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Article

Evaluation of Some Biochemical Variables in Pregnant Women who Have Aborted in The Third Month

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Abstract: The study aims to estimate some of the biochemical variables associated with pregnant women who aborted in the first months of pregnancy compared to healthy women and the relationship of these variables to early abortion.This includes measurement of prothrombin time, partial prothrombin time, International Normalized Ratio (INR), estrogen measurement, and measurement of glutathione and malondialdehydein the blood serum of the groups under study.The current study is designed by taking 130 blood samples from females.The samples are divided into two groups, the first is the healthy group as a control group including 70 samples from healthy women, and the second is the group of patients with aborted pregnant women in the third month of pregnancy which includes 60 samples with their ages ranging between 35-45 years. Prothrombin time (Pt) and partial prothrombin time (Ptt) measurements, as well as the International Normalized Ratio (INR), were significantly higher in the group of women who had abortions than in the control group of healthy women, according to the current study's findings. The findings also show that, in comparison to the control group of healthy women, the group of aborted women had significantly higher levels of estrogen and lower levels of glutathione.

Keywords: Abortion, Hemostatic Profile, Estrogen, Oxidative street

Introduction

Pregnancy is a physiological process that naturally causes extra effort to pregnant females, which requires the body to prepare functionally and nutritionally to suit the excessive stress [1].The aim of the changes that occur to the pregnant woman is to link the needs of the mother with the needs of the fetus for a correct normal birth [2]. Pregnant women are five times more likely than non-pregnant women to produce abnormal blood clots, therefore the body naturally tries to lower the risk of bleeding during and after childbirth by increasing hormones and blood changes, including particular clotting factors [3].The possibility of a pregnant woman's exposure to blood clots is during the first three months of pregnancy, and the occurrence of blood clots during pregnancy may result in the emergence of many complications, including abortion, that is, the death of the fetus in the mother's womb before it reaches the twentieth week of pregnancy [4].

When the blood clots in the venous vessel connected to the placenta, this leads to obstruction of blood flow in the placenta and thus reduces the delivery of oxygen and the necessary nutrients to the fetus, which weakens the fetus and may lead to abortion [5]. Pregnancy causes major changes in the hemostatic profile, including an increase in thrombin and a decrease in the rate of protein S and protein C, which act as anticoagulants, as well as an increase in the activity of fibrinogen factor, whose rate varies during pregnancy, increasing three times from its normal rate with the coagulation factors VII, VIII, IX, X and twelfth, and Von Willebrand factor (Vwf) [6]. Increased clotting factor levels result from increased protein synthesis, which is facilitated by elevated estrogen levels [7]. At the start of the third month of pregnancy, the placenta produces sufficient amounts of estrogen and progesterone for the normal continuation of pregnancy.Estrogen levels continue to rise to stimulate the growth of muscle mass and blood supply to the uterus. In addition, high levels of progesterone and estrogen inhibit the secretion of LH, FSH, which prevents menstruation and ovulation during pregnancy [8]. Hormonal changes during pregnancy and risk factors for thrombosis can lead to instability of clotting factors and fibrinolysis that alters the blood coagulation system's hemodynamics during pregnancy [9].

Since the level of lipid peroxide products rises physiologically continuously during pregnancy, a carefully controlled balance between the generation of reactive oxygen species (ROS) and the efficacy of antioxidant components is necessary to preserve the functional integrity of all cells and tissues in a normal pregnancy [10]. The elevated amounts of circulating lipoproteins, the placenta's prooxidant activity, and the alteration in the basal metabolic process are some of the most significant variables that contribute to an increase in lipid peroxidation during pregnancy [11], [12]. Because oxidative stress is caused by an imbalance between oxidants and antioxidants, an imbalance between oxidants and antioxidants may generate oxidative stress in the placenta. Premature abortion is one potential consequence of placental disorders [13]. Numerous studies have demonstrated that oxidative stress during pregnancy significantly affects the placenta and systemic pathophysiological processes, resulting in vascular problems and weakened immunity and endothelium. Because of this, oxidative stress plays a significant role in a number of pregnancy-related clinical disorders, including preeclampsia, spontaneous and repeated abortions, and premature birth [14], [15].

