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An approach for clinical update, investigation and comparison between pre-hepatic and post hepatic infant jaundice

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Abstract
Infant jaundice, an important pathological condition in the first week of infants' life is characterized by hyperbilirubinemia with clinically manifestations of yellowish discoloration of visible mucous membrane, skin and sclera of the eye. In a present study, total of one hundred fifteen patient samples registered for serum bilirubin concentration diagnosis were analysed with comparison between pre-hepatic and post hepatic infant jaundice using concentration of unconjugated/indirect serum bilirubin and conjugated/direct serum bilirubin method. Data analysis revealed that 89.56 per cent of samples were diagnosed for both pre & post hepatic jaundice, whereas only 4.34 per cent and 5.21 per cent for pre-hepatic and post hepatic jaundice, respectively. During serum biochemical study, it was also found that there was significant ($P \leq 0.05$) increase in the mean concentration of total serum bilirubin & conjugated serum bilirubin in patients reported for infant jaundice, whereas there was significant ($P \leq 0.05$) decrease in the mean values of unconjugated bilirubin when compared with the corresponding referral values of serum bilirubin.

Keywords: Direct bilirubin, indirect bilirubin, Infant jaundice, pre-hepatic jaundice, post hepatic infant jaundice, serum bilirubin concentration

Introduction
Poor hygienic practices, malnutrition and lack of medical facilities are some of the major factors causing huge numbers of deaths among infants and leaving large population morbid to deadly diseases. Infant Jaundice characterized as hyperbilirubinemia is one of most common pathological condition affecting majority of infants in their early period of life. Within a few days after birth, infants were reported for high concentration of blood bilirubin with yellowish discoloration of visible mucous membrane, skin and sclera of the eye (Phyul K.L. *et. al.* 2019) [5]. Excess amount of blood bilirubin may be either due to excessive erythrolysis or excretion of bilirubin by liver is impaired. In fact, about half of all newborns develop mild jaundice in the first few days of their life. If, the condition not treated early and continues for prolonged duration, it affects the developmental life of newborns and can be fatal at the end. After reaching toxic levels, it starts affecting central nervous system and causes neurological degeneration (Tawfeek M. *et al.* 2020) [9]. Several studies (Ullah S. *et. al.* 2016 & Osuorah C.D.I. *et al.* 2018) [10, 4] have reported that 5-10 per cent of all infants/newborns need immediate medical treatment for pathological jaundice which can be possible only by early diagnosis of the condition. Delay in diagnosis of symptomatic infant jaundice patients may leads into delays in obtaining treatment which can negatively affect patient prognosis (You-Fan P. *et al.* 2017) [12]. Therefore, accurate and timely diagnosis of infant jaundice not only enhances the patient prognosis but also minimizes the time lapse between the initial detection of the disease to the diagnosis and for the treatment. Therefore, newborns detected with yellow discoloration of the skin beyond the legs should have an urgent laboratory confirmation for levels of total serum bilirubin, conjugated and unconjugated serum bilirubin = to establish its type and etiology.

Material and Methods
Study was carried out on one hundred fifteen infant samples registered for serum bilirubin analysis in a referral diagnostic laboratory approaching for diagnosis of infant jaundice. Data for various parameters were subjected to statistical analysis for mean value and standard errors

to interpret the results. Individual means of different serum bilirubin concentrations were compared for statistical significance with their respective referral values.

Results and Discussion

Analysis of Data for Serum Bilirubin Concentration and Comparison of Different Bilirubin

Based upon concentration of unconjugated serum bilirubin and conjugated serum bilirubin concentration, out of total 115 registered infants samples (figure 2) near about 90 per cent patients were diagnosed for both pre & post hepatic jaundice, whereas 5.21 per cent and 4.34 per cent infants were reported to have only post-hepatic and pre-hepatic jaundice, respectively. These finding were supported by the observation of Wang *et al.* 2016 and Maisels and Gifford in 1983 [11, 3].

The results of serum bilirubin concentration analysis are presented in Table 1 and figure 1. It was found that there was a significant ($P \leq 0.05$) increase in the mean concentration of total serum bilirubin in patients reported laboratory test of serum bilirubin for diagnosis of infant jaundice. Serum biochemical studies for unconjugated/indirect bilirubin revealed that there was a significant ($P \leq 0.05$) decrease in the mean values of unconjugated/indirect bilirubin (1.72 ± 0.06); however there was a significant ($P \leq 0.05$) increase in the mean of conjugated/direct bilirubin (9.44 ± 0.26) when compared with the referral concentration. Similar findings were also reported by Sunanda *et al.* in 2000 [8].

