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Effect of Coagulation Profile in Third Trimester of Pregnancy

Author

Dr Tazkira Begum[1], Dr Wasima Jahan[2], Dr Rwitusmita Bharali[3], Dr Syed Md Ibrahim Kabir[4]

[1]Assistant Professor, Department of Physiology, Assam Medical College, Dibrugarh
[2]Proffesor, Department of Physiology. Assam Medical College, Dibrugarh
[3]Demonstrator, Department of Physiology, Assam Medical College, Dibrugarh
[4]M & HO Obst & Gynaecology. Assam Medical College, Dibrugarh

ABSTRACT

Normal pregnancy associated with many changes in coagulation profile. These changes are important for intrapartum blood loss and also for thromboembolism during pregnancy and labour. The present study aimed at to find out the quantitative change in coagulation profile in early and later part of third trimester. This study was carried out in the Department of physiology, AMC, Dibrugarh, Assam. 50 cases of pregnant women in third trimester are enrolled for the study. Among which 29 cases are in 29th to 34th wks and 21 cases are within 35th to 39th wks of gestation. For control 50 ages matched healthy female of child bearing age group are taken. Platelet count , Bleeding time and coagulation time were done in each control and cases. The mean platelet count in pregnancy at 29th to 34th wks was more than that of non pregnant but the value was less in pregnancy at 35th to 39th wks. Similarly mean bleeding time and coagulation time was also increases in third trimester than the non pregnant. But both the values are decreases in 35th to 39th wks than the 29th to 34th wks. Platelet count was progressively decreased in later part of pregnancy women compared to non pregnant women. It is partly due to hemodilution and partly due to increased platelet activation and accelerated clearance (Shehlata et al., 1999 and McCrae, 2010).To conclude thromboembolism and bleeding disorder are two major complications of pregnancy. So to prevent the complication proper study of coagulation profile is necessary.

***Key words**: Platelet count, bleeding time, coagulation time , third trimester, thromboembolism.*

INTRODUCTION

Normal pregnancy is associated with many hematological, biochemical and clinical changes. Among these, haemostatic changes of hematologic profile contribute to important maternal and fetal outcome. Most changes in coagulation profile create a state of hypercoagulability. Thrombocytopenia is the most common haemostatic abnormality observed in pregnancy.[1] In many healthy women (around10%) late pregnancy is associated with thrombocytopenia. At least in part this is due to haemodilution but the increase in mean platelet volume[2] suggests that a compensated state of progressive platelet destruction occurs. Additional evidence of *in vivo* platelet activation in late pregnancy is the increased concentration of □-thromboglobulin[3] and of thromboxane A2 derivatives[4].

The normal human pregnancy lasts for about 280 days (40 weeks), and has a large impact on the well being of a woman without any underling medical disorder at the same time makes the foetus vulnerable to the changes in the mother's internal and external physiological status. Both mother and the foetus are major consideration in the management of pregnancy[5].Third trimester of pregnancy starts from 29th to 40th wks of gestation. Fetus becomes mature at this stage.

During pregnancy the concentrations of coagulation factors VII, VIII, IX, X, XII and von Willebrand factor rise significantly, accompanied by a relevant increase in the concentration of plasma fibrinogen[6,7,8,9].Plasma fibrinogen often increases to over 600 mg/dL in late pregnancy[10]. Factor VII may increase as much as tenfold in pregnancy[1,11]. The von Willebrand factor and factor VIII are elevated in late pregnancy, when coagulation activity is about twice that in the non-pregnant state[1]. The increase in factor IX concentrations during pregnancy is reported by several authors to be small[11], as is the decrease in factor XI[12]. After an initial increase, factor XIII falls gradually, reaching 50% of the normal non pregnant value at term.

The important relationship of platelet to spontaneous haemostatic was first visualized by Hayem in 1891and it was strengthen by Duke in 1912, who clearly demonstrated a correlation between peripheral blood platelet count and bleeding time. Two important functions of platelet are a) Haemostasis by platelet plug formation and b) blood coagulation.

MATERIAL AND METHOD

The study was conducted in Department of Physiology, Assam Medical college, Dibrugarh, Assam. The 50 nos. of third trimester pregnant cases were randomly selected from the department of obst and gynae, Assam Medical college, Dibrugarh, Assam. For control 50 nos of healthy female of same age group were enrolled. For both cases and control the age group is 18 to 35 years. The cases were taken from both primipara and multipara women. The cases having high blood pressure, oedema, anaemia, albiminurea, and abnormalities in cardiovascular, respiratory and urinary system were excluded. In the study to look for the coagulation profile, quantitative estimation

of platelet count, coagulation time and bleeding time were done.

