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Evaluating Some Biochemical Parameters In Pregnancy Women With COVID-19 Infection

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ABSTRACT— Coronavirus infection (COVID-19) is a global public health issue at the present. However, previous research on the results of COVID-19 blood tests in pregnant women is inadequate. the goal of the study: The goal of this study was to study some biochemical tests in pregnant women in Mosul, Iraq, who had COVID 19 infection. A case-control research involving 331 pregnant women (113 with COVID-19, 110 without COVID-19, and 108 healthy non-pregnant women) who paid to visit a private laboratory in Mosul, Iraq from the date of 15/11\2021 to 15/1 2022. All patients have already been diagnosed with COVID-19 and they have symptoms and signs. Each of the patients and healthy controls had their whole blood samples collected to be analyzed for; serum ferritin, GOT, and GPT. Also analyze lipid profile as Total cholesterol, T.G, HDL-c, LDL-c, and VLDL-c. The large percentage of pregnant women with Covid-19 had greater levels of serum ferritin, ALP, and lipid profile than pregnant women without Covid-19, according to the current study. In addition, pregnant women who had Covid-19 had lower serum GOT and GPT levels than pregnant women who did not have Covid-19. Infections with Covid-19 may elevate the levels of serum ferritin, ALP, and lipid profile. As a result, it's necessary to keep a check on these biochemical parameters, especially in those who have severe Covid-19 infection.

KEYWORDS: Covid-19, biochemical parameters, ferritin, lipid profile

1. INTRODUCTION

In the year 2019, COVID-19, a new coronavirus that causes coronavirus disease (SARS-CoV-2), was discovered. It seems similar to previously studied zoonotic viruses including the severe acute respiratory syndrome coronavirus (SARS-CoV-1) and the Middle East respiratory syndrome coronavirus (MERS-CoV) [10]. Since its discovery in Wuhan, China in December 2019, COVID-19 has infected over 3.8 million individuals worldwide and killed over 260,000 people [21], [15]. The World Health Organization (WHO) classified the COVID-19 outbreak a public health emergency of international concern on January 30, 2020, indicating a high global danger [17]. Because of their immunocompromised status, pregnant women are especially vulnerable to COVID-19 [9]. Immune system changes that occur during pregnancy can result in premature birth, spontaneous abortion, endotracheal intubation, intrauterine growth restriction, critical care unit admission, renal failure, intravascular coagulopathy, and transmission to the fetus or child [14]. Signs, pregnant complications, CT manifestations, and mom vertical transmission have all been recorded in the majority of COVID-19-infected pregnant women [2], [16]. The need for cesarean delivery was questioned at the outset of the COVID-19 epidemic since parturients with COVID-19 may have a greater risk of miscarriage, early birth, and infant death [23]. The underlying mechanisms and side effects of COVID-19 have received a lot of study, but nothing is known about how to treat it during pregnancy. COVID-19's clinical characteristics in pregnant and non-pregnant persons were shown to be identical in previous investigations [14]. However, because the virus can cause serious issues in both mothers and babies,

intensive prenatal screening and long-term monitoring are essential [12]. The number of research on this subject is few, and the findings are inconsistent. As a result, the researchers wanted to compare the results of various serum biochemical tests between pregnant women with COVID-19 infection and healthy pregnant women without COVID-19 who served as a control group.

2. Materials and Method

2.1 Study design

Between 15\11\2021 and 15\1\2022, 113 pregnant women with positive Covid-19 rapid and molecular tests, whose ages ranged from 18 to 42 years, with a mean of 28.36 years, 110 healthy pregnant women, whose ages ranged from 20 to 39 years, with a mean of 29.83 years, and 108 healthy non-pregnant women, whose ages ranged from 21 to 33 years, with a mean of 26.41 years, participated in this All Covid-19-positive pregnant women had Covid-19 symptoms and signs, and all participants or their families gave permission.

2.1.1 Sampling

In our study, we obtained whole fresh blood from all of the participants in each group. The serum was separated by centrifugation at 3000 rpm for 10 minutes, then frozen at -20 °C for biochemical testing after the blood samples were put in plain tubes and allowed to clot.

