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Original Article

Leukocytosis and thrombocytopenia in pre-partum, post-partum cases and non-pregnant women

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ABSTRACT

Thrombocytopenia is a serious condition that may cause fatal outcomes for both mother and infant, whereas leukocytosis is an essential mediator of the inflammatory process and a marker for infection during pregnancy. **Objective:** The aim of the study was to compare the frequency of thrombocytopenia and leukocytosis among pre-partum, post-partum cases and non-pregnant healthy controls. **Methods:** Total 600 samples were collected and categorized into three groups, pre-partum, post-partum and non-pregnant 200 in each. From selected groups 3-5 ml blood was collected in EDTA tube and Sodium Citrate vial. Platelets, WBCs, RBCs and Hemoglobin levels were analyzed on Sysmex KX-21. PT and APTT of all samples was performed manually. **Results:** Leukocytosis was detected in 60% pre-partum and 64% post-partum, there was not statistically significant difference ($p=0.596$). In pregnant and non-pregnant, there was significant difference statistically ($p<0.05$). Thrombocytopenia was detected in 11% pre-partum, 13% post-partum cases and there was no statistical difference ($p>0.05$). There was statistical difference in frequency of thrombocytopenia between pregnant and non-pregnant women ($p=0.03$). There was no statistically significant difference in PT and APTT between pre-partum and post-partum ($p>0.05$). APTT were significantly different between pregnant and non-pregnant cases ($p<0.05$). **Conclusion:** The study concluded that leukocytosis and thrombocytopenia was found in higher frequency among pregnant women than non-pregnant women but there was no significant difference in frequency of leukocytosis and thrombocytopenia between pre-partum and post-partum women.

INTRODUCTION

Thrombocytopenia is the deficiency of thrombocytes in circulatory blood and when it goes down from the certain level [1]. The amount of platelet (PLT) which are low than <150,000/L during gestation period is known as gestational thrombocytopenia [2]. In previous 20 years, thrombocytopenia is most commonly diagnosed in pregnancy after anemia in hematological disorder [3]. During pregnancy thrombocytopenia is normally happened but there are less chances of connection with neonatal [4]. But there are chances of complications due to negligence of antenatal care [5]. During pregnancy, the platelets count is usually decrease due to the physiological change and many other factors such as hem dilution, plasma volume, clearance of thrombocytes, demolition of thrombocytes in placenta, fluctuation in the activity of factor VIII, production of antibodies (Ab) against platelets, fluctuation in placental blood flow as well increase the gravidity of uterus. The other reasons in which platelet count is low because low production of platelet and the demolition of platelets and splenomegaly [6,7]. In second or third pregnancy thrombocytopenia is commonly occurred [8]. It can be inherited or associated with other diseases in which coagulation factors are disrupted. Low platelets delay the activation and inhibition of clotting factors which are

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involve in formation of clot. Spontaneous bleeding occurs when there is severe thrombocytopenia. It may be reversible after pregnancy [9]. The possible etiology of thrombocytopenia in pregnancy is Thrombotic microangiopathy(TMA)[6,10]. Thrombocytopenia is mostly reported in mid half of second trimester and the platelet count could be greater than 100x10/L and there is no fluctuation in active partial thromboplastin time(APTT)and prothrombin time(PT)which affects the hemostasis[11]. In Sudan, there are 15.5% women affected with gestational thrombocytopenia [12]. In Lahore, there are 16.5% of women are affected with thrombocytopenia [13]. Leukocytosis is an increase in white blood cells above their normal range. Leukocytosis is an essential mediator in the inflammatory process and simple marker for infection during pregnancy [14]. Leukocytosis during early days of pregnancy can be the sign of disease that will occur later in pregnancy. Leukocytosis occurs, if the female is suffering from pre-eclampsia that is the state of hypertension during pregnancy and goes away after delivery[15]. Leukocytosis may be a result of fertility treatments [16]. During 3rd trimester, immunity of females often reduces that causes immunological suppression that results in leukocytosis [17]. Antenatal Corticosteroids are given during pregnancy to females who are at risk of giving a preterm delivery. Corticosteroids administration during pregnancy causes leukocytosis [18]. Leukocytosis during pregnancy may occur because of the physiological stress that encourage by the gestation phase[19]. Neutrophils can be the reason that causes leukocytosis during gestation phase. Neutrophil count is almost double during gestation[20]. In Peshawar, there are 68% cases of leukocytosis [17]. In Israel, there are 0.94% cases of leukocytosis [14]. Gestational thrombocytopenia is mainly asymptomatic except bleeding which occurs in second half of pregnancy [21]. Fever, nausea, vomiting, and pain anorexia are some of the common symptoms of leukocytosis [22]. In case of gastrointestinal thrombocytopenia, before the birth prednisone's used in a daily dose for 10 days to raise the platelet count and avoid from obstetrical and anesthetic danger [21]. While using antibiotics the physiological leukocytosis should always be kept in mind to minimize its unnecessary use during postpartum period. In 2006, Dapper DV et al concluded that the female in the 1st trimester had the highest leukocyte count [23]. In 2010, Akmal M et al concluded that the severity of thrombocytopenia is proportional to severity of hypertensive disorders [24]. In 2013, Tazur T et al performed a study that 0.94% cases had leukocytosis in Israel [25]. In 2015, Enawgaw AF et al concluded that the females lived in rural area had higher rate of thrombocytopenia [5]. The main objectives of the study were to compare the frequency of leukocytosis and thrombocytopenia among pre-partum and post-partum and control group.

