A STUDY OF PLASMA FIBRINOGEN IN PREGNANCY, LABOUR AND PUERPERIUM

by

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and

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Introduction

While it is generally agreed that plasma fibrinogen increases during pregnancy, the number of reports on the variation in plasma fibrinogen during labour and puerperium is limited and the findings are inconsistent. The plasma fibrinogen has been reported to continue to increase during labour, reaching its maximum either immediately after delivery (Vara, 1958), or during the first 24 hours after delivery (Coryell *et al.*, 1950) or third day of puerperium (Plass and Mathews, 1926) or the first post-partum week (Dieckmann and Wegner, 1934). However, Margulis *et al.*, (1954) and Hodgkinson *et al.*, (1955) failed to observe any significant alteration in plasma fibrinogen levels during normal and uncomplicated delivery.

The present investigation was, therefore, undertaken to study the fluctuations in the level of plasma fibrinogen during pregnancy, labour and puerperium in normal pregnancy, toxaemia of pregnancy and pregnancy associated with severe anaemia.

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Material and Methods

The plasma fibrinogen estimation was carried out in 134 cases which were selected from amongst the patients, attending the outpatient department, the antenatal clinics and admitted in antenatal and waiting wards of K. R. Hospital, Gwalior. The following groups of cases were studied:

1.	Normal non-pregnant ..	25 cases
2.	Normal pregnant during second trimester (20 to 24 weeks)	25 cases
3.	Normal pregnant ..	50 cases
	(a) Third trimester (34 weeks)	
	(b) Labour	
	(c) Puerperium—1st, 3rd and 7th day	
4.	Toxaemia of pregnancy ..	8 cases
5.	Pregnancy with anaemia ..	26 cases

Cases of toxaemia and anaemia were also studied during labour and puerperium like in normal pregnancy. Plasma fibrinogen estimation was done by King's Kjeldahl technique (1951).

TABLE I

Average Fibrinogen Levels during Pregnancy, Labour and Puerperium in Normal, Toxaemic and Anaemic Cases

Series	No. of cases	Plasma fibrinogen levels in mg./100 ml. with standard deviation				
		Pregnancy	Labour	Puerperium		
				1st day	3rd day	7th day
Normal ..	50	456.8 + 75.11 (312-637)	549.6 + 91.15 (418-680)	500.5 + 79.26 (350-675)	424.6 + 79.44 (275-650)	343.7 + 51.38 (200-450)
Toxaemia ..	8	542.3 + 91.52 (412-675)	624.8 + 103.04 (500-776)	539.6 + 73.23 (418-660)	480.9 + 58.6 (400-580)	413.2 + 52.75 (350-500)
Anaemia ..	26	349 + 87.91 (180-487)	443 + 78.14 (200-581)	407 + 60.04 (320-520)	335 + 56.98 (243-456)	286 + 34.91 (237-350)

NOTE—Figures in the bracket indicate range.

Results

Plasma fibrinogen levels of the cases studied have been given in Table 1, from which it will be seen that plasma fibrinogen level increases during pregnancy, becomes maximum in labour and gradually declines during puerperium in normal as well as complicated pregnancy. Figure 1 shows a graphic record of mean fibrinogen values in the present series of cases.

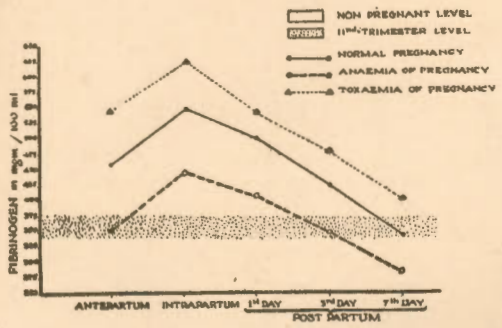

Fig. 1
Comparison of fibrinogen levels in normal pregnancy, anaemia and toxaemia series.

Discussion

The increase in plasma fibrinogen during pregnancy is in agreement with most of the other workers. The plasma fibrinogen levels in normal pregnancy, labour and puerperium, as reported by other workers and in the present series are given in Table 2. In the present series, the fibrinogen estimations during third trimester, labour and puerperium were done on the same patients; this provides a better assessment of the changes in plasma fibrinogen during labour and puerperium. The rise in fibrinogen level during pregnancy is generally believed to be a protective mechanism designed to prevent excessive blood loss at the time of delivery. During puerperium, when protection against bleeding is no longer required, the plasma fibrinogen showed a gradual decline, thus supporting the theory of the protective role of fibrinogen during labour.

