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Comparative Study of Modified Biophysical Profile in Normal Pregnancy, High Risk Pregnancy and It's Perinatal Outcome

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Abstract: ***Background and Objectives: To evaluate the role of modified fetal biophysical profile in normal pregnancy and high risk pregnancies for predicting the perinatal outcome. And to study the correlation between AFI and NST in normal and high risk pregnancy. Aim: To assess the effectiveness of modified biophysical profile in predicting perinatal outcome in normal and high risk pregnancy. Methodology: Pregnant women with normal and high risk factors with gestational age more than or equal to 37 weeks were evaluated using modified biophysical profile, Non stress test (NST) for 20 minutes and Amniotic Fluid Index using 4 quadrant technique. The patients who underwent modified BPP within 1 week were followed up till delivery and fetal outcomes were studied as foetal distress requiring operative deliveries, meconium staining of liquor (≥Grade II), APGAR score <7, Admission to NICU within 24 hrs and Perinatal death. Results: If Modified biophysical profile is normal, it gives reassurance that the fetal status is good with good perinatal outcome. In present study, the need for LSCS, meconium stained liquor, need for NICU admission, perinatal morbidity were found to be higher in cases with abnormal MBBP. Conclusion: MBPP can be used as a primary antepartum fetal surveillance test which is simple, safe, non-invasive and inexpensive to predict perinatal outcome and provide timely intervention in high risk pregnancies.***

Keywords: Modified biophysical profile, Non stress test, amniotic fluid index, perinatal morbidity

1. Introduction

It is a known fact that no health problem is of more significance to a nation than maternal health and perinatal morbidity. The average perinatal mortality in India is 16 per 1000 live births.

The goal of antepartum fetal surveillance is early identification of the compromised fetus and timely intervention when the fetus is at risk, but still in an uncompromised state. [1]

Many maternal high-risk conditions like pre - eclampsia, oligohydramnios, anemia lead to adverse neonatal outcome. Timely intervention in these pregnancies can bring down the perinatal morbidity and mortality. [2]

Antenatal fetal surveillance is directed at identifying fetuses of the high - risk pregnancy group which are at risk of suffering intrauterine hypoxia with resultant damage including death. [3] Modified fetal biophysical profile is a well-established method of antepartum surveillance in high risk pregnancies which includes:

1) Fetal movements
2) Fetal tone
3) Fetal breathing
4) Estimation of amniotic fluid volume and
5) Non stress test

Maturation of the fetal nervous system occurs throughout gestation and affects NST interpretation. The BPP variables are dependent on the activity of certain areas of the fetal central nervous system that become functional at different gestational ages. [4] Fetal tone and movement appear between 7 and 9 weeks and require activity of the brain cortex. Fetal breathing movements begin at 20–21 weeks and depend on centers in the ventral surface of the fourth ventricle. FHR reactivity appears between 28 and 30 weeks and stems from function of the posterior hypothalamus and nucleus in the upper medulla. Fetal breathing movements and FHR reactivity, therefore, are more gestational age dependent than tone and movement, both of which should be present early in the first trimester. Between 24 and 28 weeks, up to 50% of NSTs will not be reactive because of immaturity of the fetal nervous system, which limits the utility of the test in the midtrimester. This number of nonreactive tests decreases to 15% between the gestational ages of 28 and 32weeks. Frequency and amplitude of FHR accelerations increase with advancing gestational age, which contributes to the decrease in nonreactive NSTs as gestational age increases.

Modified biophysical profile (MBPP) is the modification of biophysical profile which is less time consuming than complete biophysical profile. It is the method of antepartum surveillance which comprises of Non - Stress Test and amniotic fluid index (AFI). Amniotic Fluid Index (AFI) is a marker of long-term placental function and Non-Stress Test (NST) is a marker of short-term fetal condition. Modified Biophysical Profile (MBPP) is hence less time consuming and easier to perform.[5] Hence in this study modified biophysical profile is used as a primary marker for fetal surveillance in normal and high-risk pregnancies to study its effectiveness in perinatal outcome.

Aims and Objectives

Aim: To assess the effectiveness of modified biophysical profile in predicting perinatal outcome in normal and high risk pregnancy.

Objectives: To evaluate the role of modified fetal biophysical profile in normal pregnancy and high risk pregnancies for predicting the perinatal outcome. And to study the correlation between AFI and NST in normal and high risk pregnancy.

