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Fetal Biophysical Profile Score and Perinatal Outcome

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ABSTRACT

Background: Sudden fetal demise, perinatal morbidity and mortality are still some of the major obstetrical challenges. Reduced fetal movements may have some bearing to fetal asphyxia and death, so timely detection of such condition and measures taken can prevent such mishaps.

Methods: A descriptive prospective study was conducted at Tribhuvan University Teaching Hospital, Department of Obstetrics and Gynecology from January to December 2002 in 55 cases to find out the relationship of Biophysical Profile Score with perinatal outcome in pregnant mothers with decreased fetal movement counts at or above 34 weeks of gestational age. The mode of delivery, Apgar score, neonatal admission and perinatal mortality were analyzed.

Results: The study demonstrated that most of the fetuses were in good condition with 87% of the cases scoring 8-10 BPS (normal), 6% scoring six (equivocal) and only 7% got four score (abnormal). Having the abnormal BPS of four significantly increased the risk of perinatal mortality by 50% (p=0.000). This study could not detect any significant association between Apgar score and neonatal morbidities, but showed significant correlation between BPS and caesarean section. The patients having lower BPS tended to undergo more caesarean section delivery than patients having normal BPS (p=0.009).

Conclusions: An abnormal BPS of four in cases of reduced fetal movement counts significantly influenced the risk of perinatal death. However reduced fetal movements only did not raise the risk of fetal morbidity and mortality. So BPS should be beneficial to detect the fetuses at risk in the patients having less fetal movements for the proper management at right time.

Keywords: Apgar score; biophysical profile score; fetal movements; perinatal mortality.

INTRODUCTION

The principle of good antenatal care still holds true for giving a healthy baby to a healthy mother. Antenatal care was started as social care mainly concentrating on maternal health only and fetus was considered as one of the maternal organs.[1]

Presently the maternal risk in pregnancy has been diminished to a greater extent partly due to better standard of care and obstetrical care started focusing on fetal health as well. The past concept of considering the fetus as a maternal organ no longer remains, instead fetus is considered as a second patient. It is presumed that approximately half of the still-births are due to asphyxia, hence the clinical management has stressed on recognition of fetuses at risk for appropriate intervention to deliver the healthy fetus.

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The incidence of less fetal movement counts in pregnant patients is given as 5-10% and the rate of fetal demise is reported as high as 10-30% of these patients without further surveillance and intervention.[2] So the use of Biophysical Profile Score (BPS) in these patients may help reduce fetal demise, perinatal morbidities and mortalities as well.

METHODS

This was a prospective and descriptive study. The participants used were the pregnant mothers at or above 34 weeks of pregnancy, who came to hospital with the complaints of decreased fetal movements. The subjects were admitted in hospital and were asked to record their fetal movement counts. The BPS was done to examine the fetal status of well-being and the patients were followed up till delivery to evaluate the perinatal outcome. This study was conducted in Tribhuvan University Teaching Hospital, Department of Obstetrics and Gynaecology from January to December 2002. All the data were entered in computer using Excel program and were analyzed using Epi-info version 6.

RESULTS

In this study total 60 pregnant mothers having less fetal movements were enrolled. Among the 60 subjects only 55 were entered for the analysis, and remaining five were excluded from the study for reasons as follows. Three cases did not come for delivery in our hospital and might have gone to other hospitals for delivery, one had home delivery and one delivered a neonate with congenital anomalies.

The pattern of biophysical profile score in the subjects:Among the total of 55 subjects, 33 of 55 (60%) obtained the BPS score of 10, 15 of them (27.3%) got eight score i.e. lowest limit of normal, only three (5.5%) received six score i.e. equivocal and four (7.3%) had abnormal score of four.(Table 1)

Table 1.The distribution of BPS in the subjects (n=55).

