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"Retrospective Study of Correlation between High Serum Bilirubin Values With Transcutaneous Bilirubin Values in Newborn at Apollo BGS Hospital, Mysuru".

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Abstract
Background: *Hyperbilirubinemia is one of the common problem in neonates. An estimation of the bilirubin value is essential for decision making in Jaundiced babies. Transcutaneous bilirubin screening is a quick,non-invasivetechnique to measure bilirubin level in neonates. The objective of this study was to evaluate the transcutaneous bilirubin and analyse the correlation with serum bilirubin values and to find out whether transcutaneous bilirubin measurement could avoid invasive serum bilirubin measurements.* ***Aim****: The aim of this study to find whether transcutaneous bilirubin measurement could avoid invasive serum bilirubin measurement BGS Apollo HospitalsMysore, Karnataka.****Materials and Methods:****This retrospective study was conducted in the neonatal unit of BGS Apollo hospital Mysore. Allnew-borns with history of jaundice and neonates in nursery and wards who were clinically diagnosed to have jaundice during the period July 2021 to October 2021 were included in the study.50babies who met the inclusion criteria were enrolled in the study. Transcutaneous bilirubin measurement was done using the transcutaneous jaundice meter (Bili care) and simultaneously a serum sample serum bilirubin estimation done.Babies with congenital malformations and those who are not having any symptoms of jaundice were excluded from the study.****Results:*** *The findings of the study revealed that there seems to be a close correlation between transcutaneous bilirubin and serum bilirubin measurements, the Pearson Correlation Coefficient, the value of R is 0.952 and the result is significant at p<0.5* ***Conclusion:*** *The study concluded that there is a strong positive correlation between transcutaneous bilirubin and Serum bilirubin measurements. Thus transcutaneous bilirubin measurement could avoid need for invasive serum bilirubin evaluation in neonates and only exclusion for transcutaneous bilirubin measurement that it is not reliable in neonates who already started with Phototherapy treatment.*
Key Words: *Transcutaneous bilirubin, Serum Bilirubin Jaundice, New Born, Phototheraphy.*

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I. Introduction:

For most new born babies, it is normal to have high bilirubin levels immediately after birth. Babies with high bilirubin level, the skin and eyes look yellow colour and this is referred as Jaundice. When the Baby is in mother's womb, placenta an organ which is developed in uterus during pregnancy helps to remove the bilirubin from the baby, however soon after the delivery when the placenta is cut off, the babies liver will perform the function of removing excess bilirubin from the body, however in majority cases it takes some more time to perform this process, hence Phototherapy is widely recommended for most babies which helps to remove excess bilirubin from the body and to treat Jaundice[1].

Evaluating Bilirubin levels in new born is one of the key factors for diagnosing Jaundice in babies. Bilirubin levels can be evaluated by Serum Bilirubin and Transcutaneous Bilirubin measurements. Hyperbilirubinemia is seen common among neonates which might require Phototherapy or exchange transfusion, at times it will be medically challenge if the new born is discharged very early from the hospital, hence vigilant follow-up should be made after the post discharge[2].

Infants could benefit from the transcutaneous serum bilirubin measurements which could be evaluated at home. When the Phototherapy is initiated in babies the bilirubin is covered to water soluble lumirubin and it is excreted from the body. It was observed that blanching of skin will alter the transcutaneous bilirubin measurements and measurement is not clear during the course of phototherapy. Few studies suggest that if the skin is covered during the phototherapy there will be more accurate transcutaneous bilirubin measurements[3].

Many Studies have suggested that there is a positive correlation between serum bilirubin and transcutaneous bilirubin measurements.[4] New born babies with Jaundice requires frequent bilirubin assessments,

that means recurrent blood samples are required for the bilirubin evaluation.Hence transcutaneous serum bilirubin measurements are very important and thus can reduce the need for Serum bilirubin measurement which is invasive[5].

The objective of this study was to evaluate the transcutaneous bilirubin and analyse the correlation with serum bilirubin values and to find out whether transcutaneous bilirubin measurement could avoid invasive serum bilirubin measurements. The aim of this study to find whether transcutaneous bilirubin measurement could avoid invasive serum bilirubin measurement BGS Apollo Hospitals Mysore, Karnataka.

