# Role of Modified Biophysical Profile in Predicting Fetal Outcome in High Risk Pregnancies

**Nadia Zahid[1], Kokab Zia[1], Rubina Shahzad[1], Amna Athar[1], Irum Azeems[2] and Rakhshanda Toheed[3]**

## ABSTRACT

**Objective:** To determine the role of modified biophysical profile in predicting fetal outcomes in women with high risk pregnancy.

**Study Design:** Prospective study

**Place and Duration of Study:** Department of Obstetrics & Gynaecology, Avicenna Medical College and Hospital, Lahore from 1st January to 31st December Dec 2018

**Materials and Methods:** One hundred and ten women with high risk pregnancy, gestation age >32 weeks attending antenatal outpatient clinic were included. Patients detailed demographic were recorded after informed consent. All the patients were examined by modified biophysical profile (combine non-stress test and amniotic fluid index). Fetal outcomes such as meconium stained liquor, Apgar score <7 at 5 minutes, admission to NICU and neonatal mortality were examined.

**Results:** The mean age of pregnant women was 25.32±5.25 years and mean gestational age was 36.02±0.85 weeks. Non-stress test and amniotic fluid index was normal in 70 (63.64%) patients and was abnormal in 13 (11.82%) women. Normal non-stress test and abnormal amniotic fluid index was 10 (9.10%) in women while abnormal non-stress test and normal amniotic fluid index was 17 (15.45%) in women. Meconium stained liquor found in 29 (26.36%), Apgar score <7 found in 22 (20%), neonatal intensive care admission in 35 (31.82%) and neonatal mortality found in 7 (6.36%). There was a significant association observed regarding amniotic fluid index, non-stress test and abnormal biophysical profile with meconium stained liquor, Apgar score <7, neonatal intensive care admission and neonatal mortality with p-value <0.05.

**Conclusion:** Modified biophysical profile is effective and useful tool in predicting adverse fetal outcomes

**Key Words:** Modified biophysical profile, Fetal outcome, High risk pregnancy, Amniotic fluid index

## INTRODUCTION

Motherhood is one of the most important landmarks in the life of a woman. Making this experience harmless and free of complications is the goal of any obstetrician. However, nearly 830 women still die every day from preventable causes related to pregnancy and childbirth.[1] Globally, perinatal mortality rate is 47 per thousand.

[1.] Department of Obstet & Gynae, Avicenna Medical College, Lahore.

[2.] Department of Obstet & Gynae, Noor Hospital, Ferozepur Road, Lahore.

[3.] Department of Obstet & Gynae, Lahore Care Hospital, Lahore.

Correspondence: Dr. Nadia Zahid, Associate Professor of Obstetrics & Gynaecology, Avicenna Medical College. Lahore.
Contact No: 0322-4391618
Email: drnadiazahid@gmail.com

In South Asian countries, like India nearly 25 per thousand perinatal mortality occurs.[2] The chance of complications during pregnancy is dependent upon environmental and circumstantial factors. Based on an interaction of individual and environmental characteristics, certain pregnancies are termed as high risk pregnancies, due to a indicating a potentially increased risk of adverse events during the pregnancy. Technically, a high-risk pregnancy refers to anything that puts the mother, fetus, or neonate at increased risk for morbidity or mortality during pregnancy or childbirth.[3-5]

High risk pregnancies are complicated by pre-eclampsia, eclampsia, anemia, oligohydramnios, etc. The management of this includes a thorough monitoring and timely intervention in order to avert any adverse outcome. The unfavorable outcome could theoretically be pre-empted by well-timed induction of labour and delivery of a healthy infant. Using a proper surveillance system, the unfavorable outcome during labour could be averted.[6-8]

Common methods for fetal surveillance include fetal movement counting /fetal kick count, non-stress test (NST), biophysical profile, modified biophysical profile

(NST and amniotic fluid volume estimation) and contraction stress test and umbilical artery Doppler study Biophysical profile/Modified biophysical profile uses the combination of non-stress test and sonographic evaluation of amniotic fluid. It has a high specificity and high negative predictive value and has been shown to be an effective decision /diagnostic tool.[9]

The fetal biophysical profile is one of the most widely accepted tests for the evaluation of fetal well-being in high risk cases. It includes 5 parameters- fetal tone, breathing movements, gross body movements, amniotic fluid volume, and non stress test. Hence it's more time consuming, cumbersome and expensive. It needs two phase testing by ultrasound and external fetal heart rate monitoring by cardiotocograph Doppler monitor to record fetal heart rate. The complete biophysical scoring is cumbersome, time consuming and expensive.[10-12]