Table 1: Average comparison between Total Bilirubin, Indirect Serum Bilirubin and Direct Serum Bilirubin Concentrations

Groups	Total Bilirubin Concentration (mg/dL)	Indirect Serum Bilirubin Concentration (mg/dL)	Direct Serum Bilirubin Concentration (mg/dL)
Patient reported for infant jaundice	$11.14^{a} \pm 0.28$	$1.72^{a} \pm 0.06$	$9.44^{a} \pm 0.26$
Referral value/concentration of serum bilirubin (Christine C.L. (2018); Henry C.L. (2017) and Satish M *et al*., 2007) [1, 2, 6]	6 to 8 [b]	≥5[b]	≥1[b]

Mean ± S.E.,
Different superscripts in columns indicating significant difference ($P \leq 0.05$)

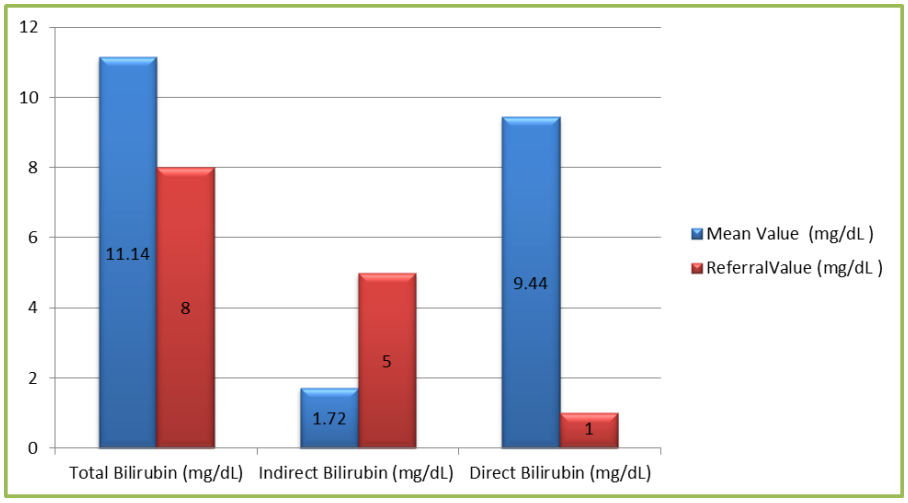

Fig 1: Graphical representation of different Serum Bilirubin Concentration

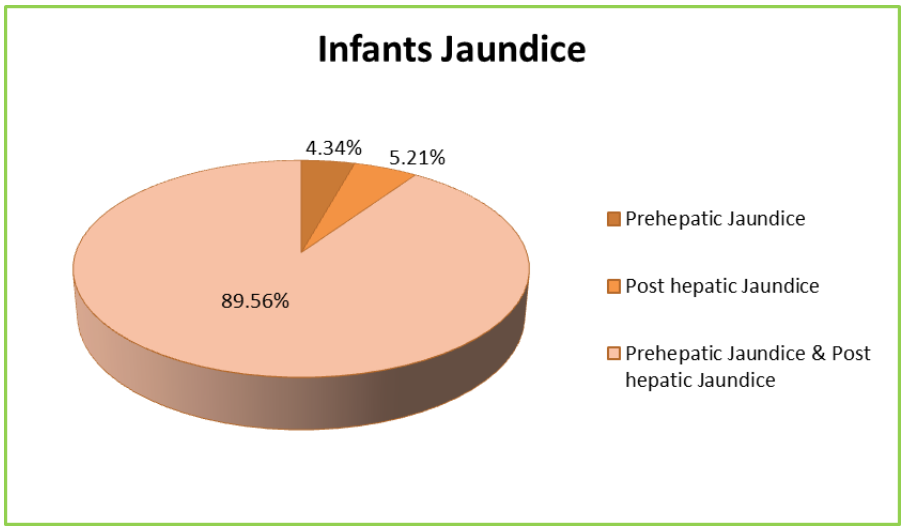

Fig 2: Percentage distribution among different types of Infants jaundice

Conclusions

The present analytical study was undertaken to observe the comparison between the incidence of pre-hepatic and post hepatic jaundice in infant. From the above findings it can be said that in the laboratory diagnosis of infant jaundice, co-incidence of pre & post hepatic infant jaundice were reported at the most followed by post hepatic infant jaundice, whereas pre hepatic jaundice was reported least.

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