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Increased of alkaline phosphatase during pregnancy

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Abstract

Background: -

Alkaline phosphatases are a group of enzymes with low substrate specificity that catalyze the hydrolysis of a wide variety of phosphate esters at an alkaline pH. They are ubiquitous in nature and are found in many tissues in humans, including bone ,intestine ,kidney ,liver, placenta, and white blood cells.

Objective

Demonstrate the changes of alkaline phosphatase level during pregnancy

Patients and methods: -

Results:-

High level of ALT is significantly obvious in second and third trimester
20-30 W by 14 ± 6 SD and in 31-40 W by 14 ± 4

Conclusion :-

The normal serum concentration of alkaline phosphatase (ALP) in adults over the age of 18 ranges from 37 to 116 U/L, while in pregnant women levels of up to twice that upper limit can still be normal.

Keyword:

Alkaline

phosphatases,

pregnancy,

ICP

Introduction

Alkaline phosphatases are a group of enzymes with low substrate specificity that catalyze the hydrolysis of a wide variety of phosphate esters at an alkaline pH. They are ubiquitous in nature and are found in many tissues in humans, including bone ,intestine ,kidney ,liver, placenta, and white blood cells. [1]

alkaline phosphatase activity is a very useful serum biochemical indicator of liver disease, particularly cholestatic disease. However, increases in the activity of alkaline phosphatase in serum and other body fluids may reflect physiologic or pathologic changes beyond those of hepatic origin. For example, nonhepatic increases in serum alkaline phosphatase activity are found in pregnant and lactating females, and in association with high fat diets. Bone disease, endocrine disease, neoplasia, and other disorders can result in increased alkaline phosphatase activity. In addition, alkaline phosphatase activity may be increased due to induction by certain drugs such as glucocorticoids and anticonvulsants. [2]

The changes in serum alkaline phosphatase that are of main diagnostic importance result from increased entry of enzyme into the circulation. This results from increased osteoblastic activity in bone disease, and increased synthesis of alkaline phosphatase by hepatocytes in hepatobiliary disease. The liver and bone forms of alkaline phosphatase are differently-glycosylated forms of a single gene product. The main value of their specific estimation is found in patients in whom bone and liver diseases co-exist, for example, as a result of cancer. Abnormal expression of genetically-distinct alkaline phosphatase isoenzymes is valuable in monitoring cancers, particularly germ-cell tumors. [3]

Alkaline phosphatase in pregnancy

Although obstetricians have observed elevations in serum alkaline phosphatase (ALP) during pregnancy, these typically are not much more than twice the pre-pregnancy upper limit of normal [5]. There is currently a paucity of cases in which exaggerated increases are observed. Seeing an atypically elevated value can be distressing to both the clinician and the patient, especially when it is unknown what the implications may be. Some retrospective and prospective cohort studies have shown that ALP could be a marker for preterm delivery, fetuses that are large for gestational age, or conversely placental insufficiency and intrauterine growth restriction [6,7,8]. Intrahepatic cholestasis of pregnancy (ICP) is a liver disorder in the late second and early third trimester of pregnancy. It is also known as obstetric cholestasis (OC) and is characterized by pruritus with increased serum bile acids and other liver function tests. The pathophysiology of ICP is still not completely understood. The symptoms and biochemical abnormality rapidly resolve after delivery. ICP is associated with an increased risk of adverse obstetrical outcomes, which include stillbirth, respiratory distress syndrome, meconium passage, and fetal asphyxiation.[9]

The most common presenting symptom of ICP is pruritus that usually presents in the third trimester. This becomes progressively more severe as the pregnancy advances and typically resolves within 48 h of delivery. It most frequently affects the palms of the hands and soles of the feet but it can be generalized or affect other areas of the body. There are no associated dermatological features other than excoriation marks, which may be severe. Many women report that their pruritus worsens at night and may become so extreme that it causes insomnia. [10]

most studies are not sufficiently large to allow accurate quantification of the frequency of the complications. Many studies have tried to correlate maternal serum biochemistry with fetal outcomes and one series reported higher rates of fetal complications in women with jaundice compared to those with pruritus alone . Bile acids have been repeatedly implicated in the etiology of the fetal disease, and the sensitivity of bile acids as a predictive marker of fetal risk has

been examined in several studies involving small numbers of cases . A recent, more definitive study from Sweden reported that there was a 1%-2% increase in risk of spontaneous preterm labour, asphyxial events (defined as operative delivery due to asphyxia, Apgar score < 7 at 5 min or arterial cord pH < 7.05) or meconium staining of the amniotic fluid and/or placenta and membranes for every additional $\mu\text{mol/L}$ of maternal serum bile acids[11]

