Outcomes of pregnant women with coronavirus disease 2019 (COVID-19) admitted to intensive care unit in Uzbekistan

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ABSTRACT

Aim. The present study aimed to investigate outcomes of pregnant women with severe acute respiratory syndrome coronavirus 2 (SARS‑CoV‑2 or COVID-19) in the intensive care unit (ICU). **Methods.** A total of 3080 pregnant women infected with COVID-19 during treatment were studied in the maternity ward of the Zangiota-1 Republican Specialized Infectious Diseases Hospital from December 2020 to January, 2022. At the time of admission of patients to the hospital, 28.9% of women were in the first trimester of pregnancy, 34.3% and 36.8% were in the second and third trimester of pregnancy, respectively. 1980 cases (64.3%) showed a moderate course of pneumonia and in 48% (1478 cases), bilateral pneumonia was detected. At the same time, 60.0% of patients had lung damage (up to 50%) according to CT dataset. **Results.** A total of 677 out of 3080 pregnant women with COVID-19 pneumonia (22.0%) needed treatment at the ICU. 490 cases out of 677 patients showed severe clinical course of COVID-19, while 277 cases (41%) showed multiple organ dysfunction syndrome (MODS). Of 277 MODS cases, 209 (75.4%) were those in the third trimester of pregnancy and 170 (61.4%) had initially severe clinical picture of COVID-19. Mortality rate in ICU was 9.4% (64 cases out of 677) while 56.6% experienced post-traumatic stress disorder (PTSD) at baseline, 26.7% had general anxiety disorders, and 16.7% (113 of 677) of women experienced depression symptoms. In the postpartum period, 46.1% (312 of 677) cases showed combinations of PTSD, anxiety and depression according to the combined Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS) assessment, which was typical for women with severe and extremely severe COVID-19, preterm birth, miscarriages and perinatal mortality. **Conclusion.** The ICU hospitalization rate for COVID-19 pneumonia in pregnant women was 22.0%, among which the vast majority (72.4%) were cases with severe clinical course of COVID-19 and PTSD (56.6%). Women in the third trimester of pregnancy were most susceptible to developing MODS and severe COVID-19 pneumonia. **Recommendation.** In promoting pregnant women's mental and physical health, understanding the characteristics of psycho-emotional stress disorders during the COVID-19 pandemic and learning how to deal with them is critical.

INTRODUCTION

There are many research papers in the context of the COVID-19 pandemic shed light on the different effects of COVID-19 depending on patient characteristics, including age, addictions, and comorbidities. Another significant population that deserves close attention during the COVID-19 pandemic is pregnant women [1]. Pregnancy condition is particularly susceptible to infectious diseases, and it is not surprising that viral infections can affect pregnancy outcomes [2- 4].

Most clinicians have confirmed that the pregnancy associated with COVID-19 pneumonia may predispose patients to a more rapid deterioration of the clinical course and may lead to the full risk of harm to both mother and fetus and also a decrease in lung volume due to a pregnant uterus along with a slightly immunodeficient state [1, 3, 5]. Studies have shown that mortality in COVID-19 among pregnant women reaches 25%, the frequency of preterm birth was from 4.3 to 25.0%, 5.9% preeclampsia, 14.5% miscarriages, 9,2% premature rupture of membranes and 2.8-25.0% fetal growth retardation [5].

The emergence of intensive care unit syndrome (ICUS) and post-intensive care syndrome (PICS) is a consequence of patients being on prolonged mechanical ventilation or the development of multiple organ failure (MOF) [5-11]. It is the most challenging problem of modern disaster medicine. These syndromes have appeared relatively recently as nosological forms of pathologies, covering any consequences of prolonged hospitalization in the intensive care unit (ICU) [5-11]. This study aimed to analyze hospitalisation cases in the intensive care unit of pregnant women with COVID-19 pneumonia.

MATERIAL AND METHODS

The study was based on the results of the examination and treatment of 3080 pregnant women infected with SARS-CoV-2 during the COVID-19 pandemic in the maternity ward of the Republican Specialized Infectious Diseases Hospital Zangiota-1 from December 2020 to January 01, 2022.

