DIAGNOSIS AND OUTCOME OF BIRTH ASPHYXIA IN RESOURCE CONSTRAINED HEALTH CARE SET UP

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ABSTRACT

Objective: To determine morbidity and mortality of neonates with low APGAR score in a resource constrained health care set up.

Study Design: Prospective descriptive study.

Place and Duration of Study: The study was carried out in combined military hospital Attock, from Jan 2013 to Jan 2015.

Material and Methods: All term neonates with 37 completed weeks of gestation and APGAR score less than 7 were included in the study. APGAR score was calculated by an attending pediatrician, gynecologist or trained female nurse at 0 and 5 minutes. In Neonatal Intensive Care Unit [NICU] the babies were daily examined by pediatrician. Outcome was documented in term of morbidity i.e. fits and mortality i.e. death of babies.

Results: Total number of neonates included in the study were 85 of which 55 (65%) were males and 30 (35%) were females. Of the total neonates 65 (76%) were discharged in satisfactory conditions and 20 (24%) expired during stay in the hospital. The mean APGAR score of newborns was 4.98 ± 0.98 at 5 minutes. During stay in hospital 46 (54%) were diagnosed to have hypoxic ischemic encephalopathy 2 (HIE2), those diagnosed with HIE3 were 5 (6%) and the rest 14 (16%) with HIE1.

Conclusion: Low APGAR score is an important cause of admission to NICU. Low APGAR score was found associated with increased risk of fits in neonates and one of the most important cause of mortality in our set up.

Keywords: APGAR score, Fits, Neonatal intensive care unit, Spontaneous vertex delivery, Term.

INTRODUCTION

Birth asphyxia is among the five most common causes of death under five year's age[1,2]. All over the world it is responsible for about 23 percent of neonatal deaths. Birth asphyxia has been reported to be responsible for about 1 million inrapartum deaths. In developed countries due to better obstetric and primary care the incidence of birth asphyxia is very low and neonatal mortality due to it is about 0.1 percent[3]. The situation is worse in developing countries where its incidence is much higher, 5 and 26 per 1000 in Cape Town and Nigeria respectively and the mortality approaches 40%[3]. Study done in Pakistan showed that it is responsible for about 20 percent of neonatal deaths and 16 percent of neonatal admission[4]. Another study reported 10 percent of neonatal admission to be due to birth asphyxia[5].

Apgar score has been used for decades to assess the immediate well-being of neonates and effectiveness of neonatal resuscitation in the delivery room. This scoring system was introduced in 1953 by a female anesthesiologist, named Virginia Apgar[6]. Since then apgar score is being used as an index of asphyxia. It is counted at 1, 5 and 10 minutes of birth. Low apgar score at 1 minute may not be significant and may be due to transitory neonatal depression but low apgar score at 5 and 10 minute is of high clinical significance and is associated with increased neonatal mortality and morbidity. Apgar score less than 7 at 5 and 10 minutes is considered as low[7].

Both fetal and maternal factors contribute to birth asphyxia. Insult to fetal brain may occur antenatally or in intrapartum period. No antenatal visits, multiple births, malpresentation, oxytocin use during labour, sever eclampsia and

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pre eclampsia, maternal anemia, meconium stained amniotic fluid and prolonged rupture of membrane are considered to be risk factors for birth asphyxia[8]. According to American Academy of Pediatrics a neonate should manifest all of the following to be diagnosed to have perinatal asphyxia: Umbilical artery PH less than 7, low persistence apgar score for more than five minutes, multi organ failure and abnormal neurological findings on clinical examination like hypotonia and fits[9]. But in resource limited countries and even in china apgar score less than 7 is still used as an index of perinatal asphyxia[10]. We also used the same criteria for diagnosis of birth asphyxia.

The rationale of this study was to highlight the burden of birth asphyxia in our step up and the morbidity and mortality resulting from it in the immediate postnatal period. Because in our set up no special intervention is available for these babies while in developed countries with special intervention the mortality and morbidity from perinatal asphyxia has greatly been reduced.

