International Journal of Contemporary Pediatrics
Singh G et al. Int J Contemp Pediatr. 2017 Mar;4(2):421-425
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291
DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20170524

Original Research Article

Association of biophysical profile with neonatal outcome: an observational study

Gurmeet Singh[1]*, Reena Sood[2], Karandeep Kaur[1]

[1]Department of Pediatrics, [2]Department of Gynecology and Obstetrics, SGRDIMSR, Sri Amritsar, Punjab, India

Received: 02 February 2017
Accepted: 06 February 2017

***Correspondence:**
Dr. Gurmeet Singh,
E-mail: dr.gmsingh@gmail.com

ABSTRACT

Background: Perinatal asphyxia is a common cause of neonatal mortality and morbidity in India. Antenatal surveillance prevents foetal injury and death and improves long term neurological outcome through optimal timing of delivery while avoiding unnecessary interventions such as caesarean delivery or preterm delivery.
Methods: After thorough history and physical examination, all patients underwent BPP assessment with USG and electronic foetal heart rate tracing and association between BPP score and various parameters were studied.
Results: Low BPP scores were associated with low Apgar score, increased rate of neonatal admissions and increased neonatal deaths. For BPP score of 6 there were 5 deaths constituting 71.4% of the total cases.
Conclusions: BPP score was found to be significantly associated with Apgar score and neonatal outcomes.

Keywords: Apgar score, Biophysical profile, Foetal hypoxia, Neonatal outcome

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, infection, hypertensive disease and intrapartum asphyxia are cited as most important contributors for perinatal mortality.[1] Almost 2/3rd of perinatal deaths occur due to obstetrical factors, perinatal hypoxia and infection, which are preventable causes. To address this problem various antenatal foetal surveillance methods have been devised in the past few decades and the search for best is still ongoing. Antepartum foetal testing is a compilation of methods devised to differentiate normal from compromised foetuses prior to onset of labour. The main techniques for foetal assessment are non-stress test (NST), contraction stress test (CST), biophysical profile, foetal movement count and modified biophysical profile and umbilical artery Doppler velocimetry.[2] The NST and CST were two primary methods available for foetal surveillance but are poor predictors of an asphyxiated infant.

Biophysical profile is the combination of NST and dynamic real-time B mode ultra-sonographic assessment of certain foetal parameters. It is a clinical tool that integrates level of dynamic biophysical activities into a usable standard.[3] It includes both acute markers of foetal status and some chronic markers of foetal and intrauterine condition. Biophysical profile predicts neonatal acidosis at delivery better than Apgar score and thus the risk of foetal death.[4] In a compromised foetus measures can be taken to intervene before progressive metabolic acidosis leads to foetal death.[5-8]

Advantage of using BPP in assessing foetal wellbeing is its wide acceptability, non-invasive nature, less time consumption and providing complete information about foetal anatomy and parameters reflecting acute and chronic response to asphyxia.[9] It evaluates neuro behaviour of foetus and status of placenta.[10] The BPP

score and Doppler sonography effectively stratify intrauterine growth restricted (IUGR) foetuses into risk categories.[11]

Parameters included in BPP are NST, ultra-sonographic measurement of the Amniotic fluid volume, presence or absence of foetal breathing movements, gross body movements and foetal tone.[12] The NST included reactive foetal heart rate, foetal breathing movements, foetal activity / gross body movements, foetal muscle tone and qualitative amniotic fluid volume/ amniotic fluid index. The BPS ≤6 has significant association with early neonatal morbidity.[13] Thus, this study was conducted to record the BPP in pregnancy at ≥ 36 weeks period of gestation and correlation of BPP with neonatal outcome was evaluated.

METHODS

It was a prospective observational study conducted at paediatrics department in collaboration with department of obstetrics at SGRDIMSR, Amritsar, India. Total 200 pregnant women at >36 weeks gestation were enrolled in the study. Women with impending eclampsia/pre-eclampsia, growth restricted foetuses, uncontrolled gestational diabetes mellitus, heart diseases, anaemia, with antepartum haemorrhage and with gross congenital anomalies in the foetus were excluded from the study. A detailed history and thorough clinical examination (systemic and obstetrics) was done on all subjects. All patients underwent BPP assessment with USG and electronic foetal heart rate tracing with assessment of: Foetal breathing movements, gross body movements, foetal tone, NST using cardiotopograph in Semi Fowler position, AFI measurement using four quadrant technique. Perinatal outcome was measured by Apgar score at 1 and 5 minutes, need for NICU admissions, perinatal morbidity and mortality.

