EVALUATION OF ANTIBIOTICS PRESCRIBED AND DEATH RELATED TO AXPHYSIA IN NEONATES

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Abstract:
Introduction: Birth asphyxia is defined as the condition of failure to start breathing or unable to keep breathing at birth or neonatal period. Very high death rate for neonates has been observed due to birth asphyxia. **Objectives:** This study was conducted to document risk of death due to asphyxia and antibiotics prescribed in patients with.**Study Design:** Purposive observational study **Place of Study:** Hyderabad and Jamshoro, Sindh, Pakistan. **Duration of Study:** January to December 2018. **Methodology:** Purposive observational study was conducted over period of 1 year from January to December 2018 in pediatric wards or neonatal intensive care unit of teaching hospital of Hyderabad and Jamshoro, Pakistan. Data was collected from 274 patients and was analyzed using Statistical Package for Social Science (Version 22.0).
Results: Out of 274 patients, 180 patients were male (65.6%) and majority were from urban areas (67.8%). Age group which was most prone to asphyxia was newborn (65.1%) whereas least affected age was 15 days to 30 days (5.1%). Among the subjects 25.3% died due to asphyxia with death majorly occurring in newborns (47.7%) while 63.2% patients survived. In 23.4% cases patients were prescribed ceftriaxone whereas in combination antibiotic therapy 63.7% patients were prescribed with cefotaxime+gentamycin however in 96 patients, these antibiotics were changed due to ineffectiveness or no response of the previous antibiotics.**Conclusion:** Findings of this study concludes that major mortality age group is newborn as this is vulnerable age in neonates and use of antibiotics was also very high at such an early stage of life which may be develop alarming issues as resistance in later stages of life.
KEY WORDS: Asphyxia, Death, Neonates. Antibiotics

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INTRODUCTION

Birth asphyxia is defined by World Health Organization (WHO) as failure to start breathing or unable to keep breathing at birth, [1]. It is very common condition, but its cause is not clear. Either it is intrapartum stress or hypoxia, or baby is premature. Different synonyms of birth asphyxia such as fetal stress, prenatal asphyxia, hypoxic-ischemic encephalopathy, and post-asphyxial encephalopathy could only be utilized when the cause is known [2]. Naturally newborn are given capability to revive from loss of breath with time after their birth but some may need medications and devices. Due to continuous bradycardia or apnea, various methods such as mask and bags are used in the babies with asphyxia [3].

Death rate for neonates is very high, about 4 million out of every 130 million newborns [4]. These deaths are more common in low- or middle-income countries. Around 4 million die before birth, having age of 6-7 months in-utero. Still apart from this ratio of death, most of deaths are not recorded. As these take place at home or in poor households and surroundings. From such a huge number of death rate, only 1% of it is counter checked as they belong to rich families and countries [5].

Another research done on global cause of child death shows that 814,000 babies die before birth due to intrapartum complications and this is fifth common reason of death in children[6]. But less attention and work done on the causes of these deaths as compared to malaria, which causes only few deaths [7]. If only neonatal deaths are taken in account as child mortality than intrapartum stillbirths are undervalued as it comprises of 1.02 million deaths[8]. The intrapartum stillbirths are equal to one third of total world stillbirths that is 3.2 million[9] still these stillbirths are not part of Global estimation[10].

Higher rate of deaths was in the babies born from 9:00 pm to 8:59 am as comparison to those who were born from 9:00 am to 8:59 pm. As well as these rates were also high in births of July and August rather than other months of the year. Similarly, death rate was higher during weekends as compared to other days of the week. All this data indicates unavailability of experienced staff at these times of deaths or poor judgement due to mental of physical fatigue.

Major reason of these deaths was lack of training and unavailability of senior doctors at delivery time [11]. Now a days, child mortality due to asphyxia is not common and perinatal deaths are due to lack of senior clinical staff at the time of delivery [12]. Still proper care and supervision at the time of delivery is important factor in deaths due to neonatal asphyxia in normal pregnancies [13].