Material and Method

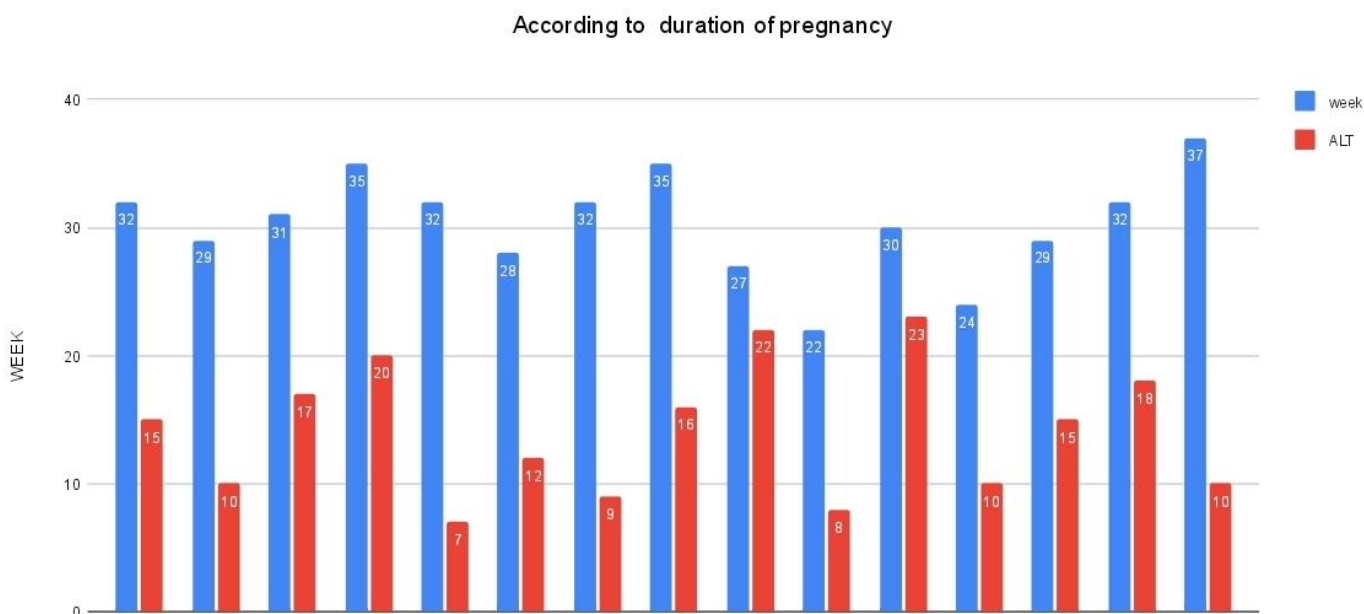
Total of 15 sample was obtained from Female patients Visited Al Batool Teaching Hospital from Period October 2022 to March 2023. The patient age ranges from 21 to 37 years old , blood sample were collected with EDTA tube and processed automatically with detector called (ARCHITECT PLUS,c4000) to estimate the ALP level, after processing the results printed with patient data (age, date and ALP level) .

