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RESEARCH ARTICLE

Neonatal thrombocytopenia and its relation to maternal disease

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Abstract

Introduction: **Platelets first appea r in the human fetus at five weeks post-concep tion, and increase in number during fetal life, reaching n ormal adult values by 22 weeks of gestation.**

Objectives: **The aim of this work t o screen neonatal thrombocytopenia, its causes and its relation to maternal diseases.**

Patients and methods: **This prospective study was carried out in the Neonatal Intensive Care Unit (NICU) at the Obstetrics and Gynec ology Department of MINIA University Hospital from the beginning of March 2017 till the June 2017. T his study was carried out on 150 neonates w o were admitted to the NICU and met the inclusion crit eria for enrollment into this study including 45 (30%)male neonates and 105(70%) female neonates ,th eir age ranged from (28 week -38 week) Who delivered to mothers which has maternal disease durin g pregnancy e.g (Diabetes , Pre mature rup ture of membrane , TORCH , preeclampsia, placental ab normalities).**

Results: **The study included 150 newborn children, 102 (68%) of whom were premature infants and 48(32%) of them were term neonates & (70%)of them were females and(30%) of them were males& mode of delivery was cesarean section in(82.7%)and vaginal delivery was (17.3%). In our study there were significant increase in maternal diseases in preterm neonates when compared with full term with p.value (0.004, 0.0002, 0.001, 0.001,0.001) for each of them respectively ,while HTN diseases were common in full term neonates (p.0.004). There was significant correlation between birth weight and maternal illness that thrombocytopenia most common among ELBW.**

Conclusion: **placental insuffici ency and perinatal asphyxia are relate d to early onset thrombocytopenia.**

Key words: **Neonatal; Thrombocy topenia; full-term; Preterm.**

Background

Platelets first appear in the human fetus at five weeks post-conception, and increase in number during fetal life, reaching normal adult values by 22 weeks of gestation [1].Neonatal thrombocytopenia can be defined as a platelet count < 150×10^9/L in any neonate of a viable gestational age [2].

The prevalence of thrombocytopenia ranges between 1–5% of all newborns. In neonates admitted to intensive care units, thrombocytopenia develops in 22–35% of all admissions, with the rate increasing as gestational age decreases [3]. Overall, thrombocytopenia in neonates is caused either by; increased platelet consumption, decreased platelet production, hypersplenism, or a combination of these [4]. Thrombocytopenic neonates can increase the number, but not the size, of their megakaryocytes, implying a limitation in one of the mechanisms by which platelet production is upregulated[1].

Causes of neonatal thrombocytopenia can usually be determined by the clinical history and presentation [2]. Thrombocytopenia which presents after the first 3 days of life is due to sepsis or necrotizing enteroclitis (NEC) in >80% of cases. The most frequent cause of early-onset thrombocytopenia is associated with chronic fetal hypoxia, as occurs in infants born to mothers with pregnancy-induced hypertension or diabetes and/ or in those with intrauterine growth restriction (IUGR). Extreme low birth weight (ELBW) babies (birth weight <1000 g), IV), cytomegalovirus (CMV), or enterovirus frequently exhibit thrombocytopenia with incompletely understood mechanisms [4].

Aim of the work

The aim of this work to screen neonatal thrombocytopenia, its causes and its relation to maternal diseases

Patients and Methods

This prospective study was carried out in the Neonatal Intensive Care Unit (NICU) at the Obstetrics and Gynecology Department of MINIA University Hospital from the beginning of March 2017 till the June 2017, with the approval of the Faculty of Medicine Ethical Committee.

Patients:

This study was carried out on 150 neonates who were admitted to the NICU and met the inclusion criteria for enrollment into this study including 45 (30%)male neonates and 105(70%) female neonates ,their gestational age ranged from (28 week -38 week)

Inclusion criteria:

All neonates infants who were admitted to the NICU including preterm and full term neonates.

Who delivered to mothers which has maternal disease during pregnancy e.g (Diabetes diabetes , Pre mature rupture of membrane , TORCH , preeclampsia, placental abnormalities)

Exclusion criteria

Neonates delivered to healthy mothers

METHODS

In this study we evaluated if there was a relationship between maternal diseased and neonatal thrombocytopenia.

All neonates were subjected to the followings;

Careful history taking including history of gestational diabetes, pregnancy induced hypertension, maternal idiopathic thrombocytopenic purpura (ITP), maternal

systemic lupus erythromatosus (SLE) and other maternal diseases. History also included mode of delivery and history suggestive of perinatal asphyxia.

* **Thorough clinical examination of neonates including; gestational age as regard last menstrual period or abdominal ultra sound , anthropometric measures, examination of cardiovascular, chest, abdomen and neurological systems stressing on signs suggestive of intracranial hemorrhage (eg, disturbed conscious level, convulsions, pallor), pulmonary hemorrhage, hematemesis, melena, purpura, bleeding from puncture sites, bleeding per umbilicus and hematuria.**

* **Full panel investigations; were done in from of complete blood count (CBC) with differential cell count**

The type of kits and instruments used in the study

* **We collected 2ml of venous blood sample collected at first 3 days from all neonates delivered from diseased mothers , collected on ehylenediaminetetraacetic (EDTA) vacutainers for complete blood picture ,stored at -20 C untill analysis**

* **The studied neonates were divided into two groups:**

Group A: Preterm neonates (gestational age < 37 weeks), there number was 102(68%). their age ranged from (28 week-36 week) neonates .