The oxidative stress increasing without an increase in level of anti-oxidative enzyme causes damage to the cell wall, where free radicals and lipids covalently bind on the cell membrane leading to the peroxidative lipid, which is the process of interaction of free radicals with unsaturated fatty acids on the cell membrane and lipoproteins in the cytoplasm as Malondehyde acts as a function of lipid peroxidation [16].

Materials and Methods

The current study is conducted by taking 130 female samples. The samples were collected from healthy and non-pregnant women (70 samples) for control group. The second group is a group of patient women who have aborted in the third month of pregnancy and consists of 60 samples with ages ranging between 35-45 years. The data of the women is obtained according to asystematized questionnaire. The amount of 5 ml of blood is drawn from each sample via a single-use syringe. After the process of drawing blood for each sample, the blood samples are placed in special tubes, where the samples are divided by putting some into test tubes containing sodium citrate anticoagulant for the preparation of plasma, and the others in tubes containing gel to prepare the serum. The tests conducted encompass the determination of prothrombin time, partial prothrombin time, and international normalized ratio, measurement of estrogen, measurement of glutathione and malondehyde in the blood serum of the groups under study [17], [18], [19], [20]. An independent T-test is applied to explore the significant differences in vital signs between groups.

Result and Discussions

Table (1) shows the mean results of the biochemical variables under study in the group of healthy women (control group) and the group of aborted women in the third month of pregnancy.

Table 1. The mean ± standard deviation of biochemical variables in the group of healthy women (control group) and the group of aborted women in the third month of pregnancy

Biochemical Parameters	The Mean± S.D		P≤0.05
	Control group	Aborted Woman group	
Prothrombin Tim (Pt) Sec	10.3±1.52	25.3±5.2	0.05
Partial Thromboplastin Tim(Ptt) Sec	33.2±4.62	70.3±6.2	0.05
International Normalized Ratio (INR)%	0.93±0.21	3.73±0.77	0.05
Esterogen HormonePg/ml	38.6±3.2	97.2±5.77	0.05
Glutathione(GHS)µmole/L	9.86±3.28	1.51±0.35	0.05
Malondialdehyde (MDA)µmole/L	2.54±0.33	4.8±0.21	0.05

Assessment level of the Prothrombin (PT)

The investigation show a significantly increasing at the level P≤0.05 in the prothrombin time, as the mean of the aborted women in the third month of pregnancy group is (25.3 ± 5.2 Sec) compared to the control group of no-pregnant women (10.3 ± 1.52 Sec)) as shown in Figure (1).

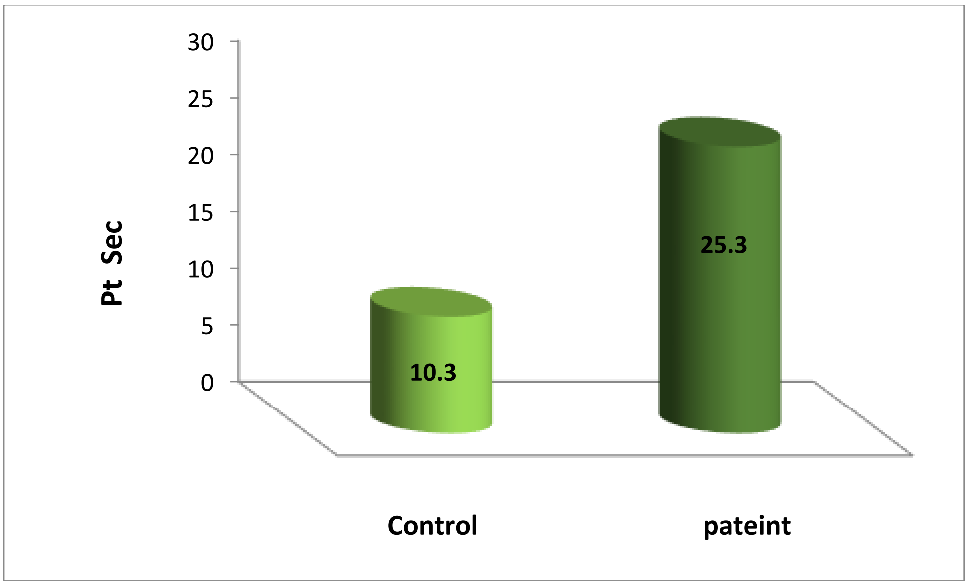

Figure 1. The standard deviation rate of the **Prothrombin** level of women.

