BIOPHYSICAL PROFILE;
BIOPHYSICAL PROFILE IN PRETERM FETUSES WITH INTRAUTERINE GROWTH RESTRICTION FOR DIAGNOSIS OF BIRTH ASPHYXIA.

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ABSTRACT... Objectives: To determine the diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia. **Study Design:** Cross-sectional study. **Settings:** Department of Radiology / Obstetrics & Gynaecology Faisalabad Medical University, Faisalabad and affiliated Hospitals. **Duration of Study:** The study was carried out for a period of one calendar year, 1st January, 2016 to 31st December, 2016. **Material & Methods:** Total 105 patients admitted through OPD and emergency fulfilling the criteria were included in this study. **Results:** In our study, 63.81% (n=67) were between 18-30 years and 36.19% (n=38) were between 31-35 years of age, mean+sd was calculated as 27.52+4.69 years diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping Apgar score as gold standard was recorded, it shows 34.29% (n=36) true positive, 7.61%(n=8) had false negative, 6.67%(n=7) false positive and 51.43%(n=54) had true negative. Sensitivity, specificity, and diagnostic accuracy rate were calculated as 81.82% 88.52% and 85.71% respectively. **Conclusion:** Higher diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia. It is recommended that these high risk patients must be screened in their antenatal period for diagnosis of birth asphyxia so that proper treatment protocols may be followed.

Key words: Preterm Fetus, Intrauterine Growth Restriction, Biophysical Profile, Diagnostic Accuracy.

INTRODUCTION

Asphyxia is a condition which is characterized by the impairment of the placental or pulmonary gas exchange or the ceasation of both and with resultant production of hypoxemia. Most common cause of perinatal death is perinatal asphyxia. Several morbidities such as cerebral palsy are also seen as asphyxic complication. In recent studies several risk factors such as low APGAR score and low pH have been found to be associated with birth asphyxia.[1] Intrauterine growth restriction represents pathological inhibition of fetal growth and failure of the fetus to attain its growth potential. The Prevalence of intrauterine growth restricted fetuses is highest in Asia and is equivalent to 75%.[2] 52% of the stillbirths are associated with growth restriction and 10% perinatal mortality is a consequence of growth restriction. UP to 72% of unexplained fetal deaths are associated with small for gestational age below the 10th percentile.[3] Fetal well-being can be assessed using biophysical profile, Doppler Velocimetry, fetal heart rate monitoring, and fetal movement counting. Fetal growth disturbances include fetuses at risk for intrauterine growth restriction[4] The Fetuses born with intrauterine growth restriction, in most cases are dealt as an obstetrical emergency along with major complications such as birth asphyxia, meconium aspiration syndrome, hypothermia, persistent pulmonary hypertension occurring in the neonatal period. Proper careful monitoring and follow up is needed to look for signs of fetal distress, if found signs of IUGR in gestational period. These include various surveillance techniques by assessing placental and fetal circulation with the aid of Doppler and biophysical profile for fetal well being assessment. Studies have shown that

perinatal asphyxia (Apgar score 5-7) occurs in 50% of cases of premature intrauterine growth restricted foetuses.[5]

That by biophysical profile which has 75% sensitivity, 79% Specificity, 12.5% positive predictive value, 98.8% negative predictive value[7] while another study with variability in specificity and sensitivity of 89.7% and 100%.[6] The use of biophysical profile as a test of fetal well being in high risk pregnancies is devoid of strong evidences.[8] As growth restriction is encountered in our population very frequently and it has associated risks of, birth asphyxia, cerebral palsy, still birth and admission to neonatal intensive care unit impose extensive financial as well as emotional burden on parents and increase work load of neonatal intensive care unit. In this respective study we explore validity of biophysical profile in fetuses with intrauterine growth restriction for diagnosis of birth asphyxia as different studies showed variable results regarding sensitivity and specificity of biophysical profile so that it can be recommended as a test of fetal well being in growth restricted foetuses.

MATERIAL & METHOD
The patients admitted through OPD and emergency that fulfilled the inclusion criteria were included in the study.

Inclusion Criteria
Pregnancies complicated with intrauterine growth restriction of duration from 32 to 36 weeks.

Inclusion Criteria
- Fetuses with congenital anomalies.
- Patients presenting in labor.
- Patients presenting with antepartum hemorrhage.

The identity of patients was recorded. Detailed history, general physical and obstetrics examination was done by gynaecologist. Biophysical profile was done by using curvilinear real time ultrasound with a 3.5 MH transducer in growth restricted foetuses in Radiology by radiologist.

- Score 8 and 10, test was considered normal.
- Score 6, test equivocal
- Score 2 and 4 are abnormal.

After delivery APGAR score of 69 fetus was assessed at 1 and 5 minutes. If at minutes it is 10 then baby was considered well if it was less than 7, it showed birth asphyxia. All data was collected and recorded on specially designed performa. All recorded observation was entered into computer and analyzed by SPPS 20.

