



FIBRINOGEN LEVEL IN APPARENTLY HEALTHY PREGNANT WOMEN IN DIFFERENT TRIMESTERS

Ream Elzain Abdelgadir¹, Nuha Ahmed Eldai² and Abdel Rahim Mahmoud Muddathir^{*2,3}

¹Assistant Professor, Hematology Department, Faculty of Medicine and Health Science- Kordofan University, Elobiad-Sudan.

²Department of Hematology and Blood Transfusion, Faculty of Medical Laboratory Sciences Alzaeim Alazhari University, Khartoum, Sudan.

³Associate Professor, Department of Clinical Laboratory Sciences, Faculty of Applied Medical Sciences, Taibah University, Medina, Kingdom of Saudi Arabia.

***Corresponding Author: Dr. Abdel Rahim Mahmoud Muddathir**

Associate Professor, Department of Clinical Laboratory Sciences, Faculty of Applied Medical Sciences, Taibah University, Medina, KSA.

Article Received on 14/06/2017

Article Revised on 04/07/2017

Article Accepted on 24/07/2017

ABSTRACT

Background: Normal pregnancies are described by hypercoagulable state, so the determination of haemostatic parameters level is important in the diagnosis, treatment and follow up of haemostatic disorders in pregnancy. This study was aimed to determine the fibrinogen level among Sudanese healthy pregnant women in different trimesters. **Material and methods:** A total of 150 healthy pregnant women (50 samples from each trimester), and 50 healthy non-pregnant women as a control group were enrolled in this study. It was conducted in Al Ribat Hospital and Elsheikh Mohammed Ali Fadul Hospital in Khartoum state during May to August 2016. Fibrinogen level was measured by Clauss method. SPSS version 21 was used to analyze the Data. **Results:** The mean of fibrinogen concentration in the first, second and third trimesters were (243.0, 273.0, 379.0 mg/dl) respectively, while the mean of fibrinogen concentration in control group was (201.0 mg/dl), the ANOVA test showed significant increased of fibrinogen level among different trimesters compared to control group (p value = 0.00). **Conclusion:** The present study showed that fibrinogen level increases in pregnant women compared to the non-pregnant control group and this increase began in the first trimester and reach its peak in third trimester.

KEYWORDS: Fibrinogen level, Pregnancy, Three trimesters.

INTRODUCTION

Pregnancy is the carrying of one or more offspring. The period of pregnancy was classified into three trimesters (First, second and third trimester) each of it about three months according to the changes that take place over time.^[1]

Normal pregnancy women were reported by many changes in the haemostatic system, leading them to refer as a Hypercoagulable state.^[2] Many pregnancies are suffering from thrombotic episodes such as deep vein thrombosis or pulmonary embolism.^[3] Thromboembolism during pregnancy is a major factor in mortality and morbidity, which represent up to five times risk in pregnancy than non pregnant women.^[4] Many studies reported a marked increase of factors VII, VIII, and X, in pregnancy women.^[5,6]

Fibrinogen is the plasma protein precursor of fibrin, which when cross-linked, becomes the principal component of the fibrin clot. Fibrinogen have three major functional processes; firstly the conversion of

soluble fibrinogen into insoluble fibrin during blood coagulation, secondly it localized and activates the fibrinolysis system on polymerized fibrin and Lastly it binds to blood cells to mediate the inflammatory response, hemostasis, tissue repair and angiogenesis.^[7]

The estimation of plasma fibrinogen is helpful not only in the early diagnosis of haemostatic failure but also to guide replacement therapy during the fibrinopenic state.^[8] The fibrinogen deficiency in pregnancy may associate with complications such as recurrent miscarriage, antepartum hemorrhage (APH), postpartum hemorrhage (PPH), and Thrombosis.^[9] In addition, low level of fibrinogen in pregnancy can indicate that pregnant women may develop eclampsia, which considers the major causes of maternal morbidity and mortality in the world. On the other hand, elevated fibrinogen level is dangerous because it leads to poor circulation, clogged blood vessels and veins. This means, that the child does not receive the nutrients and in severe cases abortion may result.^[10,11]

It is not known to what extent pregnancy affect the fibrinogen level of pregnant Sudanese women in the different trimester. In Sudan no reference value for the pregnant women and so the reference value of fibrinogen level was derived from non- pregnant women and routinely used for pregnant women. As it is important to know the level of fibrinogen, the aim of this study was to determine the fibrinogen level in apparently healthy Sudanese pregnant women in three trimesters and compare it to the normal level in non- pregnant women.

