The Influence of Parent’s Blood Type Towards Jaundice on Neonates in Sadewa Hospital 2016

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ABSTRACT
Neonatorum Pathological jaundice caused the death of 6% of neonatal deaths. The incidence of jaundice is in 50% of aterm infants and 75% of preterm infants. Incompatibility of blood type is one of the most common cause of neonatal hyperbilirubinemia. The purpose of this research is to determine the influence of parent’s blood type with the incidence of neonates jaundice. This study used prospective cohort design with purposive sampling techniques. Samples taken were grouped into two groups: risky blood type and not risky blood type; each groups contain 57 respondents. Retrieved data used blood type test and observation. Analysis used chi-square and Cox regression. Statistical analysis shows the variable which related with the incidence of jaundice in neonates is parent’s blood type (p = 0,002), birth weight (p = 0,003) and parturition type (p = 0,008) while unrelated variable is gestation (p = 0,27) and breastfeeding status (p = 0,503). Multivariate analysis relates with the incidence of neonates jaundice is parent’s blood type (p = 0,013) and birth weight (p = 0,026). For conclusion, there is significant parent’s blood type with the incidence of neonatal jaundice. Parent’s blood type increase the risk 2.5 times the occurrence of neonates jaundice (RR=2.5 CI95%=1.407-4.606). Neonates born to couple who has risky blood type has the opportunity for jaundiced 2.4 times compared with neonates born to couple who does not have risky blood type after controlled for other variables.

Keywords: Blood Type, Jaundice, Neonates

INTRODUCTION
The infant mortality rate (IMR) in Indonesia still quite high compared to other developing countries. IMR in Indonesia on 2012 is 32 deaths per 1,000 live births, this number is still targetless of Millennium Development Goals (MDGs), 23 deaths per 1000 live births in 2015. IMR is one of health measure in one area. The majority of infant mortality in Indonesia is occurred during neonates. Attention to reduce neonates mortality rate efforts (0-28 day) is important because neonates mortality contribute to 59% of infant mortality¹. According to Basic Health Research riskesdaus 2007, pathological neonatorum jaundice causing death by 6% of seven highest cause of neonates mortality¹. Jaundice rate is at 50% aterm and 75% preterm². Excess bilirubin levels enhancement in infant jaundice can be influenced by several factors namely birth weight, gestation, asphyxiation history, hypoxia, breath disorder syndrome in neonates, infection, trauma to the head, hypoglycemia, hypercability and hemolysis process due to blood incompatibility³. One reason why pathological jaundice or hyperbilirubinemia is incompatibility blood type system or blood typeincompatibility. Incompatibility blood type causing jaundice which is not widely known by many people.

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Incompatibility blood type system is caused by mother blood type O which naturally has anti-A antibodies and anti-B on its circulation. If fetus has blood type A or B, erythroblastosis may occur because IgG passed the placenta. Incompatibility blood type system is the cause of kernicterus. Neonates age, gestational age, birth weight, and maternal parity which has influence to jaundice continuation. The highest approximate of neonates complication is in Sleman, 2.120 cases. Jaundice is one of neonates complication and if not treat properly can cause morbidity and mortality on neonates. Sadewa Hospital which located in Sleman is one of the particular hospital formaternal and child as refferal hospital particularly in the case of obstetrics. Based on preliminary studies in Sadewa Hospital, its found a rate as much 300 parturition in a month. There is 342 jaundice cases in 2016. Blood type incompatibility has an important role in jaundice however it can’t be certainly counted. Based on its background, researcher intereststo research further if there’s any influence of parent’s blood type with jaundice on neonates.

The purpose of this study is to know the influence of parent’s blood type with jaundice on neonates in Sadewa Hospital 2016. The benefits of this research is expected useful to add reference, input, planning prenatal screening program about the influence of parent’s blood type toward jaundice on neonates so it can be early detected.

METHOD

This was observational analytic research with prospective cohort design. The study was conducted in Sadewa Hospital on November- December 2016. Population of this research was all married couple whom had born their baby in Sadewa Hospital. Sampling technique used purposive sampling. The subject of study consisted of risky blood type group and not risky blood type group. Inclusion criteria is baby born which biologically from married couple. Exclusion criteria is mother with DM. Each groups was taken 57 subjects, so that the whole sample was 114 subjects. Collecting data was conducted by testing mother blood type whom gave birth in November - December 2016, followed until the second day of infant to observing jaundice in neonates with kremer formula, and assessing the age of pregnancy, born weight, parturition type and breastfeeding status.