METHODS

It was a cross-sectional study conducted from November, 2020 to March, 2020. The data were processed in Sir Ganga Ram Hospital, Lahore. The total numbers of samples taken were 600. They were divided into three categories, Group 1 200 pre-partum samples, Group 2 included 200 samples of postpartum & 200 sample (group 3) of non-Pregnant women as a control. From each pregnant and non-pregnant woman, 3-5 ml blood was collected from median cubital vein through venipuncture technique and dispense into Ethylene-diamine tetra-acetic acid/EDTA tube and Sodium Citrate vial. Pregnant women of age 18 to 45 years were enrolled and non-pregnant women with the same age group were considered as control in the study. Pregnant and Non-Pregnant women with confirmed infection or other autoimmune diseases were excluded from the study. The test were performed on automated hematology analyzer (Sysmex KX-21). Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25. Mean and standard deviation was calculated for quantitative variable like age, WBC count, Hb level etc. Frequency and percentage were given for qualitative variables such as level of leukocytosis, anemia etc. Chi-square test was applied for association of qualitative variable between groups. Paired t-test was used for difference of qualitative variables between pre-partum and post-partum cases. p-value less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows no significant difference (p=0.650) when the mean value of Hb compared between pregnant (10.26± 1.8g/L) and non-pregnant (10.88± 2.2g/L) women. No significant difference (p=0.571) was found in the mean level of WBCs compared between pregnant (11.95± 5.8x109/L) and non-pregnant (10.08± 4.4x109/L) women. There was statistically significant difference (p=0.001) in mean level of neutrophil and lymphocyte between pregnant and non-pregnant women (65.94± 21.0/59.65± 19.4%) and (26.18± 19.2/31.45± 19.1%) respectively. There was not statistically significant difference (p=0.103) in mean level of monocyte between pregnant and non-pregnant (5.13± 6.2/5.74± 2.4%). The mean level of eosinophil between pregnant (2.83± 2.3%) and non-pregnant (2.99± 1.6%) was statistically significant different (p<0.05). The mean level of Hb showed statistically different (p=0.003) between pre-partum (10.26± 2.2g/L) and post-partum (10.34± 1.7g/L).

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The mean level of WBC between pre-partum (11.95± 5.8x109/L) and post-partum (12.25± 4.8x109/L) was statistically different (p=0.001). There was statistically significant difference (p=0.002) in neutrophil count between pre-partum and post-partum (65.94± 21.0/73.85± 13.2%). The mean level of lymphocyte between pre-partum (26.18± 19.2%) and post-partum (19.44± 11.1%) was statistically different (p<0.05). Monocytes and eosinophil count showed no significant difference (p>0.05) when compared between pre-partum and post-partum groups.