MATERIALS AND METHODS

This study was descriptive cross sectional hospital based study. It was carried out in Al Ribat Hospital and Elsheikh Mohammed Ali Fadul Hospital in Khartoum state- Sudan during the period of May to August 2016. The study was included 150 apparently healthy pregnant women and 50 non- pregnant healthy women as a control. Their aged ranged between 15-45 year old, with the medium age of 26 years. The study had been approved from the ethical committee of ministry of health; Khartoum- Sudan in addition to a written informed consent was obtained from all participated pregnant women. Demographic and clinical data were collected in structured questionnaire. Each pregnant women with history or evidence of thrombotic or bleeding tendency have been excluded from the study.

A total of 4.5 ml of venous blood was collected in 3.2% sodium citrate container. Blood was centrifuged at 1500

rpm for 15 minutes to obtain citrated Platelets poor plasma. Then the citrated plasma was used for the determination of fibrinogen level by Clauss method procedure.^[12,13]

Data was analyzed using the statistical package for social science (SPSS) version 21. Results were expressed as mean $\pm$ standard deviation. Independent t-test was used to compare means difference of fibrinogen level between pregnant and non- pregnant women. The statistical was considered significant difference when the p. value was $\leq$ 0.05.

RESULTS

In this study 200 citrated plasma sample were collected from 150 pregnant women their ages ranged between 15-45years old mean 26 years and 50 non-pregnant women with the same ages as control group, the studied group have been categorized, 50 women from each trimester.

The result showed that the plasma fibrinogen in control group ranged from (175-315.mg/dl), mean (201 mg/dl). In the first trimester group the fibrinogen level ranged from (175mg/dl -426mg/dl), mean (243 mg/dl). In the second trimester group the plasma fibrinogen ranged from (175 mg/dl -465.0mg/dl), mean (273 mg/dl). In the third trimester group the plasma fibrinogen ranged from (190 mg/dl -570 mg/dl), mean (379 mg/dl) Figure 1.

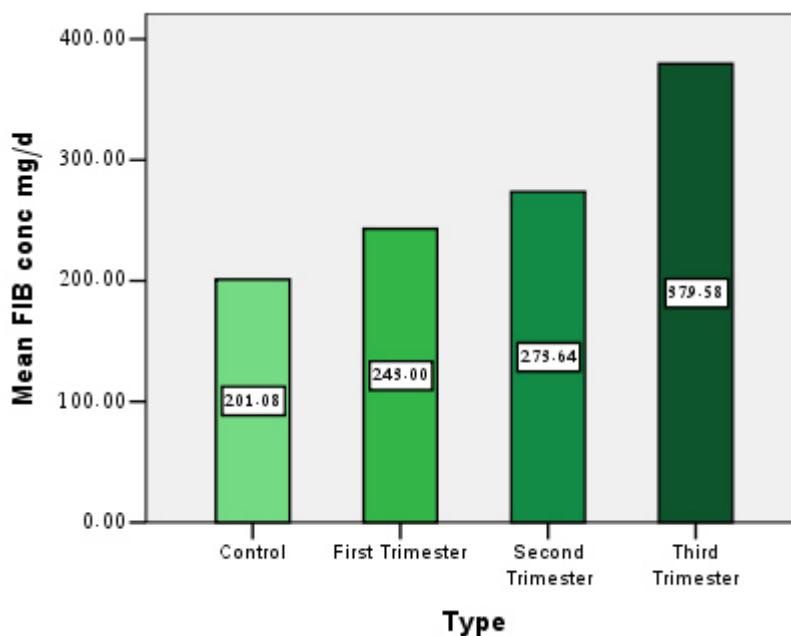


Figure 1: The mean concentration of fibrinogen (FIB) level among pregnant women in different trimester and control group

