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Study of Comparision Between Values of Serum Bilirubin in Lab. and Billirubin by Transcutaneous Billirubinometer

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ABSTRACT

The Gold standard to assess Hyperbillirubinaemia in neonates remains the serum bilirubin measurement. Unfortunately , this is invasive, painful and costly.Transcutaneous Billirubinometer finds bilirubin level in newborn which is non-invasive method. Method: The transcutaneous bilirubin measurement were performed on the infant's sternum and S.Billirubin was determined simultaneously .80 Neonates of Smt Shardaben Municipal General hospital (of july ,august & september 2013) are taken in study. The results of both methods were compared and analyzed after applying 't' test.
Results: 'p' value of study was 0.05 which showsthere was a close correlation between total S.billirubin and TCB values of NICU babies.
Conclusion: TCB measurements with TCB meter correlate very closely with total S.billirubin level by prick.Measurement technique is rapid and simple, easy to perform, non-invasive, repeated measurement overtime and thus reducing the likelihood of error.

Introduction:-

Neonatal jaundice or **Neonatal hyperbilirubinemia**[1,2], or **Neonatal icterus** (from the Greek word *ίκτερος*), attributive adjective: **icteric**, is a yellowing of the skin and other tissues of a newborn infant. A bilirubin level of more than 85 µmol/l (5 mg/dL) manifests clinical jaundice in neonates. Signs of Neonatal Jaundice are seen within the first three days of birth in 80% of preterm babies and 60% of full-term infants[3]. In newborns, jaundice is detected by blanching the skin with digital pressure so that it reveals underlying skin and subcutaneous tissue.[1] Jaundiced newborns have an apparent icteric sclera, and yellowing of the face, extending down onto the chest.In neonates, the dermal icterus is first noted in the face and as the bilirubin level rises proceeds caudal to the trunk and then to the extremities.[2] This condition is common in newborns affecting over half (50–60%) of all babies in the first week of life.[3]

Notoriously inaccurate rules of thumb have been applied to the physical exam of the jaundiced infant. Some include estimation of serum bilirubin based on appearance. One such rule of thumb includes infants whose jaundice is restricted to the face and part of the trunk above the umbilicus, have the bilirubin less than 204 µmol/l (12 mg/dL) (less dangerous level). Infants whose palms and soles are yellow, have serum bilirubin level over 255 µmol/l (15 mg/dL) (more serious level). Studies have shown that trained examiners assessment of levels of jaundice show moderate agreement with icterometer bilirubin measurements. In infants, jaundice can be measured using invasive or non-invasive methods. In non-invasive[4,5] methods, Ingram icterometers and transcutaneous bilirubinometers are used

Transcutaneous Billirubinometer[6,7] acesses the risk of hyperbillirubinaemia (newborn baby Jaundice) in newborn and allows to measure total S.Bilirubin levels easier than ever before. It also has the added advantage of using light instead of a needle.It measures Bilirubin levels in a newborn nursery, in a mother's room, in an NICU or in a Pediatrician's office[8].TCB-meter virtually eliminates the costs and time associated with blood draws and lab services.There is less risk of trauma, infection and no pain while allowing quick discharge[9] or a prompt decision towards treatment[3].

Methods:-

The present Study was done over period of 3 months (July, August and September 2013). Here, new born babies delivered at S.C.L.G.H. who developed icterus are taken in study. Total 80 babies (from NICU, post-natal ward and gynec.ward) who had clinically apparent jaundice were taken into study.The Transcutaneous bilirubin measurement were performed by Transcutaneous Billirubinometer on infant's sternum and total S.Billirubin in lab. was determined simultaneously. Transcutaneous bilirubin measurements are compared with S.bilirubin. Newborn babies are further divided into full-term and pre-term babies, baby of <3 days and >3 days. Their values are compared and analyzed.

High degree of correlation between cutaneous bilirubin& Total Serum bilirubin is the Basis for Transcutaneous Billirubinometry;[6,7]Simply stated, TCB meter measures the yellowness of the skin by analyzing the spectrum of light reflected by the baby's skin.

How to use the tcbs meter:-Remove the Jaundice meter from charge unit.Clean the measuring probe by wiping it.Set the power switch to ON position.Place the measuring probe vertically against Infant's sternum/forehead 3 times without taking off it.Meter's screen will display the average value of Transcutaneous billirubin in mg/dl.After using set the power switch to OFF position or reset to reuse it.*Forehead and upper end of sternum*as subcutaneous tissues are less over these sites as compared to other sites.Should not be done over Birth marks, bruises or over hematoma.