BPS	Subjects n (%)
10	33 (60%)
8	15 (27.2%)
6	3 (5.5%)
4	4 (7.3%)

BPS in relation to Apgar score:The normal Apgar scores were observed in the babies having both normal and abnormal BPS except one baby who had six Apgar inspite of 10 BPS (Table 2).

Table 2. BPS and Apgar score at five minutes(n=55).

BPS	Apgar at 5 min.					Total
	6	7	8	9	10	
10	1 (3%)	2 (7%)	22 (66%)	7 (21%)	1 (3%)	33
8	0 (0%)	0 (0%)	10 (67%)	5 (33%)	0 (0%)	15
6	0 (0%)	0 (0%)	2 (67%)	1 (33%)	0 (0%)	3
4	0 (0%)	0 (0%)	2 (50%)	2 (50%)	0 (0%)	4
Total	1 (2%)	2 (4%)	36 (65%)	15 (27%)	1 (2%)	55

BPS and neonatal unit admission:Total of 11 (20%) babies needed admission in the neonatal care unit in hospital.. The two of the babies among four who scored BPS of four needed neonatal unit care where as only five of the 33 babies with BPS of 10 needed neonatal care unit admission (Table 3)

Table 3. BPS and neonatal admission of the babies (n=55).

BPS	Neonatal admission		
	No.	(%)	Total
10	5	(15%)	33
8	4	(27%)	15
6	0	(0%)	3
4	2	(50%)	4
Total	11	(20%)	55

BPS in relation to perinatal mortality:The perinatal mortality was analyzed in the babies born to the subjects in relation to their BPS. There were two perinatal deaths and both occurred in the babies who had BPS of four. On applying Chi-square test, the result was statistically significant (p= 0.0000063) (Table 4).

Table 4. BPS in relation to perinatal mortality (n=55).

BPS	No. of Perinatal deaths	Total
10	0 (0%)	33
8	0 (0%)	15
6	0 (0%)	3
4	2 (50%)	4
Total	2 (4%)	55

BPS in relation to the caesarean delivery: The BPS score was compared in two groups of subjects, those having caesarean delivery and those having vaginal delivery. The patients having abnormal BPS tend to undergo more caesarean delivery than the patients having normal BPS (Table 5). The result was significant statistically (p= 0.009).

Table 5. BPS in relation to caesarean section (n=55).

BPS	Caesarean birth	Vaginal birth	Total
10	7 (22%)	26 (78%)	33
8	9 (60%)	6 (40%)	15
6	0 (0%)	3 (100%)	3
4	3 (75%)	1 (25%)	4
Total	19 (35%)	36 (65%)	55

DISCUSSION

The fetal biophysical profile score is a non-invasive and effective method of antenatal fetal surveillance. BPS helps detecting fetuses at risk.

Biophysical profile score and less fetal movements: Regarding the distribution of BPS in the subjects in present study, the majority (87.3%) scored 8-10, 7.3% of subjects scored 4, 5.5% got score of 6 and none got 2 or 0 score (Table 1). This explains that most of the subjects, though had less fetal movement counts, actually had healthy fetuses. Similar type of BPS distribution were also noted by Manning et al in a very large study done on 12,620 cases of high risk pregnancies. The study detected normal score of 8-10 on 97.5%, 6 score in 1.7%, 4 score in 0.52%, 2 score in 0.18% and 0 score in 0.00% of the subjects.[3] The results seem comparable with this study except the subjects who scored 6 and 4 are lesser in the later study than in the current study. This variation could be due to disparity on sample size i.e. 55 to 12,620. The next reason could be because of difference in subject selection; in this study subjects were all mixed of high and low risk but Manning included only high-risk patients.