ANOVA test showed significant statistical differences (P.value = 0.00) for the Fibrinogen level in non pregnant control group and pregnant groups in different trimesters

(First trimester, second trimester and third trimester) (Table 1).

Table 1: fibrinogen level in study pregnant and control group

Pregnant groups trimesters	Fibrinogen level $\pm$ SD		
	Mean	SD	P.value
First trimesters	243	62.29554	0.00
Second trimesters	273.64	72.71188	
third trimesters	379.58	95.89676	
Control group	201.08	31.45184	

The multi comparison LDS - test revealed significant statistical differences in fibrinogen level between the

pregnant women result in the three trimesters and control non pregnant women (Table 2).

Table 2: multiple Comparison of fibrinogen levels among different trimesters and non-pregnant control group

Group	Compared groups	Mean difference of fibrinogen levels	P. value
Control	First trimester	41.92	0.00
	Second trimester	72.56	0.00
	Third trimester	178.5	0.00
First trimester	Control	41.92	0.00
	Second trimester	30.64	0.03
	Third trimester	136.58	0.00
Second trimester	Control	72.56	0.00
	First trimester	30.64	0.03
	Third trimester	105.94	0.00
Third trimester	Control	178.50	0.00
	First trimester	136.58	0.00
	Second trimester	105.94	0.00

The statistical analysis showed significant differences in fibrinogen level in our study results in the three

trimesters and other study done in Nigeria and USA with P.value=0.00 (Table 3).

Table 3: Comparison of fibrinogen levels in present study and other studies

Duration	Fibrinogen level	Present Study	Nigeria ^[14]	USA ^[15]	P.value
First Trimester	Mean $\pm$ SD	243 $\pm$ 62	219 $\pm$ 71	377 $\pm$ 67	0.00
	Range	175-426	177-361	244-510	
Second Trimester	Mean $\pm$ SD	273 $\pm$ 72	242 $\pm$ 57	414 $\pm$ 62	
	Range	175-465	128-356	291-538	
Third Trimester	Mean $\pm$ SD	379 $\pm$ 95	331 $\pm$ 56	496 $\pm$ 62	
	Range	190-570	219-443	373-619	

DISCUSSION

The coagulation system undergoes significant changes during pregnancy. Fibrinogen level has a great impact to determine earlier evidence of the hypercoagulable state of pregnancy. The aim of the study is to determine the concentration of fibrinogen among apparently healthy Sudanese pregnant women in different trimesters.

In present study, there was a significant increase of fibrinogen level in pregnancy when compared with the non pregnant control group; our result was in accordance with Duperray *et al* who reported a significant increase in fibrinogen concentration.^[16]

The study was showed ascending increase in fibrinogen level from the first, through second to third trimester, our results was in agreement with previous study done by Choi JW and Mohammed ME ; in which they found that the plasma Fibrinogen level increased in pregnant

women beginning in the first trimester and reach peak in the third trimester.^[17] Also the fibrinogen level was found to be statistically different between the three trimesters and the control group and these results was in agreement with Kasper *et al*.^[18]

When comparing the study findings with other studies done in Nigeria and USA, our result showed a significant lower fibrinogen level in the three trimesters compared to USA study and higher level than the study done in Nigeria (P. value=0.00), this may be due to many factors such as genetic and ethnic factors, age, diet, drug intake, geographical. This gives strong evidence for each country to establish their own range of fibrinogen level in pregnancy women.