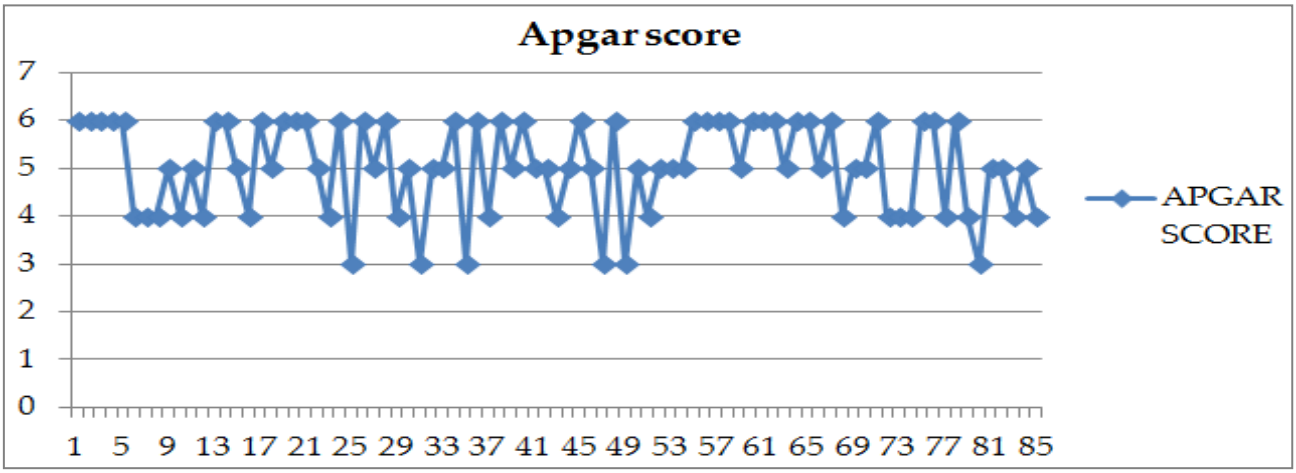

Figure-1: Distribution of Apgar score (n=85) among the patients.
Y axis shows APGAR score on X axis is no. of patients

MATERIAL AND METHODS

This prospective descriptional study was carried out in CMH, Attock, Punjab, Pakistan from Jan 2013 to Jan 2015. All term babies of both sex with perinatal asphyxia were included in the study. Sample size was calculated using WHO calculator. Sampling technique used was consecutive non probability sampling. Term was defined as 37 to 42 completed weeks of gestation and asphyxia as an APGAR score less than 7. In CMH each LSCS and difficult or assisted SVD is attended by a pediatrician while even uncomplicated SVD is attended by gynecologist and trained nurse. Apgar score was calculated by either a pediatrician, gynecologist or trained nurse. Particulars of mothers were entered in the pre formed proforma. In NICU the babies were examined and followed by classified pediatrician and the progress noted daily. Outcome of each baby in term of morbidity that's fits and mortality were entered in the proforma. Pre term babies; babies with gestational age less than 37 completed weeks and babies with congenital anomalies were excluded from the study. HIE was staged as per sarnat staging[11] by classified pediatrician.

All the data collected (source of data was preformed proformas; filled by paediatrician for each patients) after the 2 years of study was analyzed using SPSS version 18. Mean ± SD was calculated for numerical variables like age (in years) of the mothers, APGAR score and duration of stay in hospital. Frequencies and percentages were calculated for categorical variables like gender, outcome for example discharged or expired and morbidity likes fits.