Platelet count was done by Brecher and Cronkite method[13]. Normal platelet count was 1.5 to 3 lacs / cumm of blood. Coagulation time and bleeding time was carried out by Sabraze capillary tube method[14] and Dukes method[15] respectively. Normal counts were 2 to 6 minutes and 2.5 to 9.5 minutes respectively.

The data was analyzed by Microsoft excel and statistical package of social sciences (SPSS version 20.0). Mean and standard deviation were calculated and reported for quantitative variables. The statistical difference were tested by using one way ANOVA (Analysis of Variance) . A P- value of < 0.05 was considered as statistically significant.

ETHICAL CONSIDERATION

The necessary approval to conduct the study was obtained from ethical committee of Assam Medical College, Dibrugarh, Assam. Consent form obtained from all participants to ensure their voluntary participation.

RESULTS

The study population consist of 50 control and 50 cases.

The distribution of cases and their results in third trimester together with the controls are summarized in Tables 1-3

Table 1 : Shows Platelet count in lacs/ cumm in different stages

Sr. no.	Different stages	No. of cases	Range	Mean	SD	SE
1	Non pregnant	50	1.5—3.35	2.396	0.408	0.057
2	Pregnant in third trimester	50	2.85	2.331	0.419	0.059
3	Pregnancy in 29 to 34 wks	29	2.62—5.48	2.432	0.421	0.014
4	Pregnancy in 35 to 40 wks	21	2.16—5.33	2.191	0.381	0.018

Histogram: 1 Shows Platelet count in lacs/ cumm in different stages

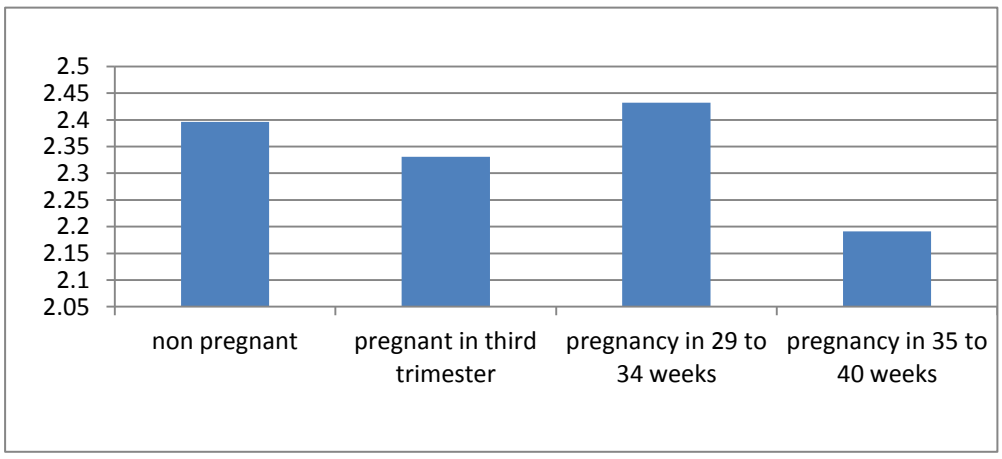

Table 2: Shows Coagulation time in minute different stages

Sl no.	Different stages	No. of cases	Range	Mean	SD	SE
1	Non pregnant	50	2.08—4.56	3.001	0.508	0.071
2	Pregnant in third trimester	50		3.464	0.760	0.010
3	Pregnancy in 29 to 34 wks	29	2.62—5.48	3.487	0.715	0.024
4	Pregnancy in 35 to 40 wks	21	2.16—5.33	3.439	0.826	0.028

