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Evaluation of PT and APTT among Pregnant Women in Atbara City, Sudan

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***Abstract*:**

This is a cross-sectional study aimed to measure PTT and PT in pregnant women with the control group the study included Any well healthy pregnant women and exclusion any complicated pregnant women. in Atbara city in the period between March and July 2018. The study included 50pregnant women and 50 non pregnant as control. 2.5mlofcitrated blood was collected under ideal conditions and analyzed PT and APTT manually. The study proved after analyzing the results statistically by Statistical Package for social Sciences SPSS that found increased significance in PTT and PT when compare to control. we show the result of APTT was significantly increased and found the mean of APTT was 61.18(2.745) sec when compared to the control group found the mean of the control group was 39.82(2.745) sec and the result of PT was slightly increased, we found the mean of PT cases was 19.64(0.916) sec when compare to control found the mean of PT 18.90(0.584) sec. This study aims to assess the coagulation profile among pregnant women from the first to the third trimester to observe any change in coagulation profile PT, APTT.

Keywords: Pregnant, Evaluation, Bleeding profiles, PT, PTT.

Background:

Pregnancy, also known as gestation, is the time during which one or more offspring develop inside a woman. Multiple pregnancies involve more than one offspring, Such as twins. Pregnancy can occur through sexual intercourse or assisted reproductive technology. Childbirth typically occurs around 40 weeks from the last menstrual period (LMP). Pregnancy is typically divided into three trimesters; The first trimester is from week one through 12 and includes conception. Conception is when the sperm fertilizes the egg. The second trimester is from week 13 until 28weeks.Around the middle of the second-trimester movement of the fetus. The third trimester is from 29 weeks through 40 weeks **[1].** Pregnancy is associated with profound anatomical, physiological, biochemical, and endocrine changes that affect multiple organs and systems. These changes are essential to help the women adapt to the pregnancy state and to aid fetal growth and survival. The hematological system must adapt in several ways such as the provision of vitamin and mineral hematopoiesis (iron, vitamin B12, folic acid). which can exacerbate maternal anemia, and preparation for bleeding at delivery, which enhanced hemostatic function **[2].**

The maintenance of circulatory hemostasis is achieved through the process of balancing bleeding (hemorrhage) and clotting (thrombosis). Hemostasis, the arresting of bleeding, depends on several components. The four major components are the vascular system, platelets (thrombocytes), blood coagulation factors, fibrinolysis, and ultimate tissue repair**.**

Many chemical reactions occur in hemostasis, from the initial stimulus that triggered bleeding to the final formation of a stable clot. To understand the process more easily, portions of the normal coagulation sequence are artificially segregated into smaller sections such as the extrinsic and intrinsic pathways. These pathways are not actual physiological pathways of hemostasis but allow for the grouping of factor defects and the focusing of laboratory assays. The initiation of the coagulation process may occur via one of two pathways: the extrinsic pathway and the intrinsic pathway. Regardless of the initiating pathway, the two pathways converge into a final common pathway. The outcome of this process is the conversion of circulating insoluble coagulation factors into a gelatinous fibrin clot with entrapped blood cells, a blood clot. As repair of damaged tissue takes place, the clot is lysed and the particulate matter is removed by the mononuclear phagocytic system **[3].**

The original theory of coagulation used a cascade or waterfall theory. This description depicted the generation of thrombin by the soluble coagulation factors and the initiation of coagulation. This theory identified two starting points for the generation of

thrombin: the initiation of the Intrinsic pathway with factor XII and surface contact, and the extrinsic pathway with factor VIIa and tissue factor. These two pathways meet at the common pathway, where they both generate factor Xa from X, leading to a common pathway of thrombin from prothrombin and the conversion of fibrinogen to fibrin. This process holds under laboratory conditions The discovery of a naturally occurring inhibitor of hemostasis, tissue factor pathway inhibitor (TFPI), can block the activity of the tissue factor VIIa complex, soon after it becomes active**.**

Laboratory testing looks at the in vitro effect of the coagulation process which is measured by the prothrombin time (PT), activated partial thromboplastin time (aPTT), thrombin time (TT), fibrin degradation products (FDPs), and D-dimer. This section will focus on PT and PTT. While the coagulation cascade does not reflect what goes on in vivo, it provides a model to which the laboratory relates for testing. However, the coagulation cascade reflects the mechanisms that the laboratory uses for results. The screening tests provide a tremendous amount of information to the physician. They can be performed both quickly and accurately**.**