2. Materials and Methods

This is Prospective randomized controlled trial conducted over a period of 18 months. After obtaining institutional ethical committee approval and written and informed consent from the patient, 100 patients satisfying the inclusion and exclusion criteria were taken. Pregnant women with normal pregnancy and high risk factors admitted in labour room in the department of Obstetrics and Gynaecology in Navodaya medical college and research centre, Raichur. Detailed history of the pregnant women was taken and thorough clinical examination including vital parameters, systemic examination, and obstetric examination was done, including all routine investigations. Normal and preganant women with high risk factors with gestational age more than or equal to 37 weeks were evaluated using modified biophysical profile, Non stress test (NST) for 20 minutes and Amniotic Fluid Index using 4 quadrant technique. NST was performed in supine position. Fetal heart sound, fetal movements, uterine contractions, if any, was recorded. NST is labeled reactive if there are two or more accelerations of FHR of ≥15 beats/minutes above baseline, lasting for ≥15 seconds in 20 min. In case of non - reactive NST, patient was given left lateral position following which 2 liters of oxygen was administered and then NST was repeated. If the result is still not reactive for 40mins, it was labeled as non - reactive NST. Real time ultrasound was done and AFI was calculated by the four quadrant technique.

Inclusion criteria: Singleton pregnancies with cephalic presentation with gestational age of 37wks or more with either of the below:

- Normal pregnancy
- Hypertensive disorders of pregnancy
- Anemia
- Oligohydramnios
- Decreased fetal movements
- Clinically suspected IUGR
- Diabetes mellitus, Gestational diabetes
- Thyroid disorders
- Cardiac disease
- Bronchial Asthma
- Epilepsy
- Any other medical conditions

Exclusion criteria:

- Preterm fetus
- Fetus with congenital anomalies
- Intrauterine deaths
- Multifetal pregnancies

3. Observations and Results

The data collected from the patients were tabulated in Microsoft excel. The results and data which were collected are reported in tables and graphs as percentage. The analysis was made using chi - square test. Statistical analysis of this data was made using SPSS (STATISTICAL PACKAGE FOR SOCIAL SCIENCES) with version 21. Age distribution of pregnant women was between 19 - 42 years. Majority of them belonged to 21 - 25years. P value is 0.0565 which is not significant. Among parity distribution of high risk pregnant women, 22 were primigravida and 28 were multigravida. Among normal pregnant mothers, 12 were primigravida and 38 were multigravida. P value is 0.1922 which is not significant.

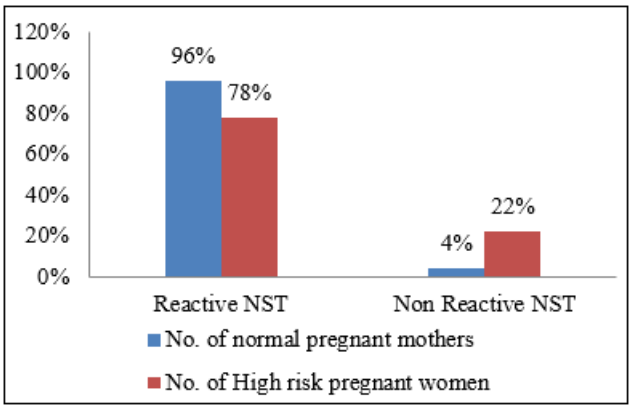

Figure 1: Non Stress Test Result

Figure 2: Among high risk pregnant mothers - (39) 78% women had reactive Non stress test and (11) 22% had non - reactive Non stress test. Among normal pregnant mothers - (48) 96% had reactive non stress test and (2) 4% had non - reactive Non stress test. P value is 0.0074 which is highly significant.

Table 1: AFI Result

AFI result	No. of normal pregnant mothers	%	No. of high risk pregnant mothers	%	χ^2 - value, p - value, Result
<5	0	0	9	18	12.36, 0.0021, HS
5 – 9	14	28	18	36	
>9	36	72	23	46	
Total	50	100	50	100	

Table 1: Among high risk pregnant mothers, (9) 18% women had AFI <5 cm and among normal pregnant mother none of them had AFI <5cm. P value is 0.0021 which is highly significant.

