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DIAGNOSTIC SIGNIFICANCE OF APGAR SCORE IN PERINATAL ASPHYXIA

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ABSTRACT

This case control study was conducted to evaluate the clinical status of infant for recruitment of babies with Perinatal asphyxia and without Asphyxia. 80 cases and 60 healthy controls were participated. Apgar score of cases at 1minutes, 5 minutes and 10 minutes of cases were <3 in 60, 11, and 6 babies, 4-6 in 20, 55 and 30 babies and 6-7 in 0,14 and 11 babies respectively. Whereas, in controls Apgar score >7 at 1 and 5 minutes were seen in 56 and 60 babies respectively which indicated that they are healthy new born. The mean and SD of Apgar score in cases was significantly lower (4.9±1.624) against (8.633 ±0.6040) among controls. Male babies 52(65%) were more affected than female 28 (34.9%). Foetal distress in asphyxiated newborn (86.25%) was due to obstetric complications and Maternal illness. There was significant negative correlation between Apgar score and Obstetric complications (p value< 0.05).

KEYWORDS: APGAR, Perinatal Asphyxia.

INTRODUCTION

Apgar score is a diagnostic tool using by Obstetrician, Paediatrician, Aneaestheologist and Nursing professionals for the evaluating the status of the newborn baby at one minute and five minutes after birth. Hence it is the first clinical examination we face in life. Dr.Virginia Apgar an Anaesthesiologist proposed this scoring system in 1952 and used her name as a mnemonic for each of the five categories that a person will score, which gained rapid world wide use. Thus this scoring system provided a standard assessment for new born infants after delivery. The Apgar scoring system is divided into five components /options viz. Activity, Pulse, Grimac, Appearance and Respiration. Thus the Apgar score quantities clinical signs of neonatal depression, such as Cynosis or Pallor, Bradycardia, depressed Reflex responses to stimulation, Hypotonia and Apnoea or Gasping respiration. Each component receives a score of 0 to 2 points.[1] The Apagar scores are recorded at one and five minutes after birth for all infants, and at 5 minutes interval thereafter until 20 minutes for infants with score less than 7 based on Resuscitation guidelines. This is because if baby scores are low at minute, the medical professional will likely intervene, or increased interventions have to start. At five minutes, the baby has ideally improved. If the score is very low after five minutes, the medical staff should reassess the score after 10 minutes. A score of 7-10 after five minutes is reassuring. A score of 4 to 6 is moderately abnormal. A score of 0-3 is concerning which indicates a need for increased intervention, usually in assistance for breathing and may be one of the first indication of encephalopathy. Further more the score is widely used in outcome studies which can be used to detect Perinatal Asphyxia. Neonatal Asphyxia is defined as impairment of gas exchange leads to prolonged and progressive hypoxemia, hypercapnea and significant metabolic acidosis. Therefore Apagar score has emerged as an invaluable diagnostic test of Perinatal asphyxia. The Apgar score provides an accepted and convenient method for determining the status of the newborn baby immediately after birth and a useful index response of resuscitation if it is needed. A crucial factor in assessment has been the Apgar score to assess the neonatal condition that may be relevant to later neurological damage. A low score immediately signalled the need for emergency attention.

APGAR	Sign	0	1	2
A	Appearance	Blue or Pale	Body pink, Extremities blue	Completely pink
P	Pulse	Absent	<100 minute	>100
G	Grimace	No Response	Grimace	Cry , Sneeze or Active pulls away
A	Activity	Limp	Some Flexion	Active Motion
R	Respiration	Absent	Weak cry Hypoventilation	Good, Crying

Figure 1: Depicting APGAR Scoring system designed by Dr. Virginia Apgar.

