Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2014; 2(6H):3445-3451 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com **DOI:** 10.36347/sjams.2014.v02i06.122

Research Article

Maternal Nutritional Status on Fetal Outcome

Dr. Kavita J Lall[1*], Dr. Dinesh Lall[2]
[1]MD, Assistant professor, Department of Pediatrics, Pt JNM Medical College, Raipur (CG)
[2]MD, Consultant, Pediatrics, Anjali Children Hospital, Raipur (CG)

***Corresponding author**
Dr. Kavita J Lall

Abstract: ***Introduction:*** New born babies constitute the foundation of life. Healthy and smiling babies are likely to evolve as physically and mentally strong adults with enhanced quality of life. The neonatal as well as fetal life both form a continuum during which human growth and development are affected by genetic, intrauterine and extrauterine environment which can be predicted by certain maternal characteristics. ***Aim & Objective*****:** To study the effect of maternal nutritional status on fetal outcome. ***Material and Methods*****:** To evaluate 500 live births in relation to maternal and neonatal factors and correlation of anthropometric measurements. The incidence of beneficiaries availing the antenatal care facilities was also studied and their correlation with neonatal outcome was analysed. It is a random study based on interview of pregnant women admitted in the antenatal wards. ***Results*****:** Mothers having gestational weight < 50 kg had incidence of 29.4% which indicate malnutrition. While 47.4% mothers had weight between 50-60 kg and 23.2% mothers had weight > 60 kg. 27.8% mothers had height < 145 cm indicate short stature which is suggestive of chronic malnutrition, between 145-155 cm incidences is 40.4% and > 155 cm incidence is 31.8%. 79% of mothers had anaemia of which 9.6% had severe anaemia, 10.8% had moderate anaemia and 38.6% had mild anaemia. ***Discussion*****:** maximum Incidence (77.1%) of low birth weight babies, delivered by mothers having severe anaemia (Hb<6gm%) while 42.2% in moderate anaemia and 34.7% in mild maternal anaemia while only 21.9% (lowest) of LBW babies delivered by mothers having no anaemia. Reflects that highest incidence of premnturity in babies were seen in mothers having severe anaemia followed by 24.7% with moderate and 13.3% with mild anaemia. ***Conclusion*****:** Out of 500 live births 90.6% were normal labour while 13.6% were abnormal labour of which 9.4% constituted LSCS delivery. There was slight female predominance of 56.8% while male child born were 43.2% of 500 born neonates. 20.4% were preterm, 75.6% were full term and 4% born were post term. Nearly one third babies had low birth weight, 38.4% while 61.6% had birth weight more the 2.5 kg.
Keywords: Maternal Nutritional, Fetal Outcome, New born babies etc.

INTRODUCTION

New born babies constitute the foundation of life. Healthy and smiling babies are likely to evolve as physically and mentally strong adults with enhanced quality of life. The neonatal as well as fetal life both form a continuum during which human growth and development are affected by genetic, intrauterine and extrauterine environment which can be predicted by certain maternal characteristics. Therefore, the progeny depends on mothers for somatic, physiological and biochemical maturation. Still the status of women in world is downhill. More than half a million women, nearly all of them in developing countries die each year in pregnancy or child birth. This amounts to one every minute. Over 60% of mothers live where the status is poor to extremely poor. These 1.4 billion women live under conditions that threaten their health. Surveys in over eighty developing countries have found that 20.45% of women aged 15-44 years do not consume enough calories each day. There is wide calorie gap' between the consumption and energy expenditure. Indian women according to one study, work for an average of 13-18 hours day. According to WHO estimates three of five pregnant women m developing countries are anaemic (Hb below 11 gm/dl). According to census of India 1991 the literacy rate among women was 39.42% compared with 63.86% in men. While average age of marriage in 1981 was 18.6 years (according to journal family welfare 1981) Union Health ministry and family welfare India reported that maternal mortality rate of 3-4 per live birth in 1989 of which 19.4% was because of anaemia. The women who would benefit most from perinatal care, the uneducated and poor get it least, because of unavailability of antenatal care.

