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Analysis levels of bilirubin, hemoglobin, and packed cell volume: Study comparative between male and female newborns children in Maysan Governorate, Iraq

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Abstract
Background: This study aimed to known evaluate the levels of bilirubin, hemoglobin and the size of cells stacked in infants and compare these values between males and females, with the aim of determining whether there are statistically significant differences between the sexes in these bloody indicators during the suckling stage.
Methodology: where samples were collected from the Children's and Maternity Hospital and also from some private laboratories in Maysan Governorate. The infection with this disease was confirmed through the examinations conducted on the children. The period of this study was from 25/11/2024 to 19/2/2025. The total number of samples from male children was (29) males and (21) females. And that is for the purpose of measuring the values of the bilirubin, hemocopine and the size of cells stacked in children. The children's ages differed from one day to one year.
Results: The value of the bilirubin in males was 7.60 and in the females of 8.49, the value of hemocopin in males and female children reached 15.69 and 16.07, respectively, while the values of the size of the cells stacked amounted to 49.45 and 49.1 respectively.
Conclusion: The presence of moral differences in the values of the Bilirubin between males and female newborn. The presence of differences that did not reach the level of morale in the values of hemoglobin and the packed cell volume between males and female newborn.

Keywords: Hemoglobin, bilirubin, volume of packed blood, newborn

Introduction
An abundant molecule found in human plasma is bilirubin. Initially, it has been thought to be a toxic waste product that could indicate hepatobiliary disease or be the cause of neonates' brain damage and kernicterus. Subsequent research, revealed that bilirubin's cytoprotective, anti-oxidant, and anti-inflammatory qualities could make high-normal or slightly increased levels advantageous [1, 2]. Because of a lack of intestinal flora that converts bilirubin to urobilinogen as well as poor activity regarding UDP-glucuronosyltransferase (UGT) in hepatocytes, nearly all neonates have reduced excretion and conjugation processes at birth [3], which increases enterohepatic circulation. Furthermore, neonates have a shorter lifespan and higher heme degradation because fetal red blood cells turnover more rapidly compared with adult red blood cells [4-5]. These are the causes of newborn's physiologic jaundice, which is typically treated by exchange transfusion or phototherapy [6, 4]. Hemolysis is typically the cause of pathologic indirect hyper-bilirubinemia in the first three days of life. Rh and Kell blood group incompatibility are among the early causes of hemolysis. ABO blood group incompatibility could cause hemolysis on days 3-7 of life. Maternal immunoglobulins against fetal red cell antigens cause hemolysis due to blood group incompatibility. According to the conventional teaching, mothers who have been exposed to incompatible red cell antigens during previous pregnancies develop IgG antibodies against unfamiliar types of blood. Those immunoglobulins subsequently pass through placenta during subsequent pregnancies and attach to red blood cells of the fetus, causing the spleen to destroy them. Additionally, mothers could come into contact with unfamiliar red cell antigens.
Hereditary spherocytosis, thalassemias, sickle cell anemia, sepsis, and deficiency of glucose-

6-phosphate dehydrogenase (G6PD) are other causes of hemolysis that manifest around days 3-7 of life (7, 8). Lower than normal enzyme glucose-6-phosphate dehydrogenase levels cause G6PD deficiency; red blood cells that lack this enzyme are unable to generate enough glutathione, which is one of the powerful cellular antioxidants, and are therefore susceptible to oxidative damage that causes hemolysis. Redcells are deformed due to precipitation and/or polymerization of abnormal hemoglobin tetramers, which in the end, leads to hemolysis. Hemoglobinopathies, such as sickle cell anemia as well as alpha thalassemia, are genetic aberrations producing structurally abnormal globin chains or low levels of particular chains of globin. Hereditary spherocytosis is caused through defects in structural proteins on red cell membrane, such as ankyrin, band 3, spectrin, and protein 4.2. The spleen prematurely removes the spherocytic red cells, which causes hemolysis as well as indirect hyperbilirubinemia.

Materials and Methods

The presented research was conducted on a group of newborns children, where samples were collected from the Children's and Maternity Hospital and also from some private laboratories in the Maysan governorate, this disease was confirmed through the tests conducted on children and this study was from 25/11 /2024 to the goal 19/2 /2025, the total number of samples (50) of male newborn (29) and female newborn (21).

