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A Review on the Effect of COVID-19 on Female Health

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ABSTRACT

COVID-19 stands for coronavirus disease. In 2019, it is highly contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) killed more than 6 million people worldwide and had a devastating impact on global demographics. is giving It has emerged as the most important global health crisis since the 1918 influenza pandemic. CoV has emerged as the most common pathogen in recent respiratory disease outbreaks. Animals such as camels, cattle, cats, and bats can be affected by respiratory, intestinal, hepatic, and neurological diseases caused by members of this widespread virus family. These viruses cross species boundaries and can infect people for unknown reasons, from the common cold to he he more serious diseases such as MERS and SARS. So far, seven of his human CoVs (HCoVs) have been identified that can infect humans. A mild course of COVID-19 disease has been observed in women. These results suggest that non-menopausal women may develop protective factors that protect against the severity of the disease. Some scientists, such as Li et al. took a step forward by linking COVID-19 infection to a gene encoded on her X chromosome. This may indicate that female mortality is declining. To understand X-linked pathogenesis, we must begin with the biological role of ACE2. The biological functions of ACE2 fall into two categories: Peptidase dependent and peptidase independent. , During the coronavirus disease 2019 (COVID-19) pandemic syndrome, there are many unknowns for pregnant women, and pregnant women are potentially vulnerable to severe SARS-CoV-2 infection. is now under consideration. Many physiological changes during pregnancy have profound effects on the immune system, respiratory system, cardiovascular function, and blood clotting. They have both positive and negative effects on COVID-19 disease progression. There is a possibility. The impact of SARS-CoV-2 on pregnancy remains to be determined and a globally coordinated effort is needed to determine its impact on implantation, fetal growth and development, birth and neonatal health. . Asymptomatic infections present another challenge in terms of service delivery, prevention, and treatment. Immune alterations during pregnancy may greatly increase a woman's susceptibility to pathogens and potential complications. Because of this, pregnancy is generally considered a high risk condition for infections. Pregnancy creates a unique immunological state that protects the fetus from maternal rejection and ensures proper fetal development while protecting against microbes. Social restrictions and isolation pose challenges to maternal care. Telemedicine has been introduced to ease the situation a bit. There are very specific conditions that can only be diagnosed by physical examination of the patient. Without regular care, risk factors for pregnant women can be overlooked and lead to horrific complications. This pandemic has left pregnant women without access to health care providers in an emergency. These are key concerns in accessing health services for all.

INTRODUCTION

The word corona means **"crown"** which refer to the appearance that coronaviruses get from the spike proteins which are sticking out of them. These spike proteins are important for the biology of this corona virus. The spike protein is the part of the virus that attaches to a human cell to infect it, allowing it to replicate inside of the cell and spread to all other cells as well. The disease caused by this virus is termed as COVID-19 Which is a short form of Corona Virus Disease- 2019.

COVID-19 which stands for Corona Virus Disease- 2019 is the highly contagious as well as infectious disease which is caused by Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2), has had a catastrophic effect on the world's demographics resulting in more than 6 million deaths worldwide and emerging as the most consequential global health crisis since the era of the influenza pandemic of 1918. After the first case of this respiratory viral illness were first reported in Wuhan, Hubei Province, China, in late December 2019, SARS-CoV-2 rapidly disseminated across the world in a short span of time, compelling the World Health Organization (WHO) to declare it as a global pandemic on March 11, 2020. Like other RNA viruses, SARS-CoV-2, while adapting to their new human hosts, is prone to genetic evolution with the development of mutations over time and this results in mutant variants that may have different characteristics than its ancestral strains. Several variants of SARS-CoV-2 have been described during the course of this pandemic situation among which only a few are considered variants of concern (VOCs) by the WHO on the basis of their impact on global public health.