II. Material and Methods

The research design used to achieve the objectives of the study is Retrospective Non-Experimental correlation study and Quantitative approach was used in the study. This study was carried out on New born babies in Apollo BGS Hospital Mysore from July 2021 to October 2021. Simple random technique was used in the study. A total 50 new born babies were selected for this Study who met the inclusion criteria. Tool used for the study had two sections one is the demographic details (Age, Gender, and Birth) and other tool regarding study variables (Serum bilirubin and transcutaneous serum bilirubin levels)

Subjects & selection method: The study population was all new babies got admitted in NICU or wards with symptoms of yellow discolouration of the skin from July 2021 to October 2021.

Variables: Research variables Serum bilirubin level and transcutaneous bilirubin level.

Inclusion criteria:

1. All babies who got admitted in NICU or ward with the symptoms of yellow discolouration of the skin (From July 2021 to October 2021).

Exclusion criteria:

1. Babies with Congenital malformations
2. Babies who are not having any symptoms of Jaundice

Procedure methodology:

This is a Retrospective Non-Experimental co relational study, a sample of 50 new born babies were selected in the study. The study was conducted at NICU and wards from Jul to Oct 2021 at Apollo BGS Hospital Mysore. Data was collected from Patient file and Med Mantra app (Apollo Software)

III. Results

SECTION A: DESCRIPTION OF THE DEMOGRAPHIC VARIABLES AMONG NEW BORN BABIES

Table 1: Age-wise frequency, Percentage distribution of neonates.

Majority of the new born baby age group was from 1 to 10 days is 46 (92%) and 11 to 20 days is 4 (8%) and None of them from 21 to 28 days' age group.

I) AGE (N= 50)

1	Age (in years)	Frequency	Percentage %
	1 to 10 days	46	92
	11 to 20 days	4	8
	21 to 28 days	0	0

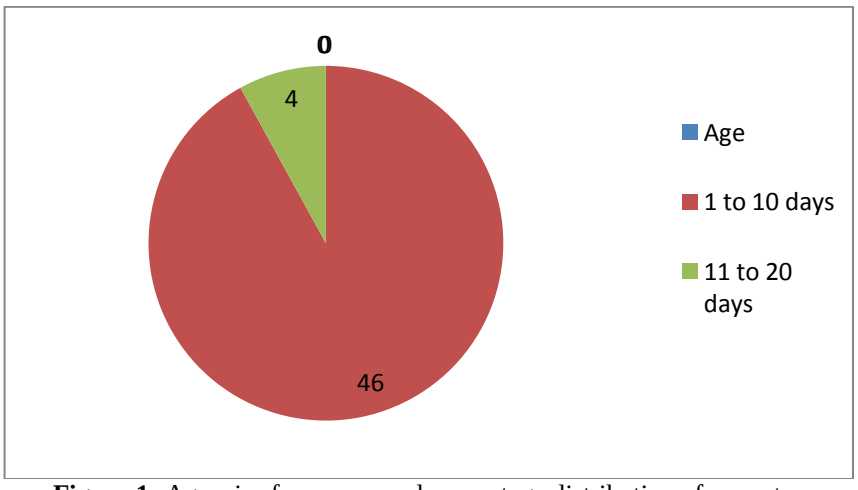


Figure 1: Age wise frequency and percentage distribution of neonates

Table 2: Gender wise Frequency, Percentage distribution of neonates
Out of the 50 New born babies Majority of the new born babies were female 27 (54%) and males were 23 (46%)

II) GENDER (N= 50)