The majority of women (48.0%; 1478 of 3080) were in the age range of 26-30 years, and the majority of women (84.0%; 2586 of 3080) did not have a history of miscarriage. Regarding the number of pregnancies in the anamnesis, most cases were noted, with two (31.0%; 956 out of 3080) and one pregnancy (27.5%; 847 out of 3080) in the anamnesis. Only 5.9% (183 out of 3080) of pregnant women were nulliparous (Table 1). At the time of admission of patients to the hospital, 889 out of 3080 women (28.9%) were in the first trimester of pregnancy (<13 weeks of gestation), 1056 women (34.3%) and more were in the second trimester of pregnancy (13-27 weeks of gestation) in total in the third trimester of pregnancy (≥28 weeks of gestation), 1135 women (36.8%). According to international criteria for assessing the severity of COVID-19 infection in pregnant women, the vast majority (64.3%; 1980 out of 3080) of cases were diagnosed with a moderate course of pneumonia. The clinical picture of pregnant women with COVID-19 infection was represented by bilateral pneumonia in 48.0% (1478 out of 3080). At the same time, the majority (60.0%; 1848 out of 3080) of patients had up to 50% of lung lesions, according to CT scanning.

Table 1. General characteristics of pregnant women with COVID-19 (n=3080)

Items		n	%
Age	18-25 years	998	32,4%
	26-30 years	1478	48,0%
	31-40 years	604	19,6%
Presence of pregnancy in anamnesis	0	183	5,9%
	1	847	27,5%
	2	956	31,0%
	3	522	16,9%
	4	572	18,6%
Presence of miscarriages in anamnesis	0	2586	84,0%
	1	432	14,0%
	2	44	1,4%
	3	16	0,6%
Pregnancy status	1 trimester	889	28,9%
	2 trimester	1056	34,3%
	3rd trimester	1135	36,8%
Severity of COVID-19 pneumonia	Mild severity	536	17,4%
	Medium severity	1980	64,3%;
	Severe course	490	15,9%
	Extremely severe course	74	2,4%
The volume of damage to the lung tissue	CT-1, less than 25% of lungs affected	524	17,0%
	CT-2, 25-50% of lungs affected	1324	43,0%
	CT-3, 50-75% of lungs affected	1106	35,9%
	CT-4, more than 75% of lungs affected	126	4,1%

Extragenital diseases were observed in 1232 out of 3080 (40.0%). They were represented by: vegetovascular dystonia, hypertension of varying severity, chronic bronchitis, tonsillitis, chronic pyelonephritis, chronic gastritis, colitis, pancreatitis, autoimmune thyroiditis, metabolic syndrome, obesity, and myopia. In 943 patients, a combination of various diseases was noted. Gynaecological diseases in history: cervical ectopia, inflammatory diseases of the uterus and its appendages, tumours and tumour-like formations of the ovaries, uterine fibroids, ectopic pregnancy, and infertility of various origins were observed in 914 patients.

The severity of psychoemotional disorders was identified and assessed according to the Generalized Anxiety Disorder 7-item (GAD-7) anxiety disorder rating scale, the IES-6 post-traumatic stress disorder (PTSD) rating scale, and the the Patient Health Questionnaire-9 (PHQ-9) depressive syndrome rating scale. Identification of combined psychoemotional pathology was performed using a special combined scale PHQ-ADS, which is the sum of scores from the PHQ-9 and GAD-7 questionnaires (the maximum score is 48, and the combination of PTSD, anxiety and depression manifests itself at 20 or more points).