Data so obtained was statistically analysed by Microsoft SPSS, Version 17.0. Chi square test was applied to the data.

RESULTS

Amongst the 200 subjects, 20 were lost to follow up and perinatal outcome was studied in 180 neonates. 159 cases (79.5%) had BPP score of more than 8 after 36 weeks of gestation while only 7 (3.5%) cases had BPP score of 6 and remaining 34 cases (17%) had a score of 10. At 1 min, 166 neonates (92.2%) had Apgar score of >7 and 14 neonates (7.8%) had <7 Apgar score. At 5 min, 177 neonates (98.3%) had Apgar score of >7 and 3 (1.7%) had Apgar score of <7.

Table 1: Association of BPP with various parameters.

		Biophysical	Profile	Score	
Variables	Total cases	6	8	10	p value
Cases	200	7 (3.5%)	159 (79.5%	34 (17%)	
Apgar score at 1 min					
>7	166	1 (14.3%)	133 (94.3%)	32 (100%)	<0.001
<7	14	6 (85.7%)	8 (5.7%)	0 (0%)	
Apgar score at 5 min					
>7	177	4 (57.1%)	141 (100%)	32 (100%)	<0.001
<7	3	3 (42.9%)	0 (0%)	0 (0%)	
Neonatal admissions					
Admissions	39	6 (85.7%)	30 (21.3%)	3 (9.4%)	<0.001
Not admitted	141	1 (14.3%)	111 (78.7%)	29 (90.6%)	
Neonatal outcomes					
Discharge	141	0 (0%)	112 (79.4%)	29 (90.6%)	<0.001
Discharge after treatment	30	1 (14.3%)	26 (18.4%)	3 (9.4%)	
Death	7	5 (71.4%)	2 (1.4%)	0 (0%)	
LAMA	2	1 (14.3%)	1 (0.7%)	0 (0%)	

Out of all the cases with BPP score of 6 there were 5 deaths constituting 71.4% of the total cases.

There were 2 neonatal deaths (1.4%) in women with BPP score of 8. No deaths were noted in new born with BPP score of 10 in mother.

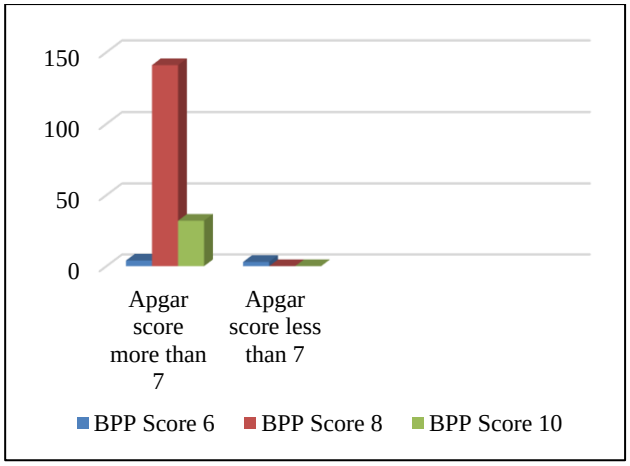

Figure 1: Relationship between BPP Score and Apgar score at 5 minutes.

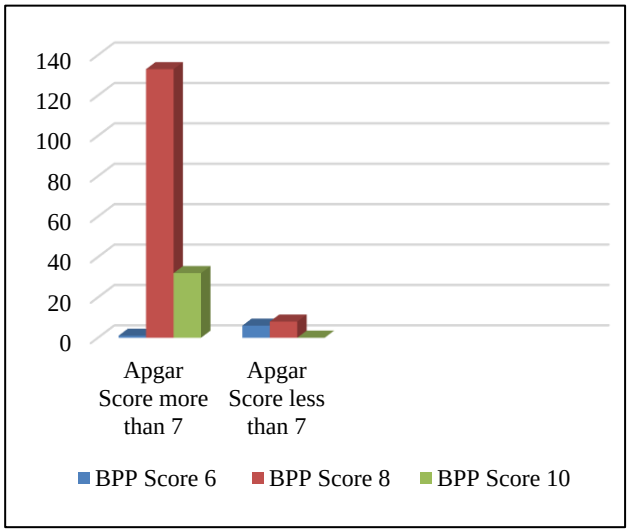

Figure 2: Relationship between BPP Score and Apgar score at 1minute.