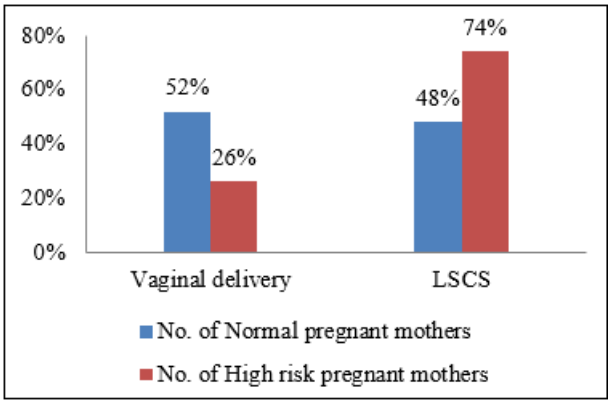

Figure 2: Mode of Delivery

Figure 2: Among high risk pregnant women, (13) 26% women underwent normal vaginal delivery and (37) 74% underwent LSCS. Among normal pregnant women, (26)

52% women underwent normal vaginal delivery and (24) 48% underwent LSCS. P value is 0.0077 which is highly significant.

Table 2: Colour of Liquor

Colour of liquor	No. of high risk pregnant mothers	%	No. of normal pregnant mothers	%	χ^2 - value, p - value. Result
Clear liquor	38	76	45	90	0.00, 1.0, NS
Meconium stained	12	24	5	10	
Total	50	100	50	100	

Table 2: During labour (38) 76% of high risk pregnant women and (45) 90% normal pregnant women had clear liquor and (12) 24% of high risk women and (5) 10% of normal pregnant woman had meconium stained liquor. P value is 1.0 which is not significant.

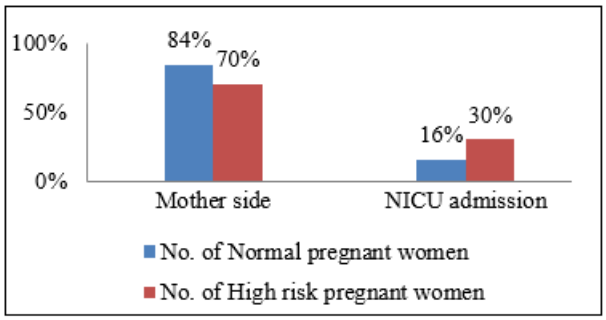

Figure 3: NICU Admission

Figure 3: (15) 30% of neonates born to high risk pregnant women required NICU admission and (35) 70% neonates did not require NICU admission.16% (8) of neonates born to normal pregnant women required NICU admission and (42) 84% neonates did not require NICU admission. P value is 0.0962 which is not significant.

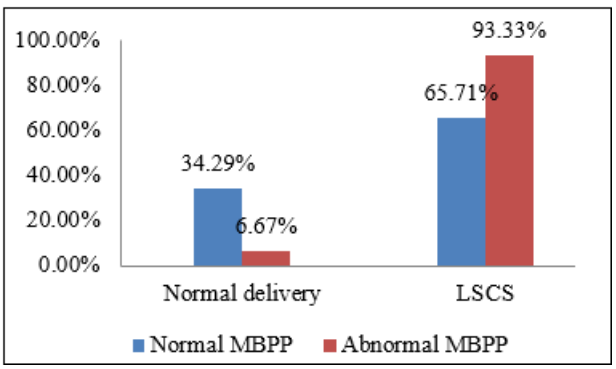

Figure 4: Comparison of Mode of Delivery in Relation to MBPP

Figure 4: Non reassuring NST and AFI < 5cm is significantly associated with LSCS. Out of 15 women with abnormal modified BPP 14 (93.33%) underwent LSCS and 1 (6.67%) had normal delivery. P value is 0.0413 which is significant.

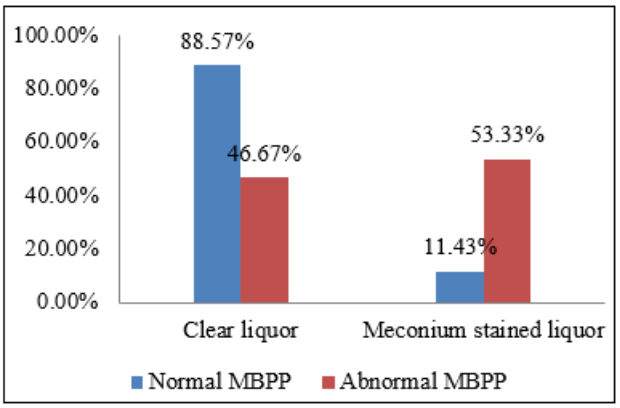

Figure 5: Comparison of Mode of Delivery in Relation to Colour of Liquor

Figure 5: Abnormal modified BPP has significant association with meconium-stained liquor with P value <0.0015 which is significant. Out of 15 women with abnormal Modified BPP 8 (53.33%) women had meconium-stained liquor.

