

Retrospective Review of Transfusion Practices in Neonatal Intensive Care Unit (NICU) of Benghazi Children Hospital (2021-2022)

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DOI: 10.36347/sjams.2023.v11i02.010

| Received: 23.12.2022 | Accepted: 02.02.2023 | Published: 11.02.2023

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Abstract

Review Article

This research aims to study the incidence of blood transfusion in relation to totally admitted cases at Neonatal department of Benghazi Libya children hospital, and to estimate most common causes that need blood transfusion, weight, sex, and age at transfusion. Out of 3036 were admitted to Neonatal ward from January 2021 to December 2022, 54 cases were received blood transfusion (1.7%), male to female ratio (1.3:1), mean weight was 2.4kg, mean age at transfusion was 24days, 51.9% had compatible blood group of mother and baby blood group, and in 48.1% were non-compatible blood.

Keywords: blood transfusion, Transfusion Practices, Neonatal ward, red blood cells.

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BACKGROUND

Blood transfusion frequently are life-saving and modern intensive care of premature neonates, children with cancer and transplant recipients would be impossible without them. however, transfusion are not without risks and they should be given only when true benefits are likely, that is to correct a deficiency or defect of a blood component that has caused a clinically significant problem, particularly neonate and infant have many special need [1].

Routine blood components consist of packed red blood cells (RBCs), platelets, frozen plasma, fresh frozen plasma, cryoprecipitate (CRYO), and granulocyte. In some cases, whole blood usually in the form of reconstituted whole blood can be used. However, in most cases, blood component are preferred because each component has specific optimal storage condition, and component therapy maximize the use of blood donation [2].

Red blood cells (RBCs) are the most frequent transfused blood component. They are given to increase the oxygen carrying capacity of the blood and to maintain satisfactory tissue oxygenation.

Aim of study:

- To estimate the incidence of blood transfusion in relation to totally admitted cases in Neonatal department of Benghazi Libya hospital in last 2 years (2021_ 2022).
- To evaluate the most common causes of blood transfusion, commonest age at time of transfusion and commonest type of anemia in the transfused cases in relation to other variables as sex and weight of the baby.

Setting and design:

A retrospective descriptive cross-section study were done in neonatal department of Benghazi children hospital from January 2021 to December 2022.

INTRODUCTION

Hemoglobin increase with advancing gestational age :at term , cord blood hemoglobin is 16.8 g/dl (14-20 g/dl) , hemoglobin levels in low birth weight(LBW) infant are 1-2 g/dl below those at term [3], reticulocyte count in the cord blood of infant range from 3-7% [4] the normal value of hematocrite (HCT) which mean the portion of 100 ml blood occupied by the erythrocyte is 39-65%, the mean corpuscular volume (MCV) that indicate volume of a single erythrocyte is range 88-123 (FL), the mean corpuscular hemoglobin (MCH) which mean the amount of

Citation: Fadwa Abdalhamid Aldeghaily, Negeia Imhamed Elgaroushi, Wafa Saad Abdalrazi, Fatema Alsedawi. Retrospective Review of Transfusion Practices in Neonatal Intensive Care Unit (NICU) of Benghazi Children Hospital (2021-2022). Sch J App Med Sci, 2023 Feb 11(2): 316-321.

hemoglobin per cell in neonate range 30-37(PG) while the mean corpuscular hemoglobin concentrate (MCHC) that mean the concentration of hemoglobin in the erythrocyte is 28-35 g/dl [5]. All these blood indices and morphologie used in diagnosis and classification of anemia.

Anemia can be defined as a reduction in hemoglobin concentration, hematocrite, or number of red blood cells per cubic millimeter the lower limit of the normal range is set at two standard deviation below the mean for age and sex for the normal population [6].

Anemia during the neonatal period is caused by:

Blood Loss:- manifested by decrease or normal HCT, increase or normal reticulocyte count and normal bilirubin level. Hemolysis is manifested by decrease HCT, increase reticulocyte count, and an increase bilirubin level.