2	Gender	Frequency	Percentage %
	Male	23	46
	Female	27	54
	Other	0	0

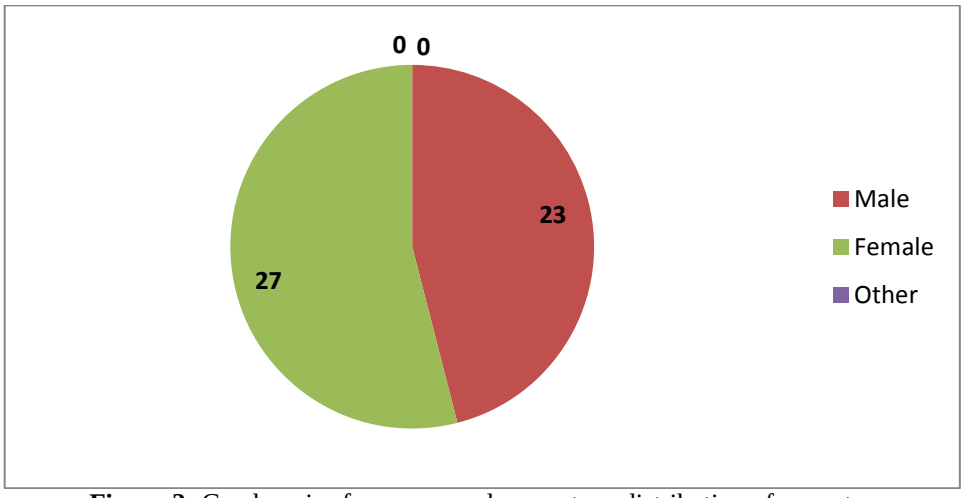


Figure 2: Gender wise frequency and percentage distribution of neonates

Table 3: Birth wise Frequency, Percentage distribution of neonates
Out of the 50New born babies, Majority of the new born baby birth 37 to 38 weeks of gestation was 41(82%) and Premature (Before 37 week of gestation) is 9 (18%)

III) BIRTH (N= 50)

3	Birth	Frequency	Percentage %
	Premature (Before 37 week of gestation)	9	18
	37 to 38 weeks of gestation	41	82
	Above 38 weeks	0	0

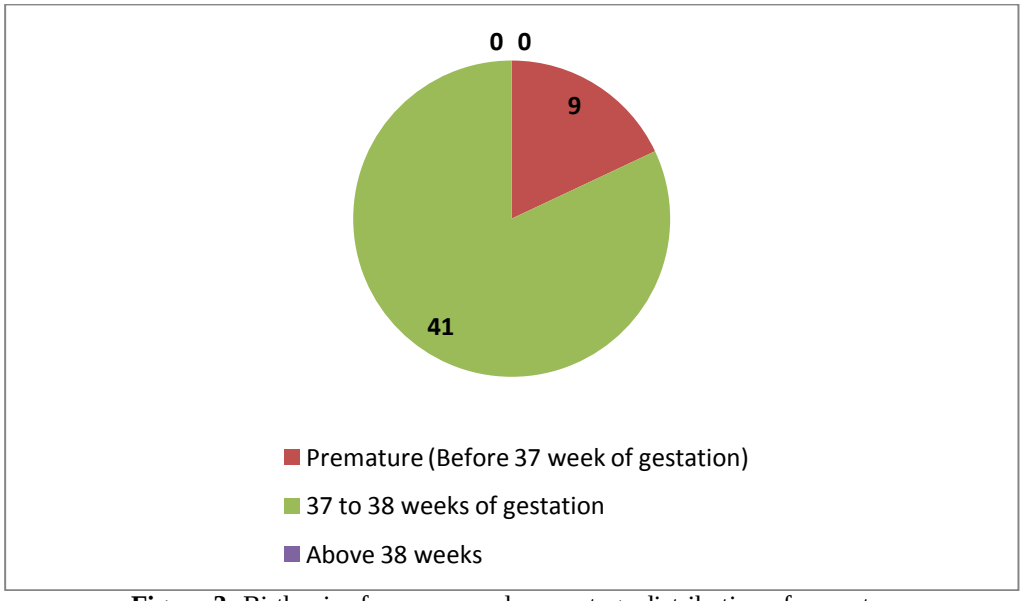


Figure 3: Birth wise frequency and percentage distribution of neonates

SECTION B: DESCRIPTION AND COMPARISON OF THE STUDY VARIABLES

Table 4: Description and Comparison of the Study Variables-TCB on Admission, Serum Bilirubin on admission and Serum Bilirubin after treatment.

All TCB values were corresponding with serum bilirubin values at the time of admission and after treatment.