Toxaemia of Pregnancy

The plasma fibrinogen level during the third trimester period in toxaemic series was found to be higher than the third trimester level in normal pregnancy. Similar results have been reported by other workers (Foster, 1924; Dieckmann, 1941; Kaur and Dhall, 1965). During labour and puerperium, the changes in fibrinogen levels were on the pattern of normal pregnancy (Fig. 1). Out of eight cases of toxaemia, antepartum haemorrhage was noticed in four, three of which also had mild to moderate degree of premature separation of placenta. The plasma fibrinogen level in these cases was not found to be low. Lack of hypofibrinogenemia in cases with mild to moderate degree of premature separation of placenta has also been reported by Reid (1951) and Kinch (1956).

Pregnancy with Anaemia

The plasma fibrinogen levels have hardly been studied in cases of anaemia of pregnancy. Bhattacharya and Malkani (1961) did not find any significant variation in fibrinogen levels in cases of anaemia of pregnancy. In the present series, the fibrinogen levels during the antepartum period, though higher than non-pregnant levels, were significantly lower than the normal third tri-

TABLE II

Plasma Fibrinogen Levels during Pregnancy, Labour and Puerperium by Various Authors in Milligram per 100 ml.

Authors	Year	Non-pregnant	II Trimester	III Trimester	During labour	Postpartum days		
						1st	3rd	7th
Plass & Mathews	(1926)	310	370	370	—	460	490	440
Dieckmann & Wegner ..	(1934)	260	430	480	—	—	550	—
Lugo	(1948)	450	—	618	—	560	—	526
Coryell et al	(1950)	480	520	580	610	650	600 (5-6 days)	—
Kinch	(1956)	—	300 (24 wks.)	470 (36 wks.)	—	420	435	440 (5th day)
Kennan & Bell	(1957)	—	—	450 (38 wks.)	430	490	520	—
Vara	(1958)	—	—	533 (39 wks.)	510	—	527 (4th day)	—
Gillman et al	(1959)	351	408 (13-28 wks.)	563 (36 wks.)	593 (IInd stage)	528	573	573
Kaur & Dhall	(1965)	196.6	314.2	355	399	—	366 (4th day)	313.1
Present series	(1964)	336.3	378.5 (20-24 wks.)	456.9 (34 wks.)	549.6	500.6	424.5	343.7

mester levels; the difference in the mean levels being 107.8 mg. per cent. During labour and puerperium, the same pattern of changes in fibrinogen levels was observed as in normal and toxaemia of pregnancy. The haemoglobin content of anaemia series ranged from 2.9 to 6.5 gm. per cent and was not found to bear any influence on the fibrinogen levels (Fig. 2).

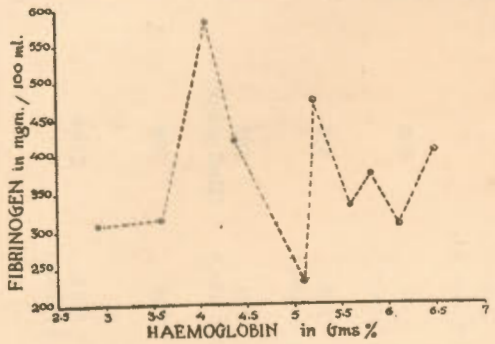

Fig. 2
Comparison of fibrinogen and haemoglobin contents in anaemia series.

One case of severe anaemia (haemoglobin 2.9 gm. per cent) gave history of external haemorrhages and had plasma fibrinogen level of 180 mg. per cent at 32 weeks. The patient after delivery developed petecheal haemorrhages all over the body and bleeding from nose and gums, and expired. The plasma fibrinogen level during labour was 200 mg. per cent, thus showing a slight rise over the antepartum level of 180 mg. per cent. Haemorrhagic manifestations in this case appear to be due to hypofibrinogenemia. Hypofibrinogenemia is generally thought to exist when the plasma fibrinogen level falls below 150 mg. per 100 ml. (Pritchard and Ratnoff, 1955). In the present case, it is likely that soon after delivery, the fibrinogen level might have dropped to the critical level of hypofibrinogenemia.

Summary and Conclusion

The plasma fibrinogen levels were determined in 134 cases. In all cases plasma fibrinogen levels were found to increase during pregnancy and labour and, decrease during puerperium. The plasma fibrinogen levels on the whole were found to be low in anaemia series and high in toxaemia series. Mild to moderate degree of premature separation of placenta in toxaemia was not found to cause any lowering of fibrinogen levels. Fall in plasma fibrinogen level following delivery may result in hypofibrinogenemia in cases with a low plasma fibrinogen level during antepartum period.

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