MATERILS AND METHODS

The study was conducted at department of Anatomy in collaboration with department of Paediatrics and department of Biochemistry during 2008-2010 of JIPMER Pondicherry, India. The study was sanctioned by Institutional Research Committee and Human Ethical committee based of ICMR guidelines. Inorder to determine the clinical status of the babies Apgar score was taken at 1 minute, 5 minutes and 10 minutes in which inclusion criteria designed were term appropriate for gestational age babies with Perinatal asphyxia as cases and babies without asphyxia matched for gestational age and weight were taken as controls. Perinatal Asphyxia is designated when more than three of the following criteria such as Apgar score less than 6 at 5 minutes, Meconium stained liquor, changes in fetal heart rate, Clinical evidence of Hypoxic Ischemic Encephalopathy (HIE) were observed based on guidelines of American Academy of Paediatrics, American College of Obstetrician and Gynaecologists. Apgar scoring system was used for assessing the clinical status of the babies immediately after birth of the newborn. The following are the guidelines of the Protocol (Figure:1).

Protocol of Apgar Scoring System (Apgar V et al)[1]
1. **Appearance / Colour**
- Completely pink body is give a *score of two*
- Baby with central part pink with peripheral cyanosis *gets one*
- Complete blue or pale body gets *zero score*.

2. **Pulse/Heart rate**
- A heart rate of >100 is considered good and given a *score of two*
- A rate of <100 receives a *score of one*.
- No heart beat can be seen, felt or heard the *score is zero*.

This was found to be the most important diagnostic and prognostic among the five signs

3. **Grimace /Reflex activity**
- Sneezing coughing and crying or active withdrawal is *scored two*.
- A response of facial grimace receives a *rating of one*.

- If infant does not respond he receives a *score of zero*.

4. **Action /Muscle tone**
- One with good tone and spontaneously flexed arm and leg which resisted extension receives *two points.*
- Minimal flexion of limbs is given *one score*.
- A completely flaccid infant receives *zero score*

5. **Respiratory effort**
- One who breathed and cried lustly receives *two score*.
- All other types of respiratory effort such as irregular, shallow respiration are *scored one*.
- An infant who is apnoeic at 60 seconds after birth receives a *score of zero*

Statistical Analysis
Comparison of cases and controls by students t-test. Correlation between different variable was assessed by Carl Perarson co-efficient Correlation. Data was analysed by Graph Pad (InStat, San Diego, USA) and P value <0.05 was taken as significant.

RESULTS

The APGAR scores of the new born babies with neonatal asphyxia and healthy controls were taken, immediately after the birth. The Apagar score of cases taken at 1minute were <3 score for in 60 babies (75%) , 4-6 score in 20(25%) babies and 6-7 score in nil babies. At 5 minutes <3 score in 11 (13.75%) new borne, 4-6 score in 55 (68.75%) and 6-7 score in 14(17.5%) babies were noticed. The Apgar score in 10 minutes was <3 in 06(7.5%), 4-6 score in 30(37.5%) and 6-7 score in 11 (13.75) (Table:1). In healthy controls the Apgar score was > 7 at 1 minute and 5 minutes were 56 and 60 respectively indicating that all babies were good around 5 minutes after birth (Table:2). The Apgar Score of cases and controls were significantly different (4.9±1.624 and 8.633±0.604) (Table:3). Based on Apgar scoring system at five minutes the asphyxia groups were classified into mild, moderate and severe with scores of 6-7, 4-6 and <3 respectively. Among the 80 babies 14(17.5%)mild, 55(68.75%) moderate and11(13.75%)severe asphyxiated infants (Table:4). The genders of the asphyxial babies were also documented in five minutes in which 53(66.2%) were males and 27(33.75%) females shows

that males are more affected than female babies with a difference of 26 (32.5%) (Table:5).

Table 1: Showing APGAR Scores at 1,5 and10 minutes of Cases of Perinatal Asphyxia.

APGAR Score	1 Minute	5 Minute	10 Minute
<3	60 (75%)	11(13.75%)	06(7.5%)
4-6	20(25%)	55(68.75%)	30(37.5%)
6-7	0(0%)	14(17.5%)	11(13.75%)
Total	80(100%)	80(100%)	47(58.75%)

Table 2: Showing APGAR scores > 7 of Healthy Controls.

APGAR Score	1 Minute	5 Minute	Status of Baby
> 7	56	60	Healthy Controls

Table 3: Showing Significant difference of APGAR scores of Cases of Perinatal Asphyxia and Healthy Controls.

