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Dynamic Profile and Clinical Implications of Hematological Parameters in Pregnant Women with COVID-19

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Abstract **Original Research Article**

Background: In the COVID-19 pandemic, the prevention and control of COVID-19 infection are extremely important. Therefore, laboratory indicators are needed that can detect pregnant patients with mild symptoms or no symptoms at the time of admission to the hospital and ensure that these patients are separated from the healthy population. ***Objective***: This study aimed to evaluate the dynamic and clinical implication of hematologic parameters in pregnant women with COVID-19. ***Methods***: The present study adopted the observational method and analysis of the haematological indices in pregnant women. The test group comprised 55 pregnant women with covid19 infection who admitted at the Mugda Medical college Hospital for treatment of COVID-19 complications, management of pregnancy complications and delivery. ***Result*:** The result of the blood RBC 46(83.64%), PCV/Hct 47(85.4%), Platelets count 19(34.55%), WBC 11(20%), MCV 12(21.82%), Lymphocytes 11(20%) showed a significant decrease among the group, while Neutrophil 8(14.55%) increased. ***Conclusion*:** The study concluded that pregnancy in women with COVID-19 has the tendency to alter haematological indices.

Keywords: Coronavirus; hematological parameters; pregnant women; severe acute respiratory syndrome.

INTRODUCTION

Several instances of pneumonia of unclear cause have been recorded in Wuhan, Hubei Province, China, since early December 2019, drawing widespread attention [1, 2]. Most of the patients had severe acute respiratory infection symptoms, and some of them developed acute respiratory distress syndrome (ARDS) and acute respiratory failure quickly. The Chinese Center for Disease Control and Prevention [3] identified a novel coronavirus from an infected patient using next-generation sequencing in early January 2020, and it was formally named severe acute respiratory syndrome Corona virus 2 (SARS-CoV-2) [4]; meanwhile, the disease was named Corona virus disease 2019 (COVID-19) by the World Health Organization (WHO). SARS-CoV-2 was the seventh member of the Corona virus family that infects humans, and it resembled the severe acute respiratory syndrome Corona virus (SARS-CoV) in certain ways [3, 5]. SARS-CoV-2 was transmitted from person to person, as evidenced by good evidence [6-9], leading in fast spread from Wuhan to other places. COVID-19 has recently been classified as a pandemic by the World Health Organization, indicating that more investigation is needed. Previous publications [2, 9, 10] briefly reviewed laboratory findings of COVID19 patients, emphasizing the importance of laboratory characteristics for hospitalized COVID-19 patients and the need for more research.

Due to factors such as increased oxygen demand, a raised diaphragm, and edema of the respiratory tract mucosa, pregnant women are more susceptible to respiratory infections [11]. Furthermore, the immunological response associated with pregnancy increases maternal sensitivity to intracellular infections such viruses [11, 12]. Pregnant women with viral illnesses (H1N1 influenza, Zika virus, and SARS-CoV) have been found to have a higher rate of complications and ICU hospitalizations than the general population [13-18].

OBJECTIVE OF THE STUDY

The goal of this study was to look at the dynamic profile of key hematological parameters in pregnant women with COVID-19.

MATERIALS AND METHODS

The present study adopted the observational method and analysis of the haematological indices in pregnant women. The test group comprised 55 pregnant women with covid19 infection who admitted at the Mugda Medical college Hospital for treatment of covid complications, management of pregnancy complications and delivery.

The researchers interacted and educated the participants about the aims and objectives of the research work, and then questionnaires were distributed to those who out of their will decided to freely participate in the research process. The numbered and labeled questionnaire was, however, filled and returned immediately.

The research questionnaire for the study was purposely designed to suit the study. It comprised two sections of demographic/personal variables and information relating to their pregnancy/medical history. Participants were free to tick any of the responses that suit their condition.

Purposive sampling was used to acquire the samples according to the inclusion criteria. All data were coded and entered into SPSS-23 for further analysis. The statistics used were both descriptive and inferential. Statistics used to describe data included frequency distribution, percent, mean, and standard deviation; graphs; tables; and figures; and inferential statistics.

RESULTS

This observational study took place in Mugda Medical College Hospital, among the patients who admitted for the treatment of treatment of covid complications, management of pregnancy complications and delivery. Among the 55 patients most of the patients (40%) age range was 33-37 years. The mean age was 31.22 ± 5.134.The following table shows the details.

Table 1: Age distribution of the patients

Age	Frequency	Percentage
18-22	4	7.3%
23-27	10	18.2%
28-32	14	25.5%
33-37	22	40.00%
38-42	5	9.00%
Total	**55**	**100**

Figure 1 shows that among the 55 patients 38.20% of the patients belongs to low class followed by 32.70% and middle class 29.10%.