Results

Table 1 :-demonstrate the relation between the ALT level and gestational age

Gestational age	ALT & Mean \pm SD
20-30W	14 \pm 6
31-40W	14 \pm 4

Figure 1 :-demonstrate the relation between the ALT level with gestational age



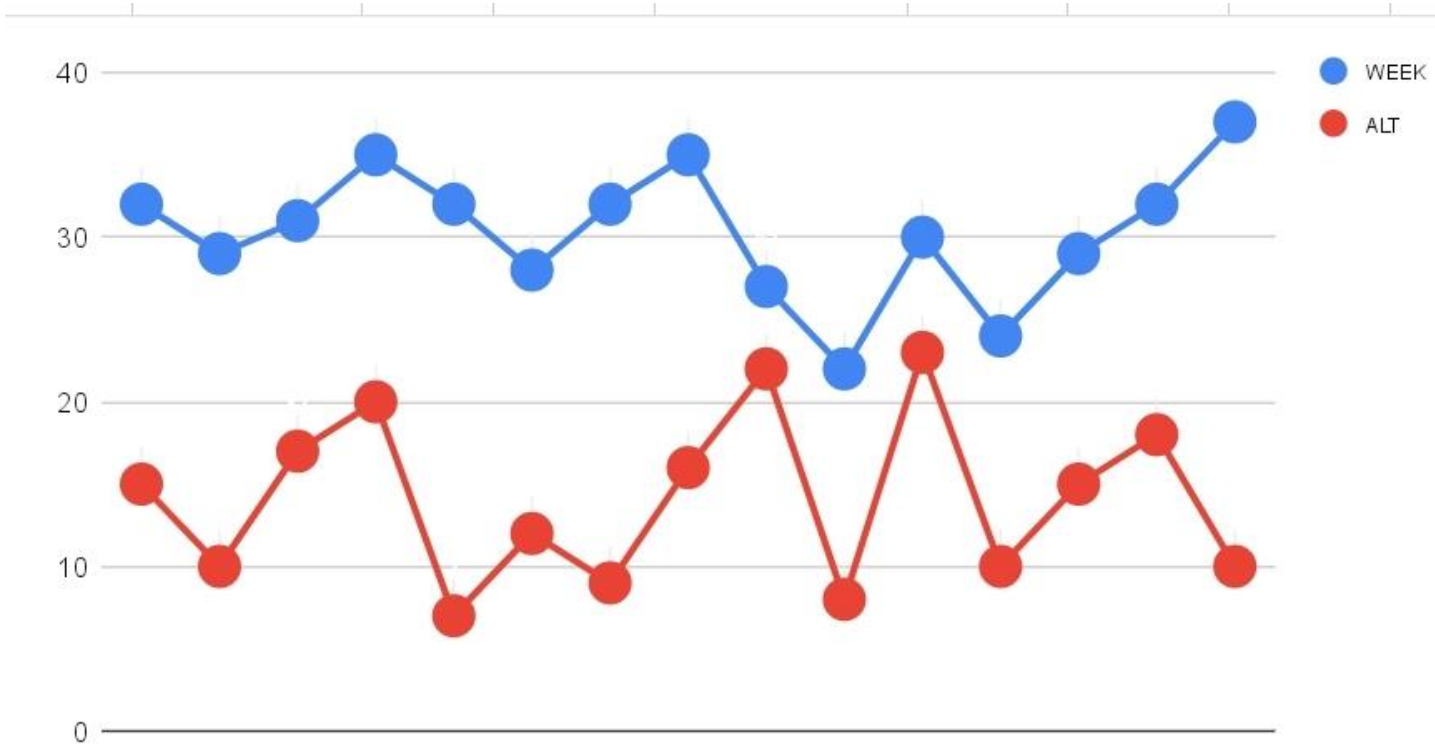


Figure 2:-demonstrate the level of ALT with gestational age

Discussion

Serum ALP has several different sources, but is found in all tissues of the body. Each isotype has a unique molecular fingerprint based on its origin. The main isotypes are found in the liver, bone, and placenta and they are key enzymes in many metabolic pathways.[12]

This study was carried out in albatool teaching hospital /Diyala, Iraq, total of 15 Patients from all ages were eligible for this study. The results showed a changes in the ALT level According to duration of pregnancy[20-30 W by 14 ± 6 SD and in 31-40 W by 14 ± 4].

ICP is associated with an increased risk of adverse obstetrical outcomes, which include stillbirth, respiratory distress syndrome, meconium passage, and fetal asphyxiation, In 2018, a prospective cohort study found a correlation between early elevations of ALP (at 13–16 weeks of gestation) and babies born large for gestational age, even in the setting of normal glucose tolerance testing [13]. A case report from 2019 presents a patient with elevated ALP levels and signs of placental insufficiency with elevated umbilical artery Doppler and intrauterine growth restriction [14]

Conclusion

- Alkaline phosphatase activity is a very useful serum biochemical indicator of liver disease, particularly cholestatic disease. However, increases in the activity of alkaline phosphatase in serum and other body fluids may reflect physiologic or pathologic changes beyond those of hepatic origin.
- The normal serum concentration of alkaline phosphatase (ALP) in adults over the age of 18 ranges from 37 to 116 U/L, while in pregnant women levels of up to twice that upper limit can still be normal.
- Cholestasis increase in risk of spontaneous preterm labour, asphyxial events.

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