This study was thus undertaken to establish and analyse the basal statistics in Sultania Zanana Hospital in relation to the maternal factors e.g. demographic, socio-economic, nutritional and

reproductive, and its influence on the fetal outcome. The other aspect of the study is to find out the pattern of feeding habits prevailing among the mothers and its effect on new born baby. Incidence and factors associated with neonatal hyperbilirubinemia among the babies was also studied.

Thus, this study was aimed in view to search out the factors persisting among the mothers who are responsible for the present dreadful mortality and morbidity of neonate in this part of the country and which can be taken under consideration for proper planning to make the survival of neonate hopeful.

MATERIAL AND METHODS

The study was conducted on 500 cases taken from the obstetric wards of Sultania Zanana Hospital Bhopal. The annual live birth delivery rate in the hospital is about 5000 per year and patient belongs mainly to lower and middle socio-economic group. Since seasonal neonatal in birth rate is well documented, therefore the study covered a time period of 1 year (July 1999- July 2000). This study includes Five hundred pregnant women who were babies delivered by them which were followed up from the day of birth to the third post-natal day. The total numbers of cases studied were six hundred and twenty seven. Out of these five hundred could be followed up in details and rest one hundred and twenty seven cases had to be discarded because of various reasons

After admission to the Antenatal wards of Sultania Zanana Hospital on first contact with mother, detailed personal history was taken as per proforma which includes, name, age (nearest completed), education, occupation, socio-economic status based on percapita income according to 'Modified Prasad's classification', adverse habits in mothers e.g. tobacco chewing, history of passive smoking, adoption of any family planning practices, and its method of adoption, history of consanguinous marriages, history of leukorrhoea. History of any gynaecological problem was also taken in account. Menstrual history was taken into details about menstrual cycles, menorrhagia and dysmenorrhoea.

History of present pregnancy (antenatal history) including antenatal immunization, diet during pregnancy and history of oedema with increase in blood pressure. History of jaundice, fever, rashes, bleeding per vagina and history of any drug intake during pregnancy was also asked for.

Booked cases included all those mothers which had registered in the antenatal clinic in SZH. Those who received immunization for tetanus was classified as immunized, and dose received was mentioned. Those cases that had rece.ved no antenatal care but immunized Were Recorded Immunized but Unbooked.

RESULTS

This study was aimed with a view to evaluate 500 live births in relation to maternal and neonatal factors and correlation of anthropometric measurements.

Table-1: Nutritional Status of Pregnent Mothers Studied

Parameters	Values showing nutritional status of mother	Incidence	Percentage
Gestational weight of mothers in kg	< 50	147	29.4%
	50 60	237	47.4%
	> 60	116	23.2%
Height of mother in cms	<145 cm	139	27.8%
	145 - 155 cm	202	40.4%
	>155 cm	159	31.8%
Hemoglobin level of mother in gm%	< 6 (severe anaemia)	48	9.6%
	6 - 8 (moderate anaemia)	154	10.8%
	8-11 (mild anaemia)	193	38.6%
	> 11	105	21.0%

Above table shows that mothers having gestational weight < 50 kg had incidence of 29.4% which indicate malnutrition. While 47.4% mothers had weight between 50-60 kg and 23.2% mothers had weight > 60 kg. 27.8% mothers had height < 145 cm indicate short stature which is suggestive of chronic malnutrition, between 145-155 cm incidences is 40.4% and > 155 cm incidence is 31.8%. 79% of mothers had anaemia of which 9.6% had severe anaemia, 10.8% had moderate anaemia and 38.6% had mild anaemia. Only 21% of mothers had no anaemia.