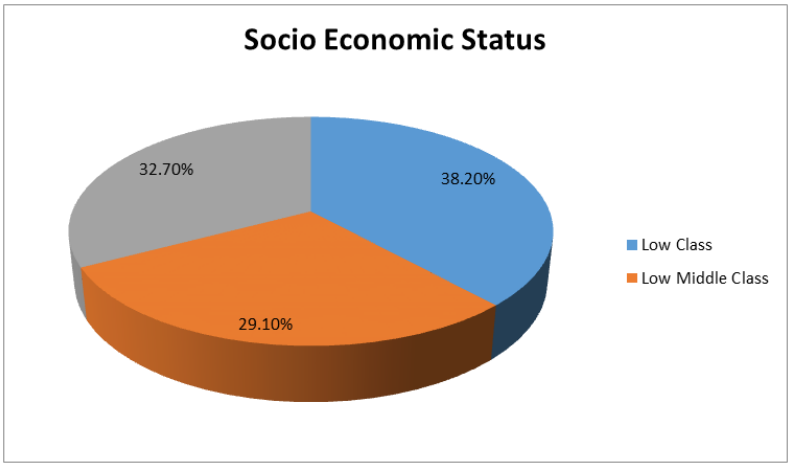

Figure 1: Socio economic status of the patients

Among the 55 participants whose blood samples were eventually accepted for haematological analysis most of the patients (45.46%) had their third trimester followed by second trimester 40.6%.

Table-2: Obstetric History of the patients

Status	Number	Frequency (%)
First trimester	08	14.54%
Second trimester	22	40.00%
Third trimester	25	45.46%s
Total	55	100

Among the 55 patients the highest no of patients 40(72.7%) had no medical disorder, 50(90.9%) had no surgical history and 41(74.5%) had no drug history. The following table shoed the details.

Table 3: Personal History of the Patients

Personal History	Yes	No
Medical History	15(27.3%)	40(72.7%)
Surgical History	5(9.1%)	50(90.9%)
Drug History	14(25.5%)	41(74.5%)

Parameter Pregnant women Reference range

The result of the blood RBC46 (83.64%), PCV/Hct47(85.4%), Platelets count19(34.55%), WBC11(20%), MCV 12(21.82%), Lymphocytes 11(20%) showed a significant decrease among the group, while Neutrophil 8(14.55%) increased. The following table Table shows the detail.

Table 4:

Hematological indices.	**Reference Range (g/dL)**	**Within Normal** 46(83.64%) **range**	**Outside of Normal Range**	**P value**
RBC	4.2-5.4 x10^6	9(16.36%)	46(83.64%)Decreased	.000
WBC	4.5 × 109^9/L	41(74.54%)	Leukocytes 3 (5.46%), Increased Leucopenia 11(20%) Decreased	.000
Platelet (thousand)	150–450	36(65.45%)	19(34.55%) Decreased	.000
PCV (%)	34.9–43.7Hb (g/dL)	8(14.56%)	47(85.44%)Decreased	.000
MCV	80-100 fL	43(78.18%)	12(21.82%) Decreased	.000
Lymphocytes (%)	15.7–46	44(80%)	11(20%)Decreases	.000
Neutrophil (%)	45–74	47(85.45%)	8(14.55%) Increases	.000
Monocyte(%)	0.5-1.0	51(92.73%)	4(7.27%)Decreases	.000

DISCUSSION

The aim of the present study was to evaluate the dynamic and clinical implication of haematological changes that occurs during pregnancy with Covid19 infection.Many studies have detailed clinical aspects of COVID-19 individuals, including epidemiological, clinical, laboratory, radiographic, and therapeutic data [2, 3, 9, 19, 20], where the majority of the laboratory findings were presented. The noteworthy differences are shown. Changes in circulating blood cells, such as abnormalities in the number and function of lymphocytes, were also important features in patients with COVID-19, similar to those seen in severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) [21, 22]. Lympopenia on admission has been reported in a number of studies, with percentages ranging from 36.9% to 83.2 percent [2, 9, 23, 24].

From the result presented in Table 4, it was discovered that there was a significant decrease (P<0.0) in the PCV of the test group 47(85.45%). This finding is in line with those of James *et al*., [25]. The decrease in PCV may be due to increase in plasma volume during pregnancy which causes haemodilution, and increased rate of infection especially, hormonal changes, and conditions that promote fluid retention and iron deficiency.

The result of the blood MCV showed a significant difference (P<0.0) between the test12(21.82%) g/dL while lymphocytes, Neutrophil, platelets, blood cell count (WBC) showed also significant differences. there was an increased level in Neutrophil8(14.55%); who observed a significant variation in the total WBC count of test groups compared to control. The observation of the various significant variations between the lymphocytes, and platelets has also been observed in previous studies by Wahed *et al*., [26]. In addition, lower platelet count had been observed in patients with more severe COVID-19 [27], as reported in patients with SARS [28, 29], and thrombocytopenia was associated with an increased risk of in-hospital mortality [30].

CONCLUSION

In this single-center study of 72 patients with confirmed COVID-19 admitted at Mugda Medical College Hospital. Changes in vital hematological parameters (leukocyte count, neutrophil count, lymphocyte count, platelet count and NLR) had been characterized in the course of hospitalization and. It can be concluded that pregnancy in women with covid19 alters haematological indices such as PCV, MCH, MCHC than that during normal pregnancy.

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