Cases (n=80)	Controls(n=60)
4.9±1.624	8.633±0.604

Table 4: Depicting Mild, Moderate and Severe Asphyxial groups assessed by APGAR scoring system.

Asphyxial Groups	1 Minute		5 Minutes		10 Minutes	
	n	Mean ±SD	n	Mean ±SD	n	Mean ±SD
(6-7) Mild	0	0	14(17.5%)	7±0	9 (11.25%)	7±0
(4-6) Moderate	22 (27.5%)	4.44±0.566	55(68.7%)	4.74±1.03	26(35%)	5.18±0.07
<3 Severe	58(72.5%)	1.01±0.90	11(13.7%)	13.7±0.481	4 (5.25%)	2.5±0.5

Table 5: Exhibiting Gender wise APGAR Scores in Mild, Moderate and Severe Asphyxia.

Asphyxial Groups	1 Minute APGAR		5 Minute APGAR		10 Minute APGAR	
	Male	Female	Male	Female	Male	Female
Mild(6-7)	0(0%)	0(0%)	12(15%)	2(2.5%)	3(3.75%)	6(7.5%)
Moderate(4-6)	15(18.7%)	7(8.7%)	35(43.7%)	20(25%)	16(20%)	10(12.5%)
Severe(<3)	37(46.2%)	21(26.2)	6(7.5%)	5(6.2%)	2(1%)	2(1%)
Total	52(65%)	28(34.9%)	53(66.2%)	27(33.75%)	21(24.75%)	18(22.5%)
	80(100%)		80(100%)		39(48.75%)	
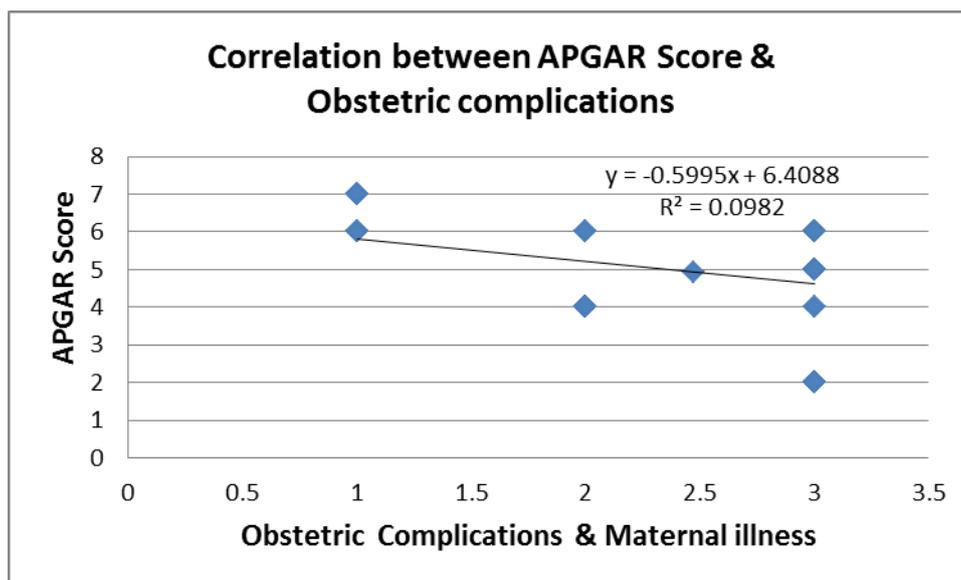
Figure 2: Depicting Correlation coefficient (Pearson) between Apgar score and Obstetric complications (p value<0.05 and r value 0.599).