2.2 Biochemical analysis

The biochemical parameters of liver alkaline phosphatase (ALP), serum glutamic oxaloacetic transaminase (GOT), and glutamic pyruvic transaminase (GPT) were determined according to standard protocol using a COBAS INTEGRA 800VR (Roche Diagnostics GmbH, Mannheim, Germany) (USA). Serum ferritin levels were measured using the ELFA method with BioMerieux kits (Enzyme-Linked Fluorescent Assay). The serum lipid profile was determined using a semi-automated analyzer and a Biolaba kit (France). Each participant's full lipid profile was examined. To quantify TC, TG, HDL cholesterol, LDL cholesterol, and VLDL cholesterol, researchers employed modified Roeschlau's approach for cholesterol, Wako method with modifications by McGowan et al and Fossati et al for triglycerides, and Phosphotungstic Acid method for HDL cholesterol.

Friedwald's algorithm was used to determine VLDL and LDL levels:

- ✓ Triglycerides/5 = VLDL
- ✓ T. Cho – (VLDL+HDL) = LDL

2.3 Statistical analysis

Data was collected, processed, and statistically analyzed to design cross-tabs and draw applicable findings using the SPSS statistical software version 28. An independent t-test and one-way ANOVA were used to tabulate the observed findings and examine the variable groups. When the t-test (p) result was less than 0.05, it was considered significant, and when it was greater than 0.05, it was considered non-significant. The effects of continuous variables were expressed using the mean ± standard deviation.

3. Results

Table 1 showed the results of serum ferritin, GOT, GPT, and ALP parameters among Pregnant with COVID-19 infection, normal pregnant women without COVID-19 infection, and Healthy women (Controls). The results reveal significantly higher mean of Ferritin and ALP (9840.8 ± 218.12 ng\ml; 2185±635.61 U\L) respectively in Pregnancy with COVID-19 infection than Healthy pregnant women (124.2 ± 19.68 ng\ml; 154.34±43.51U\L) respectively, and Healthy women (120.9±21.54 ng\ml; 136.73±48.93 U\L) respectively. In contrast, the result of GOT, and GPT reveals that the lowest mean with

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Pregnant women with COVID-19 (7.83±0.81 U\L, 8.54±1.87 U\L) respectively than Healthy pregnant women (36.88±13.07 U\L, 42.28±12.84 U\L) respectively and Healthy women (29.76±12.94 U\L, 31.24±9.03 U\L) respectively (Table 1). The statistical significance of serum Ferritin, ALP, GOT, and GPT tests measured among Pregnancy with COVID-19 infection is compatible with clinical significances ($p < 0.05$) and showed a significant ($p<0.05$) results when compared to Healthy pregnant women, and Healthy women (controls). See table 1

Table 1: Mean ± Std. deviation of Ferritin, ALP, GOT, and GPT among groups understudy

Parameters	Ferritin (ng/ml)		ALP (U/L)		GOT (U\L)		GPT (U\L)	
Statistical Study group	Mean ± S.D	S. E.	Mean ± S.D	S. E.	Mean ± S.D	S. E.	Mean ± S.D	S. E.
Pregnant women with COVID-19	9840.8 ± 218.12 a	57.63	2185±635.61a	375.22	7.83±0.81a	0.42	8.54±1.87a	0.71
Healthy pregnant women	124.2 ± 19.68 b	4.38	154.34±43.51b	39.77	36.88±13.07b	2.98	42.28±12.84b	2.83
Healthy women (Controls)	120.9±21.54 b	7.64	136.73±48.93b	42.82	29.76±12.94b	3.11	31.24±9.03b	3.68

*Different letters represent statistically significant differences at the 0.05 level.
* At the P.0.05 level, similar letters represent that there are no significant differences.

