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ORIGINAL ARTICLE

Evaluation of Trends in Respiratory Support for Very Low Birth Weight Infants: A Population Based Study

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ABSTRACT

Objective: To evaluate the trends in respiratory support for very low birth weight infants.
Study Design: Cohort study
Place and Duration of Study: Department of Paediatric Medicine Unit-2, Balochistan Institute of Child Health Services Quetta from 1st January 2021 to 31st December 2021.
Methodology: Five hundred participants were enrolled. Data regarding maternal clinical history, neonatal clinical data using standardized and was recorded on a well structures questionnaire. Risk of bronchopulmonary dysplasia was considered as in those with discharge at 34-35 weeks without supplementation of oxygen required. Nitric oxide inhalation more than 4 hours' addictive or contiguous was considered as treatment. Non intubated ventilation greater than four hours, continuous positive airway pressure through nose was delivered as respiratory support.
Results: There were 74.7% male infants without bronchopulmonary dysplasia while 74.1% female infants were having bronchopulmonary dysplasia. The gestational age as mean in no bronchopulmonary dysplasia infants was 28±2.1 while it was 26±2.2 in bronchopulmonary dysplasia infants The mean birth weight was 1187±253 grams in without bronchopulmonary dysplasia infants whereas it was 891±246 grams in bronchopulmonary dysplasia infants. One and five minutes Apgar scoring increased in without bronchopulmonary dysplasia infants.
Conclusion: Health improvement initiative programs and modern interventions should be formulated that highlights the use of non-invasive ventilation options to increase the quality of life and well-being of preterm neonates.
Keywords: Low birth weight, Respiratory Distress, Quality of life, Mortalities

INTRODUCTION

Very Low birth weight (VLBW) infants are defined as those which are born with a weight below 1.5 kilograms. These infants are born premature and require neonatal intensive care for their survival. With advancement in scientific technology the risk of morbidities and mortality related with VLBW has substantially decreased in infants especially in developed countries, however the incidence of bronchopulmonary dysplasia (BPD) has yet not decreased.[1,2] All over the globe. Recent advances in respiratory intensive therapy as well as nutritional support and care seems promising factors in reducing the risk of BPD in new born. Identification of unknown factors which are missing features in treating BPD is mandatory and could be achieved through the large community base research and population rate analysis.[3]

The majority of the neonatal cases reported with BPD are associated with development of respiratory distress and BPD due to longer stay in neonatal intensive care unit.[3] This is also linked with poor motor as well as cognitive outcomes of the preterm neonates.[4,5] Earlier interventional studies regarding postnatal care and maternal interventions have suggested strategic improvement in BPD[6] and its prevention. Early post-natal interventions include delivery of antenatal steroids in addition to surfactant therapies and non-invasive ventilation.[7-9]

The cost related with premature births and its related comorbidities have upsurge and is affecting the required treatment plan for reducing BPD.[10] There is an urgent need in revising the neonatal intensive care unit general practices. Recommendation of non-invasive respiratory support usage instead of intubation for prevention of death could play a vital role in reducing respiratory related mortalities.[11-13]

MATERIALS AND METHODS

This cohort study was conducted at Department of Paediatric Medicine Unit-2, Balochistan Institute of Child Health Services Quetta from 1st January 2021 to 31st December 2021 and 500 very low birth weight neonates were enrolled. The defined birth weight was around 400 to 1500g having gestational age as 22-31 weeks or so. Eight hospitals were selected to collect data keeping their name anonymous for privacy. Neonates born with serious anomalies were excluded from the study. Their prior approval/consent was gained before initialization of this research. Data regarding maternal clinical history, neonatal clinical data using standardized definition based on CPQCC was recorded. Bronchopulmonary dysplasia was termed as requirement of oxygen supplementation post 36 weeks and on time of discharge. Risk of BPD was considered as in those with discharge at 34-35 weeks without supplementation of oxygen required. Nitric oxide inhalation more than 4 hours' addictive or contiguous was considered as treatment. Non intubated ventilation greater than four hours, CPAP through nose was delivered as respiratory support. High flow nasal-cannula was used at ³1 L/minute with a flow rate of >1 L/minute and support given any time post delivery after leaving the room of delivery was given as maximum-respiratory support. Data was statistically analyzed by SPSS version 26.0 using Chi square and 't' tests were applied and P<0.05 considered significant.

RESULTS

There were 74.7% male infants without BPD while 74.1% female infants were having BPD. The gestational age as mean in no BPD infants was 28±2.1 while it was 26±2.2 in BPD infants. Majority of no BPD infants were within the gestational age of 28 -29 weeks while the one not having BPS were less than 26 weeks (Table 1).