Assessment level of the Partial Thromboplastin Tim (PTT)

The results also show a significant increase at the probability level (P≤0.05) in the partial thromboplastin time and the international normalized ratio (INR), as the mean ± standard deviation of Ptt for the group of aborted women in the third month of pregnancy is(70.3 ± 6.2 Sec) compared to the control group of non-pregnant women, where the mean ± standard deviation is (33.2±4.62 Sec) as shown in Figure (2).

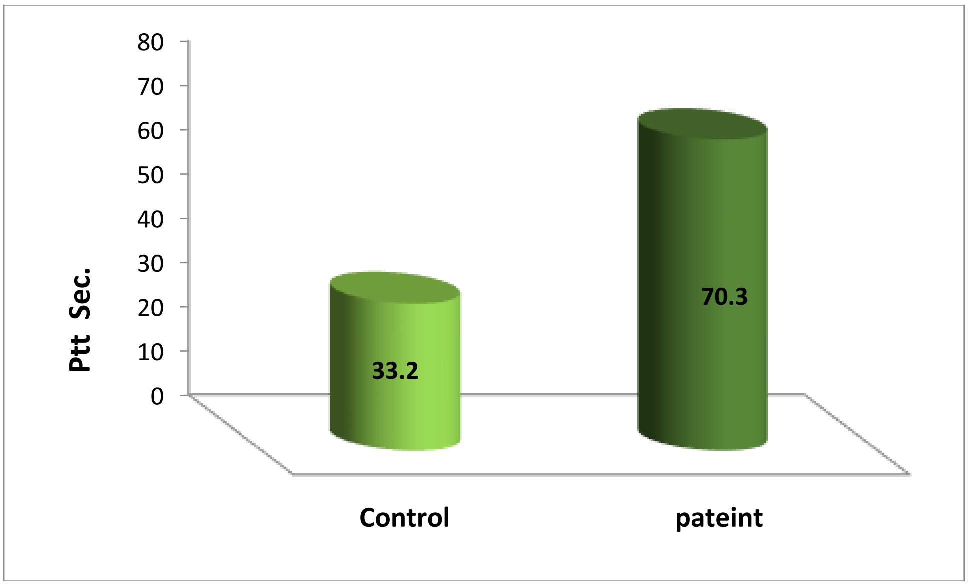

Figure 2. The standard deviation rate of the **Partial Thromboplastin Tim** level of women.

Assessment Level of the International Normalized Ratio (INR)

As illustrated in Figure (3), the INR's mean ± standard deviation is 3.73% ± 0.77, while the control group of non-pregnant women had a mean ± standard deviation of 0.93% ± 0.21. The current study's findings are in line with those of Maabet et al., who found that women who experience repeated abortions during the first few months of pregnancy have significantly higher partial prothrombin time, prothrombin time, and the international nominalized ratio when compared to healthy women [21]. The findings contradict those of Bamisaye's study, which found no significant differences in thromboplastin time when compared to the control group of non-pregnant women and a significant decrease in thrombin and INR measurements in the first few months of pregnancy when compared to non-pregnant women [22].