## MATERIALS AND METHODS

This prospective study was conducted at Department of Obstetrics & Gynaecology, Avicenna Medical College and Hospital, Lahore from 1st January to 31st December Dec 2018. A total of 110 women with high risk pregnancies (preeclampsia, anemia, history of previous still birth, clinically suspected IUGR and with decrease fetal movement), gestation age >32 weeks attending antenatal outpatient clinic were included. Women with preterm deliveries, fetuses with congenital anomalies, intrauterine deaths, multifetal pregnancies and those with no consent were excluded. Patients detailed demographic including age; sex and body mass index (BMI) were recorded. Modified biophysical profile (combine NST and AFI) was obtained for all the patients. Non-stress test was considered as reactive when two or more fetal heart rate acceleration was recorded during 20 minutes and NST was non-reactive when (fetal movement was not occurred during 20 minutes) no acceleration and reduced base line variability was noted during 20 minutes. Amniotic fluid index <7 by ultrasound scanning was considered abnormal. Fetal outcomes such as meconium stained liquor, Apgar score <7 at 5 minutes, admission to NICU and neonatal mortality were examined. Data was analyzed by SPSS 24. Chi-square test and student t' test was applied. P-value <0.05 was considered as significant.

## RESULTS

The mean age of pregnant women was 25.32±5.25 years and mean gestational age was 36.02±0.85 weeks. Mean BMI was 23.96±3.8. Non-stress test and AFI normal in 70 (63.64%) patients, NST and AFI abnormal in 13 (11.82%) patients, NST normal AFI abnormal found in 10 (9.10%) and NST abnormal AFI normal in 17 (15.45%) patients (Table 1). According to the fetal outcomes, meconium stained liquor found in 29 (26.36%), Apgar score <7 found in 22 (20%), NICU admission in 35 (31.82%) and neonatal mortality found in 7 (6.36%) [Table 2].

According to the association of modified biophysical profile with meconium stained liquor we found, when both parameters were normal 4 (5.71%) patients had meconium stained liquor, when both parameters were abnormal 13 (100%) cases had MSL, when NST normal and AFI abnormal then we found 2 (20%) cases with MSL and when NST abnormal and AFI normal then MSL in 10 (58.82%) cases (Table 3).

According to the association of modified biophysical profile with Apgar score <7 at 5 minutes we found, when both parameters were normal 3 (4.29%) cases, when both parameters were abnormal 10 (76.92%) cases, when NST normal and AFI abnormal then we found 2 (20%) cases with MSL and when NST abnormal and AFI normal then MSL in 7 (41.17%) cases (Table 4).

According to the association of modified biophysical profile (MBPP) with NICU admission we found, when both parameters were normal 10 (14.29%) neonates needs admission to NICU, when both parameters were abnormal 13 (100%) cases needs NICU admission, when NST normal and AFI abnormal then we found 4 (40%) cases need NICU admission and when NST abnormal and AFI normal then 8 (47.06%) cases needs admission to NICU (Table 5).

**Table No.1: Baseline characteristics of all the patients**

| Variable | No. | % |
|---|---|---|
| Age (years) | 25.32+5.25 | |
| Gestation age (weeks) | 36.02±0.85 | |
| Mean BMI | 23.96±3.8 | |
| NST and AFI normal | 70 | 63.64 |
| NST and AFI abnormal | 13 | 11.82 |
| NST normal AFI abnormal | 10 | 9.10 |
| NST abnormal AFI normal | 17 | 15.45 |

**Table No.2: Findings of fetal outcomes**

| Fetal outcome | No. | % |
|---|---|---|
| MSL | 29 | 26.36 |
| Apgar score <7 at 5 minutes | 22 | 20 |
| NICU admission | 35 | 31.82 |
| Neonatal Mortality | 6 | 5.45 |

**Table No.3: Association of BPP with MSL**

| Characteristics | MSL (n=29) | % |
|---|---|---|
| NST and AFI normal (n=70) | 4 | 5.71 |
| NST and AFI abnormal (n=13) | 13 | 100 |
| NST normal AFI abnormal (n=10) | 2 | 20 |
| NST abnormal AFI normal (n=17) | 10 | 58.82 |

P-value 0.001

According to the association of modified biophysical profile with neonatal mortality we found, when both parameters were normal no case with mortality, when both parameters were abnormal 4 (30.77%) cases (were died) cases had perinatal mortality, when NST normal and AFI abnormal then we found no neonate with mortality and when NST abnormal and AFI normal then 2 (11.76%) neonates were died (Table 6).