The results of serum TG, Cholestrol, HDL-c, LDL-c, and VLDL-c tests among Pregnant women with COVID-19, Healthy pregnant women, and Healthy women (Controls) were summarized in table 2. The results reveal significantly higher mean of TG (mmol/l), Cholestrol (mmol/l), LDL-c (mmol/l), and VLDL-c (mmol/l) in Pregnant women with COVID-19(5.74±1.12, 13.71±4.63, 7.92±2.64, and 3.27±1.32) respectively than Healthy pregnant women (3.16±0.94, 8.57±3.22, 5.67±1.78, and 2.13±0.95) respectively, and Healthy women (1.7±0.51, 5.18±1.97, 0.94±0.31, 0.82±0.21) respectively. while, the result of HDL-c (mmol/l) showed that the lowest mean with Pregnant women with COVID-19 (0.49±0.13) than Healthy pregnant women (0.63±0.2) and Healthy women (8.38±2.38) (Table 2). Furthermore, the statistical significance of serum TG, Cholestrol, LDL-c, and VLDL-c tests measured among Pregnancy with COVID-19 infection is compatible with clinical significances ($p < 0.05$) and showed a significances ($p<0.05$) results when compared to Healthy pregnant women and Healthy women while HDL-c showed a non-significances($p<0.05$) results when compared to Healthy pregnant women, and Healthy women. See table2

Table 2: Mean ± Std. deviation of lipid profile among groups under study

Parameters	TG-(mmol/l)		Cho (mmol/l)		HDL-c (mmol/l)		LDL-c (mmol/l)		VLDL-c (mmol/l)	
Statistical Study groups	Mean ± S.D	S. E.	Mean ± S.D	S. E.	Mean ± S.D	S. E.	Mean ± S.D	S. E.	Mean ± S.D	S. E.

Pregnant women with COVID-19	5.74±1.12 a	0.52	13.71±4.63 a	1.47	0.49±0.13 a	0.18	7.92±2.64 a	0.199	3.27±1.32 a	0.43
Healthy pregnant women	3.16±0.94 b	0.41	8.57±3.22 b	1.51	0.63±0.2 a	0.22	5.67±1.78 b	0.83	2.13±0.95 b	0.51
Healthy non-pregnant women (Controls)	1.7±0.51 c	0.23	5.18±1.97 c	0.36	8.38±2.38 b	0.39	0.94±0.31 c	0.25	0.82±0.21 c	0.13

*Different letters represent statistically significant differences at the 0.05 level.
* At the P.0.05 level, similar letters represent that there are no significant differences.

4. Discussion

Several viruses have been documented to affect the mother and fetus during pregnancy, which may provide insight into COVID-19's potential impact and mechanism during pregnancy. The coronavirus disease 2019 (SARS-CoV-2) pandemic, which is caused by the severe acute respiratory sickness coronavirus 2, is affecting many women all over the world (COVID-19). Even though preliminary Chinese data showed that pregnant women infected with SARS-CoV-2 had no worse outcomes than non-pregnant women of the same age, additional study is needed [3]. Our findings revealed a significant increase in serum ferritin and ALP in pregnancy with COVID-19 infection compared to normal pregnancy without COVID-19 infection, which is consistent with previous research that found significantly higher ALT, ferritin, and procalcitonin levels in pregnancy with severe COVID-19 infection compared to pregnancy without COVID-19 infection ($p < 0.05$) [4]. Several studies have connected elevated ferritin levels to a negative result [11]. Because iron is an essential micronutrient for viruses, the immune system of the host decreases iron availability as a protective strategy during infections, resulting in greater ferritin levels [19].

Additional biochemical analyses revealed abnormalities in liver enzymes such as ALP, GOT, and GPT, suggesting that antibiotics, followed by antiviral medicine, were administered to the majority of pregnant women, perhaps causing abnormalities in liver enzymes [4], [6]. Pregnant women with COVID-19 showed aberrant bilirubin, ALT elevation, and AST elevation, according to a cohort investigation of 1,099 COVID-19 cases [5]. 2–11 % had liver comorbidities during COVID-19, and 14–53 percent had abnormal AST and ALT levels [24]. The study's ability to detect ALT and AST variations may be limited due to the small number of pregnancy COVID-19 infection participants. In pregnancy with COVID-19infection, however, there was no difference in ALT or AST values [18].