Data processing technique with editing, coding, transferring, and tabulating. Data analysis used chi-square, cox regression using computer software with trust level 95%.

RESULT

Bivariate Analysis

The Impact of Parent’s Blood Type towards Jaundice on Neonates

Table 1. Intersection Table of Parent’s blood Type with Jaundice on Neonates in Sadewa Hospital 2016

<table>
<thead>
<tr>
<th>Parent’s Blood Type</th>
<th>Jaundice</th>
<th>Not Jaundice</th>
<th>P (95%CI)</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risky</td>
<td>28</td>
<td>49.1%</td>
<td>29</td>
<td>50.9%</td>
</tr>
<tr>
<td>Not Risky</td>
<td>11</td>
<td>19.3%</td>
<td>46</td>
<td>80.4%</td>
</tr>
</tbody>
</table>

Based on table 1, there’s meaningful impact between parent’s blood type with jaundice on neonates with p-value 0.002 (p<0.05). The size of the rr is 2.5 (95 % ci 1.407-4.609), this means of neonates born of the blood group parents risky have risk scene jaundice 2.5 times higher than neonates born of the blood group parents whom are not risky.

The Impact of External Factor Pregnancy Age, Birth Weight, Parturition Type and Breastfeeding Status towards Jaundice on Neonates
Table 2. Intersection Table of The Impact of Pregnancy Age, Birth Weight, Parturition Type and Breastfeeding Status with Jaundice on Neonates in Sadewa Hospital 2016

<table>
<thead>
<tr>
<th>Variable</th>
<th>Jaundice</th>
<th>Not Jaundice</th>
<th>P</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Pregnancy Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm (&lt;37mg)</td>
<td>5</td>
<td>55,6</td>
<td>4</td>
<td>44,4</td>
</tr>
<tr>
<td>Aterm (≥37mg)</td>
<td>34</td>
<td>32,4</td>
<td>71</td>
<td>67,9</td>
</tr>
<tr>
<td>Birth Weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Birth Weight (&lt;2500gr)</td>
<td>8</td>
<td>80</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Normal Birth Weight</td>
<td>31</td>
<td>29,8</td>
<td>73</td>
<td>70,2</td>
</tr>
<tr>
<td>Parturition Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducting parturition (SC&amp;VE)</td>
<td>34</td>
<td>42,5</td>
<td>46</td>
<td>57,5</td>
</tr>
<tr>
<td>Normal parturition</td>
<td>5</td>
<td>14,7</td>
<td>29</td>
<td>85,3</td>
</tr>
<tr>
<td>Breastfeeding Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No breastfeeding</td>
<td>9</td>
<td>42,9</td>
<td>12</td>
<td>57,1</td>
</tr>
<tr>
<td>Breastfeeding</td>
<td>30</td>
<td>32,3</td>
<td>63</td>
<td>67,7</td>
</tr>
</tbody>
</table>

Based on statistical tests result based on pregnancy age, birth weight, parturition type and breastfeeding type on neonates which hassignificance impact on jaundice on neonates i.e. birth weight variable with p-value 0.003 and pregnancy age type with p-value 0.008 (p<0.05). The size of RR for birth weight towards jaundice on neonates is 2.7 (95% CI, 750-4.177), which means that neonates with low birth weight has higher risk 2.7 to jaundice than neonates which born with Normal birth weight. RR for parturition type towards jaundice on neonates is 2.9 (95% CI 1.237-6.757), which means that neonates born with conducting parturition (SC and VE) has risky 2.9 times higher to jaundice on neonates than those who was born normally. While on the variable of gestational age has no significance relationship to jaundice with p value 0.27 (RR 1.7 95% CI 0.899-3.275). Breastfeeding status also has no significance relationship towards jaundice in this research with p value 0.503 (RR 1.3 95% CI 0.748-2.361).

Analysis Multivariate Analysis

Multivariate analysis used was cox regression, which tested in multivariate analysis with the value of p<0.25 in bivariat test.