**Table No.4: Association of MBPP with Apgar score <7 at 5 minutes**

| Characteristics | Apgar<7 (n=22) | % |
|---|---|---|
| NST and AFI normal (n=70) | 3 | 4.29 |
| NST and AFI abnormal (n=13) | 10 | 76.92 |
| NST normal AFI abnormal (n=10) | 2 | 20 |
| NST abnormal AFI normal (n=17) | 7 | 41.17 |

P-value 0.001

**Table No.5: Association of MBPP with NICU Admission**

| Variable | NICU (n=35) | % |
|---|---|---|
| NST and AFI normal (n=70) | 10 | 14.29 |
| NST and AFI abnormal (n=13) | 13 | 100 |
| NST normal AFI abnormal (n=10) | 4 | 40 |
| NST abnormal AFI normal (n=17) | 8 | 47.06 |

P-value 0.001

**Table No.6: Association of MBPP with Neonatal Mortality**

| Variable | Died (n=6) | % |
|---|---|---|
| NST and AFI normal (n=70) | - | - |
| NST and AFI abnormal (n=13) | 4 | 30.77 |
| NST normal AFI abnormal (n=10) | - | - |
| NST abnormal AFI normal (n=17) | 2 | 11.76 |

P-value 0.001

## DISCUSSION

High risk pregnancies are directly associated with high rate of maternal and neonatal morbidity and mortality. Modified biophysical profile considered a useful method for predicting adverse fetal outcomes. Many of studies demonstrated that modified biophysical profile method was very useful and effective for predicting fetal outcomes in high risk pregnancies and is very helpful in decreasing the rate of adverse fetal outcomes.[13,14] Present study was conducted to examine the role of modified biophysical profile (combine NST and AFI) in predicting fetal outcomes in women with high risk pregnancies. We found that mean age of

patients was 25.32±5.25 years and mean gestational age was 36.02±0.85 weeks. Mean BMI was 23.96±3.8. These results were similar to some previous studies in which mostly patients were ages 20 to 30 years with gestation age >34 weeks.[15,16]

In present study, we found NST and AFI normal in 70 (63.64%) patients, NST and AFI abnormal in 13 (11.82%) patients, NST normal AFI abnormal found in 10 (9.10%) and NST abnormal AFI normal in 17 (15.45%) patients. A study conducted by Arya et al[17] reported both parameters were normal in 68% patients, both parameters were abnormal in 9% patients, NST normal and AFI abnormal in 8% patients and NST abnormal and AFI normal in 15% patients.

In our study, according to the fetal outcomes, meconium stained liquor found in 29 (26.36%), Apgar score <7 found in 22 (20%), NICU admission in 35 (31.82%) and neonatal mortality found in 7 (6.36%). A study conducted by Agrawal[18] reported that 32.8% patients had AFI <8, 41.6% patients had non-reactive NST and abnormal biophysical profile was found in 49.6%. A study by Borade JS et al[19] reported that 67 babies with normal MBPP, 19 (28.7%) babies had perinatal morbidity while 21 (61.7%) out of 33 babies with abnormal MBPP had some perinatal morbidity (P<0.01).

In present study we found a significant association of modified biophysical profile with meconium stained liquor (p=0.001), Apgar score <7 at 5 minutes, NICU admission and with mortality P-value 0.001. We found when both parameters NST and AFI was abnormal there was a high rate of adverse fetal outcomes in term of morbidity and mortality. These results showed similar to many of previous studies in which modified biophysical profile showed significant association with adverse fetal outcomes such as meconium stained liquor, NICU admission and neonatal mortality.[20,21] Arya and Thapa[17] reported that when both parameters were normal morbidity found in 39% cases and when both parameters were abnormal out of 9 women 100% had morbidity and 55.5% were died. In their study 8 patients had NST normal and AFI abnormal in which morbidity found in 3 patients and none of mortality was observed and when NST abnormal and AFI normal there were 15 women and in which 60% had morbidity and 26.6% had mortality.

## CONCLUSION

High risk pregnancies resulted high rate of maternal and neonatal morbidity and mortality. Prediction of adverse fetal outcomes is very necessary for the better management of high risk pregnancies. We concluded that modified biophysical profile is effective and useful modality in predicting adverse fetal outcomes. We found a significant association of modified biophysical score with meconium stained liquor, Apgar score <7 at 5 minutes, NICU admission and neonatal mortality.