Variant	Discovery
Alpha (B.1.1.7):	First variant of concern described in the United Kingdom (UK) in late December 2020
Beta (B.1.351):	First reported in South Africa in December 2020
Gamma (P.1):	First reported in Brazil in early January 2021
Delta (B.1.617.2):	First reported in India in December 2020
Omicron (B.1.1.529)	First reported in South Africa in November 2021
Kraken (XBB.1.5)	Recently reported in United States in March 2023

Gynecological care took a backseat during the exhausting COVID-19 pandemic, with fewer menstrual abnormalities reported. We speculate that post-COVID ovarian suppression, infertility, and menstrual cycle abnormalities have been reported in conjunction with the ovarian suppression caused by COVID-19. Coronavirus has a drawn out provocative impact which might keep going for a considerable length of time post disease with Coronavirus which is named as lengthy Coronavirus disorder. It is believed that the long-term COVID syndrome, which includes persistent inflammation and the direct infiltration of SARS-CoV-2 into the ovary and its various manifestations as a post-COVID sequel, is the cause of the effects that COVID-19 has on the ovary. There have been numerous reports of individuals experiencing changes to their periods while they were sick with COVID-19 and even after they had cleared the infection. In order to determine the extent of the impact that COVID-19 can have on females who come into contact with the virus, more in-depth research is required to examine serious outcomes such as ovarian suppression and infertility. These feminine changes incorporate both lighter and heavier stream, longer periods, sporadic periods and greater blood clusters. Females who were infected with the human immunodeficiency virus experienced an earlier onset of menopause. Animal fecundity has also been shown to be affected by hantavirus infection; However, there have been few studies on the effects of COVID-19 on female fertility and menstrual changes.

1. Covid-19

Coronaviruses (CoVs) are positive-stranded RNA (+ssRNA) viruses with a crown-like appearance under an electron microscope (coronam is the Latin term for crown) due to the presence of spike glycoproteins on the envelope. The subfamily Orthocoronavirinae of the Coronaviridae family (order Nidovirales) classifies into four genera of CoVs:

Alpha coronavirus (alphaCoV)

Beta coronavirus (betaCoV)

Delta coronavirus (deltaCoV)

Gamma coronavirus (gammaCoV)

Five sub-genera or lineages make up the BetaCoV genus. AlphaCoVs and betaCoVs may have their genes from rodents and bats, according to genomic characterization. Running against the norm, avian species appear to address the quality wellsprings of deltaCoVs and

gammaCoVs. In recent outbreaks of respiratory diseases, CoVs have emerged as the most prevalent pathogens. Animals such as camels, cattle, cats, and bats can be afflicted with respiratory, enteric, hepatic, and neurological conditions by members of this extensive family of viruses. These viruses are capable of crossing species boundaries and can infect humans with illnesses ranging from the common cold to more severe ones like MERS and SARS for reasons that are still unknown. Seven human CoVs (HCoVs) with the potential to infect humans have been identified thus far. While some of the HCoVs were discovered in the middle of the 1960s, others were only discovered in the new millennium. In general, it is estimated that between 5% and 10% of people get acute respiratory infections from CoVs, which are carried by 2% of healthy people.

A novel betaCoV, SARS-CoV-2 is part of the same subgenus as the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and the severe acute respiratory syndrome coronavirus (SARS-CoV), both of which have been linked to epidemics with mortality rates of up to 10% and 35%, respectively, of SARS-CoV and MERS-CoV. It has a diameter between 60 and 140 nm and can be round, elliptic, or pleomorphic. It is sensitive to heat and ultraviolet rays, like other CoVs. In this regard, however, any virus species can't reproduce as well at high temperatures. The SARS-CoV-2 inactivation temperature is the subject of current research. A treated steel surface held at an air temperature of 54.5°C (130 °F) brings about the inactivation of 90% of SARS-CoV-2 in roughly 36 minutes. At 54.5°C, the virus half-life was 10.8 3.0 min and the time to reduce infectivity by 90% was 35.4 9.0 min.

Experts from the International Committee on Taxonomy of Viruses gave the new HCoV, which was isolated from a cluster-patient with atypical pneumonia after visiting Wuhan, the name SARS-CoV-2 because it shared 89% nucleotide identity with bat SARS-like-CoVZXC21 and 82% with human SARS-CoV. SARS-CoV-2's single-stranded RNA genome consists of 29891 nucleotides and 9860 amino acids. SARS-CoV-2 is susceptible to genetic evolution, resulting in numerous variants that may differ from its ancestral strains in terms of characteristics.. Because it aids in the detection of any new genetic variants of SARS-CoV-2, periodic genomic sequencing of viral samples is crucial, particularly in the context of a global pandemic. Notably, the emergence of the globally dominant D614G variant, which was associated with increased transmissibility but lacked the capacity to cause severe illness, marked the beginning of minimal genetic evolution.

