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Research Article

## Role of vibroacoustic stimulation test in prediction of fetal outcome in terms of Apgar score

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### ABSTRACT

**Background:** Role of vibroacoustic stimulation test in prediction of fetal outcome in terms of Apgar score. Aim: To know the efficacy of vibroacoustic stimulation test in prediction of fetal outcome.

**Methods:** The study was conducted in department of obstetrics and gynecology at Guwahati Medical College, in duration of 2007-2009. Total 200 high risk patients underwent VAST.

**Results:** VAST done among all these patients and according to fetal response divided into VAST reactive and non-reactive. In 162 (81%) patients VAST was reactive and 38 (19%) non-reactive. Among VAST (162) reactive patients, 126 (77.77%) went for spontaneous vaginal delivery and for 36 (22.22%) induction planned. Induction failed in 9 patients and cesarean section done. Total babies shifted to NICU 13 (6.5%), 4 babies expired (2%) and 9 (4.5%) improved. Thus VAST has good correlation in prediction of fetal outcome.

**Conclusions:** It is simple, rapid and non-invasive tool for detection of fetal well-being. It is efficacious in detection of early fetal jeopardy as correlated with Apgar score. There are currently no randomized controlled trials that address the safety and efficacy of VAST used to assess fetal well-being.

**Keywords:** Vast, High risk, Apgar score

### INTRODUCTION

Foetal vibroacoustic stimulation is a simple, non-invasive technique where a device is placed on the maternal abdomen over the region of the foetal head and sound is emitted at a predetermined level for several seconds. It is hypothesized that the resultant startle reflex in the foetus and subsequent foetal heart rate acceleration or transient tachycardia following vibroacoustic stimulation provide reassurance of foetal well-being. This technique has been proposed as a tool to assess foetal well-being in high risk patients.<sup>1</sup> Acceleration of foetal health surveillance (FHS) observed with foetal movements is regarded as a reliable sign of foetal well-being. Often foetus is asleep and there is absence of spontaneous foetal heart rate (FHR) acceleration, manual manipulation, auditory or

visual stimuli has been shown to evoke a response of FHR acceleration during intrapartum period.<sup>2,3</sup>

Testing prenatal habituation to vibroacoustic stimulation may play a role in evaluating the performance of the foetal central nervous system and therefore may be predictive of subsequent development after birth. This possibility is supported further in so far as deficits in central nervous system volume and function restrict the response to VAS in the anencephalic foetus. The use of VAS in conjunction with an abnormal biophysical profile or in high risk pregnancies may provide reassurance of foetal well-being.

## METHODS

This study conducted among 200 high risk patients admitted in emergency labour room of Guwahati medical college. Duration of study was 2 years (2007-2009). In this study high risk patient, IUGR, oligohydramnios, postdated pregnancy, diabetes mellitus and hypertensive pregnant patients were included. The study followed inclusion and exclusion criteria.

### Exclusion criteria

1. Gestational age < 30 weeks
2. Abnormal fetal heart rate
3. Twin
4. Eclampsia
5. Placenta previa
6. In-utero diagnosed fetal anomaly

### Inclusion criteria

1. singleton pregnancy
2. >32 wks. gestation
3. Intact membranes
4. no use of MgSO<sub>4</sub> and narcotics
5. cephalic

Vibroacoustic stimulator available in market, made by Wipro Company, 75 Hz frequency is used. Under the guidance of usg fetal head is located and stimulator is used for 3 secs, response of fetal heart rate and fetal movement noted on the screen. Acceleration of FHR >15 bpm from base line and persistence for 15 seconds is indicative of reactive test, the test is repeated for 3 times at interval of 10 minutes, and if does not show the changes then labeled as non-reactive test. Patients are categorized on this basis as reactive and non-reactive test and further management done accordingly.

## RESULTS

The high risk pregnant patients included in this study are oligohydramnios, IUGR, post-dated, diabetes mellitus and gestational hypertension. The age group, demographic profile and education level analysed [Table-1].

**Table 1: High risk pregnancy (n=200).**

Oligohydramnios	57	(28.5%)
IUGR	51	(25.5%)
Postdated pregnancy	38	(19%)
Diabetes mellitus	16	(8%)
Gestational hypertension	38	(19%)

Most of the patients were of oligohydramnios and IUGR. Maximum number of patients was age group of 20-30 years [Table-2].

**Table 2: Age group.**

<20 yrs.	11	(5.5%)
20-30yrs	98	(49%)
30-40 yrs.	71	(35.5%)
>40yrs	20	(10%)

The patient's demographic profile, education and socioeconomic status also studied. 132 (66%) of patients belong to rural population and 68 (34%) belong to urban. Maximum cases belong to lower middle class family 98 (49%) [Table 3-5].