Biophysical profile score and Apgar score in five minutes:While examining the association of BPS with Apgar score at fiveminutes, this study could not demonstrate any positive relationship. Among the four babies who had BPS score 4, all scored Apgar above 7. And all three babies, having BPS of 6 also scored Apgar above 7. All the 15 babies who scored BPS 8 also scored Apgar above 7. Only one of the 33 babies who had BPS of 10 got Apgar score 6,which means BPS score and APGAR score are not correlating in the present study. The abnormal finding of better Apgar with lower BPS in this study may be due to prompt intervention like induction of labor and emergency caesarean section on fetus having very low BPS as for example score of 4. In contrary to this result, a research study by Hina et al at Pakistan, reported better correlation between BPS score and Apgar score.[4] Both the studies being similar in many aspects like sample size (55 in current study and 69 in later study), enrollment of similar subjects like mothers having reduced fetal activity and also none of the fetus got the BPS lower than 4. Still the result differed from each other. The possible explanation for the variation of the result could be because of difference in proportions of subjects having IUGR babies, 12% in the present study and 35% in the later study.

Biophysical profile score and neonatal unit admission:The 20% of the babies born to the study subjects neededadmission to neonatal care unit in present study. Among the 28 babies of BPS 10, only five (11%) were admitted in neonatal care unit. But 27% and 50% babies of group with BPS 8 and 4 respectively, needed neonatal care admission (Table 3). This finding showed positive correlation between BPS and neonatal care admission, which means lower the BPS, sicker are the babies. However, this theory did not apply to the group of babies who had BPS 6 because all the three babies born to these subjects were healthy, so did not need admission to special neonatal care unit (Table 3). The explanation being their number is very small compared to numbers of subjects with BPS 10 and 8.

However, the study done in Canada, University of Manitoba, claimed highly significant inverse correlation between BPS and admission to neonatal care unit in high-risk pregnancies.[3] Again, the reason behind for such a vast variation in result could be the recruitment of only high-risk pregnancies in later study.Among the 11 babies admitted to neonatal care unit, two babies needed intensive care so were transferred to NICU and both babies belonged to BPS 4 group.

Association of BPS to perinatal mortality:There were two perinatal deaths in the study subjects of 55 comprising 3.6% of perinatal mortality rate. Both the deaths occurred in the group of BPS of 4 score. There were four subjects having BPS 4 so two perinatal deaths giving 50% mortality among BPS 4.The analysis of BPS with perinatal mortality detected the positive relationship in this study, which showed statistical significance giving the p value 0.000. Both the babies were treated in NICU. This result tells us BPS of 4 needs prompt intervention to deliver the baby and also there is 50% chance that baby may die within seven days of life despite the intensive neonatal care.

This result of the present study differed from the results of many other studies conducted in other places. The proportion of mortality is higher in the present study than in other studies. Several reports from other centers gave the range of perinatal mortality between 1.8 and 3.1.[5,6]Manning et al found the PMR as high as 26/1000,[7] which is nearer to the present study.

Relationship between BPS and caesarean section:In addition to the significant relationship of BPS to the perinatal mortality, the present study did demonstrate a next significant inverse relation of BPS to the caesarean delivery. The BPS scores were compared in two groups of subjects, one having caesarean delivery and another having vaginal delivery. Among the 55 subjects, 19 (35%) subjects underwent caesarean section for various indications. Of the 33 subjects having BPS 10, only seven (21%) had cesarean delivery where as nine (60%) of 15 subjects from BPS 8 group and three (75%) of four subjects from BPS 4 group had caesarean

section. This increasing trend of section rate looked very interesting with decreasing BPS score, showing the inverse correlation. This means the low BPS increases the chance of cesarean section. This trend was not seen in the group subjects having of BPS 6, where all three of them had normal vaginal delivery. This could be due to less numbers of subjects. The 26% of sections were done for fetal distress. The 21% cesarean were done for non-progress of labor.

CONCLUSIONS

An abnormal biophysical profile score (BPS) of four in cases of reduced fetal movement counts significantly influenced the risk of perinatal death. However reduced fetal movements only did not raise the risk of fetal morbidity and mortality. Biophysical profile score is useful for the detection of fetuses at risk in the pregnant mothers having reduced fetal movement counts for the detection of fetuses at risk to neonatal admission and perinatal death.

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