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Estimation of Reference Values for Liver Function ParametersinNeonates individuals from Missan district ,S. Iraq

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Abstract:

This paper offers an insight to generalists on how to extract greater information from these tests in order to improve the investigation and management of liver disease..

The activities of (total serum bilirubin (T.S.B) ,aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase(ALP), total proteins (TP) and albumin (ALB),. AST, ALT and bilirubin ,total protein were measured in ١٥٠ neonates (85 males and 65 females) from at Al-Sadder Teaching Hospital environs with collaborative arrangement of clinical biochemistry lab.in medicine college ,Missan University with age rangedbetween (1-4 days) were included in this study.

The serum activities of the liver enzymes (AST, ALT and ALP) were found to be elevated ($p \leq 0.001$) with respect to subjects on WHO. At the same time, T.S.B was abnormally elevated ($p \leq 0.001$) in the serum of neonates test, While theT.Premainedconstantwithout anychanging .

Key words: function parameters, Reference valueneonate,neonate disease.

Abbreviations

(T.S.B) total serum bilirubin, (AST), aspartate aminotransferase (ALT), alanine aminotransferase (ALP), alkaline phosphatase(TP) total proteins and(ALB),. Albumin

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تقدير القيم المرجعية لوظائف فعالية الكبد لدى الاطفال حديثي الولادة من محافظة ميسان جنوب العراق

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الخلاصة:

تم قياس مستويات نشاط كل من نسبة البلروبين الكلي، ناقلة امين الاسباراتات (Aspartate aminotransferase) -AST ناقلة امين الالانين (Alanine aminotransferase) - ALT، ،الفوسفاتاز القلوي (Alkaline phosphatase) - ALP والبروتين الكلي .TPبالاضافة الى فحص مستوى الالبومين.Alb، لدى ١٥٠ حديثي الولادة (٨٥ذكور و ٦٥ إناث)الذين تراوحت اعمارهم مابين (١الى٤) يوم ،والذين اخذت نماذج الدممن الاطفال الرضع في ردهات مستشفى الصدر لتعليمي في محافظة ميسان جنوب العراق وجرت القياسات في مختبرات فرع الكيمياء السريرية، كلية الطب جامعة ميسان.

وجد ان النشاط الانزيميلل(AST، ALT و ALP) له قيمة معنوية احصائية مرتفعة ($p\leq0.05$) . وفي الوقت نفسه، ففي قياسT.S.B اظهر قيمة معنوية مرتفعة بشكل غير طبيعي ($p\leq0.05$) في مصل اختبار حديثي الولادة، بينما ظلت قيم الالبومين T.P Alb. ثابت دون أي تغيير ضمن القيم المرجعية للمختبر.

الكلمات الافتتاحية :فعالية الكبد،القيم المرجعية لحديثي الولادة ،امراض حديثي الولادة والخدج

Introduction:

Reference intervals in the clinical chemistry are commonly based on the measurements in reference population which is representative of a defined group of individuals [(1)].

Clinical diagnosis in neonates is often based primarily on biochemical data, because clinical symptoms are difficult to assess and inconclusive[(2).] A knowledge of the validity of the data would therefore seem very important. Practical technical assessments lead to conclude that measurement of ionized calcium at actual pH in anaerobic capillary samples of whole blood[(3).]

The liver is the largest organ in the body; located under the diaphragm, it occupies most of the right hypochondrium[(4).]

The falciform ligament divides the liver into a large right lobe. For organizational purposes, LFTs can be categorized by bilirubin, Alanine aminotransferase (ALT) and aspartate aminotransferase (AST), proteins, and coagulation studies and a smaller left lobe[(5).]

Liver has to perform different kinds of biochemical, synthetic and excretory functions, so no single biochemical test can detect the global functions of liver. All laboratories usually employ a battery of tests for initial detection and management of liver diseases and these tests are frequently termed "Liver function tests"[(5,6).] although they are of little value in assessing the liverfunction . In spite of receiving a lot of criticism for this terminology, the phrase 'Liver function tests' is firmly entrenched in the medical lexicon[(7).]

The estimated incidence of neonatal liver disease is high as births. Early recognition is particularly important in neonatesand infants because a delay in diagnosis may have a negative effect onthe prognosis. For example, it is well recognized that when biliary atresia is diagnosed after 2 months of age. Furthermore, because liver dysfunction is progressive, early recognition allows for better nutritional support of the patient and a potentially slower decline in liver function[(8).]

Liver enzymes tests are commonly used in the evaluation of patients with a range of diseases .Usually these tests measure certain liver enzymes, namely alkaline phosphatase (ALP), alanine amino transferase (ALT), and aspartate amino transferase (AST)[(9).]Bilirubin is an endogenous anion derived fromhemoglobin degradation from the RBC. The classification of bilirubin into direct and indirect bilirubin are based on the original van der Bergh method of measuring bilirubin.

Bilirubin is altered by exposure to light so serum and plasma samples must be kept in dark before measurements are made. When the liver function tests are abnormal and the serum bilirubin levels more than17µmol/L suggest underlying liver disease., is also measured. These values can be

used by your doctor as a screening or monitoring tool for liver involvement[10]. About 30-60% of neonates experience abnormal liver function tests; some have no symptoms of liver disorder.Generally, increased levels correlate with increased activity, but other factors can contribute to elevated levels of liver enzyme as (Alanine aminotransferase (ALT) and aspartate aminotransferase (AST)) in the blood[11].

In health-related fields, a reference range usually describes the variations of a measurement or value in healthy individuals. It is a basis for a physician or other health professional to interpret a set of results for a particular neonates.

The present study aimed to estimate the marker of liver function test for neonatesand determine possible differences between published and the L.F.T developed local reference ranges and we present an approach based on the assumption that physicians do not continue to request for repeat measurements, when the results have proved normal.