RESULTS

During the study period, 22.0% (677 out of 3080) of pregnant women with COVID-19 pneumonia needed intensive care in intensive care units, among which the vast majority (72.4%; 490 out of 677) were cases with the severe clinical course of COVID-19 (Figure 1, Table 2). The incidence of multiple organ failure with COVID-19 was 41.0% (277 out of 677) among intensive care patients with pregnancy and 9.0% (277 out of 3080) in the total analytical sample according to the study period (from January 7 to December 26, 2021).
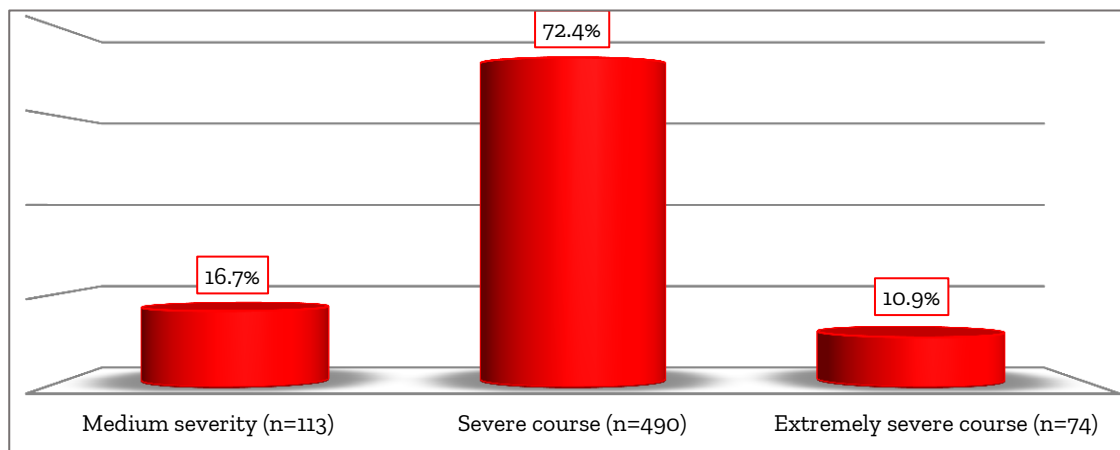
Most cases of MODS during pregnancy (75.4%; 209 of 277) against the background of COVID-19 pneumonia were women in the third trimester of pregnancy with an initially severe clinical picture of COVID-19 (61.4%; 170 of 277) (Table 2). ICU mortality was 9.4% (64 out of 677). In this structure, the majority of deaths among women with a highly severe course and mixed pathology of the psycho-emotional state - are 44 cases.

The results of identifying disorders in the psycho-emotional state of patients using special scales-questionnaires showed that initially PTSD was experienced by 56.6% (383 out of 677) women, general anxiety disorders were noted with a frequency of 26.7% (181 out of 677), and depressive states were established in 16.7% (113 of 677) cases (Table 1). Table 3 shows that in the postpartum period, according to the PHQ-ADS combined scale, combinations of PTSD, anxiety and depression were detected in 46.1% (312 out of 677) of cases, which was typical for women with severe and extremely severe COVID-19, premature births, miscarriages and perinatal mortality. An analysis of the literature showed that the pathogenesis of psychoemotional and cognitive impairments in COVID-19 is directly related to severe respiratory failure with the development of hypoxic and hemic hypoxia. In addition, it has been proven that the manifestations of mental and emotional disorders that occur against the background of COVID-19 are associated with the fact of a stressful situation due to the pandemic and the direct effect of the virus on the nervous system of patients.

It has been determined that in the presence of severe psychoemotional disorders in pregnant women with COVID-19, the effectiveness of protocols in the main areas of etiotropic and pathogenetic treatment (correction of coagulopathy, respiratory and antibacterial therapy) directly depends on the appropriate regimen of psychosocial support for pregnancy.

Thus, women in the third trimester of pregnancy were most susceptible to subtotal damage to the lung tissue and the course of a severe form of infection.

An analysis of the clinical course of psychoemotional disorders in pregnant women with COVID-19 (Table 5) on the background of intensive care showed that with a slight advantage in PTSD (204 of 312; 53.3%), progression of the pathology was noted, while in the cohort of pregnant women and parturient women with anxiety syndrome, progression was observed in only 21.5% (39 out of 181) of cases, and improvement in 78.5% (142 out of 181) of patients (p = 0.03).