How to do the analysis of the Bilirubin

This is done by pulling blood using the Capillary Tube capacity and pulling the blood from the bottom of the child's foot, then closing the mouth of the hair tube with clay, then we put the sample with a central expelling device for two minutes. By analogy, the device must be reduced with distilled water before applying the sample. The capillary tube is placed in the device so that the side of the zeros is to the bottom, as the device depends on the wavelength and the miniaturization.

How to measure packed cell volume

This procedure is performed in children using the method used to measure packed cell volume.

The area is sterilized to take blood from it by alcohol, we pull the blood by the hair tube and close the nozzle with artificial clay, the blood is placed in the centrifugal system for five minutes, after the centrifugal is done and the blood is separated in the poetic tube, we use the ruler to measure the size of the cells stacked where the ruler is placed between the end of RBC and the plasma and through it determines the value PCV. After knowing the PCV ratio, we use the following equation to measure Hb.

Hb = pcv 1/3

Statistical analysis

At a significance level of 0.05, the t-test has been employed to identify significant differences between the female and male individuals' mean values [11].

Results

Table 1: Number of newborn children and their percentages.

sex	number	percentage%	sex	number	percentage%
Male	29	59%	Female	21	42%

Table 2: Bilirubin were evaluated in newborn children between males and females

Six	Bilirubin mg/dL
Male	7.60± 0.95[a]
female	8.49± 1.60[b]

Value represent (mean± SD)

*Different letters refer to ($p<0.05$) significant difference between values.

Table 3: Hemoglobin were evaluated in newborn children between males and females.

Six	Hemoglobin g/dL
Male	15.69 ±1.50[a]
female	16.07 ± 2.01[a]

Value represent (mean± SD)

*Similar letters indicate non-significant ($p>0.050$) difference between values.

Table 4: Packed blood volume were evaluated in newborn children males and females.

Six	Packed cell volume
Male	49.45 ± 5.25[a]
Female	49.1 ± 4.77[a]

*Value represent (mean± SD)

*Similar letters indicate non-significant ($p>0.050$) difference between values.

Discussion

Risk assessment of newborns with bilirubin is an important first step in prevention. The present study provides a framework for thinking about bilirubin and the age and sex of the newborn. The study conducted on newly newborn has appeared the presence of signification differences in the values of the bilirubin between males and female newborn, as well as in table (2) as the presence of differences that did not reach the level of moral in the values of hemoglobin and packed cell volume between males and female newborn as in Table [3, 4]. The jaundice is a highly common case of medical care for newborn babies, with about 64% of mature nodes and 84% of premature breasts in the first week of life in the majority of cases this jaundice is physiological, but it may be returning to satisfactory causes that need investigation and special treatment, as the unpredictable bilirubin is able to penetrate the blood circulatory. Extreme or chronic bilirubin disease events.

Jaundice can be defined as a term used for the purpose of describing a skin yellowing that is brought on by bilirubin accumulation in skin as well as mucous membranes. The increased bilirubin level in the rotation is the cause of jaundice [12]. Two primary sources provide bilirubin. Hemoglobin breakdown in senescent red blood cells as well as prematurely damaged erythroid cells in bone marrow produces approximately 80% of bilirubin. The rest is a result of the turnover of several proteins that include heme and are present in other tissues, including the muscles and liver. Cytochromes, myoglobin, peroxidase, catalase, and tryptophan pyrrolase are some of such proteins [13, 14].

The production of Bilirubin is approximately 4 mg/kg body weight daily. A possible vicious cycle is revealed through the finding that bilirubin might cause suicidal erythrocyte death, since erythrocyte death is followed by heme degradation and bilirubin formation. Therefore, increased plasma bilirubin causes rapid eryptosis, which causes eryptosis. The current findings might provide more insight into how bilirubin affects nucleated cells. Bilirubin is an antioxidant [15] which, at lower concentration levels, protects against hepatocytes36 bile acid-induced apoptosis and renal cells' apoptosis throughout the pyelonephritis [16]. Conversely, bilirubin promotes erythrocyte PS exposure as well as glial and neuronal cell apoptosis [15, 17-18], as well as immune cell apoptosis [19]. Additionally, bilirubin increases the apoptosis of different blood cells caused by radiation [19]. Stimulating Ca21 influx is one of the signaling pathways implicated in bilirubin's harmful effects [20].

Conclusion

The presence of moral differences in the values of the Bilirubin between males and female newborn. The presence of differences that did not reach the level of morale in the values of hemoglobin and the packed cell volume between males and female newborn.

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