- Immune hemolysis:- like
 - a. Rh. incompatibility
 - b. ABO. incompatibility
 - c. Minor blood group incompatibility
- Hereditary RBC disorder like:
 - a. RBC membrane defect (spherocytosis , elliptocytosis)
 - b. Metabolic defect (G6PD, pyruvate kinase deficiency)
 - c. Hemoglobinopathies

Alpha and Gamma Thalassemia

Diminished RBC production is manifested by decreases HCT, decreases reticulocyte count, and normal bilirubin level.

Treatment of neonatal anemia may involve, individually or in combination, simple replacement transfusion, exchange transfusion, nutritional supplement or treatment of the underlying primary disorder.

Treatment of neonatal anemia by blood transfusion depends on the severity of symptoms, the hemoglobin level, and the presence of co-morbid disease that interfere with oxygen delivery the need for treatment with blood should be balanced against the risks of transfusion, however neonatal transfusion practices have changed dramatically in last 30 years and must be made in consideration of the infant's condition and physiologic need.

Transfusion protocol [1-4]:-

HCT<20 / HB<7 ----- even Asymptomatic Need 20 cc / kg packed RBCS.

HCT< 25/ HB< 8 symptomatic patient with tachycardia, tachypnea , decrease weight gaining or had episodes of apnoea Need 20 cc /kg packed RBCS.

HCT < 30/HB<10 -----symptomatic patient requiring minimal respiratory support (mechanical ventilation or nasal CPAP)-----Need 15 cc/kg packed RBCS.

HCT<35 /HB < 11.0 -----symptomatic infant requiring moderate or significant mechanical ventilation Need 15 cc /kg packed RBCS.

Material and study Design:

All patients were admitted to neonatal department of Benghazi children hospital mainly and only for blood transfusion, both males and females were included and patient from different socio-economic classes were included, most of patients was from Benghazi city, some patients from surrounding small villages away from Benghazi, some cases referred from cities from east and west to Benghazi.



Out of 3036, cases admitted to neonatal department of children hospital from 1st of January 2021

to 30st of December 2022, 54 patients were admitted mainly and only for blood transfusion. Cases that need

blood transfusion during co-morbid diseases were excluded and patients with low hemoglobin and high serum indirect Bilirubin that receive exchange transfusion were also excluded from this study.

A retrospective descriptive cross sectional design was adopted in this study. The available data was extracted from the files of 54 patients in the department including ,age at time of transfusion, sex, residence, weight of the baby, mother blood group, baby blood group, hemoglobin (Hb) level at time of transfusion, hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC).

For those with compatible blood for mother and baby blood groups were restudied for presence of low birth weight, twins' pregnancy and history of acute blood loss.

Statistical analysis and calculations were performed with the use of statistical package for social sciences software windows (SSPS version 18). The data interpreted in tables and figures, the numerical data were shown as percentage, minimum and maximum, mean \pm SD. Appropriate statistical test of significance like chi-square test was used as necessary to find the significance of observed difference between the studied variables, and p value $<$ 0.05 was taken as level of significance

RESULTS

Table 1: Neonatal demographic and clinical characteristics (n=54)

Variables	Number	Percent
Age at transfusion/day:		
0-7	10	18.5
8-14	9	16.7
15-21	9	16.7
22-28	10	18.5
More than 28	16	29.6
Gender		
Males	31	57.4
Females	23	42.6
Child weight /gm.		
Less than 2.500	23	42.6
2.500-3.500	25	46.3
More than 3.500	6	11.1
Residence		
Benghazi	34	63
Outside Benghazi	20	37

Mean age at transfusion =23.70 days, M: F ratio =1.3:1, Mean Weight. = 2.620 gm.