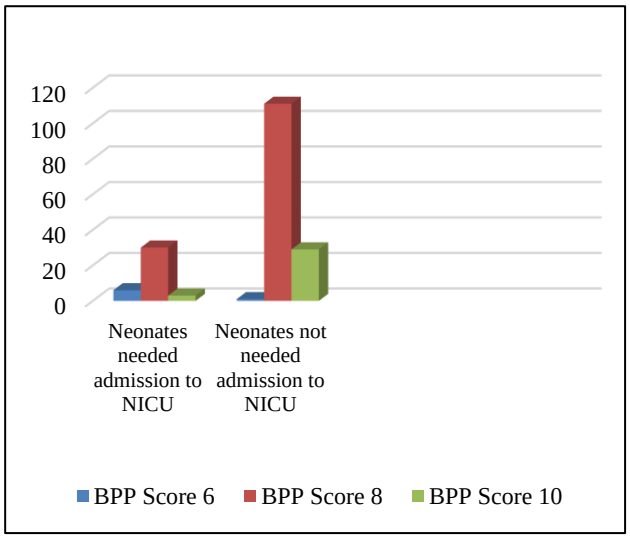

Figure 3: Relationship between BPP score and neonatal admission

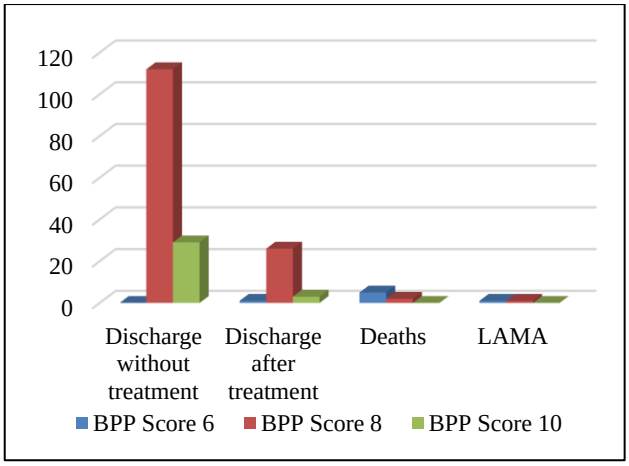

Figure 4: Relationship between BPP score and neonatal outcome.

DISCUSSION

In our study, we 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 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.[14-17]

It was found in our study that neonates born to mother with low BPP had higher risk of having low Apgar score at 1 and 5 min and the relationship between them was statistically significant (p value <0.001) as shown in diagram 1 and 2. A research study by Hina et al at Pakistan, reported positive correlation between BPP score and Apgar score.[18] Similar results were found in study done by Bano et al in which 70% babies had BPP ranged 9-10, 26% babies had BPP ranged 7-8 and 4% babies had biophysical profile score ranged from 4-6.[19]

We found significant association between BPP score and NICU admission (p value <0.001) as shown in diagram 3. Among the neonates born to women with low BPP score of 6 ,85.7% of neonates were admitted to NICU.

In our study, statistically significant association between BPP score and neonatal outcome was noted with p value of <0.001. More number of deaths (5 out of 6 neonates constituting 71.4%) were found in neonates born to mothers with low BPP score (of 6). In a study conducted at Nashville TN modified ultrasonography based BPP was used which included expanded scores of foetal movements, foetal breathing and qualitative assessment of accelerated placental maturity and this method was compared with method of Vinzileos et al 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.[20] Similar results were found in study conducted in Radiology

department PGMI, government Lady Reading Hospital, Peshawar from December 2007 to June 2008.[21]

There were 5 deaths in neonates born to mothers with BPP score of 6 and 2 deaths (1.4%) in women with BPP score of 8. However, no deaths were noted in new-born born to women with BPP score of 10. Thus, relationship of results of total score and perinatal outcome showed good predictive values with specificity of 98.8% and sensitivity of 82.4%.

Statistically significant association was found between 5 min Apgar score and outcome with p-value below 0.001. Only 2.8% of new born with 5 min Apgar score of >7 died as against 66.7% of neonates with Apgar score of <7.

Limitations of the current study were that BPP includes the use of ultra-sonographic machine for foetal assessment; it takes a longer time to complete if foetus is in sleep state and there was no consideration of presence of hydramnios as a parameter.

CONCLUSION

To summarize, BPP score of 6,8 and 10 was found in 7 (3.5%), 159 (79.5%) and 34 (17%) cases respectively. Majority of the subjects included in this study had normal BPP score.

Majority of the new born 85.7% with BPP score of 6 required admissions. Out of the total 141 new born with BPP score of 8, 21.3% were admitted with 78.7% requiring no admission. 9.4% with BPP score of 10 required admissions. Statistically significant association was found between maternal BPP score and neonatal admission at birth ($p<0.001$). It was observed that lower the score, sicker were the babies.