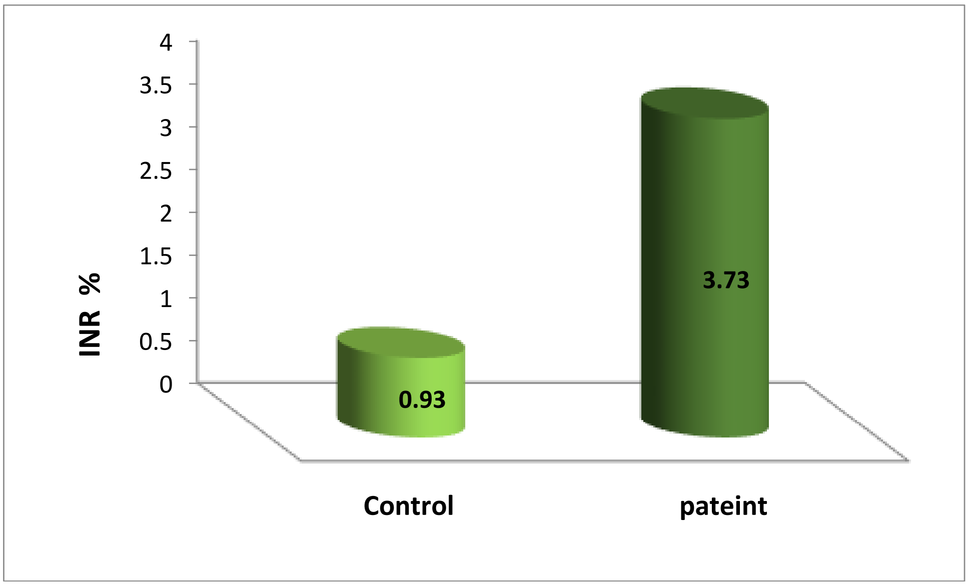

Figure 3. The standard deviation rate of the **International Normalized Ratio** level of women.

Assessment Level of the Estrogen

According to Figure (4), the mean ± standard deviation of the group of women who were aborted in the third month of pregnancy was 97.2 ± 5.77 pg/ml, while the control group of women who were not pregnant had a mean ± standard deviation of 38.6 ± 3.2 pg/ml. This indicates a significant increase in the level of estrogen at the probability level (P≤0.05).

The current study's results are in line with those of Xu et al., who found a link between high estrogen levels and the risk of abortion during the first few weeks of pregnancy [23]. Furthermore, the current study's findings contradict those of the Xuet *al*. study, which found that a group of pregnant women at risk of abortion had lower estrogen levels [24]. Additionally, the new study contradicts the findings, which shown that the estrogen level was lower in the group that had an abortion than in the group that continued to carry the pregnancy to term [25].

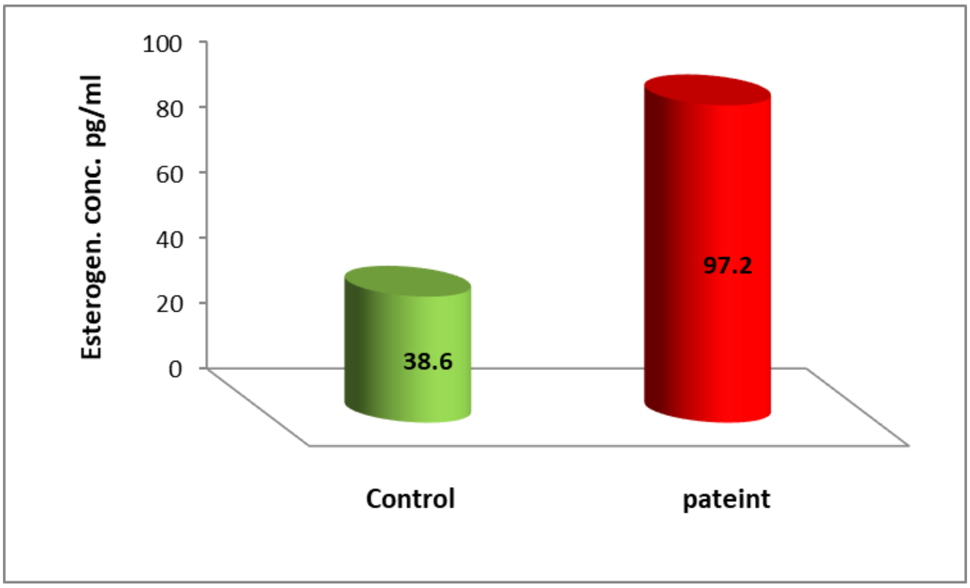

Figure 4. The standard deviation rate of the **Estrogen** level of women.