Table-2: Relationship between socioeconomic status of mother to birth Weight of baby

Socioeconomic status according to modified Prasad's classification based on per capita income in Rs.	Baby's birth weight in kg		Total
	<2.5 kg	≥ 2.5 kg	
I (> 1000)	4 (14.8%)	23 (85.2%)	27 (5.7%)
II (999 - 500)	27 (25.3%)	80 (74.7%)	107 (21.4%)
III (499-300)	52 (39.1%)	81 (60.9%)	133 (26.6%)
IV (299- 150)	72 (41.4%)	102 (58.6%)	174 (34.8%)
V < 150	41 (65.1%)	22 (34.9%)	63 (12.6%)

The above table elicits that, as the socioeconomic status increases incidence of LBW decreases. The incidence of LBW (<2.5 kg) is 14.8%, 25.3%, 31.1%, 41.4% and 65.1% belongs to I, II, III, IV and V SE class respectively. The incidence of > 2.5 kg is 85.2, 74.7%, 60.9%, 58.6% and 34.9% belongs to I, II, III, IV and V SE class respectively.

Maximum mothers belonging to low SEC class constitute 48% while high class constitute to 5.7% of mothers. This data is statistically highly significant p< 0.01.

Table-3: Relationship between Interpregnancy Interval and Birth Weight of Multipara Mothers

Interpregnancy Interval	Baby's birth weight in kg		Total
	<2.5 kg	>2.5 kg	
< 2 years	56 (45.2%)	68 (54.8%)	124 (38.2%)
2 - 4 years	45 (25.6%)	131 (74.4%)	176 (55.1%)
> 4 years	9 (40.9%)	13 (59.1%)	22 (6.7%)
Total	110 (34.2%)	212 (65.8%)	322 (100.0%)

The above mentioned table reflects that 38.2% mothers give birth to babies at interval of 2 year 55.1% between 2-4 years of inter pregnancy interval while 6.7% had birth spacing more than 4 years. Birth spacing < 2 year and > 4 years had LBW incidence 45.2% and 40.9% respectively while the incidence of birth weight > 2.5 kg is highest in mothers having birth spacing between 2-4 years. This data is statistically significant p<0.01.

Table-4: Correlation between Maternal Hemoglobin and Maturity of Baby.

Maternal Hb in gm%	Maturity			Total
	Preterm	Full term	Post term	
< 6 gm%	31 (64.6%)	17 (35.4%)		
6 - 8 gm%	38 (24.7%)	111 (72.1%)	5 (3.2%)	154 (30.8%)
8 - 11 gm%	26 (13.5%)	161 (83.4%)	6 (3.1%)	193 (38.8%)
> 11 gm%	7 (6.7%)	89 (84.8%)	9 (8.6%)	105 (25.0%)
Total	102 (20.4%)	378 (75.6%)	20 (4.0%)	500 (100.0%)

It is evident from above table that as the hemoglobin level in mother falls, the incidence of prematurity increases. Incidence of prematurity is highest (64.6%) among severely anaemic mothers followed by 24.7%, 13.5% then 6.7% in moderate, mild and no anaemia respectively. Incidence of full term babies is highest among the mothers having hemoglobin level more than 11 gm% (no anaemia) while its incidences decreases as 83.4%, 72.1% and 35.4$ in maternal anaemia of mild, is resoectively. This data is statistically moderate, severe anaemia significant p<0.01.

Table-5: Relationship between histories of Leaking to Maturity of Baby.

Leaking	Maturity		Total
	Preterm	Full term	
No history of leaking	66 (16 4%)	336 (83.6%)	402 (80.4%)
History *of* leaking	36 (36.7%)	62 (63.3%)	98 (19.6%)
Total	102 (20.4%)	398 (79.6%)	500 (100%)

The above table elicits that 19.6% of mothers had history of leaking of which 36.7% mother gave birth to preterm babies as compared to 16.4% of mothers who had no history of leaking. This means that mothers who are having history of leaking had 2.23 times more chances of giv.ng birth to preterm bab.es as compare to mothers who are having no history of leaking.