SARS-CoV-2 Variants of Interest (VOIs) are defined as variants with particular genetic markers that have been linked to changes that may result in increased transmissibility or virulence, a reduction in neutralization by antibodies obtained through natural infection or vaccination, the ability to evade detection, or a reduction in the efficacy of therapeutics or vaccination. Since the start of the pandemic, WHO has described eight variants of interest (VOIs), including Epsilon (B.1.427 and B.1.429), Zeta (P.2), Eta (B.1.525), Theta (P.3), Iota (B.1.526), Kappa (B.1.617.1), Lambda (C.37), and Mu (B.1.621). The CDC has also identified these variants as VOIs.

Previously designated VOCs and VOIs, which are circulating in at negligible levels or are undetectable and do not pose a significant risk to global public health, are referred to as previously circulating VOCs or VOIs by the WHO and Variants Being Monitored (VBM) by the CDC, in contrast to the currently circulating SARS-CoV-2 variants.

Epidemiology-

The World Health Organization (WHO) claims that the spread of viral illnesses poses a significant threat to the public's health. The severe acute respiratory syndrome coronavirus (SARS-CoV) outbreak from 2002 to 2003, the H1N1 influenza pandemic in 2009, and the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in 2012 are just a few of the viral epidemics that have been blamed for the significant decline in global health over the past two decades. SARS-CoV-2, the virus that causes COVID-19, has spread to 223 countries since the World Health Organization (WHO) declared it a global pandemic. More than 593 million cases and more than 6 million fatalities have been recorded globally. More than 200 nations worldwide have reported SARS-Co-V-2 variants of concern, with the Omicron VOC being the most prevalent currently circulating VOC since it was first reported in November 2021, according to a recent epidemiological update by WHO. Following the United States in terms of COVID-19-related fatalities and SARS-CoV-2 infections are India and Brazil. With about 375,000 reported deaths, COVID-19 was actually the third most common cause of mortality in the United States in 2020, behind cancer and heart disease.[32] The worldwide case fatality rate for COVID-19 is currently estimated by the WHO to be 2.2%. However, the case fatality rate significantly differs between nations and is influenced by age, underlying preexisting conditions, and illness severity.

2. Effect of virus on different organs

kidney	Patients hospitalized with severe COVID-19 are at risk for developing kidney injury, most commonly manifesting as acute kidney injury (AKI), which is likely multifactorial in the setting of hypervolemia, drug injury, vascular injury, and drug-related injury, and possibly direct cytotoxicity of the virus itself. AKI is the most frequently encountered extra pulmonary manifestation of COVID-19 and is associated with an increased risk of mortality.
Cardio-vascular system	Myocardial injury manifesting as myocardial ischemia/infarction (MI) and myocarditis are well-recognized cardiac manifestations in patients with COVID-19. Other common cardiac manifestations include ACS, arrhythmias, cardiomyopathy, and cardiogenic shock. A meta-analysis study of 198 published studies involving 159, 698 COVID-19 patients reported that acute myocardial injury and a high burden of pre-existing cardiovascular disease were significantly associated with higher mortality and ICU admission.
Hematologic System	Lymphopenia is a common laboratory abnormality in the vast majority of patients with COVID-19. Other laboratory abnormalities include thrombocytopenia, leukopenia, elevated ESR levels, C-reactive protein (CRP) lactate dehydrogenase (LDH), and leukocytosis
Gastro-intestinal System	GI symptoms such as diarrhea, nausea and/or vomiting, anorexia, and abdominal pain are seen in up to 1 in 5 patients with COVID-19 infection. Cases of acute mesenteric ischemia and portal vein thrombosis have also been identified.
Hepatic System	Elevation in liver function tests manifesting as an acute increase in aspartate transaminase (AST) and alanine transaminase (ALT) are frequently with COVID-19 infection. Hepatic dysfunction occurs more frequently in patients with severe COVID-19 illness.
Endocrine	Clinical manifestations such as abnormal blood glucose levels, euglycemic ketosis, and diabetic ketoacidosis have been noted in patients hospitalized with COVID-19.
Neural System	Neurological findings include headache, stroke, impairment of consciousness, seizure disorder, and toxic metabolic encephalopathy. Five patients with COVID-19 developed Guillain-Barré syndrome (GBS) based on a case series report from Northern Italy.