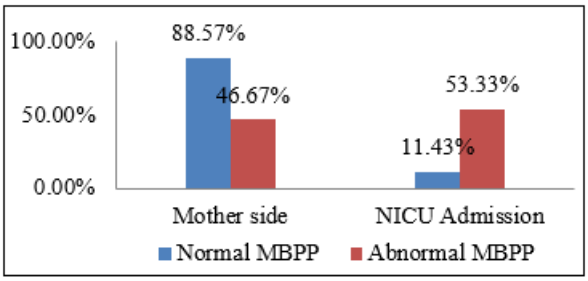

Figure 6: Comparison of Modified BPP and Baby Status

Figure 6: Abnormal modified BPP has significant association with NICU admission.
P value is 0.0024 which is significant. Out of 15 women with abnormal modified BPP 9 (53.33%) babies required NICU admission. There is no statistical significance of modified BPP with APGAR score at 1min probably due to better resuscitative measures. Abnormal modified BPP is significantly associated with APGAR score at 5mins with P value of 0.0275 which is significant. Out of 15 babies with abnormal modified BPP 2 (13.33%) babies had APGAR score <7 and none of the babies had APGAR score <7 among normal modified BPP

4. Discussion

Antepartum fetal surveillance aims for early detection of fetal compromise and timely intervention to decrease the perinatal morbidity and mortality and to prevent fetal death in pregnancies with complex maternal and fetal conditions yet avoid unnecessary interventions.

Most fetuses will be healthy, and a normal antepartum test result is highly reassuring. Fetal death within 1 week of a normal test result is rare.

Age Distribution:
In present study, age of the pregnant women ranged between 19 - 42years with a mean age of 25.47 years. Almost analogous findings were reported in study done by Monica

Agrawal et al, age of the patients ranged from 19 - 35years with mean age of 24.32years. [7]

Modified Biophysical Profile:

In present study among high risk pregnant mothers, 78% had reactive Non stress test and 22% had non - reactive Non stress test. P value is 0.0074 which is highly significant. In present study among high risk pregnant mothers, 82% had AFI >5 cm and 18% of them had AFI <5cm. P value is 0.0021 which is highly significant. In similar study by K. P. Sowmya et al, showed that 64.29% of the MBPP test results as normal, 7.14% as abnormal, NST was abnormal in 24.29% and AFI was abnormal (18cms) in 4.29% cases. Of the 70 NST's in the last MBPP, 68.57% were reactive and 31.43% were non - reactive. The AFI values were >5 in 91.43% of the cases. [2]

Table 3: Comparison of MBPP of High Risk Women with other studies

Test results	Present study	K. P. Sowmya et al
Reactive NST	68.57%	78%
AFI>5	91.43%	82%

Mode of Delivery:

Out of 35 high risk pregnant women, with normal modified BPP, 12 (34.29%) underwent normal vaginal delivery, 23 (65.71%) underwent LSCS. Out of 15 high risk pregnant women with abnormal modified BPP 14 (93.33%) underwent LSCS and 1 (6.67%) had normal delivery. P value is 0.0413 which is significant.

In similar study done by Santosh Jha et al, showed that most of the cases (70/97, 72%) in normal MBPP group had vaginal delivery and most of the cases in abnormal MBPP had caesarean section (56/75, 76%). [3]

