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Alloimmunization in Pregnant Women

KEYWORDS: HDN, Alloimmunization, Rh (D) immunoglobulin, Hydrops fetalis

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ABSTRACT ***Background and Aim:*** *Hemolytic disease of the fetus and newborn (HDN) is a condition in which the lifespan of an infant's red blood cells (RBCs) is shortened by the action of specific IgG antibodies directed against Rhesus or other blood group antigens on fetal RBCs that are inherited from the father but are not expressed by the mother. The aim of the present study was to provide data on the type and frequency of maternal RBC alloimmunization in pregnant women attending the ante-natal Clinics, King Khalid University Hospital between January 2013 to December 2013*

Materials and Methods: *A retrospective review of medical records of all pregnant women with RBCs allo-antibodies who were followed and delivered in King Khalid University hospital between January 2013 and December 2013. All samples were tested for blood grouping and screened for irregular antibodies using DiaMed ID Micro Typing system (Gel Test).*

Results: *4264 samples of pregnant women were tested, 44 samples were found positive with frequencies of 1.03% as follows: anti-D 6 (13.6%),anti-K 6 (13.6 %),anti-E 10 (22.7 %),anti-c 5 (11.4%), anti-E,c 2 (4.5%),anti-D,C 1 (2.3 %), anti-Fya,Fyb,E 1 (2.3 %), non specific 5 (11.4 %) , anti-E,c,K 1 (1.7%),anti-S 1(1.7%),anti-Leb,Lea,E1 (2.3%), anti-Jka 1 (2.3%) anti-M 1(2.3%),anti-D,C,E 1 (2.3%), anti-,Lea,Lua 1 (2.3%) and anti-Cw 1 (2.3%).*

Conclusion: *Primary prevention by using K-negative, Rh c-, Rh E-, and RhC-compatible red blood cell transfusion for women younger than 45 years may prevent up to 40% of cases of hemolytic disease of the newborn. There was a relationship between abortion and allo-immunization and Increase number of pregnancies gives a chance for alloimmunization to occur.*

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Introduction:

Hemolytic disease of the fetus and newborn (HDN) is recognized in which the lifespan of fetal's red blood cells (RBCs) is shortened by the action of specific IgG antibodies inherited from the father but are not expressed by the mother Bondagji ***et al***, (2011).The most common routes of maternal sensitization are via blood transfusion or feto-maternal hemorrhage, associated with delivery, trauma, spontaneous or induced abortion, ectopic pregnancy, or invasive obstetric procedures. These antibodies may be directed against Rhesus or other blood group antigens on fetal RBCs. HDN can exhibit different clinical forms, from a mild anemia with neonatal hyperbilirubinemia to a major fetal damage with stillbirth due to hydrops fetalis, a high-output cardiac failure syndrome, generalized edema and death may occur in the untreated cases Ngoma ***et al,*** (2016). However, with appropriate monitoring and intervention, hemolytic disease of the fetus and newborn can be treated successfully in almost all pregnant women with no long-term sequelae in offspring. Rh negative women with large feto-maternal haemorrhage (FMH) from Rh (D) positive fetus are at risk for anti D alloimmuniztion if they do not receive the adequate Rh immune globulin (RhIG) DeHaas ***et al,***(2014) Primary resources against HDN consist of extended matching of red blood cell (RBC) transfusions (Dutch guidelines,2011).

With effective antenatal care, fetuses at risk are identified by maternal antibody screening and titration, determination of paternal antigen status, and determination of fetal antigen status Jophy ***et al,*** (2013) the latter can also be done by amniocentesis or noninvasively using free fetal DNA in maternal plasma. This noninvasive fetal blood group typing was first reported by Lo ***et al,*** (1998). However, currently noninvasive detection of fetal anemia by Doppler assessments of peak systolic velocity in the fetal middle cerebral artery is used predominantly, by measuring the speed of the blood flowing through a blood vessel in the baby's brain Zipursky ***et al, (2011***). Other proposed antenatal treatment options include maternal or fetal administration of intravenous immunoglobulin and maternal administration of Phenobarbital, Trevett ***et al***,(2005).After birth, diagnosis of HDN can be confirmed by blood group and Rh typing, measuring antibodies and bilirubin, and performing direct antibody (Coombs') test. Postnatal management includes intense phototherapy, exchange transfusion to reduce hyperbilirubinemia and blood transfusion. Rath ***et al***, (2010).

2- Materials and Methods:

The study group included all pregnant women registered and delivered in King Khalid University Hospital between January 2013 and December 2013 .Age range between (19-44 years). All ante-natal women were tested for blood group, Rhesus factor and antibody screening.Anti body identification was done manually for samples with positive antibody screening using Gel Test Method, (Micro Typing System Cressier sur Morat, Switzerland) (Lapiere,1990**) .**

3- Results:

4264 samples of pregnant women were tested, 44 samples were found positive with frequencies of 1.03% as follows:

anti-D 6 (13.6%),anti-K 6 (13.6 %),anti-E 10 (22.7 %),anti-c 5 (11.4%), anti-E,c 2 (4.5%),anti-D,C 1 (2.3 %), anti-