Table 3. The Table of Multivariate Analysis Result of Parent’s Blood Type, Birth Weight and Parturition Type with Jaundice on Neonates in Sadewa Hospital 2016

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent</th>
<th>Coef</th>
<th>P</th>
<th>RR</th>
<th>CI 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaundice</td>
<td>Parent’s Blood Type</td>
<td>0.885</td>
<td>0.013</td>
<td>2,422</td>
<td>1,204-4,874</td>
</tr>
<tr>
<td></td>
<td>Birth Weight</td>
<td>0.888</td>
<td>0.026</td>
<td>2,431</td>
<td>1,112-5,313</td>
</tr>
<tr>
<td></td>
<td>Parturition Type</td>
<td>0.878</td>
<td>0.069</td>
<td>2,406</td>
<td>0,935-6,190</td>
</tr>
</tbody>
</table>

Based on statistic test result that there’s significance relationship i.e. blood type (p=0.013) and birth weight (p=0.026), while tested parturition type in multivariate shows that there’s no significance relationship (p=0.069). Risky parent’s blood type 2.4 times increase the risk of jaundice on neonates (CI 95% 1.204-4.874), risky birth weight 2.4 times increase the risk of jaundice on neonates (CI 95% 1.112-5.313). The influence of parent’s blood type has p-value 0.013 more significant compared with other p variables. Parent’s blood type gives contribution 2.4 times towards jaundice controlled by other variable.
The Impact of Parent’s Blood Type towards Jaundice on Neonates

The majority of neonates that experienced jaundice come from couples whom had impact between parent’s blood type towards jaundice on neonates. Neonates which born from parents that have risky to jaundice 2.5 times higher than neonates that born from not risky parent’s blood type.

Parent’s blood type gives contribution in compatibility of blood type system, i.e. incompatibility blood type between the mother and infant which cause blood hemolysis on infant, so cause hyperbilirubinemia. Jaundice that caused by blood type system incompatibility in the first 24 hour 35.2%, while in 1st-3rd 42.5%\(^8\). This research also shows that risky parent’s blood type whose mother blood type O and husband is not O, more potentially caused jaundice on neonates than neonates which born from not risky parent’s blood type. Research in Hermina Hospital pandanan Semarang shows that there’s increasing significance differences between bilirubin level with neonates blood type A, B, and O from the mother with O blood type\(^9\).

It is similar with Michael Kaplan and friends research 2010 in Israel where heterospecific blood type system (the mother with O blood type and infant with A/B blood type) can increase hemolysis and risks hyperbilirubinemia in neonates\(^10\). Research in Iran conducted Baskobadi and friends shows that from 237 neonates has jaundice and 56% of it has incompatibility blood type system. 38 neonates cases which had kernikterus and 12 cases in incompatibility blood type system\(^11\). Faskobadi dkk shows that of 237 neonates experienced jaundice and inkompatibilitas also contributed as many as 56%. Or 38 cases of neonates that experienced kernikterus and 12 cases where subdistricts in the group inkompatibilitas also

Research conducted in Mecca 2013 explain that Coombs’ test has positive result as many as 16.1% shows that if Coomb’ test is positive on neonates with A/B blood type from the group of mother with O blood type can increase significance risk on hyperbilirubinemia. Incompatibility blood type system and deficiency G6PD is the cause hyperbilirubinemia or jaundice on neonates in Mecc\(^12\).

Research conducted in Taiwan by Valsami et al in 2012 about direct antiliglubulin test (DAT) or Comb’s test shows that from 70/2695 had DAT positive case. In 64/70 (91.43%) DAT postive is contribution from incompatibility blood type system. Incompatibility blood type system is the important factor from DAT (+)\(^13\). Incompatibility blood type system caused by the mother O blood type which naturally has antibody anti-A and anti-B on the circulation. If fetus has A/B blood type, eritoblastosys can be happened because IgG (mother’s antibody) passing through placenta meet with its antigen of fetus erythrocytes, so that the hemolysis in infants resulting hyperbilirubin in infants\(^4\).