Figure 1. Distribution of intensive care pregnant women with COVID-19 pneumonia by severity

Table 2. Treatment outcomes in the ICU in pregnant women with COVID-19 and psychoemotional disorders

Items		Initially	Recovery	Mortality
ICU (n=677)	Medium severity	113	111	2
	Severe course	490	472	18
	Extremely severe course	74	30	44
	Total	677	613 (90.6%)	64 (9.4%)
MODS (n=277)	Medium severity	12	10	2
	Severe course	209	191	18
	Extremely severe course	56	12	44
	Total	277	213 (76.9%)	64 (23.1%)

Table 3. Distribution of intensive care pregnant women with COVID-19 pneumonia depending on the results of the assessment of psycho-emotional disorders

Items	Medium severity of COVID-19 (n=113)	Severe course of COVID-19 (n=490)	Extremely severe course of COVID-19 (n=74)	Total (n=677)
PTSD (IES-6)	78 (69.0%)	266 (54.3%)	39 (52.7%)	383 (56.6%)
	35 (31.0%)	224 (45.7%)	35 (47.3%)	294 (43.4%)
Anxiety disorder (GAD-7)	20 (17.7%)	140 (28.6%)	21 (28.4%)	181 (26.7%)
	93 (82.3%)	350 (71.4%)	53 (71.6%)	496 (73.3%)
Depression (PHQ-9)	15 (13.3%)	84 (17.1%)	14 (18.9%)	113 (16.7%)
	98 (86.7%)	406 (82.9%)	60 (81.1%)	564 (83.3%)
PTSD + anxiety + depression (PHQ-ADS)	44 (38.9%)	229 (46.7%)	39 (52.7%)	312 (46.1%)
	69 (61.1%)	261 (53.3%)	35 (47.3%)	365 (53.9%)

PTSD: post-traumatic stress disorder; GAD-7: Generalized Anxiety Disorder 7-item; PHQ-9: the Patient Health Questionnaire-9; PHQ-ADS: Patient Health Questionnaire Anxiety and Depression Scale.

Table 4. Distribution of intensive care pregnant women with COVID-19 and MOF by pregnancy status and baseline severity of pneumonia

Items	1 trimester. n=12	2 trimester. n=56	3 trimester. n=209	Total. n=277
Medium severity	-	-	-	-
Severe course	-	33 (11.9%)	170 (61.4%)	203 (73.3%)
Extremely severe course	12 (4.3%)	23 (8.3%)	39 (14.1%)	74 (26.7%)
Total	12 (4.3%)	56 (20.2%)	209 (75.4%)	277 (100%)

Table 5. Distribution of intensive care pregnant women and women in labor with COVID-19 according to the course of psychoemotional disorders during treatment

Condition		Improvement	Progression	Total
PTSD	n (%)	179 (46.7%)	204 (53.3%)	383 (56.6%)
Anxiety disorders	n (%)	142 (78.5%)	39 (21.5%)	181 (26.7%)
Depression	n (%)	79 (70.0%)	34 (30.0%)	113 (16.7%)
Mixed mental disorders	n (%)	127 (40.7%)	185 (59.3%)	312 (46.1%)

PTSD: post-traumatic stress disorder

DISCUSSION

With the COVID-19 pandemic, almost all clinicians have noted a significant increase in psychoemotional disorders. Yes, Green et al. [12] conducted a study involving 84 pregnant women, of which one-third of the participants had the main concerns related to the impact of COVID-19 on the course of pregnancy, and 40% of worries were related to the perinatal context.

An anonymous online cross-sectional survey of pregnant and postpartum women was conducted between May and June 2020 in 64 countries. The data from these studies were posted on the Pregistry platform for COVID-19 research (https://corona.pregistry.com) in 12 languages. Participants measured demographics, COVID-19 exposure, anxiety, mental health symptoms, IES-6 post-traumatic stress, PHQ-4 anxiety/depression, and UCLA loneliness [18, 19]. Of the 6894 participants, a significant proportion of women scored at or above the thresholds for elevated PTSD (2979 [43%]), anxiety/depression (2138 [31%]) and loneliness (3691 [53%]). The most frequently reported fears were related to pregnancy and childbirth, including the inability to visit relatives after childbirth (59%), infection of the child with COVID-19 (59%), and lack of support during childbirth (55%). COVID-19 is causing changes in the plan of delivery (41%). Greater child-related anxiety (i.e., inadequate child care, risk of infection) and missed doctor visits were associated with significantly higher post-traumatic stress, anxiety/depression, and loneliness [13, 14].