The mean birth weight was 1187±253 grams in without BPD infants whereas it was 891±246grams in BPD infants, statistically there was significant (P<0.05) difference. This study results also showed that there was an increase in 1 minute APGR score presented in no BPD infants and it was even high in no BPD infants at 5 minutes (Table 2).

Table 1: Distribution of gender and gestational age within infants

Variable	Without BPD (n=345)	With BPD (n=155)	P value
Gender			
Male Infant	258 (74.7)	40 (25.8)	<0.05
Female Infant	87 (25.2)	115(74.1)	
Gestational age (weeks)			
<26	38 (11.01%)	67 (43.2%)	0.04
26-27	65 (18.8%)	54 (34.8%)	0.56
28-29	130 (37.68%)	24 (15.4%)	0.024
≥30	112 (32.4%)	10 (6.45%)	0.001

There was a decreasing incidence of BPD in 3 hospitals while and increasing trend in 5 hospitals. The increasing incidence of BPD was prominently observed in majority of the hospitals with

higher number of staff on call and increased NICU beds availability (Table 3).

Within the treatment used for treating respiratory stress inhaled nitric oxide use was highest in with BPD infants whereas maternal chorioamnionitis and surfactants were significantly used in without BPD as well as with BPD cases (Fig. 1).

Table 2: Birth weight and APGR infant scoring

Variable	Without BPD (n=345)	With BPD (n=155)	P value
Birth weight (gms)	1187±253	891±246	0.03
1 minute Apgar score	5.9±2.3	4.7±2.2	0.05
Apgar score at 1 minute			
<4	66 (19.1%)	98 (63.2%)	0.18
4-7	126 (36.5%)	39 (25.1%)	0.02
8-10	154 (44.6%)	18 (11.6%)	0.005
5 minute Apgar score	7.9±1.3	6.9±2.2	0.05
Apgar score at 5 minutes			
<4	55 (15.9%)	72 (46.4%)	0.16
4-7	103 (29.8%)	46 (29.65)	0.03
8-10	187 (54.2%)	37 (23.8%)	0.02

Table 3: AAP level and on call status comparison with incidence of BPD

AAP level	Decreasing BPD incidence	Increasing BPD incidence
Two	-	1 (20%)
Three	1 (33.3%)	3 (60%)
Four	1 (33.3%)	1 (20%)
Not Known	1 (33.3%)	-
Teaching Hospital Status on Call	1(33.3%)	3 (60%)
NICU Beds	1(33.3%)	2 (40%)

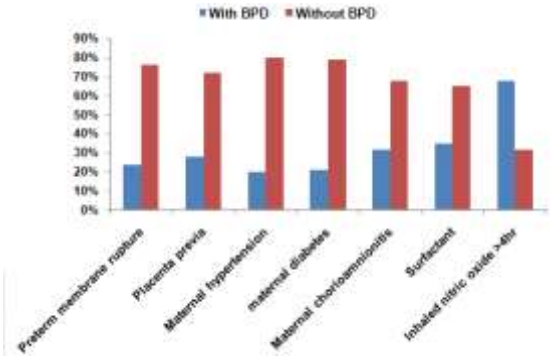

Fig 1: Treatment workup and clinical

DISCUSSION

Despite of the modern interventions in the field of medicine, BPD is still posing a major short and long term health challenges. Its risk escalates many times in low birth weight infant who are already on the verge of various health problems including growth retardation, short stature, wasting and cognitive impairment. Recent studies also support the evidence that, risk of BPD is higher among those children who receive respiratory support at the time of delivery and were on pulmonary surfactants. Although long chances of neonates increased many times nevertheless, it is important to find the etiological factors of BPD to minimize the overall burden of respiratory diseases and infections in preterm child.[14-17] Present study was designed to determine the general trend of respiratory support in LBW neonates and its adverse impact on their overall health and well-being.

A multi-center study highlighted the frequency of BPD as 42% in low birth weight infants.[18] Another Canadian study reported the prevalence of BPD as 16-33%. This range might be because of modern interventions, improvements in delivery rooms and use of delivery surfactants.[19] Research data suggested that, several post-natal, perinatal and antenatal factors play negative role in the development of BPD.[20-22] Low birth weight infant usually requires ventilation assistance foe their optimal gas exchange but it also raise the chances of inflammation in lungs and oxygen free radical generation.[20]

Consequently, by reducing the lungs involvement during resuscitation at the time of delivery might prove helpful in decreasing the chances or atleast reduce the severity of bronchopulmonary dysplasia in LBW neonates. Though, trends have changed in recent times and shifted to less invasive strategies especially for the care of LBW or preterm infant, BPD is still a challenging issue for medical practitioners and health-care officers. Non-invasive strategies should be generated to increase the quality of life in highly targeted groups.

CONCLUSION

Health improvement initiative programs and modern interventions should be formulated that highlights the use of non-invasive ventilation options to increase the quality of life and well-being of preterm neonates.

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