Table-6: Correlation between Maternal Height and Baby's Weight

Mother's height in cm	Baby's birth weight in kg		Total
	< 2.5 kg	>2.5 kg	
< 145	74 (53.2%)	65 (46.8%)	139 (27.8%)
145- 155 cm	67 (33.1%)	185 (66.9%)	202 (40.4%)
>155 cm	51 (32.0%)	108 (68.0%)	159 (31.8%)
Total	192 (38.4%)	308 (61.6%)	500 (100.0%)

The above table shows that as the height of mother's increases, there is increase in weight of the babies. In mothers having height < 145 cm had incidence of LBW, 53.2% (highest) while lowest in mothers having height > 155 cm, 32% while between 145-155 cm its incidence is 33 1%. Babies having weight > 2.5% had incidence in maternal height < 145 cm, 46.8% - lowest in 145-155 cm 66.9% and > 155 cm (68% highest) and in > 155 cm it is 68% highest. This data is stastically significant p<0.01.

Table-7: Correlation between Maternal Height and Maturity of Baby

Maternal height in cm	Maturity			Total
	Preterm	Full term	Post term	
<145 cm	29 (20.8%)	108 (77.7%)	2 (1.4%)	139 (27.8%)
145- 155 cm	52 (25.7%)	146 (72.3%)	4 (2.0%)	202 (40.47%)
>155 cm	21 (13.2%)	124 (77.8%)	14 (8.8%)	159 (31.8%)
Total	102 (20.4%)	378 (75.6%)	20 (4.0%)	500 (100.0%)

Above table shows that as the maternal height increases the incidence of premature baby's decreases. Mothers having height < 145 cm had incidence of preterm babies were 20.8% while in mothers having height > 155 cm it is 19.4 and 20.7% of preterm babies belong to maternal height of 145-155 cm. 71.8% of full term babies belong to maternal height > 155 cm while it is 77.2% having maternal height 145-155 cm and 77.7% incidence of full term babies belong to maternal height < 145 cm. This data is stastically significant p<0.01.

Table-8: Correlation between Maternal Hemoglobin Level and Hemoglobin Level of Newborn Baby

Maternal Hb in gm%	Baby Hb Level			Total
	< 14	14 - 17	> 17	
< 6 gm%	7 (14.6%)	17 (35.4%)	24 (50.0%)	48 (9.6%)
6 - 8 gm%	27 (17.5%)	104 (67.6%)	23 (14.9%)	154 (30.8%)
8 - 11 gm%	31 (16.0%)	155 (80.3%)	7 (3.62%)	193 (38.6%)
> 11 gm%	14 (16.3%)	87 (82.9%)	4 (3.8%)	105 (21.0%)
Total	79 (15.8%)	363 (72.6%)	58 (11.6%)	500 (100.0%)

Above table shows that mothers having no anaemia had babies 72.6% having hemoglobin in normal range 14-17 gm% while its incidence decreased to 80.3% in mild anaemia (8-11 gm%). Mothers having moderate anaemia had incidence of normal range (14-17 gm%) of Hb in their babies were 67.6%, while there is slight increased (14.9%) in babies having Hb > 17 gm%. In severely anaemic mothers it is seen that there is tremendous increase in incidence of babies having Hb > 17 gm% i.e. 50%.

Table-9: Relationship between Time of First Feed Given and Literacy Level of Mothers

Time of first feed given	Illiterate	Primary & Middle educated	Secondary and Graduate mothers	Total
Within 4 hours	24 (12.7%)	79 (41.8%)	86 (45.5%)	189
4 - 12 hours	67 (27.0%)	166 (66.9%)	15 (6.1%)	248
12 - 24 hours	52 (82.5%)	9 (14.3%)	2 (3.2%)	63
Total	143	254	103	500

From above table it is evident that maximum incidence of mothers who fed their babies within 4 hours of birth were secondary class educated and graduate mothers 45.5% and primary and middle class educated mothers 41.8% and illiterate mother 12.7%.