Farrell et al. [15], according to the results of their research, also revealed a high prevalence of anxiety and depressive symptoms (34.4 and 39.2%, respectively) according to the PHQ-ADS scale in one of the most economically developed countries in the world, Qatar. Alfayumi-Zeadna et al. [16] assessed the prevalence of symptoms of perinatal depression during the COVID-19 pandemic among Arab and Jewish women in Israel. The sample included 730 perinatal women (604 Jews and 126 Arabs). The prevalence of perinatal depression in the entire study population was 40%, and among Arab women was significantly higher than among Jewish women (58% vs 36%, P<0.001). Higher values of perinatal depression were significantly associated with symptoms of anxiety (P<0.001) and stress associated with COVID-19 (P<0.001). Ceulemans et al. [17] conducted a study on 9041 women with COVID-19 (including 3907 pregnant and 5134 lactating women). The prevalence of major depressive symptoms was 15% in the pregnant cohort and 13% in the breastfeeding cohort. Moderate to severe generalized anxiety symptoms were found in 11% and 10% of pregnant and lactating women. Risk factors associated with poor mental health were: the presence of chronic mental illness, chronic somatic diseases in the postpartum period, smoking, unplanned pregnancy, and professional status.

Our study of 3080 pregnant women shows the impact of pregnancy status on the prevalence of psychoemotional status disorders in each gestation period. Thus, women with PTSD and combinations of depression with anxiety were significantly more in the second trimester of pregnancy and had a lower frequency among women in the first trimester of pregnancy, shown by private and general structural analysis. The impact of the severity of COVID-19 pneumonia on the incidence of anxiety disorders and associated disorders of the psychoemotional status during pregnancy is also shown. Most pregnant women with psychoemotional conditions (51.5%; 1585 out of 3080) were assigned to the moderate course of the COVID-19 cohort.

CONCLUSION

The frequency of hospitalizations in the ICU for COVID-19 pneumonia in pregnant women is 22.0%, among which the vast majority (72.4%) were cases with severe clinical course of COVID-19 and post-traumatic stress disorders (56.6%). The frequency of cases with the development of multiple organ failure (MOF) in COVID-19 was 41.0% among intensive care patients with pregnancy and 9.0% in the total analytical sample. Women in the third trimester of pregnancy were most susceptible to the development of MOF and the course of a severe form of COVID-19 pneumonia.

DECLARATIONS

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Ethical approval
The review board and ethics committee of RSCS named after acad. V.Vakhidov approved the study protocol and informed consents were taken from all the participants.

Authors' contributions

All authors contributed equally to this work.

Competing interests

The authors declare that they have no competing interests.

REFERENCES

[1] Ayaz R, Hocaoğlu M, Günay T, Yardımcı OD, Turgut A, Karateke A. Anxiety and depression symptoms in the same pregnant women before and during the COVID-19 pandemic. J Perinat Med. 2020 Nov 26;48(9):965-970. DOI: https://doi.org/10.1515/jpm-2020-0380

[2] Poon LC, Yang H, Lee JC, Copel JA, Leung TY, Zhang Y, et al. ISUOG Interim Guidance on 2019 novel coronavirus infection during pregnancy and puerperium: information for healthcare professionals. Ultrasound in Obstetrics & Gynecology. 2020 May 1. DOI: https://doi.org/10.1002%2Fuog.22013

[3] Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, Vecchiet J, Nappi L, Scambia G, Berghella V, D'Antonio F. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. Am J Obstet Gynecol MFM. 2020 May;2(2):100107. DOI: https://doi.org/10.1016/j.ajogmf.2020.100107

[4] Juan J, Gil MM, Rong Z, Zhang Y, Yang H, Poon LC. Effect of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcome: systematic review. Ultrasound Obstet Gynecol. 2020 Jul;56(1):15-27. DOI: https://doi.org/10.1002/uog.22088

[5] Diriba K, Awulachew E, Getu E. The effect of coronavirus infection (SARS-CoV-2, MERS-CoV, and SARS-CoV) during pregnancy and the possibility of vertical maternal-fetal transmission: a systematic review and meta-analysis. Eur J Med Res. 2020;25(1):39.

