J Compr Ped. 2014 May; 5(2): e16317. DOI: 10.17795/compreped-16317

Published online 2014 May 20. **Letter**

Use of Brain Natriuretic Peptide in Predicting Severity of Respiratory Distress Syndrome in Neonates

Suresh Kumar [1,*]

[1]Department of Pediatrics, Chaitanya Hospital, Chandigarh, India

*Corresponding author: Suresh Kumar, Department of Pediatrics, Chaitanya Hospital, Sector 44, Chandigarh, India. Tel: +91-9855373969, Fax: +17-25004041, E-mail: sureshangurana@gmail.com

Received: November 21, 2013; **Revised:** December 22, 2013; **Accepted:** February 5, 2014

Keywords: Natriuretic Peptide, Brain; Respiratory Distress Syndrome, Newborn

Dear editor

Respiratory distress syndrome (RDS) remains the most common problem in preterm neonates resulting in significant morbidity, mortality, and extra health care costs (1, 2). Early identification of preterm neonates susceptible to RDS is important since they may benefit from prophylactic surfactant administration and/or less vigorous ventilation (3, 4). In this regard, Shahramian et al. (5) conducted a case control study involving 65 preterm infants < 37 weeks with Apgar score > 7 as cases and 65 term infants as controls and demonstrated that serum brain natriuretic peptide (BNP) levels correlated with increased severity of RDS among cases. They suggested that BNP can be used as a prediction marker for RDS in preterm neonates. BNP is secreted by cardiac myocytes in response to pressure or volume overload, the associated pathological changes of RDS (6). This fact has been explored in preterm neonates in prediction of RDS in various studies. Rocha et al. (7) studied plasma N-terminal pro-BNP in 45 preterm neonates at 24 hours, day 7 and day 21 of life, and demonstrated that plasma BNP at 24 hours of life was directly related to increasing severity of RDS, suggesting a close relation to the functional impairment of pulmonary hemodynamic changes. Joseph et al. (8) studied plasma concentrations of N-terminal pro-BNP in 34 premature infants (without cardiac or infectious diseases) with a diagnosis of bronchopulmonary dysplasia (BPD) at 4 weeks of age and after 1 month of conventional therapy. They observed that baseline NT-pro-BNP concentrations were high in healthy premature infants compared with previously reported healthy neonates, and significantly higher in those who developed BPD. There was a significant correlation between concentrations of NT-pro-BNP and severity of respiratory distress.

In the study by Shahramian et al. (5), BNP was measured from cord blood, which could help in early identification of preterm neonates at risk of RDS and earlier interventions. This was the major advantage of this study. The limitations of study included: small sample size, no serial measurement of BNP, use of only chest radiograph as a scoring system for severity of RDS without any clinical inputs, and no information about number of patients who required treatment (surfactant and/or ventilation). There were few distressing points in this paper. It was surprising to see that though the BNP levels among cases and controls were 36.66 pg/mL and 1.7 pg/mL, respectively, still the difference was not statistically significant (P = 0.069). Another concerning point was that why healthy term newborns (controls) were kept in NICU for 3 days? In a table of the mentioned article, only 9 (13.8%) of healthy term newborns (controls) were normal and rest 56 (86.2%) had respiratory distress, which is difficult to explain. Why such a high prevalence of respiratory distress was present in healthy term neonates?