Assessment Level of the Glutathione

The results also demonstrate a significant drop in glutathione levels at the probability level P≤0.05. The group of women who were aborted in the third month of pregnancy had a mean ± standard deviation of 1.51 ± 0.35 µmole/L, while the control group of non-pregnant women had a mean ± standard deviation of 9.86 ± 3.28 µmole/L (Figure 5).

The findings are in line with Ghneim's research, which shows that the group of women who had repeated abortions had much lower glutathione levels than both the pregnant and non-pregnant groups [26].

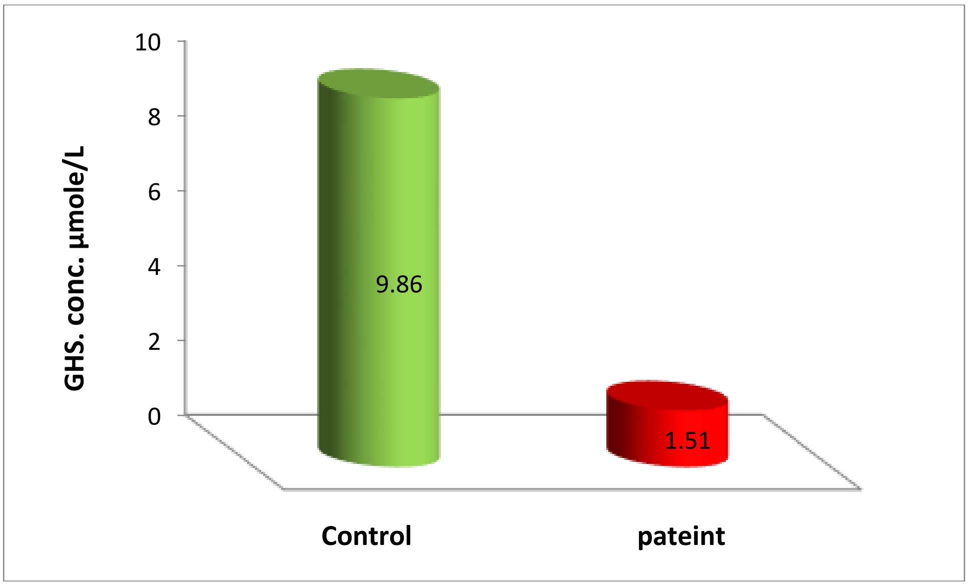

Figure 5. The standard deviation rate of the **Glutathione** level of women.

Assessment Level of the Malondialdehyde

The current study's findings show that the level of malondialdehyde has significantly increased at the probability level P≤0.05. As illustrated in Figure (6), the control group of non-pregnant women had a mean ± standard deviation of 2.54 ±0.33 μmole/L, while the group of aborted women in the third month of pregnancy had a mean ± standard deviation of 4.8 ± 0.21 μmole/L.

Malondialdehyde (MDA), one of the numerous substances generated by the lipid oxidation process, was found in the mitochondrial section of placental cells and may cause problems including spontaneous or repeated abortion [27]. The results are consistent with a study bySutama whohas indicated to an increase of MDA level in the blood serumfor the group of cases at risk of abortion as a risk factor compared to the normal pregnancy group [28].

