

CO-RELATION OF BIOPHYSICAL PROFILE WITH APGAR SCORE

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ABSTRACT

Objective: To correlate fetal Biophysical Profile (BPP) with Apgar score of the neonate among pregnant women presenting at term.

Material and Methods: This study was conducted at Obstetrics and Gynecology Department of Hayatabad Medical Complex, Peshawar. Study design was descriptive cross sectional [correlational] study. Duration of this study was 6 months from January 2012 to June 2012 in which a total of 114 patients were observed using correlation coefficient of +0.299(14), 95% confidence interval and 90% power of test. Non-probability consecutive sampling technique was used in selection of patients with inclusion criteria.

Results: In this study mean maternal age was 33 years with standard deviation ± 3.92 . Forty three (38%) mothers were primi para and 71 (62%) mothers were multi para. Vaginal delivery was performed in 84(73.7%) cases, 22(19.3%) patients had caesarian section and instrumental delivery was done in 8(7%) patients. Eighty three (73%) babies had biophysical profile score ranged 9-10, 24(21%) babies had biophysical profile score ranged 7-8 and 7(6%) babies had biophysical profile score ranged from 4-6. Mean biophysical profile score was 9 with standard deviation ± 1.14 . where as 48(42%) babies had APGAR score ranged 9-10, 55(48%) babies had APGAR score ranged 7-8 and 11(10%) babies had APGAR score ranged from 4-6. Mean APGAR score was 8 with standard deviation ± 1.27 .

Conclusion: The fetal Biophysical Profile (BPP) appears to be an effective technique for assessment of fetal condition.

Key Words: Biophysical profile, fetal, hypoxia, APGAR score.

INTRODUCTION

The requirement of identification of high-risk pregnancies and their proper management is a must, which is obvious with the theme of 2005 on world health day "Every mother and child count". Contemporary fetal testing involves serial, systematic fetal assessment aimed at identifying fetuses in jeopardy so that appropriate steps can be undertaken to prevent permanent damage/death.

These 5 variables consisted of fetal movement, fetal tone, fetal breathing, Amniotic fluid volume and Non stress test (NST). The biophysical profile is an excellent test for evaluation of fetal well-being. The test is easy to perform, requires no immediate supervision, can be done quickly as an office procedure, has no contra indication and involves no risk to the mother and fetus. Negative predictive value of BPP is 98.5% like NST (98%) but positive predictive value of an abnormal BPP (50.8%) is far better than NST only. Clark and Co-workers used an abbreviated BPP as their first-line ante

partum test.¹ Manning and colleagues proposed the combined use of 5 biophysical variables as a means of assessing the fetal health than any single variable used alone². These 5 variables consisted of fetal movement, fetal tone, fetal breathing, amniotic fluid volume and Non-Stress Test.

The BPP variables are dependent on the activity of certain areas of fetal central nervous system that become functional at different gestational ages. Fetal tone and movements appear between 7 and 9 weeks and require activity of brain cortex. Fetal breathing movements begin at 20 to 21 weeks and depend on centers in the ventral surface of the fourth ventricle. FHR reactivity appears between 28 and 30 weeks and probably stems from function of the posterior hypothalamus and nucleus in the upper medulla.³¹ The sensitivity of each of these centers to hypoxia is different. The variable become functional earlier in fetal development are more resistant to acute changes in fetal oxygenation. Therefore one can assume that each function evaluated in the BPP has a different predictive value in indicating fetal hypoxia. Serious consequences may ensue from improper management decisions based on total BPP score rather than careful evaluation of each test component.^{3,4}

Manning and colleagues proposed the combined use of 5 fetal biophysical variables as a more accurate means of assessing fetal health than any single variable

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alone. They concluded that consideration of 5 variables could significantly reduce both false positive and false negative rates. Required equipment included a real time sonography device with B mode display and Doppler USG to record FHR. Typically these tests require 30-60 minutes of examiner's time.^{5,6} Normal variables were assigned a score of 2 each and abnormal variables a score of zero. Highest possible score is 10.