DISCUSSION

The prognosis of the new born infant is excellent, if they receive one of the upper three scores and poor if one of the lowest three scores by using Apgar scoring method at one minute and five minutes immediately after delivery. In the current study we documented the Apagar scores of the new babies at 1 minute, 5 minutes and 10 minutes which provides us to record the status of the new babies whether they were asphyxiated or healthy. The Apgar score was significantly different in asphyxiated babies and non-asphyxiated babies. Leviton et al reported that Apgar score only describes the condition during the initial minutes of life, neonatal encephalopathy (NE) is a clinical syndrome describing cerebral symptoms in the earliest days of life in the term infant.[2] In our study we noticed the appearance of skin colour, heart rate > 100 /minute, reflex activity in response to irritation, spontaneous flexion of limbs and cry during respiration indicates the babies were in good health with high Apgar scores, however babies without good scores were implied them into mild, moderate and severe asphyxiated babies. Apgar score of 0 at 5 minutes is associated with increased risk of cerebral palsy in new born in full term infants. A five minute Apgar score 7-10 is considered as normal .Score of 4-6 are intermediate and not makers of high level risk of later neurological function. Neurological status of the babies were detected by Sarnat and Sarnat scoring[3]. Dag moster et al reported that low Apgar scores in new born were associated with neonatal death and cerebral palsy but less convincingly with risk of developing other chronic disabilities[4]. In our study 28 babies were expired due to low Apgar scores at 1 minute and 5 minutes with obstetric complications and 59 babies shows seizures. It was agreed by Kristina et al who stated that obstetric factors would influence the risk of low Apgar score, and that a low Apgar score at 5 minutes would be associated with adverse outcome in which an increased risk of neonatal morbidity, infant mortality, and neurologic impairment[5]. The Apagar scores are recorded at one and five minutes after birth for all infants, and at 5 minutes interval thereafter until 20 minutes for infants with score less than 7 based on Resuscitation guidelines American Academy of Pediatrics and American College of Obstetricians and Gynecologists.[6] Neverthless in the present study we recorded the Apgar score at 10 minutes when the score was less than seven in 47(58.75%) infants, however we could not taken Apgar score beyond 10 or 20 minutes after delivery. A low one minute Apgar score does not correlate with infants future outcome. The five minute Apgar score and particularly the change in the score between 1 and 5 minute is a useful index of the effectiveness of the resuscitation efforts. It has been agreed by Enrico L et al who suggested that the assessment of the Apgar score varied greatly among participants, particularly when scoring respiratory effort in intubated newborn babies[7]. An infant who is apnoeic and requires intubation and ventilation should receive normoxia may be achieved through adequate artificial ventilation. At five minutes, the heart rate is 120 beats/min, the infant is completely flaccid on the ventilator, does not respond to stimulation, and is pink. According to Neil M the application of the Apgar score to very preterm infants has also been questioned, such infants frequently have low scores and may be assessed during active resuscitation or elective intubation.[8] In our study we excluded the preterm babies due to the same reason even if, the asphyxiated term baby had low Apgar score. Golan A et al[9] reported that maternal complications includes hypertension (22.1%), fetal distress (7.9%), meconium stained amniotic fluid (29.1%), IUGR (24.5%), Breach presentation (17%), caesarean section (35.2%) in which Oligohydramnios (0.58%) shows high risk morbidity and mortality. In our study we documented 69 cases had obstetrics complications and remaining 11 babies were without complications for which PROM (42%) Prolonged labour (43.47%), PIH (7.2%),CPD (5.79%), cord prolapse (2.89%) . 32% of the babies were expired, 2 left against medical advice and 62.5% survived. There was significant negative correlation between Apgar score and Obstetric complications. Schmidt B et al[10] reported that Apgar score remains a best tool for the identification of the newly born infant in need for cardiopulmonary resuscitation and to predict outcome and evaluate change in the condition of the newly born infant over the first minute of life. Our study agreed with observations and results of the previous reports. The author previous studies shows there was significant negative correlation with Apgar and DNA damage in oxidative stress induced DNA damage, Micronucleus assay, Chromosomal aberrations, Seizures and Hypoxic ischemic encephalopathy.[11] and further strengthens the current study as there was significant negative correlation between Apgar score and Obstetrics complications.

CONCLUSION

The Apgar scoring system is a Paramount method to assess the status of the new born at early minutes after birth at delivery room. The data of the current study elucidates that Apgar score is an index for grading the Perinatal asphyxia based on its scores for which Apgar score and obstetric complications negatively correlated.

ACKNOWLEDGMENTS

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