3. Manifestations on Female Sex hormones and female health

A protective role of estrogen against SARS-CoV infection was reported in studies in female mice. Estrogen is hypothesized to be important in regulating viral infection and disease progression through its effects on immune/inflammatory responses and ACE2 expression. The above evidence clearly points to a major role of estrogen in immune and non-immune responses to viral infections. Not surprisingly, postmenopausal women who developed COVID-19 had a more serious route of transmission. Furthermore, ovariectomy or treatment of female mice with estrogen receptor antagonists significantly increased mortality, indicating a protective effect on estrogen receptor signaling in COVID-19. Taken together, these data suggest that sex differences in susceptibility to COVID-19 in mice are similar to those in humans, suggesting that estrogen receptor signaling is an important protective factor. increase. Ding et al. Regarding COVID-19 infected patients admitted to Tongji hospitals. Patients he was divided into three groups. The first group is non-menopausal women, the second group is menopausal women, and the third group is men. Males were of approximately the same age range as females. In the study above, no significant relationship was found between men and women. On the other hand, there were significant differences in both disease severity and clinical manifestations between non-menopausal women and age-matched men. A mild course of COVID-19 disease was observed in women. These results suggest that non-menopausal women may develop protective factors that protect against disease severity.

Some scientists like Li *et al.* took a step forward by linking COVID-19 infection to a gene encoded on her X chromosome. This may point to the fact that female mortality is declining. To understand X-linked pathogenesis, we must begin with the biological role of ACE2. The biological functions of ACE2 can be divided into two categories: peptidase-dependent and peptidase-independent. The peptidase-independent function of ACE2 is primarily relevant in mediating coronavirus infection. The gene encoding ACE2 is on her X chromosome and females have two copies of her. According to the Lyon theory, one of her two her X chromosomes of her mother or father is transcriptionally silenced. This complex silencing process leading to X-chromosome inactivation is the fundamental basis for ensuring balanced gene expression between males and females. Some genes (15–30%) located on the short arm of the chromosome may escape inactivation. This has to do with her ACE2 mapping in the p22.2 band, thus avoiding gene inactivation. This phenomenon could therefore explain the observed sex difference with respect to her ACE2 expression. Future studies on ACE2 levels,

copy number variations, X inactivation and pre-existing comorbidities in the genomic context are therefore essential. This will help us understand gender differences in ACE2-related pathophysiology and how they are fully relevant to the SARS-CoV-2 pandemic.

4. Pregnancy and COVID-19

Pregnancy is generally considered a high-risk condition for infectious diseases, as immune changes during pregnancy can greatly increase a woman's susceptibility to pathogens and potential complications. Pregnancy creates a unique immunological state that protects the fetus from maternal rejection and ensures proper fetal development while guarding against microbes.

In this case, there are many unknowns for pregnant women during the coronavirus disease 2019 (COVID-19) pandemic syndrome, and that pregnant women are potentially vulnerable to severe her SARS-CoV-2 infection. is now considered. Many physiological changes during pregnancy have profound effects on the immune system, respiratory system, cardiovascular function, and blood clotting. They have both positive and negative effects on COVID-19 disease progression. There is a possibility. The impact of SARS-CoV-2 on pregnancy remains to be determined and a coordinated global effort is needed to determine its effects on implantation, fetal growth and development, parturition and neonatal health. Asymptomatic infections pose another challenge in terms of service delivery, prevention and management. In addition to the direct effects of the disease, a number of indirect effects of the pandemic are affecting access to reproductive health services. It has adverse effects on women's health, such as a decrease in heart rate and an increase in psychological stress, causing distress and increasing socioeconomic disadvantages. This review examines current knowledge about COVID-19 during pregnancy and highlights areas for further research to reduce its impact on women and their children. The risk of contracting her SARS-CoV-2, the virus that causes it, does not appear to be high. However, research has shown that they are at higher risk of contracting COVID-19 or contracting severe COVID-19, even compared to non-pregnant women of the same age. Her COVID-19 while pregnant has also been linked to an increased chance of premature birth.

The Pregnant women who are old age and overweight or have pre-existing medical conditions such as hypertension (high blood pressure) and diabetes mellitus are at particular risk of serious condition of COVID-19.