4	Bilirubin range	TCB on admission (Frequency N=50)	Serum Bilirubin on Admission (Frequency N=50)	Serum Bilirubin after treatment (Frequency N=50)
	Normal	46	46	17
	Slightly high	0	0	26
	Moderately high	4	4	7
	Very High	0	0	0

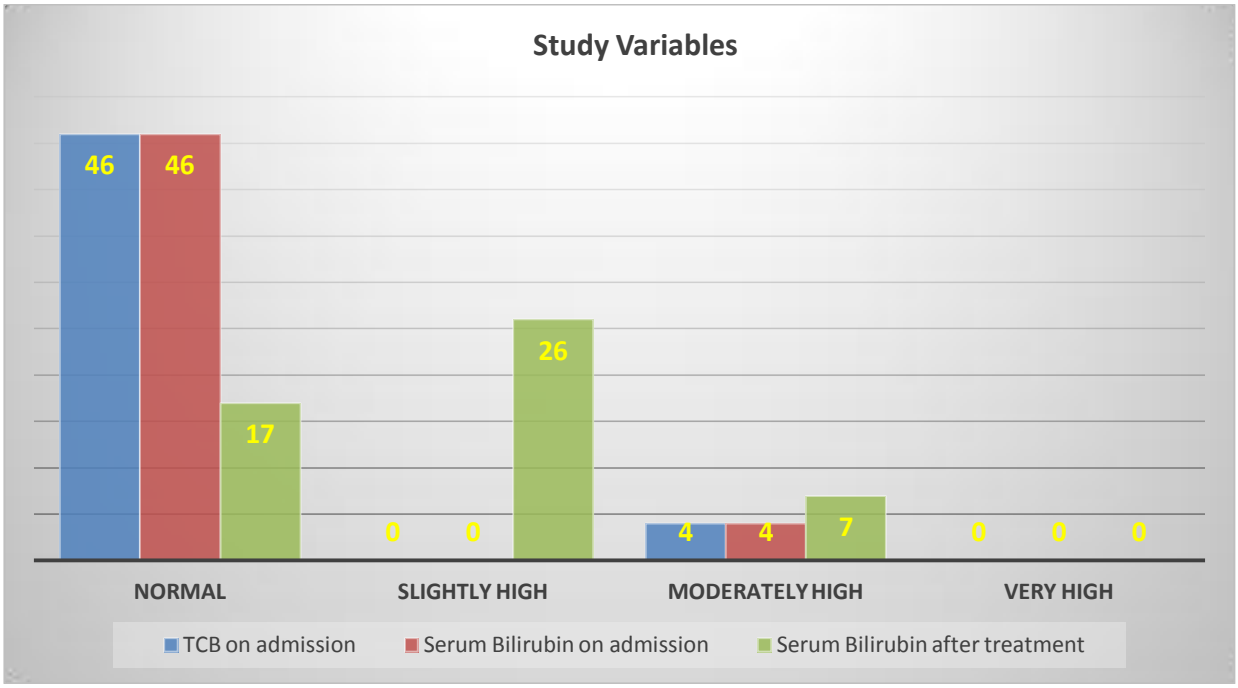
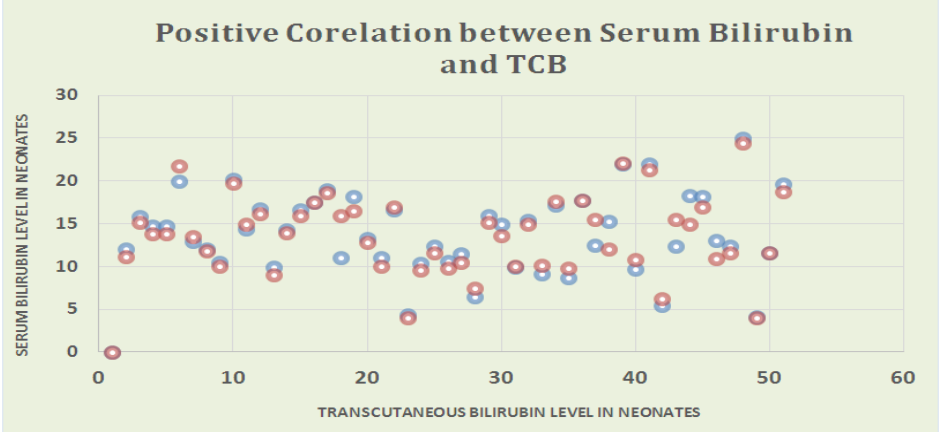


Figure 4: Comparison of the Study Variables- TCB on Admission, Serum Bilirubin on admission and Serum Bilirubin after treatment.