Materials and Methods

Study Area:

This study was undertaken at Al-Sadder Teaching HospitalMissan province Iraq, environs with collaborative arrangement of clinical biochemistry lab.in medicine college ,Missan University

Blood Samples:

(3mL) from each of 50 neonates (20 males and 30 females) with age rangedbetween (1-4 days) , were transferred into plain tube without anticoagulant and left at room temperature for 20 minutes for clotting, and then centrifuged at 3000 rpm for 10 minutes, sera after separation was then taken and used for measuring total serum bilirubin (T.S.B) ,aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase(ALP),total proteins (TP) and albumin (ALB),. All the assays were performed based on the standard operating procedures using kit supplied by (Bio labo/France)

Data management and statistical analysis:

Data were double entered into a Microsoft Excel database, compared, and corrected for data entry errors then imported into Statistical Package for Social Sciences (SPSS). The data was visually inspected for extreme values and ten values for single parameters that appeared

physiologically impossible removed. Outliers in the remaining data were identified using Box plots,a

P-values for the difference between study group participants were estimated using the Mann- Whitney test where ($p<0.05$),($p\leq0.001$) were considered significantly different. Comparison of reference ranges for different within group was by means comparison using One-Way-ANOVA.

Results

In this study ,The table 1 showsthe results for all the fifty neonates test that weredone. It is apparent that during the first four daysof life most of the babies showed much moreretention (i.e. less excretion) than did the babies of one to four days of age.

The serum activities of the liver enzymes (AST, ALT and ALP) were found to be elevated ($p\leq0.001$) with respect to subjects on WHO. At the same time, T.S.B was abnormally elevated ($p\leq0.001$) in the serum of neonates test, While theT.P and albuminremainedconstantwithout anychanging in our study group,table(1) .

Table(1): Serum liver function test for study group .

Group	Markers (unit)	Results*	Normal range
Neonates	T.S.B (µmol/L)	0.71±0.15	0-1 mg/dl
	AST activity (U/L)	14.5±4.65	Up to 54 IU/liter
	ALT activity (U/L)	12.3±1.001	Up to 50 IU/liter
	ALP (U/L)	15.1±2.01	5.1–7.5 K/dl
	T.P (mg/dL)	7.12±1.02	5.6-8.4 mg/dl
	Alb. (g/dL)	4.20±0.85	3.2-5.5(g/dL)

All data express by mean ±SD,*

Discussion

In a baby there can be one or more signs that the liver is not working properly. The skin and eyes may be jaundiced. The abdomen may look swollen or stick out. The urine may be dark yellow or brown. The stools are often grey or white instead of green or yellow. There may also be bleeding or easy bruising. The blood might contain higher than normal levels of liver enzymes. The liver may feel large or look large on an x-ray. In infants, Cholestatic jaundice is different from psychologic jaundice[12].

Obtaining the blood specimen for the LFTs can be difficult, especially in the infant with poor venous access. Each laboratory has specific requirements for each specimen. The nurse should check with the laboratory to determine these requirements before the specimen is drawn.The following are general guidelines for obtaining LFT specimens. Bilirubin, enzyme, and protein levels may all be drawn as capillary, venous, arterial, or line specimens[13].

Liver function tests comprise a variety of individual tests and procedures that can be used to evaluate how well the liver functions. These tests help to determine if the liver is performing its task adequately.

In our country, many clinical chemistry laboratories are either using the reference values from reagent manufacturers or those published in laboratory textbooks

Causes of Raised AST Activities:

Artfactual, during the neonatal period, circulatory failure with shock and hypoxia, myocardial infarction, acute viral or toxic hepatitis, cirrhosis, infectious monucleosis (due to liverinvolvement), cholestatic jaundice, malignant infiltration of the liver, skeletal muscle disease, aftertrauma or surgery (especially after cardiac surgery), sever hemolytic episodes[1].

Glutamat pyruvate Transaminase (GPT, EC.2.6.1.2) is present in high concentration in liverand to a lesser extent in skeletal muscle kidney and heart. Measurement of GPT activity in serumused an indicatory of hepatocellular damage[11,12].

Causes of Raised ALT Activities:

Circulatory failure with shock and hypoxia, acute viral or toxic hepatitis, cirrhosis,infectious mononucleosis, cholestatic jaundice, surgery or extensive trauma and skeletal muscledisease (much less affected than GOT), congestion secondary to congestive cardiac failure[1,13].

The observed significant increase of some liverfunction analytesand decrease of others in both neonate age is an indication that theseanalytes are age dependent.

The increase in serumreference range for ALT could be explained by loss of liver cell integrity with advancement in age and is inagreement with studies carried out in India and Kuwait[14].

The observed variation in reference range valuesdeveloped in this study compared to reference rangevalues for the same parameters from other locationssuggest variations in analytical methods in addition toethnic composition and ecological parameters as stated in other studies[14,15]. The higher reference range value for AST, compared to those of otherlocations could be due to genetic factors,

dietary andenvironmental factors. Many studies reported ahigher reference values AST and ALP inblacks than in whites neonate.

The differences in the reference range value for ASTcompared to those determined from other literature sitescould be explained by differences in genetic factors andmuscular exertion; these results agree with those reportedin studies [12,16].

In addition, The significant differences in the reference range values for T.S.B and T.P could be attributed to the sample size; however, this difference may not have significance.

Generally, physiological functions have been shown to vary with population due to differences in diet, genetics, physical, environmental and socioeconomic conditions . The reference values for most liver function tests determined in this study vary from those of many population currently used to interpret laboratory results, indicating that there is need to use sex and age established reference values that are applicable to specific neonates rather than take a set of reference values determined for one population and apply it to another population.

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