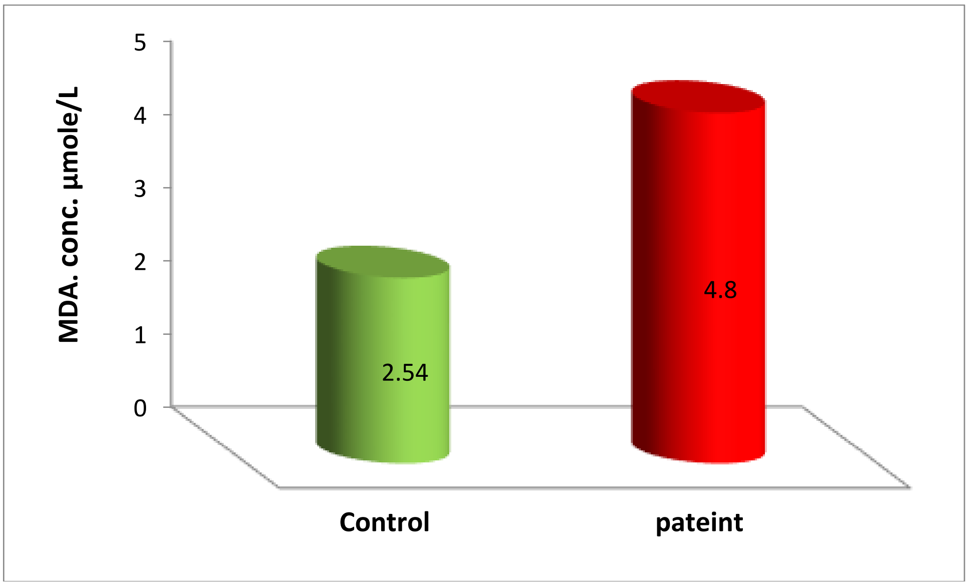

Figure 6. The standard deviation rate of the **Malondialdehyde** level of women.

Conclusion

Based on the research conducted, the findings reveal a significant difference in various biochemical variables between pregnant women who have undergone an abortion in the third month of pregnancy and healthy control women. The study indicated that prothrombin time (PT), partial prothrombin time (Ptt), and the International Normalized Ratio (INR) were notably higher in the aborted group, while estrogen levels were significantly increased and glutathione levels were markedly reduced. Additionally, malondialdehyde (MDA), a marker for oxidative stress, was found to be elevated in the group of women who had experienced an abortion. These results suggest that changes in coagulation parameters and oxidative stress markers may be associated with the occurrence of early pregnancy loss. This study provides valuable insights into the biochemical disturbances that may contribute to miscarriage and highlights the importance of monitoring these parameters in pregnant women to better understand and possibly prevent abortion-related complications. Further studies are necessary to explore the underlying mechanisms and potential therapeutic interventions to mitigate such risks during pregnancy.

REFERENCES

[1] Medved, V.I., Zhuk, S.I., Konkov, D.H., Litvinov, S.K., Ocheretna, O.L., "The evidence bases of etiopathophysiology and preventive clinical management of nausea and vomiting in pregnancy," Reprod. Health Women, vol. 4, pp. 13-28, 2023.

[2] G. R. Gangakhedkar, and A. P. Kulkarni, "Physiological changes in pregnancy," Indian J. Crit. Care Med., vol. 25, Suppl. 3, p. S189, 2021.