RESULTS

Of the total no of 85 babies included in the study 35% were male and 65% were female. Apgar score distribution is given in fig-1 with mean score, 4.98 ± 0.98 at 5 minutes. Of the total neonates 76% were discharged in satisfactory conditions and 24% expired during stay in the hospital. During stay in hospital 46 (54%) were diagnosed to have hypoxic ischemic encephalopathy 2 (HIE2), patients diagnosed with HIE3 were 5 (6%) and the rest 14 (16%) were with HIE1 as shown in fig-2. Babies who did not develop signs of encephalopathy were 20 (24%). Rest of the data collected during the study is given in table.

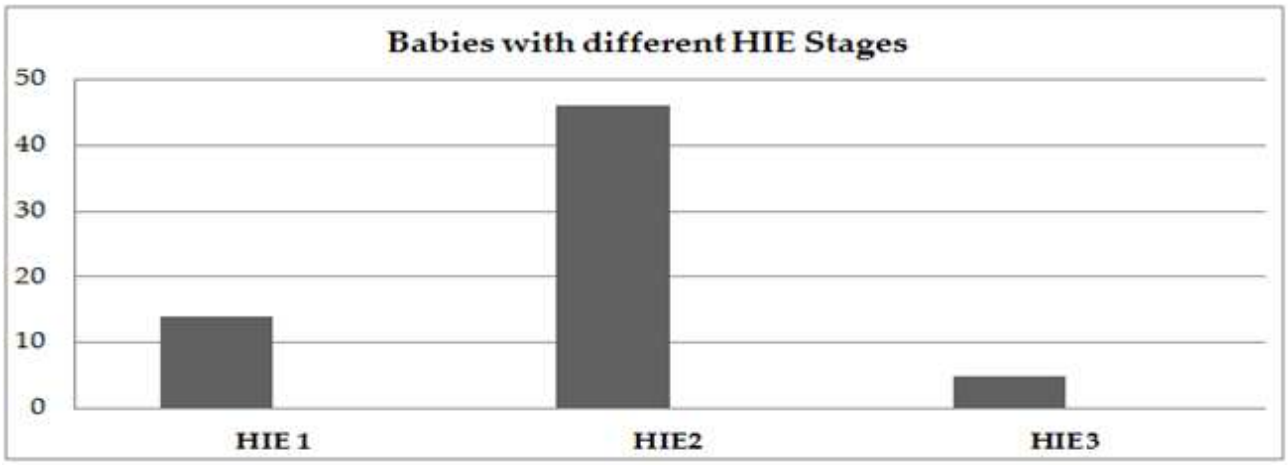

Figure-2: Patients with different Hypoxic Ischemic Encephalopathy stages (n=65).
HIE-hypoxic ischemic encephalopathy.

DISCUSSION

Birth asphyxia is an important cause of admission to NICU in our set up and is related to significant neonatal mortality and morbidity. Specific head or Whole body cooling for birth asphyxia is now the standard of treatment all over the world[12]. This therapeutic intervention is started within six hours after birth and continued till 48 to 72 hours and has resulted in significant improvement in term of mortality and morbidity including neurological outcome in the immediate neonatal period and even later[13]. Despite the fact that this intervention has dramatic established benefits, no such interventional therapy is available in Pakista. The main reason for it is the non availability of reliable data regarding this devastating condition. We used Apgar score for patients to label them as having birth asphyxia. The same criteria though don't meet standard criteria for the diagnosis of birth asphyxia is still used in resource limited countries including china[8,10,14] and even in recent study low apgar score has been linked with significant neonatal mortality[15].

In our study male were more affected than female and the incidence of birth asphyxia was more in babies delivered by SVD than LSCS. Also its incidence was more in unbooked cases and in primigravida. Similar findings were observed in other studies also. Study from Karachi also showed male predominance with male 60% and female 40%. Another study from India also showed similar results[16]. Both these studies also showed increased incidence of birth asphyxia in babies delivered by SVD than LSCS. Studies by Aslam et al[8] and Sahoo et al[17] also documented increased incidence of perinatal asphyxia in primigravida as compared to multigravida similar to our finding. Aslam et al[8] also reported increased incidence in unbooked cases as compared to booked cases and this has also been noted in our study.