Mothers who fed the babies between 4-12 hours are 27% illiterate, 66.9% primary and middle class educated and 6.1% secondary class or more educated. The incidence of mothers who fed babies between 12-24 hours were secondary and graduate educated 3.2%, 14.3% were primary and middle educated while maximum incidence were of illiterate group. This explains that as literacy level of mother's increases earlier feedings were given to the babies.

Table-10: Incidence of Type of Prelacteal Feeds Given to Newborn

Types of prelacteals	Incidence	Percentage
Tea	41	32.0%
Honey	26	20.3%
Water	48	37.5%
Ghutti	13	10.2%
Total	128 (25.6%)	100.0%

Above table shows that there is maximum incidence of water given as prelacteal feeds 37.5%, followed by tea 32%, then honey 20.3% and ghutti 10.2%. About 1/4th of mother give their babies prelacteal feeds (25.6%).

DISCUSSION

Maternal hemoglobin level and fetal outcome

Preeti Pandya and M.N. Hazra in 1992 reported that maternal anaemia is seen to be directly related to foetal out come in the form o Prematurity and low birth weight.

Similar picture was reflected in present study, that maximum Incidence (77.1%) of low birth weight babies, delivered by mothers having severe anaemia (Hb<6gm%) while 42.2% in moderate anaemia and 34.7% in mild maternal anaemia while only 21.9% (lowest) of LBW babies delivered by mothers having no anaemia. Reflects that highest incidence of premnturity in babies were seen in mothers having severe anaemia followed by 24.7% with moderate and 13.3% with mild anaemia. Similar observations wore showed by many authors Sheela [1] study done at SSG Hospital. N.A. Baisher 1972, ICMR Bulletin 1975, N.K. Tyagi [2], Bhargava *et al*. [3], Madhawan and Taskar, Leela Raman In [4], Lalitha Krishnan and B K. Chakladhar [5]. Acta Pediatric scand [6], Shanti Ghosh *et al*. [7], Shrivastava *et al.* [6], Chadha *et al.* [5].

Mathur *et al*. [8], Sharma *et al*. [9] and Bhargava *et al.* [3], mentioned that severe anaemia was associated with higher hamoglobin and ferritin values in neonates. Similar observations were seen in present study (Table C-12) that mother having severe anaemia (<6gm/Hb had 50% of babies born with hamoglobin more than 17gm%).

Maternal blood groups and foetal outcome

In present study about 34.6% babies developed NNH of which 27.2% were pathological (15.1% ABO incompatibility, 9.8% Rhincompatibility, 2.3% ABO with RH incompatibility) and 72.8% babies developed physiological NNH. (Table E-1) Maximum incidence of association of NNH was found to be with maternal blood group B. (39.9%, while maternal blood group '0' is associated to maximum incidence of apperance of NNH on first day (32.8%).

Factors influencing the feeding habits of neonate

Ferraco M. reported the influence of maternal education on breast feeding. Educated mothers were found to practising exclusive breast feeding while others practicing total breast feeding having P value >0.05. In present study 39.1% of illiterate mothers were practicing top feeding compared to 14.8% in graduate mothers. 35.93% illiterate mother gave prelacteal feeds to their babies compared to 18.75% in graduate mother. It is evident that maximum incidence of mothers who fed their babies within 4 hours of birth were secondary and graduate mothers 45.5% and primary and middle class educated mothers 41.8% and illiterate mothers were 12.7% The maximum incidence of mothers who fed babies between 12-24 hours were illiterate 82.5% compared to graduate mother 3.2%. Similar type of observation was reported by UNICEF-ICMR report 1986 Paut and Chothia *et al*. 1990[10-12].

CONCLUSION

Study was carried out within a time period of one year in which 500 pregnant mothers were examined and the babies delivered by them were followed up.