Following delivery, the infant adapts to the external environment by various physiological changes. The APGAR score is a method to evaluate these changes. Although it is a useful initial evaluation, APGAR score has some drawbacks. While the one-minute score indicates need for resuscitation and the 5-minute score may predict long-term prognosis. APGAR score alone cannot be used to conclude fetal distress.

MATERIAL AND METHODS

This study was conducted in Unit C of Obstetrics and Gynaecology Department of Hayatabad, Medical Complex, Peshawar from January 2012 to June 2012. The aim was to correlate fetal BPP with Apgar score of the neonate among pregnant women presenting at term in tertiary care hospital. The Apgar score was measured through Spearman's Rank Correlation. It was a descriptive, cross sectional study and the sample size comprised of 114 patients.

The inclusion criteria was Gestational age: 37-42 weeks, parity: Primigravida or multigravida (up to P5), Age: 15-40 years, patients with history of sluggish fetal movements, (Premature rupture of membranes (PROM) and clinical suspicion of Intrauterine growth retardation (IUGR). The exclusion criteria was grand multigravida, multiple-pregnancy, known fetal anomalies, maternal medical complications DM HTN, cord around neck.

Permission was taken from hospital ethical committee. Patients were recruited from OPD and emergency of HMC Peshawar, keeping in view of the criteria. Informed written consent was taken from the patients and they were either be admitted in Gynae ward or followed on outpatients. Patients were sent to radiology department for obstetric ultrasound and BPP. Patients were followed till delivery. During active labour, fetal and maternal monitoring continued and at any sign of fetal distress emergency Lower Segment Cesarean Section (LSCS) was performed. After delivery Apgar score of newborn was noted at 5 min using the standard chart and was recorded in patients pro-forma.

All the data was analyzed by SPSS version 15.0. Frequency and percentage were calculated for qualitative variable (BPS, Apgar score). Mean and standard deviation of quantitative variable was calculated. Spearman's RANK correlation test was applied to see the relationship between BPP and Apgar. P value of 0.05 or less was considered as significant. Results were presented as tables and graphs.

RESULTS

Maternal age among 114 patients was analyzed as shown in Table 1. Parity among 114 patients was analyzed, 38% mothers were primi-para while 71 (62%) were multi-para. Biophysical Profile score among 114 babies was sorted as 83 (73%) babies had biophysical profile score ranged 9-10, 24 (21%) and 7 (6%). Mean biophysical profile score was 9 with standard deviation ± 1.14 . Thus 94% had a favourable BPP score.

APGAR score among 114 babies was analyzed as 48 (42%) babies had APGAR score ranged 9-10, 55 (48%) babies had APGAR score ranged 7-8 and 11 (10%) babies had APGAR score ranged from 4-6. Mean APGAR score was 8 with standard deviation ± 1.27 .

Correlation of Biophysical Profile score with APGAR Score among 114 babies was analyzed. In 83 babies, biophysical profile score ranged 9-10, after delivery 35 babies had APGAR score range from 9-10, 42 babies had APGAR score ranged from 7-8 and 6 babies had APGAR score ranged from 4-6. The correlation of Biophysical Profile with Apgar score is shown in Table 2. Mode of delivery among 114 patients was analyzed as 84 (73.7%) cases had vaginal delivery, 22 (19.3%) patients had caesarian section and instrumental delivery was done in 8 (7%) patients as shown in Table 3.

Table 1: Age distribution (n=114)

Age (in years)	Frequency & percentage
15-20	3(3%)
21-30	62(54%)
31-35	49(43%)
Total	114(100%)

- Mean age was 33 years with SD + 3.92

Table 2: Corelation of biophysical profile with APGAR score

BPP /APGAR Score	APGAR Score				
	9-10	7-8	4-6	Percentage	
Bio-physi-cal profile	9-10	35	42	6	83
	7-8	10	11	3	24
	4-6	3	2	2	7
	Total	48	55	11	114

- Spearman's RANK Correlation test was applied in which P value was 0.002.