In our study 24% of babies with low apgar score developed no signs of encephalopathy, babies with HIE stage 1 were 16% with stage 2

were 54% and those with stage 3 were 6. Our studies also reported increased prevalence of HIE in babies with low apgar score. Study by siva et a[16] reported the incidence of HIE in low apgar score babies to be 31% with maximum of the babies in stage 1, while in our study most of the babies were in stage 2. Another study by Rehan Majeed et al[14] revealed that 36% of the babies with low apgar score developed no encephalopathy, another 36% went into HIE stage1, 20% stage 2 and 8% into stage 3. Study from Bangladesh reported the frequency of HIE stage 1 to be 25%, stage 2 to be 36% and stage 3 to be about 38% among the asphyxiated neonates[18].

The most common antenatal problem observed in our study was maternal anemia in 82%, PROM in 34%, PIH 24%, fever and UTI 11% each. Almost similar antenatal problems have been reported in other studies too. Study by Rehan Majeed et al[14] reported history of anemia among mothers of asphyxiated to be 60%, PROM 24%, PIH 19% and fever 24%. But study by Aslam et al[8] reported that maternal anemia and hypertension are unrelated to birth asphyxia. But other studies have showed increased incidence of birth asphyxia in female with PIH[16,19]. Hypertension may lead to decreased placental flow and may prone baby to perinatal asphyxia[19]. Mortality for asphyxiated babies in our study was

Table: Maternal and fetal data.

Materna/ fetal data	No. of patients	Percentange/Mean ± SD
Maternal age		26.47 ± 4.71
Parity		
Primigravida	49	58
Multigravida	36	42
Antenatal visits		
Booked	12	14
Unbooked	73	86
Antenatal problems		
Anemia	70	82
PROM	29	34
IH	21	24
Fever	10	11
UTI	9	11
Oligohydramnios	8	9
Polyhydramnios	3	2
Admission		
Outdoor	47	55
Indoor	38	45
Mode of delivery		
SVD	61	72
LSCS	24	28
Apgar score		4.98 ± 0.98
Birth weight		2.74 ± 0.57
Duration of hospital stay		2.55 ± 1.50
Sex of neonates		
Male	55	65
Female	30	35

SVD: spontaneous vertex deliver, LSCS: lower segment caesarian section, SD: standard deviation, PROM: premature rupture of membrane, PIH: pregnancy induced hypertension, UTI: urinary tract infection.

24%, while mortality due to birth asphyxia from urban area of Pakistan has been reported to be about 14%[20]. Study from Bangladesh has reported the mortality due to peri natal asphyxia to be 26%, the reported mortality from India is 8% and that from Nigeria is 14%. These differences may be due to difference in diagnostic techniques and differences in interventions[21].