[6] Kramer CL. Intensive Care Unit-Acquired Weakness. Neurol Clin. 2017 Nov;35(4):723-736. DOI: https://doi.org/10.1016/j.ncl.2017.06.008

[7] Bryant SE, McNabb K. Postintensive Care Syndrome. Crit Care Nurs Clin North Am. 2019 Dec;31(4):507-516. DOI: https://doi.org/10.1016/j.cnc.2019.07.006

[8] Luetz A, Grunow JJ, Mörgeli R, Rosenthal M, Weber-Carstens S, Weiss B, Spies C. Innovative ICU Solutions to Prevent and Reduce Delirium and Post-Intensive Care Unit Syndrome. Semin Respir Crit Care Med. 2019 Oct;40(5):673-686. DOI: https://doi.org/10.1055/s-0039-1698404

[9] Gardashkhani S, Ajri-Khameslou M, Heidarzadeh M, Rajaei Sedigh S. Post-Intensive Care Syndrome in Covid-19 Patients Discharged From the Intensive Care Unit. J Hosp Palliat Nurs. 2021 Dec 1;23(6):530-538. DOI: https://doi.org/10.1097/NJH.0000000000000789

[10] Kawakami D, Fujitani S, Morimoto T. et al. Prevalence of post-intensive care syndrome among Japanese intensive care unit patients: a prospective, multicenter, observational J-PICS study. Crit Care. 2021 Feb 16;25(1):69. DOI: https://doi.org/10.1186/s13054-021-03501-z

[11] Le Marec J, Jouan Y, Ehrmann S, Salmon Gandonnière C. Le syndrome post-réanimation [Post-intensive care syndrome]. Rev Med Interne. 2021 Dec;42(12):855-861. French. DOI: https://doi.org/10.1016/j.revmed.2021.05.005

[12] Green SM, Inness B, Furtado M, McCabe RE, Frey BN. Evaluation of an Augmented Cognitive Behavioural Group Therapy for Perinatal Generalized Anxiety Disorder (GAD) during the COVID-19 Pandemic. J Clin Med. 2021 Dec 31;11(1):209. DOI: https://doi.org/10.3390/jcm11010209

[13] Basu A, Kim HH, Basaldua R, Choi KW, Charron L, Kelsall N, Hernandez-Diaz S, Wyszynski DF, Koenen KC. A cross-national study of factors associated with women's perinatal mental health and wellbeing during the COVID-19 pandemic. PLoS One. 2021;16(4):e0249780. DOI: https://doi.org/10.1371/journal.pone.0249780

[14] Wyszynski DF, Hernandez-Diaz S, Gordon-Dseagu V, Ramiro N, Basu A, Kim HH, Koenen KC. Frequency and source of worries in an International sample of pregnant and postpartum women during the Covid-19 pandemic. BMC Pregnancy Childbirth. 2021 Nov 12;21(1):768. DOI: https://doi.org/10.1186/s12884-021-04241-2

[15] Farrell T, Reagu S, Mohan S, Elmidany R, Qaddoura F, Ahmed EE, Corbett G, Lindow S, Abuyaqoub SM, Alabdulla MA. The impact of the COVID-19 pandemic on the perinatal mental health of women. J Perinat Med. 2020;48(9):971-976. DOI: https://doi.org/10.1515/jpm-2020-0415

[16] Alfayumi-Zeadna S, Bina R, Levy D, Merzbach R, Zeadna A. Elevated Perinatal Depression during the COVID-19 Pandemic: A National Study among Jewish and Arab Women in Israel. J Clin Med. 2022;11(2):349. doi: https://doi.org/10.3390/jcm11020349

[17] Ceulemans M, Foulon V, Ngo E, Panchaud A, Winterfeld U, Pomar L, Lambelet V, Cleary B, O'Shaughnessy F, Passier A, Richardson JL, Hompes T, Nordeng H. Mental health status of pregnant and breastfeeding women during the COVID-19 pandemic-A multinational cross-sectional study. Acta Obstet Gynecol Scand. 2021 Jul;100(7):1219-1229. DOI: https://doi.org/10.1111/aogs.14092