

# To Calculate the Frequency of Post-transfusion lung injury in neonates

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## ABSTRACT

**Background:** Transfusion related acute lung injury (TRALI) is a serious blood transfusion complications characterized by the acute onset of non-cardiogenic pulmonary edema following transfusion of blood products. It is defined as an acute lung injury that is temporally related to a blood transfusion; specifically, it occurs within the first six hours following a transfusion.

**Aim:** To calculate the frequency of post transfusion lung injury in neonates

**Settings:** Neonatal ICU and HDU in department of pediatrics, of Services hospital Lahore

**Study design:** Descriptive study (case series)

**Methodology:** After informed consent 320 neonates were included in study. Informed consent was taken from parents. Data of neonates who received blood transfusion was noted on a predesigned Performa (attached) and following information was noted Gestational age, Birth weight, Age, Gender, Volume transfused, Indication of transfusion, Before Transfusion Respiratory rate and Oxygen saturation was noted and changes in these parameters were recorded at 30 minutes interval for 6 hours and X ray was performed after 6 hours.

**Results:** In our study, out of 320 cases, 201(62.81%) were between 1-15 days while 119(37.19%) were between 16-28 days of life, mean±sd was calculated as 13.58±7.59 days, 187(58.44%) were male and 133(41.56%) were female, frequency of post transfusion lung injury in neonates was recorded as 44(13.75%) while 276(86.25%) had no findings of the morbidity.

**Conclusion:** We concluded that the frequency of post transfusion lung injury is higher among neonates but the results of our study are primary and needs some other studies to validate our findings.

**Keywords:** Neonates, post transfusion lung injury in neonates, frequency

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## INTRODUCTION

Transfusion related acute lung injury (TRALI) is a known entity since 1950s.<sup>1</sup> Previously it was studied in adults and estimated incidence vary from 1 in 5000 to 1 in 100,000<sup>2</sup>. Current mortality rates are in range of 5 to 25%.<sup>3</sup> Now it is observed to occur in all age groups<sup>4</sup>. In a study conducted at McMaster Children's Hospital (Canada) its incidence was calculated to be 15%<sup>5</sup>, in another study conducted at Health Sciences Centre, Winnipeg, Manitoba, Canada the calculated incidence was 8.5%<sup>13</sup>. It is a potentially life threatening complication of blood transfusion which usually occurs within 6 hours of blood or blood product transfusion and has been shown to increase morbidity and mortality<sup>6</sup>. Neonatal post transfusion lung injury should be considered as a differential in any neonate who develops respiratory distress following transfusion in the absence of volume overload or cardiac dysfunction<sup>7,8</sup>.

Despite the very high prevalence and numbers of blood transfusions in the neonates (particularly

preterm infants) in intensive care units<sup>9</sup>, it seems to be under reported and under diagnosed.<sup>10</sup> The lack of reports of TRALI in our population is likely to lack of awareness, absence of consensus on the definition or difficulty in diagnosis due to other confounding factors. In neonatal post-transfusion lung injury there is worsening of pulmonary functions following transfusion in critically ill neonates<sup>11,12</sup>. It was studied that 8% of critically ill neonates develop worsening of pulmonary functions following transfusion<sup>13</sup>. Although most cases of TRALI resolve with supportive care but some may need mechanical ventilation<sup>14</sup>. It is the commonest cause of transfusion related mortalities, TRALI represented 43% of confirmed transfusion related fatalities reported to CBER over the last five years<sup>15</sup>. So, proper diagnosis and reporting is important.

In our study we will calculate the frequency of transfusion related acute lung injury in neonatal population as no data is available regarding frequency of TRALI in neonatal population in Pakistan. There is marked variability in available data. As mentioned previously it is calculated to be 15% in one study and 8.5% in other<sup>5,13</sup>. As we are living in a different environment with a different set of population so results can be different and we will

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compare it with available data. The results from this study will provide base line data that will enable healthcare workers to anticipate and avoid TRALI by avoiding unnecessary transfusions.

The objective of my study was to calculate the frequency of post transfusion lung injury in neonates.

## MATERIAL AND METHODS

This descriptive study (case series) was carried out during 6 months at Neonatal ICU and HDU in department of pediatrics, of Services hospital Lahore. Sample selection was all neonates in neonatal ICU and HDU who receive transfusion of blood products. Non probability consecutive sampling technique was used. Sample size estimated using 95% confidence interval, 4% margin of error with an expected frequency of TRALI as 15% is 320

**Inclusion Criteria:** Neonates were included in the study if they

- Received any form of blood product while they were admitted in Neonatal intensive care unit and High dependency unit.
- Stable cardiac or pulmonary status (no change in heart rate or respiratory rate >15% from base line) up till 6 hours prior to transfusion of blood or blood product.