**Table 3: Demographic profile.**

Rural	132	(66%)
Urban	68	(34%)

**Table 4: Socioeconomic status.**

Lower middle class	98	(49%)
Middle class	62	(31%)
Upper class	40	(20%)

**Table 5: Education.**

High school <	98	(49%)
Intermediate <	86	(43%)
Graduation & post graduation	16	(8%)

The patients also categorized on the basis of gestational age term and preterm > 37 wks. And < 37 wks. [Table-6].

**Table 6: Gestational Age.**

< 37 wks.	38	19%
>37 wks.	162	81%

Patients less than 37 weeks received 2 dosage of betnesol for fetal lung maturity. VAST done among all these patients and according to fetal response divided into VAST reactive and non-reactive. In 162 (81%) patients VAST was reactive and 38 (19%) non-reactive.

**Table 7: VAST results.**

Reactive	162	81%
Non-reactive	38	19%

Among VAST (162) reactive patients, 126 (77.77%) went for spontaneous vaginal delivery and for 36 (22.22%) induction planned. Induction failed in 9 patients and caesarian section done.

Those patient non-reactive for VAST, 33 patient caesarian done and out of them 5 patient not given consent for operation. Then trial of labour given explaining the associated risk. Thus lower segment

caesarian section done in 42 (21%) cases [Table-7] [Table-8] [Table 9].

**Table 8: Reactive VAST (n=162).**

Spontaneous vaginal delivery	126	77.77%
Induction	36 (failed =9)	22.22%

**Table 9: Non-reactive VAST (n=38).**

Cesarean section	Planned 38 (5 refused)	86.84%
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Total caesarian section done in 42 patients, 33 VAST non-reactive and 9 induction failure cases. During operation, in 37 (88%) patient's meconium stained liquor was present. In 25 (67.56%) cases, thick meconium was present and in 12 (32.43%) thin meconium was present and in 5 (11.90%) patients inspite of non-reactive VAST liquor was clear. All the babies delivered either by caesarian section or normal delivery, assessed by 5 min Apgar score. Babies categorized according to Apgar score [Table-10].

**Table 10: Apgar score.**

>8	152 (76%)	Immediately handed over
6-8	43 (21.5%)	Observation then 35 handed over and 8 shifted to NICU
4<	5 (2.5%)	Directly shifted to NICU

Total babies shifted to NICU 13 (6.5%), 4 babies expired (2%) and 9 (4.5%) improved. Thus VAST has good correlation in prediction of fetal outcome but further studies and trials still needs to establish a definite role in prediction of fetal jeopardy.

## DISCUSSION

The idea that the fetus responds to extra uterine sound stimuli came from the observation that a woman felt an increase in fetal movement during the audience applause at a concert (Forbes and Forbes, 1927). Most of the startle reflex or fetal recoil is felt by the mother. Since palpable or visualized fetal movements after acoustic stimulation is almost always associated with a reactive NST (98%), this is a simple means to assess the neurological status of the unborn child (Michael et al, 1985).<sup>4</sup> Vibroacoustic stimulation also alters the fetal behavioral state from 1F to 2F or from 2F to 4F state. The time spent in state 1F decreases, while 4F state is significantly more commonly seen after significantly more commonly seen after stimulation (Devoe et al, 1990).<sup>5</sup> Fetal movement after stimulation has also correlated with a biophysical profile of >8 (Sarinoglu et al, 1996).<sup>6</sup>

In our study, 19% of the patients showed non-reactive VAST, rate of caesarean section was 86.84%, meconium aspiration rate 88%, babies admitted to NICU 6.5% and

2% expired. Results were comparable to study done by Kavitha et al<sup>7</sup> 24% non-reactive VAST, rate of caesarean 68.8%, meconium aspiration 68.8%, NICU admission rate 12.5% and baby expired 6.3%. Sarno AP et al<sup>8</sup> in their study showed VAST in early period as a predictor of subsequent condition of the fetus in utero. Currently no randomized controlled trials that address the safety and efficacy of VAS used to assess fetal well-being in labour in the presence of a nonreassuring CTG trace. Although VAS has been proposed as a simple, non-invasive tool for assessment of fetal well-being, there is insufficient evidence from randomized trials on which to base recommendations for use of VAS in the evaluation of fetal well-being in labour in the presence of a nonreassuring CTG trace.<sup>9</sup>

## CONCLUSIONS

Vibroacoustic stimulation test is non-invasive, less time consuming, easy non-stress test to know the foetal well-being in- utero. But still there is need of randomized control trials to establish its effective role in prediction of foetal outcome.

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