Histogram : 2 Shows Coagulation time in minute different stages

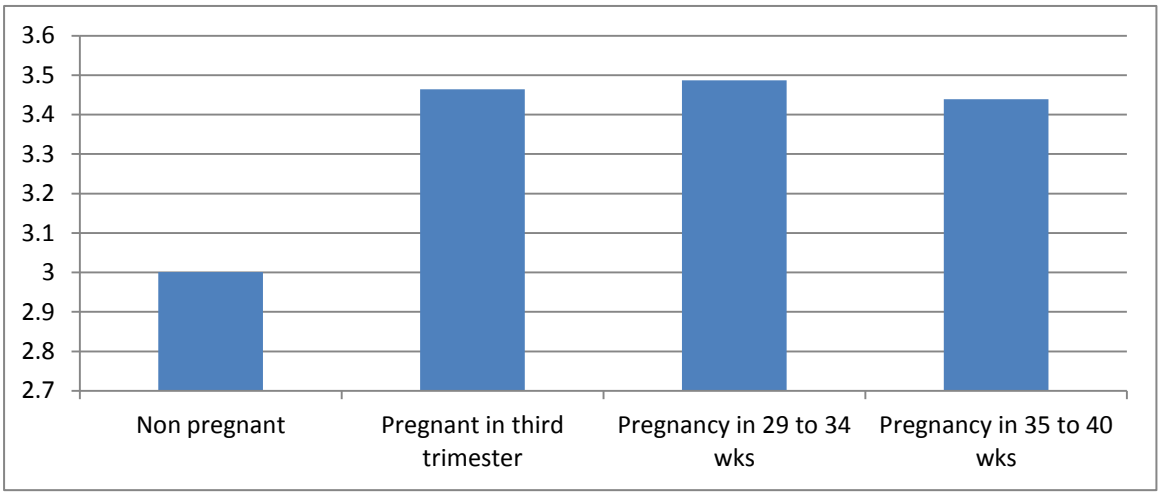

Table 3: Shows Bleeding time in minutes in different stages

Sl no	Different stages	No. of cases	Range	Mean	SD	SE
1	Non pregnant	50	1.5-2.66	1.783	0.203	0.027
2	Pregnant in third trimester	50	2.85	1.883	0.350	0.049
3	Pregnancy in 29 to 34 wks	29	1.5—2.42	1.948	0.291	0.010
4	Pregnancy in 35 to 40wks	21	1.11—2.43	1.844	0.401	0.019

Histogram : 3 Shows Bleeding time in minutes in different stages

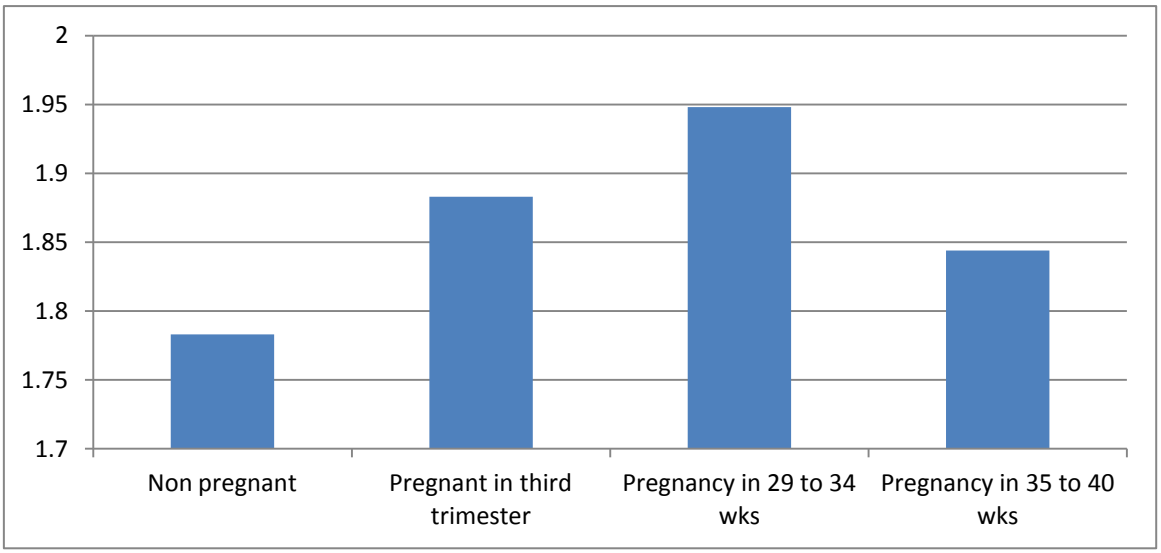

Table :4 A, B, C, D Shows the results of statistical comparison of coagulation profile in the third trimesters to non pregnant

Table 4: A.