RESULT
A total of 105 cases fulfilling the inclusion criteria were enrolled to determine the diagnostic accuracy of biophysical profile in preterm features with intrauterine growth restriction for diagnosis of birth asphyxia. Age distribution of the patients were done shows that 67 (63.81%) were between 18-30 years and 38 (36.19%) were between 31-35 years of age, mean + was calculated as 27.52+4.69 years. (Table-I) shows gestational age of the patients. 62 (59.05%) were between 32-34 weeks and 43 (40.95%) were 31-35 weeks of gestation, mean+sd was calculated as 33.99+1.42 weeks. (Table-II & III). Apgar scor of the patients was recorded, 58.10% (n=44) had 1-6 score and 41.90% (n=61) had 7-10 Apgar score, mean+sd was calculated as 2.67+1.20. (Table-IV). Biophysical profile of the patients was recorded, 47.62% (n=50) had 8biophysical score, mean+sd was calculated as 6.44+2.45. (Table-V). Frequency of birth asphyxia in preterm fetuses with intrauterine growth restriction on gold standard was recorded in 58.10% (n=44) while 41.9% (n=61) had no finding of birth asphyxia. (Table-VI). Diagnostic accuracy of biophysical profile (BPP) in preterm foetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping Apgar score as gold standard was recorded, it shows 34.29% (n=36) had true positive, 7.61% (n=8) had false negative, 6.67% (n=7) false positive and 51.43% (n=54) had true negative. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 81.82%, 88.52%, 83.72%, 87.09% and 85.71% respectively.

Age	No. of Patients	Percentage
18-30	67	63.81%
31-35	38	36.19%
Total	105	100

Table-I. Showing age distribution

Gestational Age	No. of Patients	Percentage
32-34	62	59.05%
31-35	43	40.95%
Total	105	100

Table-II. Showing gestational age

Apgar score	no. of Patients	Percentage
1-6	44	41.90%
7-10	61	58.10%
Total	105	100

Table-III. Showing Apgar score

Biophysical profile	No. of Patients	Percentage
8	50	47.62%
8	55	52.38%
Total	105	100

Table-IV. Showing biophysical profile

Birth asphyxia	No. of Patients	Percentage
Yes	44	58.10%
No	61	41.90%
Total	105	100

Table-V. Showing birth asphyxia in preterm foetuses with IUGR

Biophysical profile	7	7	Total
Positive	(a) TP=8	(b)FP=54	43
Negative	(c)FN=44	(d)TN=61	62
Total	44	61	105

Table-VI. Showing preterm foetuses profile Apgar score

- Sensitivity = 81.82%
- Specificity = 88.52%
- Diagnostic accuracy = 85.71%

DISCUSSION

Intrauterine growth restriction is dealt on daily basis as a problem faced by obstetricians, neonatal mortality in both term and pre-term neonates is significantly increased in those diagnosed antenatally with IUGR. Evaluation of fetal symmetry by fetal biometry (relative size of head to abdomen and femur) was proposed more than 30 years ago as a tool to distinguish an intrinsic fetal growth problem (symmetric IUGR) from an extrinsic growth problem due to suspected placental insufficiency (asymmetric IUGR) in the third trimester. We planned this study to explore validity of biophysical profile in intrauterine growth restriction for diagnosis of birth asphyxia as different studies showed variable results regarding sensitivity and specificity of biophysical profile so that it can be recommended as a test of fetal well being in growth restricted foetuses. In our study, 67 (63.81%) were between 18-30 years and 38 (36.91%)were between 31-35 years of age, mean+sd was calculated as 27.52+4.69 years, diagnostic accuracy of biophysical profile in preterm foetuses with intrauterine growth restriction for diagnosis of birth asphyxia it shows 36 (34.29%) true positive, 7.61% (n=8) had false negative, 6.67% (n=7) false positive and 51.43% (n=54) had true negative. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 81.82%, 88.52%, 83.72%, 87.09% and 85.71% respectively. Our findings are in agreement with a study showing sensitivity and specificity of 100% and 89.7%.[6] Result of another study[7] that biophysical profile has sensitivity 75%, specificity 79%, negative predictive value 98.8% are also closely related to our study. False positive rate of the NST is reduced by Performing the BPP, usually; however, False positive rate of BPP ranges from 75% for a score of 06 to 20% for a score of zero. Newer techniques are used to reduce the False positive rate in the assessment of BPP, one among them is, Vibroacoustic stimulation which agitates feta activity during the BPP testing.[9] The BPP test owes significant technical ease in direct fetal behavioural assessment. Test is not free of disadvantages such as the vulnerability on visual interpretation of the (non stress test) NST, long performance time needed (at least 30 minutes), and the indirect provision of information regarding fetal abnormalities such as[13] cardiovascular status and perfusion details. Performance is operator

dependent too. Furthermore, there is significant lack of randomized trials comparing the BPP with other tests.[10] In USA BPP, the most acceptable and appreciable method of noncontiguous fetal well- being assessment.[11-13] BPP is judged with high accuracy by assessing its individual components. When all the parameters within the framework are within normal limits, there is questionable need for an NST. Supported by the study of Manning et al. Who described a high-risk pregnancy protocol devoid of routine NST and all other BPP parameters were normal.[14] Others view the NST and the BPP) with equal importance and take them as independent predictors of normal outcomes.[15] We are of the view that as growth restriction is encountered very frequently in our population and it has associated risks of still birth, cerebral palsy, birth asphyxia, and admission to neonatal intensive care unit which impose having financial as well as emotional burden on parents and increase work load of neonatal intensive care unit, biophysical profile may be a useful technique for prediction of neonatal outcome.[14]