Table 3: Mode of delivery (n=114)

Mode of delivery	Frequency & percentage
Vaginal delivery	84(73.7%)
Caesarian section	22(19.3%)
Instrumental delivery	8(7%)
Total	114(100%)

DISCUSSION

This study was carried to find the correlation of fetal Biophysical Profile with APGAR score in women presenting in term. In our study most of the women 97% were presented in age range 21-35 years in which 38% mothers were primi para and 62% mothers were multi para. In our study Biophysical profile closely co-related with Apgar score at five minutes. Seventy three percent babies had biophysical profile score ranged 9-10, 21% ranged 7-8 and 6% between 4 and 6. On the APGAR Score 42% babies had APGAR score ranged 9-10, 48% 7-8 and 10% ranged from 4 to 6. Similar results were found in study done by Bano B et al¹² in which 70% babies had biophysical profile score ranged 9-10, 26% babies had biophysical profile score ranged 7-8 and 4% babies had biophysical profile score ranged from 4-6. Where as in APGAR Score 46% babies had APGAR score ranged 9-10, 48% babies had APGAR score ranged 7-8 and 6% babies had APGAR score ranged from 4-6.

Abnormal BPS is associated with an increase in perinatal morbidity and possibly an increase in perinatal mortality as well; if no prompt action is taken to deliver the infant. A pregnant lady is four times more likely to be delivered by cesarean section when the BPS is abnormal, than when it is normal.

The confidence built around BPS has led some institutions to base their antenatal fetal risk determination on composite fetal biophysical profile score while others have confidently managed pregnancies at 42 weeks gestation and above with normal BPS conservatively, while awaiting spontaneous onset of labour.

Johnson¹³ in her study on BPS in the management of post-term pregnancies found substantial and significant increase in the incidence of fetal distress, low APGAR score and neonatal morbidity in fetuses exhibiting abnormal BPS, when compared to a group of fetuses with normal BPS. This study is very much comparable to the results of Johnson¹⁴ in which patients with poor BPP showed hypoxic babies requiring ventilation and prolonged nursery care afterwards.

Vintzileos and colleagues evaluated the relationship between biophysical profile and umbilical cord pH in patients undergoing cesarean section before the onset of labour. Their data suggested a significant relationship between biophysical profile scoring and fetal acid-base status¹⁵. The fetal heart rate reactivity center and the fetal breathing center cease functioning when pH was lower than 7.2, the centers controlling movements and tone began to malfunction at pH 7.1 to 7.2 and were completely abolished at pH below 7.10. Hence, it seems that the initial manifestations of fetal acidosis are reactive fetal heart rate and loss of fetal breathing while in advanced fetal acidemia; fetal movements and tone are compromised¹⁶. Vintzileos reported 42.8% perinatal death rate in fetuses without fetal

tone^{14,17}. In this study cesarean section was performed in 4 patients before the onset of labour due to very poor BPP i.e. < 4-6/10 (out of these four, two expired and other two survived). Perinatal mortality was 50%, which is comparable to Vintzileos showing 42.8%. This might be due to greater number of patients selected by Vintzileos.

Perinatal morbidity and mortality was low in patients having good APGAR score in current study comparable results English JD^{16,18} conducted in North West Armed Forces Hospital. This study showed that the patients having poor BPS, delivered babies with low APGAR score. However, despite the complaints of decreased fetal movements and clinically smallish babies, most of the patients had normal BPS and babies delivered with good APGAR score. It means BPS effectively detected those patients who really needed early intervention and thus avoiding unnecessary inductions and cesarean sections with related morbidity.

CONCLUSION

BPS is a good non invasive test to detect fetal hypoxia at early stage and saves the life of babies.

RECOMMENDATIONS

It is recommended that health institutions involved with obstetrics care should incorporate the BPS system in their protocol, but sole dependency for obstetrical intervention should not depend only on BPP and clinical assessment is mandatory.

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