Parameters	Pre-partum group n=200	Post-partum group n=200	Control group n=200	P_1-Value	P_2-Value
Hb (g/L)	10.26± 1.8	10.34± 1.7	10.88± 2.2	0.003	0.650
WBC (x10^9/L)	11.95± 5.8	12.25± 4.8	10.08± 4.4	<0.001	0.571
Neutrophils (%)	65.94± 21.0	73.85± 13.2	59.65± 19.4	0.002	<0.001
Lymphocytes (%)	26.18± 19.2	19.47± 11.2	31.45± 19.1	0.006	<0.000
Monocytes (%)	5.13± 6.2	4.32± 3.10	5.74± 2.4	0.197.	0.103
Eosinophil (%)	2.83± 2.3	2.25± 1.6	2.99± 1.6	0.436	0.005

Table 1: Comparison of Hematological parameters between pre-partum, post-partum and non-pregnant women.

P1- Group 1 and Group 2

P2 –Group 1 and Group 3

Table 2 shows no statistically significant difference in mean level of Platelets and PT between pregnant and non-pregnant women. The mean level of APTT between pregnant (33.00± 2.8Sec) and non-pregnant (33.70± 2.3Sec) was statistically significant difference (p=0.008). There was no statistically significant difference (p>0.05) in mean level of Platelet and APTT between pre-partum and post-partum groups. The mean level of PT between pre-partum (15.19± 2.0 Sec) and post-partum (14.96± 1.8Sec) was statistically significant different (p=0.039).

Factors	Pre-partum group n=200	Post-partum group n=200	Control group n=200	P_1-Value	P_2-Value
Platelet (109/L)	285.99± 223.7	254.75± 107.6	273.25± 154.3	0.508	0.076
PT (Sec)	15.19± 2.0	14.96± 1.8	14.76± 2.0	0.039	0.250
APTT (Sec)	33.00± 2.8	33.70± 2.3	33.36± 2.3	0.163	0.008

Table 2: Coagulation Profile compared between, pre-partum, post-partum and non-pregnant Women

P_1 - Group 1 and Group 2

P_2 –Group 1 and Group

DISCUSSION

The current study was designed to find the frequency of thrombocytopenia and leukocytosis in pre-partum and post-partum cases in Ganga Ram Hospital. Thrombocytopenia is the common hematological disorder after anemia in pregnancy often mismanaged and under diagnosed. Gestational thrombocytopenia is directly associated with a higher occurrence of intrauterine growth problems and delivery before estimated time and it may also be an important risk factor for mother and baby at the time of delivery. Thrombocytopenia can occur at any point of pregnancy. In this study, (11%) pre-partum women had thrombocytopenia, and 7% pre-partum females had high platelet count. Thirteen percent (13%) females had low platelet count in post-partum. This study is in agreement with a study conducted in India on 856 pregnant women and found 11.68% pregnant women with thrombocytopenic condition [1]. In Ethiopia, a total of 217 women were enrolled in a study and 8.8% thrombocytopenia was observed [5]. Bai P and his coworkers, reported thrombocytopenia in 6% pregnant women in Pakistan [26]. During third trimester of pregnancy, the prothrombin time remains same mostly but active partial thromboplastin time usually shortened mainly due to increase in factor VIII. It plays an important role in hemostasis. In this study, there was no statistically significant difference found in values of PT between pregnant women and controls and there was statistically significant difference between PT values of pre-partum and post-partum cases. While between the values of APTT in the cases and controls there was a significant difference and no statistically significant difference found in the values of APTT between pre-partum and post-partum women. Obeagu EI et al performed study on hematological profile of pregnant and non-pregnant women of Abia State, Nigeria. The study showed significant changes (p<0.05) in mean value of WBCs, lymphocytes, monocytes and eosinophil of the pregnant women relative to non-pregnant women [27]. The current study, was not in agreement with Obeagu et al in term of WBCs and monocytes which showed non-significant difference between pregnant and non-pregnant women. But neutrophil lymphocytes and eosinophil showed a significant level of difference which was in agreement with Obeagu et al findings [27].

CONCLUSION

There was high frequency of leukocytosis and thrombocytopenia among pregnant women than non-pregnant women but there was no significant difference in frequency of leukocytosis and thrombocytopenia between pre-partum and post-partum. Among leukocytosis, neutrophilia was more common during pregnancy as compare to other types of white blood cells. Further follow-up studies on larger sample size should be performed to find out the exact cause and types of anemia, leukocytosis and thrombocytopenia.

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