CONCLUSION

It is concluded that preterm fetuses with intrauterine growth restriction can be assessed with high accuracy by the use of biophysical profile for diagnosis of birth asphyxia. Routine antenatal check up with proper periodic screening is recommended in these high risk patients in their antenatal period for diagnosis of birth asphyxia so that early diagnosis and prompt treatment protocol may be followed.

REFERENCES

1. Nayeri F, Shariat M, Dalili H, Bani Adam L, Mehrjerdi F, Shakeri A. **Perinatal risk factors for neonatal asphyxia in vali-e-Asr Hospital; T ehran –Iran.** Iran J Reprod Med. 2012; 10:137-40.

2. Imdad A, Yakoob MY, Saddique S, Bhutta ZA. **Screening and triage of intrauterine growth restriction (IUGR) in general population and high risk pregnancies: a systematic review with a focus on reduction of IUGR related stillbirths.** BMC Public Health 2011; 11(Suppl 3): 1-12.

3. Mandruzzato G, Antssaklis A, Botet F, Chervenak FA, Figueras F, Grunebaum A**. Intrauterine restriction (IUGR).** J. Perinat. Med 2008; 36:277-81.

4. Zelop CM[1], Javitt MC, Glanc P et al. **ACR appropriateness criteria[R] growth disturbances – risk of intrauterine growth restriction.**

5. **Ultrasound Q.** 2013 Sep; 29(3):147-51.

6. Sbarcea A, Raca N. **Evaluation of risk factors involved in intrauterine growth restriction.** Stud Uni Vasile Goldis 2012; 22: 225-33.

7. Chousawai S, Tongprasert F, Yanase Y, Udomwan P, Tongsong T. **The efficacy of rapid biophysical profile in predicting poor pregnancy outcomes in suspected growth restriction fetuses: preliminary study.** J Med Assoc Thai. 2012; 95:482-6.

8. Jamal a, Maroosi V, Eslamian L, Noori K. **A proposed trial of fetal biophysical profile versus modified biophysical profile in the management of high risk pregnancies.** Anta Medica Iranica. 2007; 45:204-8.

9. **Antenatal imaging and assessment of fetal well-being. In: Baker PN, editor. Obstetrics by ten teacnhers.** 19th ed. London: Hoder Arnold, 2011:61-74.

10. Inglis SR, Druzin MI, Wagner WE, Kogut E. **The use of vobroacoustic stimulation during the abnormal or equivocal biophysical profile.** Obstetrics and gynecology 1993; 82:371-4.

11. Alfirevic Z, Neilson JP. **Biophysical profile for fetal assessment in high risk pregnancies.** Cohrane Database of Systematic Reviews 2000; 2:342.

12. Manning FA, Marrison I, HarmanCR, Menticoglou SM. **The abnormal fetal biophysical profile score. V. Predictive accuracy according to score composition.** Am J Obstet Gynecol 1990; 162:918-27.

13. Manning FA, Marrison I, Harman CR, Menticoglou SM, Lange IR, Johnson JM. **Fetal assessment based on fetal biophysical profile scoring. IV. An analysis of perinatal morbidity and mortality.** Am J Obstet Gynecol 1990; 162:703-9.

14. Vintzileos Am, Gaffney SE, Salinger LM. **"The relationships among the fetal biophysical profile, umbilical cord pH, and Apgar scores."** Am J Obstet Gynecol 1987; 157:627-31.

15. Manning FA, Marrison I, Lange IR, **"fetal biophysical profile scoring: selective use of the nonsress test,"** Am J Obstet Gynecol 1987; 156:709-1.

16. Platt LD, Eglinton GS, Sipos L. **"further experience with the fetal biophysical profile,"** Obstetrics and Gynecology 1983; 61:480-5.
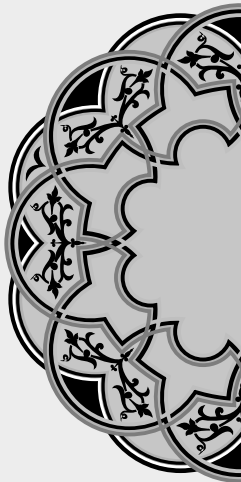
"Breakdowns can create breakthroughs."

Unknown

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