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Association of Biophysical Profile With Neonatal Outcome In Patients Presenting With Reduced Fetal Movements

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Abstract

Background: Perinatal period is the most vulnerable period in the life of an individual and the rate of deaths during this period is higher than any other period of life. Reduced fetal movements is a common indication for assessment of fetal wellbeing. Reduced fetal movements is considered as high-risk pregnancy because the fetus is at high risk of hypoxia and sudden demise. Biophysical profile predicts neonatal acidosis at delivery better than APGAR score and thus the risk of fetal death.

Methods: Hospital based prospective study conducted on 130 pregnant women

Results: Low BPP score was associated with low Apgar score, increased rate of neonatal admissions and increased neonatal deaths.

Conclusion: The association between BPP score, APGAR score, mode of delivery and NICU admission was statistically significant.

Keywords: BPP score, Fetal outcome, survived.

Introduction

Perinatal period is the most vulnerable period in the life of an individual and the rate of death during this period is higher than any other period of life. Pre term births, infections, hypertensive diseases and intrapartum asphyxia are cited as most important contributors for perinatal mortality.[1] Almost 2/3rd of perinatal deaths occur due to obstetric factors, perinatal hypoxia and infections, which are preventable causes. Maternal perception of fetal movements is one of the first signs of fetal life and is regarded as a manifestation of fetal wellbeing. Movements are first perceived by the mother between 18 to 20 weeks of gestation and rapidly acquire a regular pattern[1]. Fetal movements have been defined as any discrete kick, flutter, swish or roll[1].

A significant reduction or sudden alteration in fetal movements is a potentially important clinical sign. It has been suggested that reduced or absent fetal movements may be a warning sign of impending fetal death. Fetal movements tend to plateau at 32 weeks of gestation. There is no reduction in the frequency of fetal movements in the late third trimester[2].

Reduced fetal movements are a common indication for assessment of fetal wellbeing. A reduced fetal movement is considered as high-risk pregnancy because the fetus is at high risk of hypoxia and sudden demise.

To address this problem, various antenatal fetal surveillance methods have been devised in the past few decades and the search for best is still ongoing.

Antepartum fetal testing is a compilation of methods devised to differentiate normal from compromised fetuses prior to onset of labor. The main techniques for fetal assessment are non-stress test (NST), contraction stress test (CST), Biophysical profile, fetal movements count, modified Biophysical Profile Score and Umbilical Artery Doppler Velocimetry.[2] The NST and CST are two primary methods available for fetal surveillance but are poor predictors of an asphyxiated fetus.

Biophysical Profile is the combination of NST and dynamic real-time B mode ultra-sonographic assessment of certain fetal parameters. It is a clinical tool that integrates level of dynamic biophysical activities into a usable standard.[3] It includes both acute markers of fetal status and some chronic markers of fetal and intrauterine conditions. Biophysical profile predicts neonatal acidosis at delivery better than APGAR score and thus the risk of fetal death. In a compromised fetus, measures can be taken to intervene before progressive metabolic acidosis leads to fetal death.[4-6]

The purpose of this study was to evaluate BPP as an effective predictor for the assessment of fetal condition and to improve fetal outcome by early detection of fetal hypoxia, in women presenting with reduced fetal movements at Department of Obstetrics and Gynecology, SMS Medical College, Jaipur (Rajasthan).

Material and Methods

Type Of Study: An observational study.

Study Design: Longitudinal study.

Inclusion Criteria

- Age 18-35 yr.
- Singleton pregnancy of >37 weeks of gestation.
- Women with decreased fetal movements.
- Women giving written consent.

Exclusion Criteria

- Women with intrauterine fetal death.
- Women in labour.

Statistical Analysis

-Continuous variables were summarized as Mean and Standard Deviation whereas nominal / categorical variables as proportion (%).

-Unpaired't' test and parametric test were used for analysis of continuous variables while chi-square test / Fischer exact test and other non-parametric test was used for normal / categorical variables.

-p-value < 0.05 was taken as significant. MEDCALC 16.4 version software was used for all statistical analysis.

Observations And Results

Table 1: Distribution according to BPP score.

BPP score	No. of women	Percentage
≤4	2	1.54
6	25	19.23
≥8	103	79.23
Total	130	100.00

In our study, 79.23% women had ≥8 BPP score followed by 19.23% had 6 BPP score and 1.54% had ≤4 BPP score.

Table 2: Distribution according to AFI in Ultrasonography report.

AFI	No. of women	Percentage
>5 cm	113	86.92
≤5 cm	17	13.08
Total	130	100.00

On USG, AFI>5 cm was found in 86.92% cases and in 13.08% cases, AFI was≤5 cm.

Table 3: Association between ultrasonography findings and fetal outcome.

AFI	Fetal outcome		Total
	Survive	Death	
>5 cm	112 (99.12%)	1 (0.88%)	113 (86.92%)
≤5 cm	10 (58.82%)	7 (41.18%)	17 (13.08%)
Total	122 (93.85%)	8 (6.15%)	130 (100.00%)

Chi-square =41.53 df=1 p-value=0.001

Out of total, 17 cases who had AFI ≤5 cm in USG, fetal outcome was poor in 41.18% cases.

The association between AFI findings and fetal outcome was found statistically significant.

Table 4: Association between BPP scoreand fetal outcome.

BPP Score	fetal outcome		Total
	Survive	Death	
≤4	0 (0.00%)	2 (100.00%)	2 (1.54%)
6	19 (76.00%)	6 (24.00%)	25 (17.69%)
≥8	103 (100.00%)	0 (0.00%)	103 (79.23%)
Total	122 (93.85%)	8 (6.15%)	130 (100.00%)

Chi-square =69.53 df=2 p-value=0.001

Out of 2 women, who presented with ≤4 BPP score, both babies were expired. Out of 25 women who presented with 6 BPP score, 19 (76.00%) babies survived and 6 (24%) babies were died. Out of 103 patients present with ≥8 BPP score, all 103 (100%) babies survived.

