Subjects with middle socio economic status delivered live and full term babies more which may be probably due to good nutritional status in middle class. Primigravida subjects delivered more full term babies which indicates that increase in parity leads to delivery of baby who is pre-term and has low birth weight.

Hypertensive and diabetic subjects needed fewer blood transfusions than anaemic subjects which were due to low haemoglobin levels in anaemic subjects. The highest association of control over blood pressure was seen in hypertensive and diabetic subjects as anaemic subjects were subjected to low blood pressure levels.

The anaemic subjects delivered more pre-term and low birth weight babies. The low haemoglobin levels in anaemic subjects reduce the nutritional reserves of these women and may lead to pre-term delivery of baby who has usually birth weight less than normal.

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