Availability of senior doctors and staff all the time is not possible as delivery can occur at any time. Mistakes takes place at number of times such as when unexperienced staff start working or if there is time of annual days off, night shifts or if there is less staff during holidays [11]. In recent years, child deaths decreased due to increase control of infectious diseases such as diarrhea, pneumonia, malaria and measles in newborn and toddlers, but neonatal deaths do not decrease as such. In one of the reports in 2000, the data showed 37% mortality rate in toddlers [14] which was increased to 41% [15] out of 3.6million where as there is no obvious change in the death rate of new born even at the global level [6]. Yearly there are 3 million stillbirths takes place still there is less focus given to it. These deaths are more common in south Asia and Africa [8]. Major factor is unavailability health resources in these areas. Though resuscitation is not expensive but still not common because unavailability of trained doctors [16]. Accuracy of mortality data is not much significant in less developed countries due to the home births and poor system of collecting data. Still births are basically fetal deaths and baby who is born alive but die afterwards should not be termed as stillbirth [9] and it is easily misunderstood by untrained staff as stillbirth is more acceptable to the family then death afterwards. For more accurate data some interventions may be helpful such as incentives on death registration and keeping an eye on burial region [8].

According to WHO, neonate is newborn who is below 28 days old and this age is very risky. In this age proper care and feed is very important for survival and health future [17]. One of the researches says that, it's better to prevent asphyxia than to treat it and there are various interventions available such as inhibiting the complications like prolonged labor, placental insufficiency, cord complications and abruption. Neonatal resuscitation can be effective enough for mild asphyxia whereas severe asphyxia requires effective treatment, but its success is limited [18].

SUBJECTS AND METHODS

Prospective observational study was conducted over period of 1 year from January to December 2018 in pediatric wards or neonatal intensive care unit of teaching hospital of Hyderabad and Jamshoro, Pakistan. Birth asphyxia is defined as the condition of failure to start breathing or unable to keep breathing at birth or neonatal period having ≤ 5 at 10 minutes of Apgar score and chest compressions or mechanical ventilation for resuscitation within 10 minutes.

Data was collected from 274 patients by purposive sampling technique. Patients of less than 1 month both male and female with diagnosis of asphyxia. All the patients above 1month, cancer patients, ICU, emergency patients, HIV-AIDS patients, and Hepatitis B & C patients. The information retrieved from patient's medication record file include their demographic record, diagnosis, list of medication prescribed, doses and duration of therapy was recorded in a predesigned questionnaire.

Consent was taken from patient's guardian and the collected data was assessed by comparing against WHO guidelines for the management of common childhood illnesses 2013, British National Formulary (2017) and Lexi Comp Drug Information Handbook (2015). Hospital Ethical approval was obtained.

Data were analyzed using Statistical Package for Social Science (Version 22.0). Chi-square test was used for categorical variables and other statistical tests used were percentages and proportions.

RESULTS

Table 1 shows the demographic characteristics of the patients. During the study period 274 patients enrolled in the study. Majority of patients were male with percentage of 65.6% (n=180) and 34.3% (n= 94) were females. Among the patients 67.8% (n=18) were from urban areas whereas 32.2% (n=88) were from rural areas. Age group which was most prone to asphyxia was newborn (65.1%, n=181) followed by 1-3 days of age 15.3% (n=42), 4-14 days 13.5% (n=37) and least affected age group was 15-30 days (5.1%, n=14).

All these patients were given medical assistance 24 hours but there was shortage of staff at nighttime. As mentioned in Table 2, from collected data 25.3% (n=69) patients died due to asphyxia, 11.5% (n=32) patients left against medical advice (LAMA) and 63.2% (n=173)

patients survived. LAMA patient's data of survival and mortality is unknown. Major mortality rate age group was newborn (47.7%, n=42), followed by 1-3 days (27.3%, n=24), 4-14 days (18.2%, n=16) and 15-30 days (6.8%, n=6) as shown in Table 2.

Neonates with diagnosis of asphyxia were also prescribed antibiotics as monotherapy or combination therapy. Common prescribed antibiotics were ceftriaxone 20-50mg/kg once daily, cefotaxime 25mg/kg every 6,8 or 12 hourly, ampicillin 30mg/kg 2,3 or 4 times daily, gentamycin 2.5mg/kg or 4-5mg/kg every 12,18, 29 or 36 hourly depending on postmenstrual age, amikacin 15mg/kg every 24 hourly, meropenem 20mg/kg ever 8 or 12 hourly and ceftazidime 25mg/kg every 8, 12 or 24 hourly.

As shown in Table 3, 23.4% (n=64) patients were prescribed ceftriaxone whereas in combination antibiotic therapy, 48.9% (n=134) patients were prescribed with cefotaxime+gentamycin, 9.49% (n=26) were given ampicillin+cefotaxime and 18.2% (n=50) were prescribed ceftriaxone+amikacin. Table 3 also shows that, in 96 patients these antibiotics were changed, with ceftazidime 38.5% (n=37), meropenem+gentamycin 41.7% (n=40), and meropenem 19.8% (n=19) cases (p value <0.01) due to ineffectiveness or no response of the previous antibiotics. In 22.2% patients, antibiotic therapy was changed before 5 days.