Results:

Table1: average of the total serum and transcutaneous bilirubin alongwith there corresponding P values.

		No of babies	Avg. results of TSB	Avg results of TCB	P value
Maturity	Full term	27	14.5	13.5	0.29
	Preterm	53	14.6	14.3	0.01
Age	<3 days	46	12.8	13.3	0.08
	>3 days	34	15.1	14.7	0.2

Out of the total no of 80 babies studies; 46 babies were <3 days and rest 34 babies were >3 days.The study population had 42 male babies and 38 female babies. There were 27 full term and 53 preterm babies in the study.

Afterstaticallyanalysis of the data showed close correlation between the total serum bilurubin and transcutatneous bilurubin, A difference of +2 and -2 SD was noted from the study.In most cases the value of TCB is +2 Higher then the TSB level. The "P" value was measured which was 0.29 in FT baby[10] and 0.01 in PT baby[11] while the p value was o.o8 in babies who were <3 days of age and while it was 0.2 in the babies who were >3 days of age(table 1).T test has been applied. Pvalue less then 0.05 is significant and hence close correlation between TCB and TSB is observed.

The drawback of this study was the Transcutaneous bilirubinometer[6,7] cannot measure the bilurubin level above 20. And so for the determination of bilurubin levels needing exchange transfusion could not be relied upon on the trancutaneous bilurubinometer. It was Used only on infants upto 14 days of age. After initiation of phototherapy or after an exchange transfusion, results may be inaccurate. It requires daily charging as it works through chargeable battery.It should be handle with care as bilirubinometer is costly.

The limitation of the study were that as it is a cross-sectional study it is unfair to come to a conclusion as sample size is too small to represent the actual general population. Hence, more studies with broader sample size need to be done to stamp the usefulness of TCB meter in neonatal practice.

Discussion

Neonatal hyperbilirubinemia[1,2], defined as a total serum bilirubin level above 5 mg per dL (86 µmol per L), is a frequently encountered problem. Although up to 60 percent of term newborns have clinical jaundice in the first week of life, few have significant underlying disease. However, hyperbilirubinemia in the newborn period can be associated with severe illnesses such as hemolytic disease, metabolic and endocrine disorders, anatomic abnormalities of the liver, and infections.Jaundice typically results from the deposition of unconjugated bilirubin pigment in the skin and mucus membranes. Depending on the underlying etiology, this condition may present throughout the neonatal period.Hence measurement of bilirubin is a very important aspect in neonatal period.Often a pediatrician is interested to corroborate his clinical estimate of the icterus[8] with actual serum bilirubin level.Any such technique should ideally be accurate, non-invasive[4,5] and valid

Transcutaneous bilirubinometry performs better than visual assessment. The latter is not a reliable technique for estimating levels of bilirubin,[1]but the complete absence of jaundice as judged by the eye in good lighting conditions has quite high accuracy as far as predicting which infants are unlikely to develop high total serum bilirubin levels.In infants with mild jaundice, transcutaneous bilirubinometry may be all that is needed to assure that total bilirubin levels are safely below those requiring intervention. In infants with moderate jaundice, transcutaneous bilirubinometry may be useful in selecting patients who require phlebotomy or capillary blood sampling for serum bilirubin measurement. In infants with extreme jaundice, transcutaneous bilirubinometry may be a useful tool to fast-track such infants to rapid and aggressive therapy.

A large number of studies have tested the agreement between transcutaneous bilirubinometer results and TSB. Most studies have found fair to excellent correlation between the two. While the correlation may be good, the difference between two values may be too large to be acceptable clinically. It appears that the difference between the transcutaneous bilirubin estimate and TSB may be too much to be acceptable. Despite these limitations, transcutaneous bilirubinometers can serve as a screening tool, especially where services of a neonatologist are not available. However, this cannot serve as a substitute for TSB estimations

Conclusions:-

We conclude that transcutaneous bilirubin measurement using billirubinometer correlate very closely with total s.billirubin level in lab.Measurement technique is rapid, simple, easy to perform, non-invasive and improves compliance of parents as it is not painful.Repeated measurements can be taken over time and thus reducing likelihood of error.

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