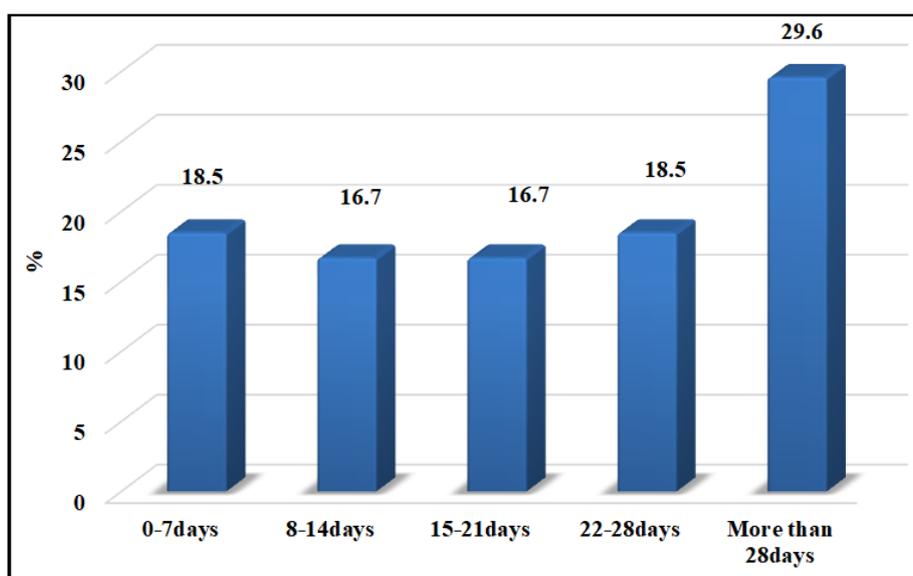


Figure 1: Age distribution of patients at time of receiving blood

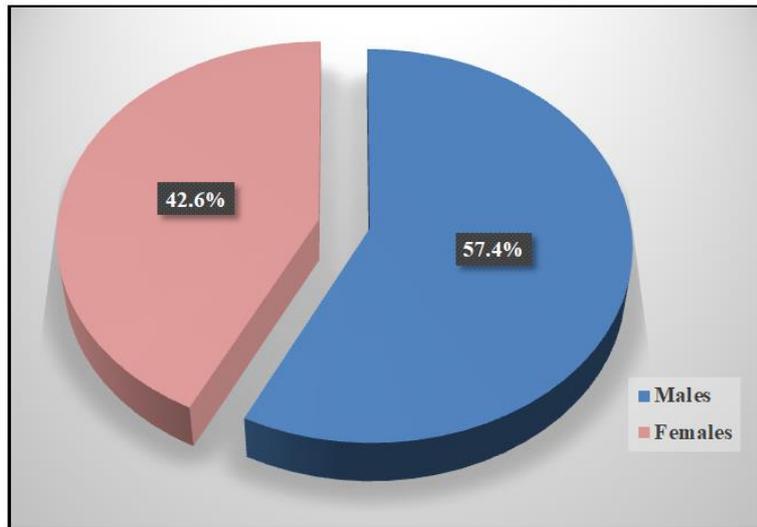


Figure 2: Gender distribution of patients

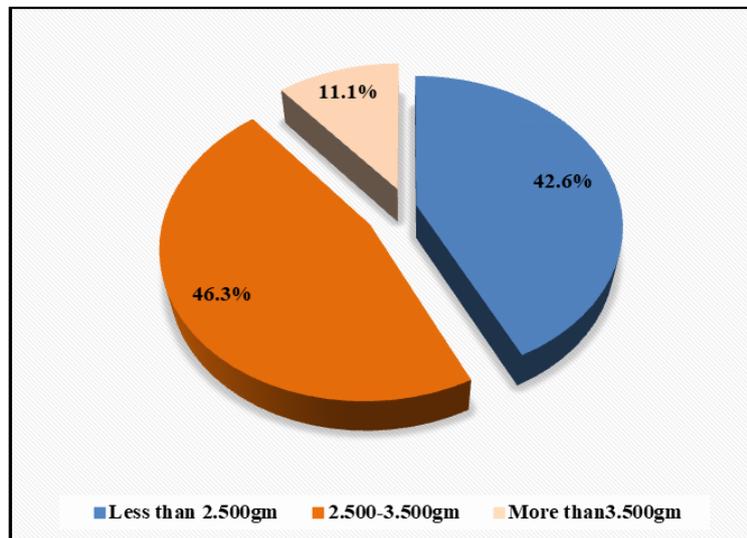


Fig 3: Weight distribution of patients

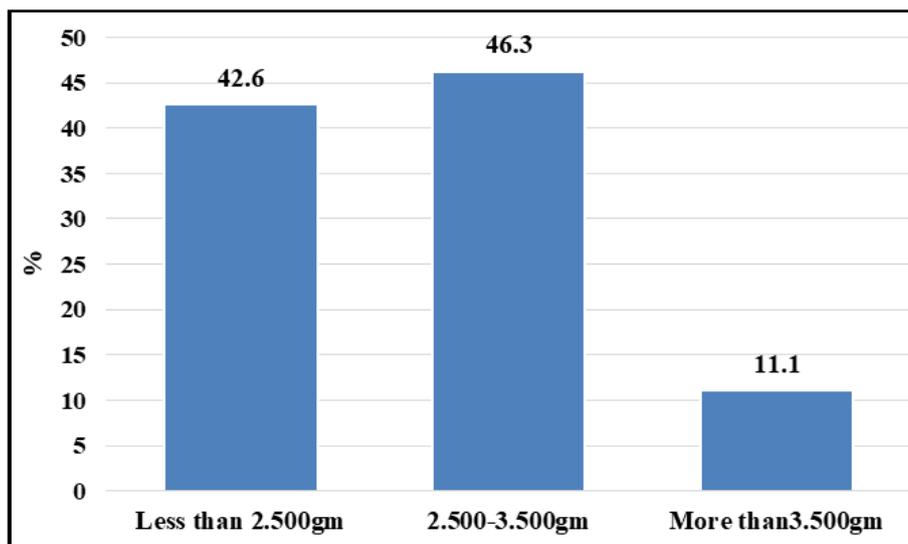


Fig 4: Weight distribution of patients

Table 2: Haematological profile of patients

Parameters	Number	Percentage
HB g/dl		
Less than 7	17	31.5
7-9	31	57.4
More than 9	6	11.1
HCT l/l		
Less than 21	25	46.3
21-30	27	50.0
More than 30	2	3.7
MCV fl		
Less than 88	20	37.0
88-123	34	63.0
MCH pg		
Less than 30	9	16.7
30-37	38	70.4
More than 37	7	13.0
MCHC g/dl		
28-35	24	44.4
More than 35	30	55.6

Mean HB= 7.53, Mean HCT= 21.63, Mean MCV= 93.37, Mean MCH= 32.80, Mean MCHC=35.154