CONCLUSION

The study was concluded that fibrinogen level was a significantly higher in pregnancy when compared with

non pregnant control group. On the other hand the fibrinogen level in pregnant group with different three trimesters was significantly different from the studies done in other countries. Thus implies the important of each country to use their own references value in pregnancy.

REFERENCES

1. A. milo G.I, Anokwute M.U, Ifeanyichukwu M.O, et al. Fibrinogen Concentration and Thrombin Levels in Pregnant Women in Nnewi, Anambra State, South, Eastern Nigeria. *Journal of Biology, Agriculture and Healthcare*, 2013; 3: 7.
2. Stirling Y, Woolf L, North WRS, Seghatchian M J and Meede T W. Haemostasis in normal pregnancy. *Thromb Haemost*, 1984; 52: 176-83.
3. A. Victor Hoffbrand, Daniel Catovsky Edward G.D. Tuddenham. *Postgraduate haematology*. 4th edition, vol.2. Wiley Blackwell: 2005; 787-807.
4. Jean M. Thomson, *Blood Coagulation And Haemostasis: A practical Guide*, second edition. chapter 5, Churchill: Livingstone, 1985; 166.
5. V.Ruth Bennett, Linda k Browen; Margaret Myles: *Myles Textbook For Midwives, twelfth edition, Edinburgh: livingstone*, 1996; 94-102.
6. Hellgren M. Hemostasis during normal pregnancy and puerperium. *Semin Thromb Hemost*. 2003; 29(2): 125-130.
7. William S. Beck, *HEMATOLOGY*. fourth Edition, Harvard: MIT press, 1985; 415-416.
8. Nachtigall MJ. Toward optimal health: an update on preconception care. Interview by Jodi R. Godfrey. *J Womens Health (Larchmt)*. 2009; 18(6): 779-83.
9. Bolton-Maggs PHB, Perry DJ, Chalmers EA et al. The rare coagulation disorders-review with guidelines for management from the United Kingdom. Haemophilia Centre Doctors' Organisation. *Haemophilia*, 2004; 10: 593-628.
10. Alessi M.C; Ail Aud M.F; JUHAN-VAGUEI;: Facteurs de risqué thrombogenes et athero sclerose feuil, *Biol*; 1994 ; 197: 39-41.
11. Kannel WB, Wolf PA, castelliwp, Agostino RB. *Fibrinogen and risk of cardiovascular disease: The Farmingham study*. *JAMA*. 1987; 258.
12. Clauss A. Rapid physiological coagulation method in determination of fibrinogen *Acta Haemat*, 1957; 17: 237-246.
13. NCCLS. Procedure for the Determination of Fibrinogen in Plasma; Approved Guideline Second Edition. NCCLS document H30-A2, 2001.
14. Okwesili A.1, Ibrahim K.1, Nnadi D. C.2, Barnabas B.1, Abdulrahman Y.1, Buhari H.1, Udomah F. A.1, Imoru M.1, Egenti B. N.3, Erhabor O.1 Fibrinogen Levels Among Pregnant Women of African Descent in Sokoto North Western Nigeria *Frontiers in Biomedical Sciences*, 2016; 1(2): 7-11.
15. Abbassi-Ghanavati M, Greer LG, Cunningham FG. Pregnancy and laboratory studies: a reference table for clinicians. *Obstet Gynecol*. 2009; 114(6): 1326-31.
16. Duperray A, Languino L R, Plescia J, McDowall A, Hogg N, Craig A G, Berendt A R, Altieri, D C. Molecular identification of a novel fibrinogen binding site on the first domain of ICAM-1regulating leukocyte-endothelium bridging. *Biological Chemistry*, 1997; 272: 435-441.
17. Choi J W, Pai SH: *Tissue Plasminogen Activator level change with Plasma Fibrinogen concentration during pregnancy-Department of clinical pathology, Inha University Hospital*, 2007; 400-103.
18. Kasper CK, Hoag MS, Aggeler PM, Stone S: *Blood clotting factors in pregnancy*. *Obstet Gynecol*; 24: 242-247.