In our study, statistically significant association between BPP score and neonatal outcome was noted with p value of <0.001.

Table 5: Association between BPP score and APGAR score at 5 min.

BPP score	APGAR score			Total
	1-3	4-7	>7	
≤4	0 (0.0%)	2 (100.00%)	0 (0.0%)	2 (1.54%)
6	0 (0.0%)	22 (88.0%)	3 (12.00%)	25 (17.69%)
≥8	0 (0.0%)	19 (18.45%)	84 (81.55%)	103 (79.23%)
Total	0 (0.00%)	43 (33.08%)	87 (66.92%)	130 (100.00%)

Chi-square =85.82 df=2 p-value=0.001

Out of 2 women who presented with 0-4 BPP score, both neonates had APGAR score ≤4 at 5 min. Out of 25 women presenting with 6 BPP score, 22 babies had APGAR score ≤4 and 3 babies had APGAR >7. Out of 103 women who presented with ≥8 BPP score, all 84 babies were born with APGAR score more than 7.

The association between APGAR and BPP score was statistically significant.

Table 6: Association between BPP score and NICU admission.

BPP score	NICU admission		Total
	Yes	No	
≤4	2 (100.00%)	0 (0.00%)	2 (1.54%)
6	22 (88.00%)	3 (12.00%)	25 (17.69%)
≥8	16 (15.53%)	87 (84.47%)	103 (79.23%)
Total	40 (30.77%)	90 (69.23%)	130 (100.00%)

Chi-square =56.52 df=2 p-value=0.001

Out of 2, 100.00% babies were admitted in NICU in BPP score ≤4. Out of 25, 88.00% were admitted in NICU in

BPP score 6. Out of 103, 15.53% were admitted in NICU in BPP score ≥8. The association between BPP score and NICU admission was found statistically significant.

Table 7: Association between BPP score and mode of delivery.

BPP score	Mode of delivery		Total
	ND	LSCS	
≤4	0 (00.00%)	2 (100.00%)	2 (1.54%)
6	7 (28.00%)	18 (72.00%)	25 (17.69%)
≥8	79 (76.70%)	24 (23.30%)	103 (79.23%)
Total	86 (66.15%)	44 (33.85%)	130 (100.00%)

Chi-square =26.09 df=2 p-value=0.001

Out 2, 100.00% babies delivered by LSCS in BPP score ≤4. 72.00% babies delivered by LSCS in BPP score 6. 23.30% babies delivered by LSCS in BPP score ≥8. The association between BPP score and mode of delivery was found statistically significant.

Discussion

In our study, 79.23% women had 8-10 BPP score followed by 19.23% had 4-6 BPP score and 1.54% had 0-2 BPP score. Gurmeet Singh et al[7] conducted a similar study on 200 women complaining of reduced fetal movements and found that, 159 cases (79.5%) had BPP score of 8. BPP score of 6 and 10 was seen in 7(3.5%) and 34(17%) cases respectively. None had score of 0, 2 and 4. Similar results were noted by Manning et al[8] in 2009 with normal score of 8-10 in 97.5%, 6 score in 1.7%, 4 score in 0.52%, 2 score in 0.18% and 0 score in 0 % cases.

In our study on USG, AFI>5 cm was found in 86.92% cases and in 13.08% cases, AFI was≤5 cm. A study conducted by Syeda. R.M et al,[9] on 50 women complaining of reduced fetal movements reported that 96% of women had AFI>5 cm, 4% had ≤5 cm.

In our study, statistically significant association between BPP score and neonatal outcome was noted with p value of <0.001. In a study conducted by Nashville TN,[10] modified ultrasonography based BPP was used which included expanded scores of fetal movements, fetal breathing and qualitative assessment of accelerated placental maturity and this method was compared with method of Vinzileos et al [11]and applied to 180 high risk pregnancies to determine the correlation with perinatal outcome. Relationship of results of total score and perinatal outcome showed good predictive values with high specificity and sensitivity. Similar results were found in study conducted in Radiology department PGMI, government Lady Reading Hospital, Peshawar from December 2007 to June 2008.

It was found in our study that neonates born to mothers with low BPP had higher risk of having low APGAR score at 1 min. and 5 min. Out of 2 mothers who presented with 0-4 BPP score, APGAR score was 4-7 in both neonates. Out of 25 women, having 6 BPP score, 19 babies had APGAR score 4-7 and 5 had APGAR less than 3. Out of 103 women presenting with 8-10 BPP score, all 78 babieshad APGAR more than 7. The association between APGAR and BPP score was statistically significant. Kikwai Willey Kibet et al[12] also observed that the significant association between APGAR score and BPP score. Johnson et al. [13]in her study on BPP in management of post term pregnancy found an increase in perinatal morbidity in fetuses exhibiting an abnormal BPP. This study is very much comparable to our study where abnormal BPP was associated with increased perinatal morbidity.

Conclusion

In our clinical set up, we found a significant correlation between decrease fetal movements and poor fetal

outcome. The association between BPP score APGAR, NICU admission and mode of delivery was statistically significant. So proper clinical evaluation and BPP assessment is indicated in any women presenting with decrease fetal movements so that fetal hypoxia can be detected early before fetal death. and it is recommended that women and health care providers should be educated about fetal movements counting as a routine antenatal evaluation and the importance of early awareness of decrease fetal movements must be emphasized, so that early intervention may be done to prevent poor fetal outcome.

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