To the best of the researchers' knowledge, this is the first case-control research to investigate at the lipid profile in COVID-19-positive pregnant women. COVID-19 pregnant women had significantly higher levels of TC, Cholesterol, LDL-C, and V LDL-C, according to the findings. This study's findings were similar to those of other research conducted in China and India [13]. Dylipidemia can develop as a result of a viral infection's protracted inflammation, and lipid metabolism is essential for viral replication, membrane homeostasis, endocytosis, and exocytosis [1].

In fact, abnormal lipid metabolism was observed after recovering from a prior SARS-CoV-1 infection, confirming a biological link [22]. Triglyceride levels grow during pregnancy as a result of estrogen and hepatic lipase activity. Hyperlipidemia is marked by a decrease in lipid catabolism at the tissue level as a

result of decreased lipoprotein lipase enzyme activity and insulin resistance [8]. However, the underlying cause of abnormal TC, Cholesterol, HDL-C, and LDL-C levels in COVID-19 individuals remains unknown. In this regard, a number of ideas have been suggested. To begin with, the liver is an important part of lipid metabolism, and SARS-CoV-2 might harm the liver, causing changes in lipoprotein absorption and production. According to a research, nearly half of COVID-19 patients had a moderate rise in liver markers alanine transaminase (ALT), aspartate transaminase (AST), and alkaline phosphatase (ALP), indicating mild to moderate liver impairment [20]. Excessive inflammation, which leads to alterations in lipid metabolism, is another notable feature in patients of COVID-19 [23]. This is especially true for patients who have had serious illnesses or who have died. Third, the virus's inflammatory response may alter vascular permeability, allowing cholesterol molecules to escape into tissues like alveolar gaps and cause exudates. The exudates are high in protein and cholesterol [7]. In summary, the findings suggest that COVID-19 infection in pregnant women might cause changes in serum ferritin, liver enzymes, and lipid profile. As a result, ferritin and liver enzyme monitoring is necessary during COVID-19 therapy of pregnant women, particularly for those with chronic illnesses.

5. Conclusion

In pregnant women with COVID-19 infection, the case-control analysis revealed significant differences in levels of ferritin, ALP, GOT, GPT, and LDL-C, as well as higher cholesterol and TG, when compared to pregnant women without COVID-19 infection. Due to the lipid profile is inexpensive and widely available in all laboratories, it may be useful in determining the severity and prognosis of COVID-19 in resource-constrained locations.

6. References

[1] Abu-Farha M, Thanaraj TA, Qaddoumi MG, Hashem A, Abubaker J, Al-Mulla F. The role of lipid metabolism in COVID-19 virus infection and as a drug target. Int J Mol Sci. 2020; 21(10):3544.

[2] Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, Li J, Zhao D, Xu D, Gong Q, Liao J, Yang H, Hou W, Zhang Y. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: A retrospective review of medical records. Lancet 2020; 395, 809–815.

[3] Chen H, Guo JJ, Wang C, Luo F, Yu XC, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. Lancet 2020; 395: 809–815.

[4] Goel H, Gupta I, Mourya M, Gill S, Chopra A, Ranjan A, Rath GK, Tanwar P. A systematic review of clinical and laboratory parameters of 3,000 COVID-19 cases. Obstet Gynecol Sci. 2021; 64(2):174-189.

[5] Guan WJ, Ni Z Y, Hu Y, Liang WH, Ou CQ, He J X, et al. Clinical characteristics of coronavirus disease 2019 in China. N. Engl. J. Med. 2020; 80: 656–665.

[6] Haddad MF, Alhamadany AYM, and AlTaie AA. Some biochemical parameters in patients of covid-19 in mosul city, Iraq. Biochem. Cell. Arch. 2021; 21(1): 2091-2096.