[3] C. N. Bagot et al., "Changes in laboratory markers of thrombotic risk early in the first trimester of pregnancy may be linked to an increase in estradiol and progesterone," Thromb. Res., vol. 178, pp. 47-53, 2019.
[4] Langer and N. T. Connell, "Update on pregnancy-associated venous thromboembolism," Thromb. Update, vol. 8, 100107, 2022.
[5] M. A. Ortega et al., "The pivotal role of the placenta in normal and pathological pregnancies: a focus on preeclampsia, fetal growth restriction, and maternal chronic venous disease," Cells, vol. 11, no. 3, p. 568, 2022.
[6] K. M. Nichols et al., "Venous thromboembolism associated with pregnancy," J. Am. Coll. Cardiol., vol. 76, no. 18, pp. 2128-2141, 2020.
[7] M. Y. Abou-Ismail, D. C. Sridhar, and L. Nayak, "Estrogen and thrombosis: a bench to bedside review," Thromb. Res., vol. 192, pp. 40-51, 2020.
[8] F. Parisi et al., "The pathophysiological role of estrogens in the initial stages of pregnancy: molecular mechanisms and clinical implications for pregnancy outcome from the periconceptional period to end of the first trimester," Hum. Reprod. Update, vol. 29, no. 6, pp. 699-720, 2023.
[9] Hussein et al., "Unraveling the clot-miscarriage nexus: mechanisms, management, and future directions in thrombosis-related recurrent pregnancy loss," Clin. Appl. Thromb. Hemost., vol. 31, 10760296251339421, 2025.
[10] T. Hussain et al., "The role of oxidative stress and antioxidant balance in pregnancy," Mediators Inflamm., vol. 2021, p. 9962860, 2021.
[11] M. Z. Jovandaric et al., "The importance of metabolic and environmental factors in the occurrence of oxidative stress during pregnancy," Int. J. Mol. Sci., vol. 24, no. 15, p. 11964, 2023.
[12] K. Grzeszczak et al., "Oxidative stress in pregnancy," Biomolecules, vol. 13, no. 12, p. 1768, 2023.
[13] K. Toboła-Wróbel et al., "Association of oxidative stress on pregnancy," Oxid. Med. Cell. Longev., vol. 2020, p. 6398520, 2020.
[14] M. H. Schoots et al., "Oxidative stress in placental pathology," Placenta, vol. 69, pp. 153-161, 2018.
[15] Z. Sultana et al., "Involvement of oxidative stress in placental dysfunction, the pathophysiology of fetal death and pregnancy disorders," Reproduction, vol. 166, no. 2, pp. R25-R38, 2023.
[16] R. Aouache et al., "Oxidative stress in preeclampsia and placental diseases," Int. J. Mol. Sci., vol. 19, no. 5, p. 1496, 2018.
[17] N. W. Tietz, Clinical Guide to Laboratory Test, 4th ed., 2006, p. 928.
[18] J. M. Hall, G. F. Cause, and K. S. Korach, "The multifaceted mechanisms of steradiol and estrogen receptor signaling," J. Biol. Chem., vol. 276, no. 26, pp. 26869-26872, 2001.
[19] R. K. Abbas et al., "Assessment of some biochemical parameters in Iraqi women with recurrent miscarriage," JT, vol. 4, Special Issue, pp. 175-180, Nov. 2022.
[20] M. A. El-Missiry et al., "Ameliorative effect of melatonin against gamma-irradiation induced oxidative stress and tissue injury," Ecotoxicol. Environ. Safety, vol. 66, pp. 278-286, 2007.
[21] M. G. Nasr et al., "Activated partial thromboplastin time (APTT) and prothrombin time (PT) level among Sudanese women with recurrent miscarriage," J. Drug Deliv. Ther., vol. 11, no. 6-S, pp. 128-131, 2021.
[22] E. B. Oluwaseyi et al., "Pregnancy-associated coagulopathies in selected community hospitals in Southwest Nigeria," J. Fam. Med. Prim. Care, vol. 10, no. 4, pp. 1614-1620, 2021.
[23] L. Xu et al., "Higher β-human chorionic gonadotropin and estrogen levels during the first 6 weeks of pregnancy are associated with threatened abortion," J. BioScience Trends, vol. 13, no. 3, pp. 245-252, 2019.
[24] Q. Xu et al., "Sex hormone metabolism and threatened abortion," Med. Sci. Monit., vol. 23, pp. 5041-5048, 2017.
[25] Y. Qiu et al., "Effects of different doses of estrogen on ER expression and ovarian function in patients with unexplained recurrent abortion," Gynecol. Endocrinol., vol. 38, no. 10, pp. 844-848, 2022.

[26] V. A. Zejnullahu et al., "The role of oxidative stress in patients with recurrent pregnancy loss: a review," Reprod. Health, vol. 18, no. 1, p. 207, 2021.
[27] M. Pebrina and F. Fernando, "Relationship between catalase enzyme activity and malondialdehyde (MDA) levels in incomplete abortion and imminent abortion," 2nd SeSICNiMPH Conf., pp. 181-187, 2021.
[28] H. J. Al-Dulymi et al., "Study of the level of C-reactive protein and some oxidative stress markers in pregnant and aborted women in the first trimester of pregnancy," J. Wildlife Biodivers., vol. 7, Special Issue, pp. 403-414, 2023.