**Exclusion Criteria:** Infants were excluded from review if they have

- Congenital heart disease (on clinical examination and previous medical record)
- Birth weight below 1000g (extremely low birth weight)
- Gestational age below 28 wks (on history and medical record)

**Data collection procedure:** After informed consent 320 neonates were included in study. Informed consent was taken from parents. Data of neonates who received blood transfusion was noted on a predesigned Performa (attached) and following information was noted Gestational age, Birth weight, Age, Gender, Volume transfused, Indication of transfusion, Before Transfusion Respiratory rate and Oxygen saturation was noted and changes in these parameters were recorded at 30 minutes interval for 6 hours and X ray was performed after 6 hours.

**Data analysis procedure:** Data was analyzed using SPSS version 19 quantitative variable like gestational age was presented by mean and standard deviation and qualitative data like presence of absence of TRALI was presented by frequency and percentage.

## RESULTS

A total of 320 cases fulfilling the inclusion/exclusion criteria were enrolled to calculate the frequency of

post transfusion lung injury in neonates. Age distribution of the patients was done showing that 20(62.81%) were between 1-15 days while 119(37.19%) were between 16-28 days of life, mean±sd was calculated as 13.58±7.59 days (Table 1). Patients were distributed according to gender showing that 187(58.44%) were male and 133(41.56%) were female (Table 2). Frequency of post transfusion lung injury in neonates was recorded as 44(13.75%) while 276(86.25%) had no findings of the morbidity (Table 3).

Stratification for frequency of post TRALI with regards to age and gender was done and presented in Table. 4 & 5 respectively (Table 4&5).

Table 1: Age distribution (n=320)

Age(in days)	n	%age
1-15	201	62.81
16-28	119	37.19
Mean±SD	13.58±7.59	

Table 2: Gender distribution (n=320)

Gender	n	%age
Male	187	58.44
Female	133	41.56

Table 3: Frequency of post transfusion lung injury in neonates (n=320)

Post TRALI	n	%age
Yes	44	13.75
No	276	86.25

Table 4: Stratification for frequency of post trali with regards to age

Age (Years)	Post TRALI (n=44)	
	Yes	No
1-15	30	171
16-28	14	105

*P value 0.42*

Table 5: Stratification for frequency of post trali with regards to gender

Gender	Post TRALI (n=44)	
	Yes	No
Male	27	160
Female	17	116

*P value 0.67*

## DISCUSSION

Transfusion related acute lung injury (TRALI) is a serious blood transfusion complications characterized by the acute onset of non-cardiogenic pulmonary edema following transfusion of blood products. It is defined as an acute lung injury that is temporally related to a blood transfusion; specifically, it occurs within the first six hours following a transfusion.

This study was planned with the view that we will calculate the frequency of transfusion related acute lung injury in neonatal population as no data is available regarding frequency of TRALI in neonatal population in Pakistan.

In our study, out of 320 cases, 201(62.81%) were between 1-15 days while 119(37.19%) were

between 16-28 days of life, mean±sd was calculated as 13.58±7.59 days, 187(58.44%) were male and 133(41.56%) were female, frequency of post transfusion lung injury in neonates was recorded as 44(13.75%) while 276(86.25%) had no findings of morbidity.

The findings of our study are in agreement with a previous study where it was calculated to be 15%<sup>5</sup>, another study recorded 8.5% of the neonates with TRALI<sup>13</sup> which is slightly lower than our study.

TRALI may be caused by the passive infusion of antibodies directed against host leukocytes, of biologic response modifiers into a susceptible host, or of permeability factors<sup>16,17</sup>. The single-event antibody-mediated pathophysiology of TRALI appears reasonable<sup>72</sup> but does not explain why TRALI may occur without the infusion of specific antibodies directed against host leukocytes, especially autologous TRALI<sup>18</sup>, and why TRALI does not occur even when there is an antibody infused into patients with the cognate antigen<sup>19</sup>. Such data may lead one to consider that TRALI may be a multifactorial syndrome brought on by at least 2 distinct clinical events. The first is activation of the pulmonary endothelium resulting in PMN sequestration, and the second is activation of these primed adherent PMNs resulting in endothelial damage, capillary leak, and ALI<sup>20</sup>. This 2-event model comprises antibody-mediated and non-antibody-mediated TRALI. Preliminary data indicate that antibody-mediated and 2-event models of TRALI may cause ALI by the capacity to prime host PMNs. Further work is required to define the effects of this life-threatening syndrome, to identify patients at particular risk, and to arrive at a consensus definition so that clinicians and nursing staff may properly diagnose TRALI.

The results of our study provided base line data that may enable healthcare workers to anticipate and avoid TRALI by avoiding un-necessary transfusions.

## CONCLUSION

We concluded that the frequency of post transfusion lung injury is higher among neonates but the results of our study are primary and needs some other studies to validate our findings.

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