[7] Heffner JE, Sahn SA, and Brown LK. Multilevel likelihood ratios for identifying exudative pleural effusions(∗) Chest 2002; 121(6):1916–1920.

[8] Herrera E, Desoye G: Maternal and fetal lipid metabolism under normal and gestational diabetic

conditions. Horm Mol Biol Clin Investig. 2016; 26(2):109–127.

[9] Liang H, and Acharya G. Novel corona virus disease (COVID-19) in pregnancy: what clinical recommendations to follow? Acta Obstet. Gynecol. Scand. 2020; 99: 439–442.

[10] Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. J Travel Med. 2020; 27:taaa021.

[11] Liu Z, Sun R, Li J, Cheng W, Li L. Relations of Anemia With the All-Cause Mortality and Cardiovascular Mortality in General Population: A Meta-Analysis. The American journal of the medical sciences 2019;358(3):191-9.

[12] Luo Y, Yin K. Management of pregnant women infected with COVID-19. Lancet Infect Dis. 2020; 20: 513– 514.

[13] Pérez-Torres I, Guarner-Lans V, Soria-Castro E, Manzano-Pech L, Palacios-Chavarría A, Valdez-Vázquez RR, Domínguez-Cherit JG, Herrera-Bello H, Castillejos-Suastegui H, Moreno-Castañeda L, Alanís-Estrada G, Hernández F, González-Marcos O, Márquez-Velasco R and Soto ME. Alteration in the Lipid Profile and the Desaturases Activity in Patients With Severe Pneumonia by SARS-CoV-2. Front. Physiol. 2021; 12:667024.

[14] Qiao J. What are the risks of COVID-19 infection in pregnant women? Lancet. 2020; 395: 760– 762.

[15] Rothan HA, and Byrareddy S N. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J. Autoimmun. 2020; 109:102433.

[16] Schwartz D. A. An analysis of 38 pregnant women with COVID-19, their newborn infants, and maternal-fetal transmission of SARS-CoV-2: maternal coronavirus infections and pregnancy outcomes. Arch. Pathol. Lab. Med. 2020; 144: 799–805.

[17] Sohrabi C, Alsafi Z, O'neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). Int. J. Surg. 2020; 76: 71–76.

[18] Sun Guoqiang, Zhang Yizhi, Liao Qing, and Cheng Yao. Blood Test Results of Pregnant COVID-19 Patients: An Updated Case-Control Study. Frontiers in Cellular and Infection Microbiology 2020; 10: 560899.

[19] Taneri PE, Gómez-Ochoa SA, Llanaj E, Raguindin PF, Rojas LZ, Roa-Díaz ZM, et al. Anemia and iron metabolism in COVID-19: a systematic review and meta-analysis. European journal of epidemiology 2020;35(8):763-73.

[20] Wei X, Zeng W, Su J, Wan H, Yu X, Cao X. Hypolipidemia is associated with the severity of COVID-19. J Clin Lipidol. 2020; 14(3):297–304.

[21] World Health Organization. COVID-19. 2020; Available online at: https://covid19.who.int/ (accessed 14 December, 2021).

[22] Wu Qi, Zhou Lina, Sun Xin, Yan Zhongfang, Hu Chunxiu, Wu Junping, Xu Long, Li Xue, Liu, Huiling, Yin Peiyuan, Li Kuan, Zhao Jieyu, Li Yanli, Wang Xiaolin, Li Yu, Zhang Qiuyang, Xu Guowang, Chen Huaiyong. Altered Lipid Metabolism in Recovered SARS Patients Twelve Years after Infection. Scientific Reports 2017; 7(1):9110.

[23] Wu Y, Liu C, Dong L, Zhang C, Chen Y, Liu J, et al. Coronavirus disease 2019 among pregnant Chinese women: case series data on the safety of vaginal birth and breastfeeding. BJOG. 2020; 127, 1109–1115.

[24] Zhang C, Shi L, and Wang, FS. Liver injury in COVID-19: management and challenges. Lancet Gastroenterol. Hepatol. 2020; 5: 428–430.