**Author's Contribution:**
Concept & Design of Study: Nadia Zahid
Drafting: Kokab Zia, Rubina Shahzad
Data Analysis: Amna Athar, Irum Azeem, Rakhshanda Toheed
Revisiting Critically: Nadia Zahid, Kokab Zia
Final Approval of version: Nadia Zahid

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

## REFERENCES

1. World Health Organization Media Centre. Maternal Mortality Fact Sheet No. 348. Updated November, 2016. Available at: http://www.who.int/mediacentre/factsheets/fs348/en/, last accessed on 19th January, 2017.
2. Agaro C, Beyeza-Kashesya J, Waiswa P, Sekandi JN, Tusiime S, Anguzu R, et al. The conduct of maternal and perinatal death reviews in Oyam District, Uganda: a descriptive cross-sectional study. BMC Women's Health 2016; 16:38.
3. Karimi P, Kamali E, Mousavi SM, Karahmadi M. Environmental factors influencing the risk of autism. J Res Med Sci 2017; 22:27.
4. Naim A, Al Dalies H, El Balawi M, Salem E, Al Meziny K, Al Shawwa R, et al. Birth defects in Gaza: prevalence, types, familiarity and correlation with environmental factors. Int J Environ Res Public Health 2012; 9:1732-1747.
5. Bamfo JE, Odibo AO. Diagnosis and management of fetal growth restriction. J Pregnancy 2011; 640715.
6. Chamberlain G, Philipp E, Howlett K, Masters, eds. British Births 1970. H. Obstetric Care. London, U.K.: William Heinemann Medical Books, 1978.
7. Gibb DMF, Cardozo LD, Studd JWW, Cooper DJ. Prolonged pregnancy: is induction of labour indicated? A prospective study. Br J Obstet Gynaecol 1982; 89:292-5.
8. Wood S, Cooper S, Ross S. Does induction of labour increase the risk of caesarean section? A systematic review and meta-analysis of trials in women with intact membranes. BJOG 2014; 121:674-85.
9. Audette MC, Kingdom JC. Screening for fetal growth restriction and placental insufficiency. Semin Fetal Neonatal Med.2017; 2: S1744-65.
10. Manning FA, Platt LD, Sipos L. Antepartum fetal evaluation: development of a fetal biophysical profile score. Am J Obstet Gynecol 1980;136:787.
11. Johnson JM, Harman CR, Lange IR, Manning FA. Biophysical profile scoring in the management of the post-term pregnancy: an analysis of 307 patients. Am J Obstet Gynecol 1986; 154: 269-73.
12. Bresadola M, Mastro F, Arena V, Bellaveglia L, Di Gennaro D. Prognostic value of biophysical profile score in post-date pregnancy. Clin Exp Obstet Gynecol 1995; 22:330-8.
13. Arias F, Daftary, Bhide, Practical guide to high risk pregnancy and delivery. 3rd ed. New Delhi: Elsevier, 2008.p.17-22.
14. Donald I, Assessment of fetal wellbeing, In: Misra R, ed. Practical obstetric problems. 6th ed. New Delhi: BI Publications; 2007:465-85.
15. Mary B. Munn, MD. Management of oligohy dramnios in pregnancy. Obstet Gynecol Clin N Am 2011; 38: 387–95.
16. Singh S, Rai R, Prajwal S, Rao PS. Role of modified biophysical profile in the management of post term pregnancy: Int J Reprod Contracept Obstet Gynecol 2018;7(2):456-61.
17. Arya TS, Thapa R. Prediction of fetal outcome in high risk pregnancy with a modified biophysical profile. Int J Gynaecol 2017; 3(1): 50-53.
18. Agrawal M, Nigam N, Goel S, Khan NZ. The role of modified biophysical profile in high risk pregnancies and fetal outcome. IJBR 2018; 9(02).
19. 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;7(6): 2287-2294.
20. Anand RT, Chauhan A. Relationship of the findings of colour doppler and non-stress test with the perinatal outcome among the cases of intrauterine growth restriction. MVP Journal Med Sci 2016; 3:115-7.
21. Agarwal S, Agarwal V, Yadav S. Comparative study of amniotic fluid index in normal & high risk pregnancy complicated by PIH. Ind J Obs Gyn Res 2015; 2:242- 5.