CONCLUSION

Low apgar score is an important cause of admission to NICU. Low apgar score was found associated with increased risk of fits in neonates and as one of the most important cause of mortality in our set up.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Al-Macki N, Miller SP, Hall N, Shevell M. The spectrum of abnormal neurologic outcomes subsequent to term intrapartum asphyxia. J Pediatr Neuroradiol 2009; 41(6): 399-405.
2. Carlo WA, Goudar SS, Pasha O, Chomba E, Wallander JL, Biasini FJ, et al. Randomized trial of early developmental intervention on outcomes in children after birth asphyxia in developing countries. J Pediatr 2013; 162(4): 705-12.
3. Haider BA, Bhutta ZA. Birth asphyxia in developing countries: current status and public health implications. Current problems in pediatric and adolescent health care 2006; 36(5): 178-88.
4. Rahim F, Jan A, Mohummad J, Iqbal H. Pattern and outcome of admissions to neonatal unit of Khyber Teaching Hospital, Peshawar. Pak J Med Sci 2007; 23(2): 249-53.
5. Mahmud S, Shah SA, Ali S, Ghafoor T, Ahmed S, Lodhi MA. Pattern of neonatal admissions in a tertiary care hospital. Pak Armed Forces Med J 2016; 66(suppl-1): 95-9.
6. Apgar V. A proposal for a new method of evaluation of the newborn infant. Curr Res Anesth Analg 1953; 32(4): 260-67.
7. Thorngren-Jerneck K, Herbst A. Low 5 Minute Apgar Score: A population based register study of 1 million term births. Obstet Gynecol 2001; 98(1): 65-70.
8. Aslam HM, Saleem S, Afzal R, Iqbal U, Saleem SM, Shaikh MW et al. Risk factors of birth asphyxia. Ital J Pediatr 2014; 40(1): 89-94.
9. Chalak LF. Perinatal Asphyxia in the Delivery Room: Initial Management and Current Cooling Guidelines. Neo Reviews 2016; 17(8): e463-70.
10. Xu T, Niermeyer S, Lee HC, Simon WM, Yue Q, Gong L et al. International Perspectives: Reducing birth asphyxia in china by implementing the neonatal resuscitation program and helping babies breathe initiative. Neo Reviews 2016; 17(8): e425-34.
11. Sarnat HB, Sarnat MS. Neonatal encephalopathy following fetal distress: A clinical and electroencephalographic study. Arch Neurol 1976; 33: 696-05.
12. Azzopardi DV, Strohm B, Edwards AD, Dyet L, Halliday HL, Juszczak E, et al. Moderate hypothermia to treat perinatal asphyxial encephalopathy. N Engl J Med 2009; 361(14): 1349-58.
13. Jacobs SE, Morley CJ, Inder TE, Stewart MJ, Smith KR, McNamara PJ, et al. Infant Cooling Evaluation Collaboration. Whole-body hypothermia for term and near-term new borns with hypoxic-ischemic encephalopathy: A randomized controlled trial. Arch Pediatr Adolesc Med 2011; 165(8): 692-700.
14. Majeed R, Memon Y, Majeed F, Shaikh NP, Rajar UD. Risk factors of birth asphyxia. J Ayub Med Coll Abbottabad 2007; 19(3): 67-71.
15. Iliodromiti S, Mackay DF, Smith GC, Pell JP, Nelson SM. Apgar score and the risk of cause-specific infant mortality: A population-based cohort study. Lancet 2014; 384(9956): 1749-55.
16. SB SS, Nair CC, Madhu GN, Srinivasa S, Manjunath MN. Clinical profile and outcome of perinatal asphyxia in a tertiary care centre. Curr Pediatr Res 2015; 19 (1 & 2): 9-12
17. Sahoo MR, Arigela V, Pradeep Y, Rao S, Sudarsini P. Effect of the perinatal risk factors on the outcome of the term asphyxiated neonates at the time of discharge in NICU. Pediatric Review: Pediatr Res 2016; 3(5).
18. Banerjee M, Majumdar SK, Shahidullah M. Relationships of Urinary Beta 2-microglobulin in neonates with impaired renal function in different stages of hypoxic ischaemic encephalopathy. Bangladesh J Child Health 2013; 37(1): 22-6.
19. Rachatapantanakorn O, Tongkumchum P, Chaisuksant Y. Factors associated with birth asphyxia in Pattani Hospital, Thailand. SMJ 2005; 23(1): 17-27.
20. Jehan I, Harris H, Salat S, Zeb A, Mobeen N, Pasha O, et al. Neonatal mortality, risk factors and causes: A prospective population-based cohort study in urban Pakistan. Bull World Health Organ 2009; 87(2): 130-8.
21. Etuk SJ, Etuk IS. Relative risk of birth asphyxia in babies of booked women who deliver in unorthodox health facilities in Calabor, Nigeria. Acta Tropica 2001; 79(2): 143-47.