SECTION C: CORRELATION BETWEEN SERUM BILIRUBIN AND TCB VALUES

Table 5: Correlation between serum bilirubin and TCB values: There is a strong positive correlation between transcutaneous bilirubin and Serum bilirubin measurements, the Pearson Correlation Coefficient, the value of R is 0.952 and the result is significant at p< .05

Figure 5: Correlation between Serum Bilirubin and TCB Levels in Neonates



IV. Discussion

The present study was aimed to evaluate the transcutaneous bilirubin and analyse the correlation with serum bilirubin values and to find out whether transcutaneous bilirubin measurement could avoid invasive serum bilirubin measurements. Retrospective Non-Experimental correlational study was used and the population for the study was selected from Apollo BGSHospitals, Mysore. The total samples under the study were 50new born babies**.** In this study data collection was made frompatient file and Med mantra software.The objectives of the study were to assess serum bilirubin level of new-borns, to assess the transcutaneous bilirubin levels of new-born and to ascertain a correlation between serum bilirubin and TCB values. The Assumptions of the study is that TCB values is equivalent or superior to standard serum bilirubin level estimation. The data was analysed by inferential statistics According to new born baby age 1 to 10 days is 46 (92%) and 11 to 20 days is 4 (8%) and None of them from 21 to 28 days' age group.In relation to gender, out of 50 new born babies selected 23 (46%) are male and 27 (54%) are female. In relation to Birth, Premature (Before 37 week of gestation) is 9(18%), 37 to 38 weeks of gestation is 41(82%) and None of the new born babies were above 38 weeks.Out of 50 new born babies selected 23 (46%) are male and 27 (54%) are female. The study results concluded that there is a strong good correlation between transcutaneous bilirubin and Serum bilirubin measurements, the Pearson Correlation Coefficient, the value of R is 0.952 and the result is significant at $p<0.5$ Thus transcutaneous bilirubin measurement could avoid need for invasive serum bilirubin evaluation in neonates and only exclusion for transcutaneous bilirubin measurement that it is not recommended in neonates who already started with Phototherapy treatment.

Similar studies were conducted on Discrepancies Between Transcutaneous and Serum Bilirubin Measurements, results of study showed that; 925 TSB levels were matched to a TcB value. The mean TcB – TSB difference was 0.84 ± 1.78 mg/dL, and the correlation between paired measurements was 0.78the study concluded that During routine clinical care, TcB measurement provided a reasonable estimate of TSB levels in healthy new-borns[6].

Similar studies were conducted onCorrelation of transcutaneous bilirubin and serum bilirubin concentration in term and late preterm new-borns. In the Study Four hundred paired TcB and TSB measurements were taken. TcB was significantly correlating with TSB ($P < 0.001$) in both low-risk and medium-risk thresholds for phototherapy. TcB had a sensitivity and negative predictive value of 100% each, a specificity of 56%, and a positive predictive value of 23%. For high-risk cases, using the 75th centile as cut-off, the sensitivity and negative predictive value were reduced to 88% and 97.0%, respectively. The Study concluded that TcB correlates closely with TSB concentration in neonates born after 35 weeks gestation. The rate of rise in TcB may help in identification of neonates at risk and minimizing invasive blood investigations[7]

V. Conclusion

The study concluded that there is a strong positive correlation between transcutaneous bilirubin and Serum bilirubin measurements. Thus transcutaneous bilirubin measurement could avoid need for invasive serum bilirubin evaluation in neonates and only exclusion for transcutaneous bilirubin measurement that it is not reliable in neonates who already started with Phototherapy treatment. Hence Transcutaneous Bilirubin measurements could be recommended as an alternate to Serum Bilirubin measurements only before initiation of Phototherapy treatments.

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Conflicts of Interest and Funding

None

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