There was statistically significant association between BPP score and 1 min Apgar score and with 5 min Apgar score with p value below 0.001. Higher BPP score was found to be associated with higher 1 min Apgar score and 5 min score.

Lower BPP score were found to be associated with poor outcome and association was statistically significant. Lower BPP scores were found to be associated with poor outcome. So, it is concluded that BPP score is a valid score for better outcome.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Lawn JE, Kerber K, Laryea EC, Cousens S, Stst DM. 3.6 million neonatal deaths- what is progressing and what is not? Semin Perinatol. 2010;34:371-86.
2. ACOG Guidelines on antepartum fetal surveillance. Am Fam Physician. 2000;62(5):1184-8.
3. Turan S, Miller J, Baschat AA. Integrated testing and management in foetal growth restriction. Semin Perinatol. 2008;32(3):194-200.
4. Vintzileos AM, Campbell WA, Rodis JF. Foetal biophysical profile scoring: current status. Clin Perinatol. 1998;16(3):661-89.
5. Filho HA, Junior AE, Nardozza LM, Costa LL, Moron AF, Mattar R. Ultrasound assessement of the fetal biophysical profile: what does an radiologist need to know? Eur J Radiol. 2008;66(1):122-6.
6. Lalor JG, Fawole B, Alfirevic Z, Devane D. Biophysical profile for fetal assessment in high risk pregnancies. Cochrane Database Syst Rev. 2008;23:CD000038.
7. Alfirevic Z, Neilson JP. Biophysical profile for fetal assessment in high risk pregnancies. Cochrane Database Syst Rev. 2000;2:CD000038.
8. Filho GHA, Araujo E, Nardozza LM, Costa DLL, Moron AF, Mattar R. Ultrasound assessment of the fetal biophysical profile: what does a radiologist need to know? Eur J Radiol. 2008;66:122-6.
9. FA Manning. Fetal biophysical profile score theoretical considerations and practical application. Sonography in obstetrics and gynecology principle. Chapter 32, 7th/Edition, The McGraw-Hill compnies China; 2011.
10. Baschat AA, Viscardi RM, Gardner BH. Infant neurodevelopment following fetal growth restriction: relationship with antepartum surveillance paramteres. Ultrasound Obstet Gynecol. 2009;33:44-50.
11. Baschat AA, Galan HL, Bhide A, Berq C, Kush ML, Oepkes D, et al. Doppler and biophysical assessment in growth restricted fetuses. Ultrasound Obstet Gynecol. 2006;27:41-7.
12. Lin CC, Adamczyk CJ, Mittendiorf R. Fetal congenital malformations biophysical profile evaluation. J Reprod Med. 1998;43(6):521-7.
13. Arauz RJF, Chequer MJC, Lopez AAG, Hernandez JVH, Mendez AJA. Usefulness of biophysical profile in preterm rupture of membranes with treatment. Gynecol Obstet Mex. 2005;73:415-23.
14. Manning FA, Morrison I, Lange IR, Harman CR, Chamberlain PF. Fetal assessment based on fetal biophysical profile scoring: experience in 12,620 referred high-risk pregnancies, perinatal mortality by frequency and etiology. Am J Obstet Gynecol. 1985;151(3):343-50.
15. Manning FA. The fetal biophysical profile score: current status. Obstet Gynecol Clin North Am 1990 Mar;17 (1):147-62.
16. Manning FA, Harman CR, Menticoglou S, Morrison I. Assessment of fetal well being with ultrasound. Obstet gynecol Clin North Am. 1991 Dec;18(4): 891-905.

17. Manning FA. Fetal biophysical profile: a critical appraisal. Clin Obstet Gynecol. 2002;45(4):975-85.
18. Albu AR, Horhoianu IA, Dumitrascu MC, Horhoianu V. Growth assessment in diagnosis of fetal growth restriction. J Med Life. 2014;7(2):150-4.
19. Bano B, Zahid B. Hussain U. Fetal biophysical profile, as a tool to predict fetal outcome. Perinatal Med J. 2010;17(4):670-5.
20. Shah DM, Brown JE, Salyer SL, Fleischer AC, Boehm FH. Modified scheme for biophysical profile scoring. Am J Obstet Gynecol. 1989;160(3):586-91.
21. Mahmoud G, Tasnim N, Qazi A. Admission biophysical profile a better predictor of perinatal out come mother and child health centre, Pakistan Institute of Medical Sciences Islamabad. J Surg Pak. 2000;16:6-11.

Cite this article as: Singh G, Sood R, Kaur K. Association of biophysical profile with neonatal outcome: an observational study. Int J Contemp Pediatr 2017;4:421-5.