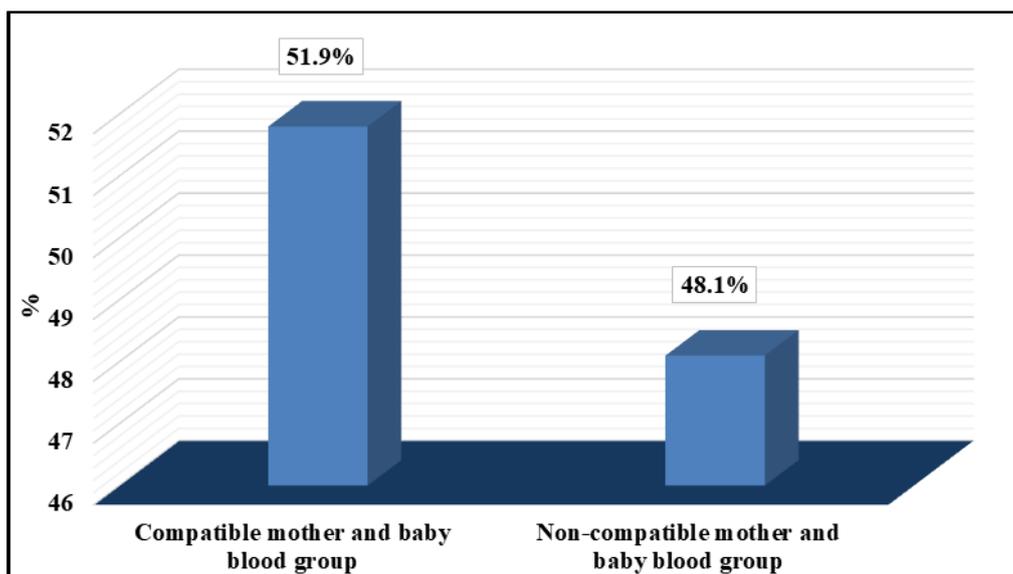


Fig 5: Low HB in relation to mother and baby blood groups

Table 3: Low hemoglobin in relation to mother and baby blood groups

Blood groups	Compatible 28(51.9%)			Non-compatible 26(48.1%)	
	Prematurity	Twins	Blood loss	ABO	RH
Variables	16(57.1%)	10(35.8%)	2(7.1%)	16(61.6%)	10(38.4%)

DISCUSSION

Out of 3036 were admitted to Neonatal ward of Benghazi Libya children hospital from January 2021 to December 2022, 54 cases were received blood transfusion (1.7%), however there was considerable difference in the transfusion rate between different countries and within the same country as indication for blood transfusion is controversial depend on expert

clinical opinion, the prevalence of blood transfusion was 3.5% at Federal teaching hospital Gombe, Nigeria [7] and was 13.03% in other study done in china, they also report that the rate of blood transfusion is differ in Northeast china (higher) than in Southwest china [8].

In this study, the male gender was predominant (57.4%) and female (42.6%), 63% was from Benghazi and 37% represent cases outside Benghazi city, 29.6%

their ages were more than 28 days with mean age at 24 days, this result agree with Numan Nafle Hameed done in Iraq [11] who showed that most common age group of receiving blood product was (22-28) days and disagree with Ogunlesi *et al.*, study in Nigeria who showed that half of transfusion took place during first week of life. for the weight 46.3% their weight between 2.500-3.500kg with mean weight 2.620kg this accord with other studies reported that low birth weight and poor gaining infant are among the groups of patients undergoing transfusion frequently [9, 11].

In the haematological profile of these studied cases , we found 57.4% had HB range between 7-9g /dl with mean HB 7.5g /dl and 50% had HCT between 21-30% with mean HCT 21.63, this result accord with worldwide blood transfusion protocol Recommendation which depend on HB level, HCT, and presence of co-morbid disease and recommend that , in neonatal period , patient with HB less than 7.0 and HCT equal or less than 20.0% must receive packed RBCs even Asymptomatic [1-4].

For erythrocyte morphology 63.0% were between 88-123 FL with mean 93.37 FL, MCH 70.4% between 30-37 PG with mean 32-80 PG, so Normocytic Normochromic morphology was predominant.

Regarding the causes that indicate blood transfusion, we study low HB in relation to mother and baby blood group compatibility and divid patients two groups, those with compatible mother and baby blood group was 51.9% and those with non-compatible blood group (RH, ABO incompatibility) was 48.1%.

For the cases with compatible mother and baby blood group restudied in relation to their weight, presence of twin pregnancy or history of blood loss and we found 57.1% had low birth weight, 35.8% had twin pregnancy and 7.1% history of acute blood loss which was two males after circumcision.

For non-compatible mother and baby blood group are studied in relation to their mother blood group, and we found 61.6% was ABO incompatibility and 38.4% was RH incompatibility.

As well known infant with ABO and RH. Incompatibility who do not have an exchange transfusion may have protracted hemolysis and may require transfusion several weeks after birth [10].

CONCLUSION

The study found that the incidence of blood transfusion was 1.7% in relation to totally admitted

cases in last two years. Low birth weight, ABO and RH. Alloimmunization are among the groups of patients undergoing transfusion. Our strategy for indication of blood transfusion are accord with worldwide blood transfusion protocol.

Limitation of the study

The data collected in this study only reflected apercentage of Benghazi Libya children hospital and not all cities in the country important missing information not recorded in medical records was significant in some variables such as peripheral blood smear, reticulocyte count, and direct coombs test. Therefore, lack of information creates errors.

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