This is very vital that the pregnant women – and all those near them – so they have to take precautions to protect itselves against the COVID-19. and if they feel unwell (like fever, cough or difficulty in breathing), so they should take urgent medical advice from a health worker. COVID-19 is suspected or confirmed, health workers should take all appropriate precautions to reduce risks of infection to themselves and others, including hand hygiene (hand must be sanitize) and also appropriate use of protective clothing like gloves, gown and medical mask and also a lab coat.

5. The effect of covid on maternal health and fetus

Since its onset in December 2019, the impact of the COVID-19 pandemic has had a very strong and frightening impact on the lives of many people around the world. The pandemic has resulted in significant changes in government policy, including: B. Health System Involvement. A lot happens during this time. Many curfews have been imposed in hotspot areas, some places have become safe zones, and large groups have tested positive for the coronavirus. This leads to poor or inadequate provision of many services, especially medical services. Restrictions on activity should prevent the spread of infection in communities and allow health services to be prepared in the context of a pandemic. On the other hand, the regular routine health care system was very disrupted and people faced many problems in seeking medical advice. Although not directly causing an increase in rates, neglected pregnancies and lack of regular antenatal visits can have indirect adverse effects on maternal health. During past epidemics, the health system was largely paralyzed to provide normal services due to surges in demand and staff redeployment due to the epidemic. Decreases significantly with each outbreak. WHO has already said: During the 2014 Ebola virus outbreak in West Africa, the indirect impact of the epidemic on maternal health It was serious. During this outbreak, there was a 22 percentage point decline in prenatal care, an 8 percentage point decline in institutional delivery, and a 13 percentage point decline in postnatal care. Again, this decline is largely due to fear of contracting the disease from health care workers and other patients, loss of trust in the health care system, and uncertainty about the exact cause of the disease. The 2003 Severe Acute Respiratory Syndrome (SARS) epidemic saw a similar decline in healthcare utilization. In Taiwan, outpatient care decreased by 23.9% and inpatient care decreased by 35.2%.

The current novel coronavirus infection (SARS-CoV-2 infection) was reported by WHO (World Health Organization) as a global pandemic on March 11, 2020. Social restrictions and

isolation challenge the care of pregnant women. To alleviate the situation to some extent, telemedicine was introduced. There are very specific medical conditions that can only be diagnosed by physically examining the patient. In the absence of regular care, high-risk factors for pregnant women can be overlooked and lead to much-feared complications. This pandemic has left pregnant women inaccessible to care providers in emergencies. These are key concerns in accessing health services for all.

6. CONCLUSION

Based on the currently available literature, this seems reasonable SARS-cov-2 infection can affect both female and male reproductive organs and may affect some of them Degree can also affect human fertility and the course and outcome of pregnancy. The latter It is likely, as the possibility of vertical transmission of the virus has been reported. Base Study results include both male (testicles, semen) and female (ovaries, uterus) components Genitalia are potential targets for SARS-cov-2 infection. Nevertheless, there are reports pointing to a possible role of viral infection in reproduction little is known about the long-term effects of infection on organs. Therefore, it is from It is very vital to provide a thorough research paper describing the underlying mechanisms SARS-cov-2 infection and its effects on the human reproductive system and fertility.

Research on COVID-19 has increased exponentially, with some researchers, we seek to clarify unresolved questions about fertility, pregnancy and fetal outcomes, while some articles only describe COVID-19 as a mild to moderate condition, other serious illness. SARS-cov-2 infection and associated adverse effects RAS dysfunction was evident in both male and female fertility. However, the effects are either due to the direct effects of the virus or as a result of the inflammatory state of the virus the patient is still under discussion. The virus also shows increased morbidity in pregnant women Patience. Consider maternal physiological changes during pregnancy due to SARS-cov-2 infection this process helps researchers better understand possible outcomes both mother and fetus. ACE2, a major player in RAS (Renin-Angiotensin System), The pathophysiology of SARS-cov-2 in the reproductive system has received considerable attention. Vertical transmission of COVID-19 is not yet established and persists an important question to answer. Additionally, the safety and efficacy of her COVID-19 vaccination in a pregnant woman and her fetus needs further research. Further large-scale studies are needed to answer all these questions, and a concerted global effort is needed to collect reliable large-scale data. In fact, these speculations must be

supported by evidence-based studies. To this end, multicenter retrospective and/or cohort studies can be conducted to investigate the possible consequences of SARS-cov-2 infection on fertility, pregnancy, and neonatal life.

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