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Fya,Fyb,E 1 (2.3 %), non specific 5 (11.4 %) , anti-E,c,K 1 (1.7%),anti-S 1(1.7%),anti-Leb,Lea,E1 (2.3%), anti-Jka 1 (2.3%) anti-M 1(2.3%),anti-D,C,E 1 (2.3%), anti-,Lea,Lua 1 (2.3%) and anti-Cw 1 (2.3%) (Graph 1)

The distribution of antibodies within different blood groups of pregnant women was as follows:

O positive 19 (43.1%), O negative 7 (15.9 %),A positive 8(18.1 %), A negative 2 (4.5 %), B positive 5 (11.4 %) and B negative 1 (2.3%) and AB pos 2 (4.5%) (Graph 2)

4- Discussion:

HDN is a condition caused by maternal antibodies to fetal red cell antigens, which cross the placenta and cause haemolysis. The antibodies can be natural or immune. In the latter case, the sensitizing event is frequently a previous pregnancy or a transfusion, where the mother was exposed to the relevant antigen. Some antibodies (including anti-D, anti-K and anti-c) confer significant fetal and neonatal risks such as anemia requiring intrauterine or neonatal transfusion, jaundice or perinatal loss. There are many antibodies that are unlikely to significantly affect the fetus but can cause neonatal anemia and hyperbilirubinaemia, while others may cause problems for the screening and provision of appropriate blood to the mother or fetus/neonate when required .This study showed that the frequencies of red cell alloimmunization among the pregnant women was 1.03%

This is in accordance with the findings of several other studies, such as those by Koelewijn, et al (2008) tested 305.000 samples with prevelance of (1.2%), Pahuja, et al (2011) tested 3.577 samples 45 was positive for antibodies with prevelance of 1.25% and Howard, et al(1998) tested 22,264 samples,45 samples were positive with prevelance 1%. There was an association of obstetric history,parity,gravity with alloimmunization.Thus 27 had a parity of 1 to 4 children with 8 had a parity of more than 4 children.

Our results (1.03%) were similar to results conducted in Tanzania (Africa), among 77.949 pregnant women tested, 855 were found positive for antibodies identification with frequencies of 1.1% (Ngoma, 2016).

In a study in Oman. 33 out of 1160 Rh positive women alloimmunized with minor RBCs antibodies that gave a prevalence of 2.7%. The most frequent antibody was anti-E 38%, followed by anti-c 17% and anti-Kell 17 (Tamima, 2015). Our study also showed that the most frequent antibody was anti-E which is 10 (22.7%).

The prevalence of the current study is high compared to a study done in Sweden (Gottvall, 2008) with a prevalence of 0.4% and a study done in China with a prevalence of 0.79 % (Lee, 2003).

In a Croatian study, clinically significant non-D antibodies produced HDN in approximately 55% of alloimmunized pregnancies, and severe HDN, defined by perinantal transfusion requirement or death, in approximately 25% (Dajak, 2011)

Our study also was lower than the study In in Port Harcourt, Nigeria with the frequency of 3.4% (Zazzheaus,2011), deliveries of non-primiparous women are more affected by alloimmunization since the immunization event is often the previous delivery (Afra,2013). The parity distribution is important, as each pregnancy and delivery increases the cumulative risk for FMH. For obvious reasons the prevalence is lower in countries with a low fertility index.

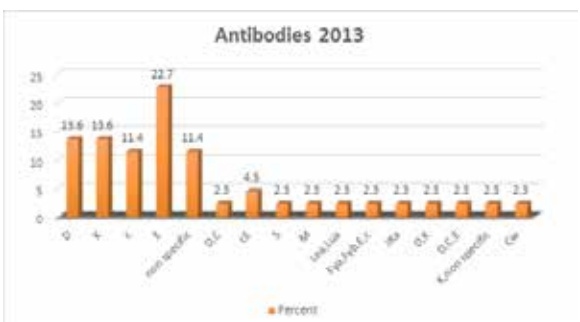
Our study showed that most of women with abortion got, anti E and anti E combined with other antibodies, out of 44 positive antibodies 12 (27.3%) multiparous pregnant women with anti-E and 5 (11.4%) multiparous pregnant women got anti E combined with other antibodies

5-Conclusion & Recommendations:

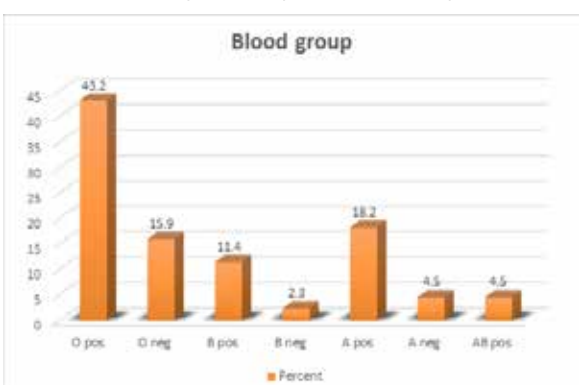
Primary prevention by using K-negative, Rh c-, Rh E-, and RhC-compatible red blood cell transfusion for women younger than 45 years may prevent up to 40% of cases of haemolytic disease of the newborn There was a relationship between abortion and allo-immunization and Increase number of pregnancies gives a chance for alloimmunization to occur.

7- Appendices:

Graph (1): Showing percentage of antibodies



Graph (2): showing blood groups percentage



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