Blood coagulation involves a biological amplification system in which relatively few initiation substances sequentially activate by proteolysis a cascade of circulating precursor proteins (the coagulation factor enzymes) which culminates in the generation of thrombin; this, in turn, converts soluble plasma fibrinogen into fibrin.Fibrin enmeshes the platelet aggregates at the sites of vascular injury and converts the unstable primary platelet plugs to firm, definitive, and stable hemostatic plugs.The operation of this enzyme cascade requires a local concentration of circulating coagulation factors at the site of injury. Surface-mediated reactions occur on exposed collagen, platelet phospholipid, and tissue factor. Except for fibrinogen, which is the fibrin clot subunit, the coagulation factors are either enzyme precursors or cofactors. All the enzymes, except factor XIII, are serine proteases (i.e. their ability to hydrolyze peptide bonds depends upon the amino acid serine at their active center**.**

Coagulation factors may be categorized into substrates, cofactors, and enzymes. Substrates are the substance upon which enzymes act. Fibrinogen is the main substrate. Cofactors accelerate the activities of the enzymes that are involved in the cascade. Cofactors include tissue factor, factor V, factor VIII, and Fitzgerald factor. All of the enzymes are serine proteases except factor XIII which is a transaminase **[4].**

Materials and methods:

Study design:

Cross-sectional study with the control group.

Study area:

In Atbara city, Sudan.

Study duration:

From Marsh to July 2018

Study population:

(100) blood samples (50) blood samples for the Study group of pregnant and (50) for the control group.

Data collection tools:

The primary data will be collected by using a questionnaire.

Blood Sampling:

venous blood was collected using a sterile disposable plastic syringe, the vein puncture area is clean with 70% ethanol, and the blood is added to the anticoagulant at a ratio of 2.5ml of blood to 0.25 ml of citrate (3.2%) buffer sodium citrate and gently mix the sample is centrifuge at 25000SP for 15min to obtain platelet-poor plasma (PPP).

Principle of APTT:

The APTT was performed by manual testing. it measures the overall activity of an intrinsic pathway. Undiluted, platelet-poor plasma was incubated at 37c° with a particulate factor XII activator (ellagic acid) A reagent containing phospholipids (partial thromboplastin) was added, followed by CaCl2.the time required for clot formation after the addition of CaCl2.Prekallikrein is required as a cofactor for the auto-activation of factor XII by factor XIIa. XI is activated and requires a cofactor of HMWK. XIa activates IX to IXa, which in the presence of VIIa converts X to Xa. Also present are platelet phospholipids PF3. Calcium is required for the activation of X to proceed rapidly. The reaction then enters the common pathway where both systems involve factors I, II, V, and X. This results in a fibrin monomer polymerizing into a fibrin clot. Factor XIII, or fibrin stabilizing factor, follows activation by thrombin. This will convert initial weak hydrogen bonds, and cross-linking fibrin polymers to a more stable covalent bond.

Principle of PT:

Tissue thromboplastin in the presence of calcium activates the extrinsic pathway of the human blood coagulation mechanism. When a reagent is added to normal anticoagulant plasma, the clotting mechanism is initiated, forming a solid gel clot within a specified period. the time required for clot formation would be prolonged if factor/factor activity is deficient in the extrinsic pathway of the coagulation mechanism.

Ethical considerations:

The procedure of blood sampling is explained to the women and their participants. All women and their participants are informed about the research objectives and procedures during the interview period. Verbal consent is obtained from all participants.

Data analysis:

The data are compared by using statistical analysis performed with a statistical package for social sciences (SPSS), to obtain the means and standard deviation of activated partial thromboplastin time.

Results:

This is a descriptive cross-sectional study that was conducted in Atbara during the period between March to July 2018. This study measured PT&APTT among pregnant women including 50 pregnant women and 50 none pregnant as a control, 2.5ml of citrated blood was collected under ideal conditions and then analyzed manually. The study provides after analyzing the results statistically by Statistical Package for Social Sciences SPSS found increased significance in PTT and PT when compare to control. The frequency of age of pregnant women in (< 20) was (14) %, frequency in (20-29) was 50% and in (30-39) was 36% **(Table1).** The frequency according to normal women was 0% and according to pregnant women was 100% **(Table2).** The frequency of pregnancy in the first trimester was 4% in the second trimester was 42% and the frequency of pregnancy in the third trimester was 54 **(Table3).** The frequency of the number of pregnancies (1-2) was 44% and frequency (3-4) was28% and frequency in time more than 6 was 4% and frequency according to No pregnancy was 6% **(Table4).** The frequency according to normal women was 100% and according to complicated pregnant women was 0% **(Table5).** The frequency according to the period between pregnancy (1 year) was 2%, in (1.5 years) was 10% in (2 years) 26%, in (3 years) was16%, in the period more than 3 years 16%, according to No pregnancy was 30% **(Table6).** Frequency to disease was 100% and according to another disease 0% **(Table7).** There was a slight increase in PT among pregnant women, and there was a significant increase in APTT among pregnant women **(Table8).**

Table-1: Distribution of study group according to age

Age group	*Frequency*	*Percent*
< 20 years	7	14%
20 - 29 years	25	50%
30 - 39 years	18	36%
Total	**50**	**100%**