The proportion of jaundice in a group of couples with risky parent’s blood type had jaundice 49.1% while had not jaundice 50.9%. Although its only has little differences, but there’s differences, there are which hadn’t jaundice is higher compare with whom had jaundice, whereas they come from the same group of couple with risky factor on blood type. It is accordance with Hasan and Alatas (2007) which states that there’s hemolysis impact on smaller infants. This is because isoaglutinin anti-A and anti-Bon mother’s serum most of which is shaped 19-S gamablobulin-M that cannot be through the placenta and called natural isoaglutinogen. Just smattering of the mother who had O blood type, had antibodies 7-S namely gamaglobulin-G (immune isoaglutinogen) is high and can be through the placenta so that result in hemolysis in infants\(^14\).

From explaining outlined can be concluded that incompatibility blood type system (incompatibilitymother and infant blood type) derived from the contribution of parent’s blood type(conjugal) is a frequently causes of jaundice or hyperbilirubinemia in the first 72 hours of neonates life. Although it said that not all mother with O blood type have antibodies (IgG) that can be passed through the placenta, but mother with O blood type and husband hadn’tO blood type is a risk factors to jaundice than neonates derived from mother that hadn’t O blood group.
The Impact of Gestational Age, Birth Weight, Parturition Weight and Breastfeeding Status towards Jaundice on Neonates

Based on the research results show that the majority of infant with enough month (aterm ≥ 37 mg) as many as 105 infants. It known that Gestational age has no significance correlation towards jaundice and gestational age cannot be concluded as a risk factor to jaundice. According to Behman (2006) that premature infants more often find hiperbilirubinemia than baby enough months. It is caused by ripeness hepar factors so indirect billirubin conjugation be rudimentary direct billirubin. 

But on an infant by the gestational age 37-38 mg that could be said of aterm also have characteristic of premature and mature. Usually, it weighths like mature infant and managed like mature infant, but often occurrence problematic as it is experienced in premature infants, for example respiratory disorders syndrome, hiperbilirubinemia, weak power induction, so the infant needs to be monitored carefully. 

Infant maturity can affect jaundice. Jaundice is on 50% of enough months infants (aterm) and 75% of less month infants (preterm) 2. If seen the proportion then there will be more many preterm infants that experienced jaundice than enough months infants. But if seen from the results of the bivariat analysis between gestational age with jaundice there’s significance correlation because p < 0.05, the result can be caused of the other factors that participate and can because of the sample of gestational age variable related to an jaundice is not representative. 

Based on the research results shows that the majority of infant which born with normal weight (≥ 2500 grams) are 104 infants (91.2%) while the rest born with low weight (< 2500 grams) are 10 infants (8.8%). It’s known that there is significance correlation between infant weight with jaundice in neoantes. Neonates which born in low weight 2.7 times higher to had jaundice compared with neonates born heavier. 

Many infants, especially infant with low weight (< 2500 grams or gestasion age < 37 weeks) experienced jaundice in the first weeks of his life. In low weight, the formation of hepar is rudimentary (immaturity hepar) so it cause indirect bilirubin conjugation to direct bilirubin in rudimentary hepar. 

This result accordance with the research conducted by Saputra 2016 that there’s significance differences between premature infant than enough months infant on an infant with low weight towards neonates jaundice in PKU Muhamadiyah Hospital Surakarta. 

Based on the research shows that the majority of infants were born by conducting parturition (SC and VE) as 80 infants (80.2%) and the remaining 34 infants (29.8%) was born normally. It’s known that there is significance correlation between parturition type with jaundice on neonates. Neonates with conducting parturition (SC and VE) has risk 2.9 times higher to jaundice compared with neonates born normally. 

Cephalhematoma that extends can rise anemia and hiperbilirubinemia in infants, cephalhematoma can be caused by the pull or pressure at the time of parturition process like vacuum extraction (VE) . Although asphyxia, trauma, and meconium aspirations can be reduced with SC, the risk of secondary respiratory distress until transient takipneu, quaternary deficiency, pulmonic and hypertension would rise. It can the occurrence of hepar hypoperfusion and led to the process by obstructed conjugation bilirubin. 

It accordance with research that conducted in D نوعas Hospital Cimahi 2009 that there’s significance impact between parturition type with hiperbilirubinemia, the results of statistical tests shows p value 0.014. Parturition type is dominant variable that corelate with hiperbilirubinemia and neonates which born from unspontaneous parturition has a chance to hiperbilirubinemia 50.193 times higher than neonates which was born through spontaneously parturition after controlled by the prematurity. 