BNP is also elevated in a number of critical illnesses apart from RDS in preterm neonates including cardiac diseases, shock, pulmonary hypertension, acute respiratory distress syndrome (ARDS), acute pulmonary embolism, chronic obstructive pulmonary disease, and renal failure. BNP serves as a marker of severity and prognosis in these conditions (9). Many of these conditions may interplay in sick preterm neonates (such as RDS plus shock/pulmonary hypertension/underlying cardiac disease/acute kidney injury), making BNP a less reliable indicator of severity of RDS in these situations. Infants (preterm and term) with congenital heart disease that causes significant pressure or volume overload of the right or the left ventricle, have elevated BNP and NT-pro-BNP levels (10). In these cases, a holistic approach (clinical and laboratory

Implication for health policy makers/practice/research/medical education:
This editorial highlighted the importance of BNP in predicting the severity of RDS in preterm neonates. BNP can also be used to assess the severity and prognosis of cardiac and pulmonary diseases other than RDS.

testing) will make things clear rather than relying only on BNP. Another fact is that at birth and in the first few days of life, levels of BNP and NT-pro-BNP are elevated in healthy infants and children. Thereafter, their levels decrease and remain relatively constant throughout childhood (10). Therefore, levels measured soon after birth or in the cord blood may make interpretations difficult unless hour- or day-specific values of BNP and NT-pro-BNP are known. According to Shahramian et al. study (5), cord blood BNP can be used to predict which preterm neonate is going to develop RDS. If it is so, neonates at risk of RDS could be monitored in a better way and receive early intervention, ultimately leading to improved survival. The unavailability of testing facility for BNP levels may be a major limiting factor in countries with poor resources, where it is needed the most. Larger prospective studies on this issue are required to prove the usefulness of BNP as a marker of severity of RDS. Even marginal benefit may prove to be useful where easy and affordable testing is available. Even said this, BNP should not replace clinical judgment to identify preterm neonates at risk of RDS, but should augment the clinical acumen in decision making.

Financial Disclosure

There was no financial disclosure regarding this study.

References

1. Kramer MS, Demissie K, Yang H, Platt RW, Sauve R, Liston R. The contribution of mild and moderate preterm birth to infant mortality. Fetal and Infant Health Study Group of the Canadian Perinatal Surveillance System. *JAMA*. 2000;**284**(7):843–9.
2. Hermansen CL, Lorah KN. Respiratory distress in the newborn. *Am Fam Physician*. 2007;**76**(7):987–94.
3. Rojas-Reyes MX, Morley CJ, Soll R. Prophylactic versus selective use of surfactant in preventing morbidity and mortality in preterm infants. *Cochrane Database Syst Rev*. 2012;**3**:CD000510.
4. Dani C, Bertini G, Pezzati M, Cecchi A, Caviglioli C, Rubaltelli FF. Early extubation and nasal continuous positive airway pressure after surfactant treatment for respiratory distress syndrome among preterm infants <30 weeks' gestation. *Pediatrics*. 2004;**113**(6):e560–3.
5. Shahramian I, Noori NM, Sharafi E, Ramezani AA, Hesaraki M. Brain Natriuretic Peptide: A Predictor for Severity Respiratory Distress Syndrome in Newborns. *J Compr Ped*. 2013;**3**(5):189–93.
6. da Graca RL, Hassinger DC, Flynn PA, Sison CP, Nesin M, Auld PA. Longitudinal changes of brain-type natriuretic peptide in preterm neonates. *Pediatrics*. 2006;**117**(6):2183–9.
7. Rocha G, Clemente F, Rodrigues T, Guimaraes H. [Clinical significance of plasma N-terminal pro- B-type natriuretic peptide in respiratory distress syndrome of the preterm neonate]. *Acta Med Port*. 2009;**22**(4):349–54.
8. Joseph L, Nir A, Hammerman C, Goldberg S, Ben Shalom E, Picard E. N-terminal pro-B-type natriuretic peptide as a marker of bronchopulmonary dysplasia in premature infants. *Am J Perinatol*. 2010;**27**(5):381–6.
9. Phua J, Lim TK, Lee KH. B-type natriuretic peptide: issues for the intensivist and pulmonologist. *Crit Care Med*. 2005;**33**(9):2094–13.
10. Nir A, Nasser N. Clinical value of NT-ProBNP and BNP in pediatric cardiology. *J Card Fail*. 2005;**11**(5 Suppl):S76–80.