Short Communication

The Incidence of Neonatal Pneumonia Associated with Maternal Age

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Abstract

Neonatal pneumonia is the leading form of infection and accounts for one of the most significant neonatal mortality. It is critical to address the risk factors so that the incidence of neonatal pneumonia can be reduced. Environmental factors including adequate nutrition, breastfeeding, indoor air quality (especially smoking) and house hygiene condition contribute significantly to the incidence of neonatal pneumonia but the genetic risk factors have not yet been studied well. Here in this report the data analysis from 136 neonatal pneumonia patients indicates the maternal age may be one of the genetic risk factors for neonatal pneumonia that may assess the possibility for further study.

Keywords: Neonatal Pneumonia; Risk factors; Maternal age

Introduction

Neonatal pneumonia is the largest cause of newborn mortality, more than 510,000 neonates were suffered from pneumonia [1]. The major pathogens are usually obtained in maternal genital tract or the nursery, including Gram-positive streptococci such as Staphylococcus aureus, and gram-negative bacilli such as Escherichia coli, Klebsiella sp, and Proteus sp. Immunization against Hib, pneumococcus, measles and whooping cough (pertussis), proper nutrition level and antenatal care are critical to prevent pneumonia [2,3]. Recent study indicated that the concentrations of alveoli surfactant protein B and A are increased in neonatal pneumonia [4], the mean birth weight, inadequate antenatal care, nonprofessional delivery, obstetric problem of mother and prolong labor were significant risk factors for neonatal pneumonia [5]. In addition, non-breast feeding or cessation of breast feeding during the neonatal period may substantially increase the incidence of pneumonia [6]. In current report we analyzed the effects of mother's age in the incidence of neonatal pneumonia.

Subjects and Methods

The data were obtained from 329 neonatal patients hospitalized in Zheng Zhou First People's hospital during the period from 2011 to 2015, 132 female and 197 male, with the age ranging from 15 minutes to 73 days. The diagnosis and treatment followed standard criteria and protocols [7]. The maternal age data obtained from the Zhengzhou Statistic Bureau, including 4372 samples (2015, private communication). The records of the related patients and related parental information were statistically analyzed with software SPSS 17.0 and the exponential and polynomial regression analysis were conducted to show the possible trends.

Results

Among the 329 neonatal patients there are 136 patients suffered solely or partially from neonatal pneumonia, and the percentage is 41.2%. The age of the mothers and the number of cases at each age were analyzed (Figure 1).

In the regression analysis of neonatal pneumonia, the highest R^2 occurred in polynomial regression, reached 0.5065; the peak value was at 26 years old. For the maternal birth age, the highest R^2 occurred in polynomial regression also and reached 0.9129. The peak value was at 24 years old.

The regression analysis for the distribution of paternal ages reached 0.3008 of R^2 with exponential regression, and the R^2 only reached 0.2773 with polynomial regression. The peak value is at 28 years old. This is very different from maternal age distribution.

Discussion

In neonatal stage pneumonia is the leading form of infection in neonates and accounts for one of the most significant neonatal morbidity and mortality. It is of most importance to address the risk factors in order to reduce the high prevalence of neonatal pneumonia. Environmental factors including adequate nutrition, breastfeeding, indoor air quality (especially smoking) and house hygiene condition contribute significantly to reduce the incidence of neonatal pneumonia. For example non-breast feeding or cessation of breast feeding during the neonatal period may substantially increase the incidence of pneumonia [6]. The genetic factors such as the family heredity, parental factors have not yet been illuminated. One study conducted in the department of Pediatrics, Dhaka Medical College & Hospital (100 neonates, 50 pneumonia patients and 50 control) indicated that birth weight, normal vaginal delivery, prolonged labor, inadequate antenatal care, home delivery, delivery by untrained personnel, neonatal resuscitation, intrapartum fever, foul smelling liquor, prolonged rupture of membrane, and obstetric problem of mother may all contribute to the incidence of neonatal pneumonia [5]. In this study it is found that the age of mother may associate with the incidence of neonatal pneumonia: the shift of peak age from 24 to 26 years old indicates the contribution of physiological alteration along with age which may increase the prevalence of neonatal pneumonia (dotted line, Figure 1). In addition, the significantly decreased R^2 value from 0.9129 to 0.5065 indicates that maternal age is associated with the incidence of pneumonia is not simply due to birth distribution along with maternal age (dash line, Figure 1). The fact that the incidence of neonatal pneumonia did not increase along
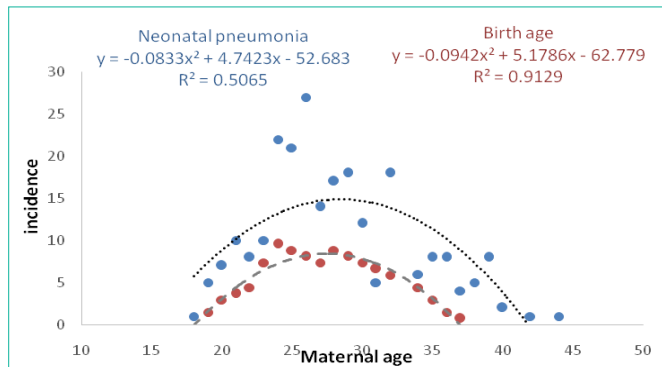
Figure 1: The incidence of neonatal pneumonia is associated with the maternal age. The blue plots represent the distribution of the incidence of neonatal pneumonia along with maternal age, and the dotted line indicated the polynomial regression trend. The Orange plots represent the distribution of maternal birth age, and the dash line indicated the polynomial regression trend.

Figure 2: The incidence of neonatal pneumonia is not associated with paternal age. The plots represent the distribution of the neonatal pneumonia incidence along with paternal age. The dotted line indicated the exponential regression and the dash line indicated the polynomial regression for the same set of data.

with maternal age after 26 years old may due to the decrease of birth rate, and other factors like improved finance status and healthcare. This observation coordinated the report that the parenteral nutrition was identified as a risk factor for ventilation associated pneumonia [2]. Apparently, the maternal nutrition level is associated with physiological alteration along with age. On another hand, the paternal age did not show clear association with the incidence of neonatal pneumonia (highest R^2 valued at 0.3008, Figure 2), although neonates of single mothers are at increased risk of neonatal mortality [8]. It is reasonable that married mothers may have more stable family life and living conditions including nutrition supply, but the age of fathers may not affect directly in family life and living condition. Nevertheless a larger patient cohort is necessary to draw a solid conclusion.

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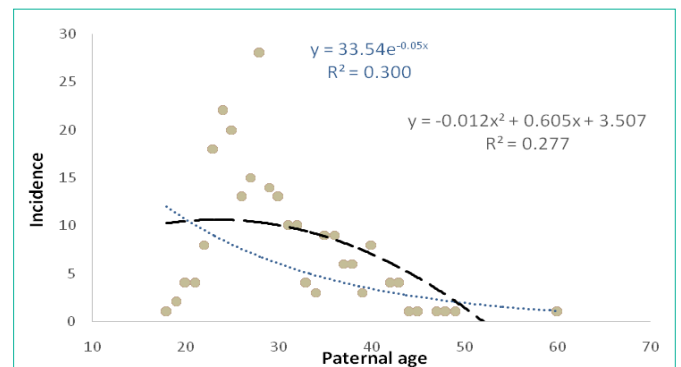
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