Based on the results of research shows that majority of infant that born and get breastfeeding by his mother is 93 (81.6%). It’s known that of statistical tests does not obtain the significance correlation between breastfeeding status with jaundice on neonates. In this research, factors that studied is that breastfeeding cannot be concluded as risk factor to jaundice. 

Although breastfeeding is risk factor to jaundice on neonates, however jaundice because of lack of breastfeeding (breast milk jaundice) starts on 3rd day after infant is born. Jaundice first can be seen 2-3 days
usually are physiologic which probably because of infant doesn’t get breastfeeding. Lactogenesis phase II started about 30 or 40 hours after they born, the volume of colostrum and breastfeeding started to rise. At first it is a lot of that experienced difficult breastfeeding, few moments after they born, but after that breastfeeding will come out with smoothly. Although breastfeeding doesn’t out for a moment after born, infant can be able to survive without intake in the first 72 hours. 

This research assess jaundice on neonates until the 2nd of infant born, while for jaundice because of a lack of breastfeeding begin after the 2nd or 3rd as after infant born. Because of that, it can be concluded that jaundice in this case, just a little caused by breastfeeding but more because of other factors.

The Impact of Parent’s Blood Type towards Jaundice on Neonates after Controlled by other Variable

According to Sukadi (2002) the cause of hyperbilirubin is still predisposition factor. The cause of hyperbilirubin often are maternal factors like pregnancy complication (incontability blood type system and Rh), and breastfeeding, perinatal factors like infection, and birth trauma (cephalhermaton), and neonates factor like prematurity, the low of breastfeeding, hypoglycemia, and genetic factor. In addition, risk factor of hiperbilirubin in infant with low weight and parturition type. From multivariate analysis, known that parent’s blood type and birth weight are risk factor of jaundice on neonates. The influence of parent’s blood type contribute 2.4 times towards jaundice after controlled by other variables. Neonates which born from couple with risky blood type, 2.4 times had jaundice compare with other which born from couple with no risky blood type after controlled by variables of gestational age, birth weight, parturition type and breastfeeding.

It’s explained that incompatibility blood type system is the important cause of encephalopathy bilirubin (kern-jaundice), while neonates age, gestational age, birth weight, parturition correlate in giving contribution on seriousness level of jaundice. It can be concluded that the blood type of mother and infant which derived from the contribution of parent’s blood type (conjugal) is important risk factor to jaundice on neonates, in addition to other risk factor. Although can be said that not all mothers with O blood type have antibodies (IgG) that can be passed through the placenta, but mother with O blood type and her husband doesn’t have O blood type is a risk factor to jaundice than neonates which come from mother with no O blood type. Because of that, it’s important to pay attention on parent’s blood type, especially mother blood type in judging the cause of jaundice on neonates.

CONCLUSION

Based on the research result and discussion on the impact of parent’s blood type with jaundice in Sadewa Hospital 2016, it can be conclude that there’s significance correlation between parent’s blood type with jaundice on neonates. Risky parent’s blood type (Mother with O blood type and husband with no O blood type) can increase jaundice neonates than not risky parent’s blood type. For variables of gestational age, birth weight, parturition type and breastfeeding type, which impacting in jaundice on neonates is variables of birth weight and parturition type. For variable of gestational age and breastfeeding, there’s no impact in jaundice on neonates.

The influence of parent’s blood type contribute 2.4 times toward jaundice after being controlled by other variable, neonates which born from a couple with risky blood type had jaundice 2.4 times compare with which born from not risky blood type. Parent’s blood type is risk factor which very impacting towards jaundice, followed by birth weight variable, while for parturition type doesn’t give impact after multivariate tested.

SUGGESTION

For patients or people expected for couple, doing blood type screening. For the next researcher, it can be reference to add the knowledge related with blood type relates with jaundice. For Sadewa Hospital Director, its expected can make policy or fixed procedure of caring which giving for maternal conceives and infant to
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early detecting the risk factors of jaundice on neonates. For a midwife in Sadewa Hospital is expected to make the prenatal screening program relates with parent’s blood type as risk factor of jaundice.

BIBLIOGRAPHY


