SERUM LACTATE DEHYDROGENASE IN PREGNANCY

by

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Introduction

Several enzyme tests have been extensively studied during pregnancy in an attempt to assess feto-placental function and development. The placenta is a rich source of enzymes most of which are of course common to other tissues. During pregnancy they appear in the maternal serum and several investigators have determined their activities with the object of obtaining early warning of impairment of foetal welbeing. Lactate dehydrogenase is a terminal enzyme in glycolysis and converts pyruvate into lactate. It has been reported, consisting of 5 components, $LDH_1 (H_4)$, $LDH_2 (H_3M_1)$ $LDH_3 (H_2M_9)$, $LDH_4 (HM_3)$ and $LDH_5 (M_4)$.

Hence this study was undertaken with a particular interest to study the profile of LDH and its isoenzymes in normal pregnancy, post partum and in abnormal pregnancy.

Material and Method

The study is conducted in 105 female subjects. The classification is as follows:

Group I: Non-Pregnant females as control group.

Group II: Pregnant women in 1st trimester.

Group III: Cases from 2nd trimester.

Group lV: Women in 3rd trimester of pregnancy.

Group V: Postpartum cases.

In this group the blood sample was collected within 24 hours after delivery. In other groups, the fasting blood samples were collected.

Group VI: Cases of abnormal pregnancy such as (a) threatened abortion, (b) antepartum haemorrhage and (c) severe pre-eclampsia.

The total serum LDH was estimated by colorimetric method described by King and Woottan (1964). The separation of LDH isoenzymes was done by Disc electrophoresis using polyacrylamide gel as medium (Ivor Smith 1968).

Observations and Results

It is apparent from Table I that the total LDH activity is increased in all the three trimesters of normal pregnancy. Further there was a rise of LDH more than two fold in the post partum group. The increase in total LDH activity in 1st trimester, 2nd trimester, 3rd trimester and post partum is found to be statistically

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TABLE I

Serum Total LDH in Non-pregnant and Pregnant Women

Group	No. of Subjects	Serum total LDH (IU/L) Mean ± S.E.
I (Control)	20	120.68 ± 8.8
II (1st Trimester)	10	130.9 ± 9.9
III (IInd Trimester)	10	139.10 ± 12.5
IV (IIIrd Trimester)	25	203.03 ± 13.3
V (Postpartum)	25	276.62 ± 11.7
VI (Abnormal pregnancy)		
(a) Threatened abortion	5	201.5 ± 13.1
(b) Antepartum haemorrhage	5	275.1 ± 8.72
(c) Severe pre-eclampsia	5	135.09 ± 3.36

TABLE II

Levels of LDH Isoenzymes in Non-pregnant and Pregnant Women

Group	LDH_1%	LDH_2%	LDH_3%	LDH_4%	LDH_5%
I	26.6 ± 0.0	36.4 ± 0.5	29.8 ± 0.9	7.3 ± 0.5	0.2 ± 0.7
II	36.1 ± 0.9	35.3 ± 0.8	28.5 ± 1.3	Absent	Absent
III	32.2 ± 0.4	34.7 ± 0.9	36.6 ± 0.8	Absent	Absent
IV	22.3 ± 0.3	35.0 ± 0.4	36.7 ± 0.4	5.9 ± 0.4	Absent
V	12.5 ± 1.1	26.2 ± 0.8	31.9 ± 0.8	12.1 ± 1.7	16.0 ± 1.6
VI					
(a)	20.4 ± 0.8	24.0 ± 0.9	25.9 ± 1.1	19.6 ± 0.4	10.02 ± 0.8
(b)	17.4 ± 0.6	25.1 ± 0.8	26.2 ± 0.4	18.8 ± 0.4	12.5 ± 1.0
(c)	12.8 ± 0.5	25.4 ± 0.4	26.7 ± 0.5	18.7 ± 0.2	16.4 ± 1.5

significant ($P < 0.05$) as compared with normal healthy non-pregnant group. The subgroups of VI group show higher activity than that of normal pregnant cases. The highest value is shown by subgroup (b). The increase in all subgroups is found to be stsatistically significant ($P < 0.05$).

Table II shows that there is a significant rise in LDH_1 fraction in first and second trimesters (Groups II and III) and it declines in other groups as compared to control values. LDH_3 value is less in first trimester group while it is increased in late pregnancy and post partum subjects, when compared with non-pregnant group. The increase in LDH_4 and LDH_5 in post partum subjects is found to be statistically significant ($P < 0.05$). In group VI, there is a significant decrease in LDH_1, LDH_2 and LDH_3 isoenzymes, while LDH_4 and LDH_5 both are increased. The increase was found to be statistically significant ($P < 0.05$).

Discussion

It is evident from Table I that there is a significant increase in total LDH activity in all the trimesters of normal pregnancy. It suggests that our results are in good agreement with results reported by Hill and Levi (1954), Theisen *et al* (1961). More significant elevation in total LDH activity was found in 3rd trimester. Similar results have been reported by

Hagerman and Wellington (1959), Kontinnen and Pyrola (1963) and Shukla *et al* (1978).

Slight rise in first trimester may be due to burrowing of the decidua by trophoblast. Slight increase of serum LDH in second trimester and maximum increase of serum LDH in third trimester may be due to increase in the placental cells, as they proliferate to increase surface area. The second reason may be increase in permeability of placental cells.

Group V comprising of post partum subjects shows significant elevation of total LDH. The probable source for this rise may be the increased activity of uterine musculature and separation of placenta. There is an increased activity of LDH_3, LDH_4 and LDH_5 in post partum subjects. LDH_3 and LDH_4 are responsible for placental tissue, while LDH_5 muscle in origin.

In subgroups of VI group, there is significant increase in total LDH activity. In threatened abortion and antepartum hemorrahage (a, b) the LDH_4 and LDH_5 were increased. The probable source for this rise may be the increased activity of uterine musculature and separation of placenta. Wolf (1973) has suggested that red blood cells in the clot and necrosis of the placenta are responsible for the increase in LDH activity. In toxemia of pregnancy i.e. severe pre-eclampsia, the total LDH activity was slightly increased. The activity of LDH_4 and LDH_5 fractions were significantly increased. The high value of LDH_5 may be an indication or degree of damage of liver as suggested by Shukla *et al* (1973). But further study with large number of subjects should be done before giving this rise a diagnostic importance.

Summary

The present study was conducted on 105 subjects comprising of 70 normal pregnant, 15 abnormal pregnant and 20 normal healthy non-pregnant women.

The serum total LDH activity and its isoenzymes were estimated in gestation and compared with normal healthy non-pregnant women, which served as control group.

The study reveals that the pregnancy is associated with alteration in the activity of serum lactate dehydrogenase. The elevation of activity of LDH attained was maximum in the third trimester of normal pregnancy, and post partum subjects.

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