Parameter	Non Pregnant 50 cases Mean±SD	Pregnant 50 cases Mean±SD	Significance
Platelet count	2.396±0.408	2.331±0.419	>0.05
Coagulation time	1.783±0.203	1.883±0.350	>0.05
Bleeding time	3.001±0.508	3.464±0.760	>0.001

Table : 4 B

Parameter	Non Pregnant 50 cases Mean±SD	Cases During 29-34 wks of Pregnancy 29 cases Mean ±SD	Significance
Platelet count	2.396±0.408	2.432±0.421	>0.05
Coagulation time	1.783±0.203	1.948±0.291	<0.001
Bleeding time	3.001±0.508	3.487±0.715	<0.01

Table : 4 C

Parameter	Non Pregnant 50 cases Mean±SD	Cases During 35-40 wks of Pregnancy 29 cases Mean ±SD	Significance
Platelet count	2.396±0.408	2.191±0.381	<0.05
Coagulation time	1.783±0.203	1.844±0.401	>0.05
Bleeding time	3.001±0.508	3.439±0.826	<0.01

Table : 4 D

Parameter	Cases During 29-34 wks of Pregnancy 29 cases Mean ±SD	Cases during 35-40wks of Pregnancy 21 cases Mean±SD	Significance
Platelet count	2.432±0.421	2.191±0.381	<0.001
Coagulation time	1.948±0.291	1.844±0.401	<0.05
Bleeding time	3.487±0.715	3.439±0.826	>0.5

In table 1-3 and Histogram1,2,3 shows the mean ±SD of platelet count, coagulation time and bleeding time in non pregnant , pregnant third trimester and in early and later part of third trimester. In table 1, shows the mean platelet count in entire third trimester but it increases in early third trimester of pregnancy than the non pregnant. But the value decreases in later part of third trimester or in 35 to 40 weeks of pregnancy. Similarly the mean ±SD of coagulation time and bleeding time both increases in third trimester than the non pregnant, but the values are again decreases in later part of pregnancy than the early part of third trimester.

In table 4 -A, B, C, D shows the comparison of coagulation profile in control and study group. Here the comparison of mean ±SD of platelet count between non pregnant and pregnant and non pregnant and early part of third trimester is statistically not significant (Table A and B). But comparison with non pregnant to later part of third trimester and comparison of early and later part of third trimester are statistically very significant (Table C and D).

Comparison of mean±SD coagulation time in non pregnant to early and later part of third trimester and early and later part of third trimester are statistically very significant.

In bleeding time mean ±SD comparison in non pregnant to early and later part of third trimester are statistically highly significant. But comparison between early and later part of third trimester is not significant.

DISCUSSION:

Quantitative changes in platelets occur in various thrombotic and hemorrhagic states are now a day in focused. In recent years considerable amount of works have been done regarding coagulation profile in pregnancy, labor and puerperium. But there are some lack of uniformity of findings by various factors like socio-economic and nutritional status of the woman and racial and other environmental condition. Now, the objective of the present study are to find out the quantitative change in platelet count , bleeding time and coagulation time in early and later part of pregnancy and also to compare the values with non pregnant and each other.

In the present study showed that the mean platelet count increases in early part of third trimester than the non pregnant but again decreases in later part of pregnancy. The increase in platelet count in early part of third trimester of pregnancy than the non pregnant is due to the hypervolumic status of pregnancy. But the mean platelet count decreases

in later part of third trimester of pregnancy than the early part may be due to fall in plasma volume due to haemodilution and increase utilization or changes in stimulation of production during later part of third trimester of pregnancy[16,17,18]. Present study correlates the findings of Celento et al, 1931: Kennan and Bell, 1957; Czernik et al 1963.

The present study showed the mean value of coagulation time is increases in both early and later part of pregnancy than the non pregnant state. The present study findings regarding coagulation time is similar to that of M. Hellgren and M. Blomback. This may be due to increase no of clotting factors in the circulation, but at the same time there will be decrease no of anticoagulant in the circulation and reduces in fibrinolytic activity. So there will be increase coagulation time in pregnancy. But in later pregnancy there will be depletion of plasma volume leading to increase concentration of clotting factors in the circulation this imparts decreases in coagulation time in later part of third trimester of pregnancy than the early part of the same.

In the present study the bleeding time found to be prolonged in third trimester of pregnancy than the non pregnant state. Statistically the values are highly significant. But it does not correlate with the platelet count in the study. In the study we found that coagulation time correlated with the bleeding time. Because from the table 4 we found that when coagulation time increases in early third trimester ,the bleeding time decreases and in later part of third trimester coagulation time decreases than that of early third trimester ,so the bleeding time also decreases than the earlier. This may be due to decrease amount of anti coagulant in the circulation play a role in decreasing bleeding time.

CONCLUSION:

In summary, pregnancy is associated with major changes in haemostasis .It includes increases in the platelet count ,decreases in the quality of natural anticoagulants and a reduction in fibrinolytic activity leading to difference in bleeding and coagulation time. These changes are greatest at the time of delivery .Platelet counts may be lower in pregnancy most commonly due to gestational thrombocytopenia or ITP and it is more marked in later part of third trimester of pregnancy .

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