Table 1: Characteristics of Patients

Characteristics		**Frequency**	**Percentage (%)**
Gender	Male	180	65.6
	Female	94	34.3
Locality	Urban	186	67.8
	Rural	88	32.2
Age group	Newborn	181	65.1
	1day-3days	42	15.3
	4days- 14days	37	13.5
	15days-30days	14	5.1

Table 2: Outcome and age at the time of death of patients with asphyxia

Variable		**Frequency**	**Percentage (%)**
Outcome of patients	Deaths	69	25.3
	LAMA	32	11.5
	Survived	173	63.2
	Total	274	100
Age at the time of death	Newborn	42	47.7
	1-3 days	24	27.3
	4-14 days	16	18.2
	15-30 days	6	6.8
	Total	88	100

Table 3: Antibiotics prescribed, switching of antibiotics and time in change of therapy

Variables		**Frequency**	**Percentage (%)**
Antibiotics Prescribed	Ceftriaxone	64	23.4
	Cefotaxime+gentamycin	134	48.9
	Ampicillin+cefotaxime	26	9.49
	Ceftriaxone+amikacin	50	18.2
	Total	274	100.0
Switching of Antibiotics	Ceftazidime	37	38.5
	Meropenem+gentamycin	40	41.7
	Meropenem	19	19.8
	Total	96	100.0
Therapy Changed in 5 days	No	213	77.7
	Yes	61	22.2
	Total	274	100.0

DISCUSSION

Present study indicates mortality rate in neonates due to asphyxia and antibiotics used at this age. Neonates are most vulnerable group for mortality and millions of children die each year, as explained in various research studies and WHO guidelines but less work is done to focus on main causes of these death. Major problem observed is lacking data regarding cause of death. Similar data available shows that these deaths in neonates are either due to intrapartum problems or due to other complications after birth. This study proves that most deaths takes place in babies less than one day of age due to asphyxia. About half of the of newborns (47.7%, n=42) die within few hours of their birth which shows that steps should be taken to save these neonates with techniques explained in WHO guidelines. These guidelines are very simple and can save thousands of babies each year. It is clarified by this research that ratio of deaths after birth is equally large as that of stillbirths.

Neonatal death due to asphyxia was 25.3% (n=69) which is similar to the study done by Muthukumaran *et al*., 2018, in which mortality rate due to asphyxia was 23.3%. They conducted retrospective study at tertiary care regional neonatal hospital unit in Southern India from January - December 2017. Majority of the patients in their study were male (57%) as in our study (male=65.6%). Their study focused on reviewing neonatal deaths over the period of 1 year with prime causes of deaths, pattern of antimicrobial resistance and occurrence of sepsis among neonatal deaths [19]. Similarly, Lozano *et al*., 2010, in a systematic analysis for the Global Burden of Disease Study 2010, portraying global and regional mortality rate comparison from 1990 and 2010, also highlight that main cause of neonatal death is birth asphyxia [20]

Our study was also consistent with the study of Wood *et al*., 2019, in which they identified that majority of the neonatal asphyxia was from urban areas similar our study. Their study was retrospective cohort study done on all hospitals in Alberta, a Canadian province [21].

On the other hand, our study is inconsistent with the study conducted by Carneiro1 *et al*., 2018, in which they identified interventions for neonatal asphyxia. In their study, 77% neonates were given antibiotics whereas in present study all the patients were prescribed with antibiotics. Though antibiotics prescribed were not mentioned in their study. It was documentary study carried out on records from January -August of 2016, at Tertiary Neonatal Intensive Care Unit of a reference pediatric hospital in Ceará, Brazil in which 48 records of newborns with perinatal asphyxia, based on the neonatal therapeutic intervention score system ([22]). Limitations of the study were that the blood culture was not collected before starting antibiotics due to lack of financial and human resources and infrastructure.

CONCLUSION

Findings of this study conclude that major mortality age group was newborn as this is vulnerable age in neonates and maximum care should be taken throughout day and night. Senior and trained staff should be appointed with flexible duty times as they can take correct and prompt decisions with respect to devices and medication. Use of antibiotics was also very high at such an early stage of life which may be develop alarming issues as resistance in later stages of life.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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