Table-2: Distribution of study group according to normal or pregnant women

Normal or pregnant	*Frequency*	*Percent*
Pregnant women	50	100%
Normal women	0	0%
Total	**50**	**100%**

Table-3: Distribution of study group according to trimester

Trimester	*Frequency*	*Percent*
First	2	4%
Second	21	42%
Third	27	54%
Total	**50**	**100%**

Table-4: Distribution of study group according to number of pregnancies

Number of pregnancies	*Frequency*	*Percent*
1 – 2	22	44%
3 – 4	24	28%
5 – 6	9	18%
More than 6	2	4%
No previous pregnancy	3	6%
Total	**50**	**100%**

Table-5: Distribution of study group according to normal or complicated pregnancy

Normal or complicated pregnant	*Frequency*	*Percent*
Normal pregnancy	50	100%
Complicated pregnancy	0	0%
Total	**50**	**100%**

Table-6: distribution of study group according to period between pregnancies

Period between pregnancies	*Frequency*	*Percent*
1 year	1	2%
1.5 years	5	10%
2 years	13	26%
3 years	8	16%
More than 3 years	8	16%
No previous pregnancy	15	30%
Total	**50**	**100%**

Table-7: Distribution of study group according to disease

Disease	*Frequency*	*Percent*
Normal	50	100%
Other diseases	0	0%
Total	**50**	**100%**

Table-8: Comparison of mean (SD) and mean difference of PT and APTT between case (n= 50) and normal control (n=50)

Group	*Mean (SD)*	*MD*	*P*-value
PT case	19.64(0.916)	6.474	0.035
PT control	18.90(0.584)	4.127	0.027
APTT case	61.18(2.745)	19.411	0.017
APTT control	39.82)2.745	17.293	0.004

Discussion:

Pregnancy, also known as gestation, is the time during which one or more offspring develop inside a woman. The maintenance of circulatory hemostasis is achieved through the process of balancing bleeding (hemorrhage) and clotting (thrombosis). This study was conducted to determine the partial thromboplastin time and prothrombin time in pregnant women. Found the mean of APTT was (61.18) (2.745), mean of normal control was (39.82) (2.745). the result was significantly increased when compared to control and the men of PT was (19.64) (0.916) sec it slightly increases sec. A study done by Mona Awad in Shandi city in 2017 reported the mean of APTT was (40.2750), mean of normal control was (31.8250). which agrees with our study **[5].** Another study done by Ibeh N, et Niger J med 2000 reported the means of the APTT were significantly lower in the first, second, and third trimesters with controls (35.59±4.95 second,32.22±5.79seconds, and 29.60±3.66seconds; P=0.01) which disagreement with our study **[6].** A study was done by ALkhansa Osman Mohamed, Khalda Mirghani hamza, Assad Mohamed, Ahmed Babiker Department of Hematology and immunohematology Collage of medical laboratory science, Sudan university of Sudan and Technology. Khartoum Sudan. - Department of medical laboratory science ALghad international college for applied medical science. ALmadina ALmunawera. Saudi Arabia received September 30-2015. Accepted November 3-2015. reported - Shows that the PT and the PTT remain unchanged among pregnant women which disagreement with our study **[7].** Another study was done by Hellgren M. seminthromb he most in 2003. Reported Show changes representative of hypercoagulability during pregnancy which agree with our study **[8].** Another study was done by st Cerhecaf, et al. Eursobstet Gynecol Reprod boil.1997. reported Variation during pregnancy in PT and other parameters which agree with our study **[9].**

Conclusion:

This study concluded that there was a significant increase in APTT among pregnant

women and a slight increase in PT among pregnant women.

References:

[1] Clinical Hematology –theory-and-procedures Fifth Edition chapter (23) page 400.

[2] Mona Awadalla- shandi 2015-study to determine APTT and PT in pregnant woman.

[3] Deice and lewis. practical.haematoogy.pdf Eleventh Edition 2011-chapter (18) page 400/650.

[4] A study done by Ibeh N, etal Niger J med 2000 reported the means of the APTT were significantly lower in the first, second and third trimesters with controls (35.59±4.95 second ,32.22±5.79seconds and 29.60±3.66seconds; P=0.01).

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[6] study done by stCerhecaf, etal.EursobstetGynecolReprod boil.1997. reported Variation during pregnancy in PT and other parameters.

[7] study done by ALkhansa Osman Mohamed, KhaldaMirghanihamza, Assad Mohamed, Ahmed Babiker Department of Hematology and immunohematology Collage of medical laboratory science, Sudan university of Sudan and Technology. Khartoum Sudan. -Department of medical laboratory science ALghad international college for applied medical science. ALmadinaALmunawera.. reported - Show that the PT and the PTT remain unchanged among pregnant women.

[8] study done by Mona Aowad in Shandi city in2017 reported the mean of APTT was (40.2750), mean of normal control was (31.8250). the result was significant increased when compare to control.