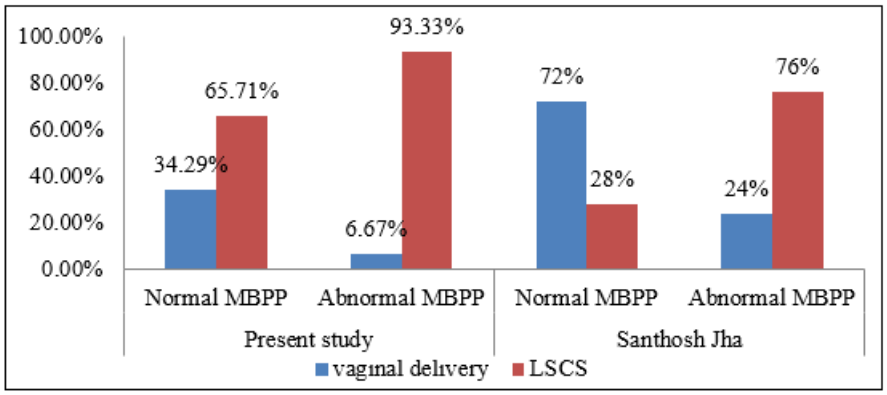

Figure 7: Correlation of modified BPP and mode of delivery among high risk cases - comparative analysis with other studies

Baby Status:

In present study, out of 15 women with abnormal modified BPP, 6 (46.67%) babies were mother side and 9 (53.33%) babies required NICU admission. Out of 35 women with normal modified BPP, 29 (88.57%) babies were mother side and 6 (11.43%) babies required NICU admission.

In study by Santosh Jha et al, most of the cases (64/97, 65.9%) in normal MBPP arm did not require NICU admission. However, in abnormal MBPP arm (34/75, 45.3%) required neonatal admission. [3]

Meconium stained liquor:

In present study, out of 15 women who had abnormal modified BPP, 7 (46.67%) had clear liquor and 8 (53.33%) had meconium stained liquor.

In the study by Archana Maurya et al out of 54 women who had abnormal modified BPP and out of them 41 (75.9%) had clear liquor and 13 (24.1%) had meconium stained liquor. [8]

In a study by Tara Sweta Arya et al 'Prediction of fetal outcome in high risk pregnancy with a modified biophysical profile' they had 32 women with abnormal modified BPP and out of them 19 (59%) had clear liquor and 13 (40%) meconium stained liquor [9].

5. Conclusion

Modified biophysical profile can be used as a primary antepartum fetal surveillance test which is simple, safe, non - invasive and inexpensive to predict perinatal outcome and provide timely intervention in high risk pregnancies. Modified biophysical profile can be used as a preliminary test for antepartum fetal surveillance and use conventional biophysical profile for confirmation of abnormal results. When the Modified biophysical profile is normal, it gives reassurance that the fetal status is good with good perinatal outcome. At the same time, Modified biophysical profile when is abnormal, it indicates that the fetus may be compromised.

References

[1] Jankidevi S. Borade, Sushma P. Sharma. The role of modified biophysical profile in predicting perinatal outcome in high-risk pregnancies. Int J Reprod Contracept Obstet Gynecol.2018 Jun; 7 (6): 2287 - 2294.

[2] K. P. Sowmya1, S. R. Mudanur, Padmasri R., Lalitha S. Modified biophysical profile in antepartum fetal surveillance of high-risk pregnancies. Int J Reprod Contracept Obstet Gynecol.2017 May; 6 (5): 1854 - 1858.

[3] Santosh Jha, Ganesh Dangal. Role of Modified Biophysical Profile in High Risk Pregnancy in Predicting Fetal Outcome. J Nepal Health Res Counc 2020 Jul - Sep; 18 (48): 401 - 5.

[4] Callen's ultrasonography in obstetrics and gynecology, sixth edition ISBN: 978 - 0 - 323 - 32834 - 0 Copyright

[5] Arias textbook of High Risk Pregnancy 5th edition
[6] Williams obstetrics 26th edition Copyright © 2022 by McGraw Hill
[7] Monica Agrawal, Nitu Nigam, Sangeeta Goel and Naheed Zia Khan. The role of modified biophysical profile in high risk pregnancies and fetal outcome. International Journal of Biomedical Research 2018; 09 (02): 81 - 85.81IJBR (2018) 09 (02).
[8] Modified biophysical profile and fetal outcome in high risk pregnancy: dr. Archana Maurya, dr. V. Kushwah Gajra sch. j. app. med. sci.2014; 2 (1c): 283 - 290
[9] Tara Sweta Arya, Rashmi Thapa. Prediction of fetal outcome in high risk pregnancy with a modified biophysical profile. MedPulse – International Journal of Gynaecology. July 2017; 3 (1): 50 - 53. http: //medpulse. in/ Gynacology /index. php.