Group B: Full term neonates (gestational age ≥ 37 weeks), there number was 48(32%) their age ranged from(37 week-38 week) neonates.

Prevalence of thrombocytopenia was studied in both study groups. Different etiologies of thrombocytopenia were studied with correlation to age of onset and severity. Neonatal platelet counts of 100 - 149 × 109\ L represent mild thrombocytopenia, platelet counts of 50 - 99 × 109\ L are considered moderate thrombocytopenia, and levels less than 50 × 109\ L are categorized as severe thrombocytopenia. Outcome of thrombocytopenic neonates was studied in both groups and related to of to its severity.

Platelet transfusion was given in case of thrombocytopenia associated with hemorrhage or severe thrombocytopenia. IVIG at a dose of 1g/kg/day on two consecutive days was given in case of (neonatal alloimmume thrombocytopenia) NAIT or autoimmune thrombocytopenia and in some cases of sepsis with severe thrombocytopenia according to the protocol of our unit.

We collected 2ml of venous blood sample collected at first 3 days from all neonates delivered from diseased mothers , collected on ehylenediaminetetraacetic (EDTA) vacutainers for complete bloods picture ,stored at -20 C untill analysis

Data management and statistical analysis

Data management and analysis were performed using Statistical Package for Social Sciences (SPSS) version 17. Numerical data were described as mean ± standard deviation (SD), median, minimum and maximum, while qualitative data were summarized as frequency and percentages. The chi-square test or Fisher's exact test were used to compare between the groups with respect to categorical data. All p-values are two-sided. P-values < 0.05 were considered significant.

Discussion

Thrombocytopenia is one of the commonest hematological disorders inneonatal period ,it affect up to third of those admitted to NICU [3]

In the first 72 hours of life is usually secondary to placental insuffiency and caused by reduced platelet production , fortunately most episodes are mild to oderate and resolve spontaneously [5].In our study we found that thrombocytopenia present in neonates delivered to mother with maternal disease where there platelet number was (108± 32.9) There maternal disease were (Hyper tension, diabetes mellitus, pre mature rupture of membrane placental abnormalities ,and TORCH infection).This was in agreement of (Khalessi et al.,2013, Patil,2014)[6, 7] who reported that the most common predisposing factors were Pregnancy induced hyper tension up to 13% PROM 7.5% and eclampsia 3%

In our study there were significant increase in maternal diseases in preterm neonates when compared with full term with p.value (0.004, 0.0002, 0.001, 0.001,0.001) for each of them respectively ,while HTN diseases were common in full term neonates (p.0.004)

This comes in agreement with Robert et al.,2003 [5]who reported that most cases of thrombocytopenia were in preterm neonates who results from placental insufficiency , fetal hypoxia and infection .

While Christensen et al.,2006,[8] reported that platelet count (100,000_150,000) are more common in preterm neonates than full term neonates born to diseased mothers . Also Nandyal et al.,2016,[9] reported that the important causes of Thrombocytopenia in neonates is prematurity.

Keerith et al.,2017[10] in his study found that increase number of full term than preterm due to increase number of septicemic full term admitted to NICU than preterm neonates during the study period this difference between us and other study can be explained by increase number of preterm in our study than full term , in which there was decrease incidence of platelet production and increase consumption due to sepsis which were more common in preterm .

In our study there was significant correlation between birth weight and maternal illness that thrombocytopenia most common among ELBW.

Charoo et al.,2009&Khalessi et al.,2013[6,10] proved that thrombocytopenia occurred in low risk group which included ELBW and neonates with IUGR .

Anil et al.,2012[11] found that thrombocytopenia occurred in preterm due to limited ability to compensate for accelerated destruction of platelets

The incidence of mild thrombocytopenia occurred in PROM this comes in agreement Summary

Neonatal thrombocytopenia is the most common blood disease in neonatal intensive care after anemia caused by blood sampling. thrombocytopenia, which comes three days after the birth is due to a sepsis or gastrointestinal infection. In most cases, this deficiency in the first three days of life

is related to chronic hypoxia of the fetus during pregnancy. Neonatal bleeding depends not only on the number of platelets, but also on the viability of the blood vessel or hemorrhagic disorder.

This prospective monitoring study aims to determining the prevalence of neonatal thrombocytopenia and studying the possible causes. This is related to the age of the neonatal and the severity of thrombocytopenia. The study was carried out in neonatal intensive care at the Obstetrics, Gynecology and pediatric Hospital at Minia University from March 2017 to the end of June 2017. The study included 150 newborn children, 102 (68%) of whom were premature infants and 48(32%) of them were term neonates & (70%)of them were females and(30%) of them were males& mode of delivery was cesarean section in(82.7%)and vaginal delivery was (17.3%).

Thrombocytopenia in the first three days of life was related to the presence of diseases in maternaldisease such as (Hyper tension, diabetes mellitus, pre mature rupture of membrane placental abnormalities ,and TORCH infection)(P.value<0.01) (significant data).

Conclusions

Placental insufficiency and perinatal asphyxia are related to early onset thrombocytopenia.

Competing interests: The authors declare that they have no competing interests.

Authors' contributions: SE and GA conceived the study, carried out its designing, coordinated the implementation. SY conducted the statistics of this work. GA and SY participated in the design of the study, analysis and interpretation of data and revised the statistics and final draft of the manuscript. All authors read and approved the final manuscript.

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