Out of 500 live births 90.6% were normal labour while 13.6% were abnormal labour of which 9.4% constituted LSCS delivery. There was slight female predominance of 56.8% while male child born were 43.2% of 500 born neonates. 20.4% were preterm, 75.6% were full term and 4% born were post term. Nearly one third babies had low birth weight, 38.4% while 61.6% had birth weight more the 2.5 kg.

Maternal nutritional status had significant influence on foetal outcome. Mothers having gestation weight (at the time of admission) below 50 kg gave birth to maximum number of low birth weighted babies (58.5%) and premature babies (42.9%) as compared to average weight mothers. These babies were found to have less birth length and head circumference (birth length less than 47 cm 63.9% highest incidence and head circumference less than 33 cm had highest

incidence 51.7%). Short statured mothers (height less than 145 cm) were found to give birth to LBW babies (53.2%) and premature babies 47.3% with increased incidence as compared to optimal heighted mothers. These babies were also found to have less birth weight and head circumference (Less than 47 cm of birth length 53.9% and less than 33. Mothers having severe anaemia were prone to give birth to LBW babies 77.% and moderate anaemia (42.2%) compared to (21.9%) having no anaemia. While mothers having severe anaemia and moderate anaemia gave birth to premature babies in high proportion 64.6% and 24.7% respectively, compared to 6.7% in mothers having no anaemia. Mothers having severe anaemia gave birth to the new-born having haemoglobin level to higher side. 8.6% of mothers who were severe anaemic, 50% of them gave birth to babies having haemoglobin level more than 17 gm%.

Feeding practices adopted by mothers showed strong influence by maternal educational status. Illiterate mothers were found to give top feedings and prelacteal feedings in large proportion as compared to educated mothers. 39.1% of and 35.9% of illiterate mothers were found to give top feedings and prelactcal feedings respectively. These mothers were found to feed their babies more delayed after birth.

Only 12.7 % of illiterate mothers had fed their babies within four hours of birth while 82.5% of babies were given feeds within 12 to 24 hours of birth.

Type of delivery was also influenced the pattern of feeding, LSCS delivered babies were found to have more chances. (44.6%) of getting t0p feeding and no babies delivered by LSCS were given feeds with in 4 hour.

REFERENCES

1. Seela Raman "Effect of maternal nutrition on foetal development and on neonatal outcome. Annals National Academy Medicine Science.1989; 25(1): 51-60.
2. Tyagi NK. Effect "LBW in relation to nutritional status in primipara" Indian Pediatrics. 1985; 22.
3. Bhargava SR. ICMR higher risk study India or pediatrics 28 Dec. 1991: 1473-1480.
4. Madhvan. "Birth weight of Indian infants born in hospitals" Ind. J. Paed. 1969; 36- 193.
5. Chadha VK. "Nutritional status of urban poor mothers and birth weight" Journal of Obs gynecology. 1991; 278-782. 64.
6. Shrivastava SR. "Study of maternal & fetal factors in relation to small for date babies" Indian Pediatrics Oct. 1982; (19): 861-863.
7. Shanti Ghose. Bio-social determinants of birth weight" Indian Pediatrics. 1977; 14(2).
8. Mathur. "Breast feeding in babies delivered by caesarean section Indian Paediatrics.1993; 1285-1290.
9. Sharma. "Anthropometric measurement and the assessment of neonatal maturity" IJP. 1975;42: 332.
10. Pandya Preeti MN. Hazra "Fetomaternal outcome in patients of severe anaemia in pregnancy Journal of Obs & Gynee. 1992; 114: 5-10.
11. Lalitha Krishnan and BK. Chakladar: "Maternal Risk factor and low birth weight" Journal of Obs & Gynecology. August 1998; 52-56.
12. Mukherjee DK. "Birth weight and its relation to maternal factor" Ind. J. Paed.1970; 37: 460.