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COVID-19 AND INFERTILITY (CROSS-SECTIONAL STUDY)

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Abstract:

People of all ages all over the world are experiencing a serious health crisis brought on by COVID-19. Initial reports suggested the illness was localised to the lungs. Some new research, however, has defined the effects of COV-19 on male and female reproductive systems. . In Further, COVID-19 mediator effects, such as renin-angiotensin system disruption, oxidative stress, and inflammation,
Influences of cytokine storm, fever, and psychological stress on reproductive physiology have also been explored , COVID-19 increased body temperature, oxidative stress, and cytokine storm that are all mediated by in-patient gametogenesis, steroidogenesis, and menstrual cycles. Last but not least, being shut away from other people, Stress and dissatisfaction brought on by uncertainty about one's employment have been shown to elevate glucocorticoid-mediated poor quality sperm in males and an increased chance of miscarriage in females. This explains why the impact Evidence of the effect of COVID-19 on fertility and reproductive health is strong.
method a cross-sectional survey was administered to Iraqi women who are either making plans for or are presently undergoing treatment for infertility. In the middle of July of 2020, a digital survey questionnaire was sent over a range of social media platforms, including websites dedicated to women's health and fertility in Iraq
Results.Participant demographic and reproductive characteristics are given .
CONCLUSION Despite the fact that this review's findings reveal substantial changes in menstruation, recovery of normal ovarian reserve and hormone levels; transient, mild alteration. When it comes to having children, The greatest effect of covid.19 infection was a decrease in both the quantity and quality of birds. and embryos

Keywords: SARS-CoV-2, COVID-19, Assisted Reproductive Technology, Pregnancy, Fertility

INTRODUCTION

The coronavirus infection broke out in 2019 and has rapidly turned into a global pandemic. It shortly became a healthcare burden, both for the system and for patients. Female fertility concerns arose after abnormal findings in the menstrual cycle: altered menstrual duration, frequency, regularity, and volume (heavier bleeding and clotting),
increased dysmenorrhea, and worsened premenstrual syndrome [1]. As the pandemic is far from ending, more and more questions regarding the female reproductive system, especially fertility issues, are arising, and clarifications regarding the possible link between COVID-19 and women's reproductive health are required. Coronavirus disease (COVID-19) is thought to be transmitted via direct (deposited on persons) or indirect (deposited on objects) contact [2]. Social distancing is the most effective protective measure, as it is an airborne disease. Manifold transmission ways have been reported: via droplets,

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surfaces, via inanimate objects, fecal–oral transmission, and
biological fluids transmission (saliva, tears), notwithstanding that vertical transmission is also a hypothesis largely debated. Semen transmission presumption cannot be ruled out yet [3], but a recent systematic review concluded that there is no evidence suggesting that COVID-19 is a sexually transmitted disease (STD) .The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) encloses a spike protein (S protein) allowing viral binding to the angiotensin-converting enzyme (ACE)2, which acts as a viral receptor and is also widely expressed on the surface of various organs and tissues [5]. In order for the virus to gain entry into the cell and bind to ACE2, cleavage of the S protein is necessary, which is facilitated by the transmembrane serine protease 2 (TMPRSS2). SARS-CoV-2 does not only invade the lungs but also attacks other organs with high ACE2 expression [6], including cardiac, renal, intestinal, and endothelial cells. The testis, ovary, vagina, uterus, and placenta are involved, too [7–10]. Considering the above, female reproductive may be affected by SARS-CoV-2 infection, as the oocytes and ovarian tissue express medium–high levels of ACE 2 receptor [11,12]. No significant difference has been observed in the ACE2/ transmembrane serine protease 2 (TMPRSS2) expression rate between young and old ovaries and low and high ovarian reserve [13]. Cleaving of the S protein could be achieved by other proteases, which are currently under investigation for increasing SARS-CoV-2 infectivity, such as TMPRSSP4 in the gut epithelial cells [14], cathepsins B and L (CTSB and CTSL, respectively) in TMPRSS2- cells [15]. FURIN in epithelial layers of several mucosal tissues [16,17] and MX dynamin-like GTPase 1 (MX1), which modifies the protein S by neutrophil elastase [18]. Angiotensin II (Ang II) promotes vasoconstriction of the spiral arteries and consequently
induces menstruation. The myometrial activity might be influenced by the relationship between Ang II and Ang 1–7 [19]. Therefore, an alteration in the function of Ang II and ACE 2 may determine irregularities of the menstrual cycle, heavy periods, and hyperplastic endometrium [20]. Moreover, high levels of stress have been linked to
menstrual cycle changes [21,22]. For this reason, we feel the need to investigate whether COVID-19 infection can induce menstrual cycle alterations, bearing in mind that infertility is already a stress inducer.

Effects of COVID-19 on gametes

Although the male reproductive tract has a higher expression of ACE2 receptors than the female reproductive tract, both contain cells susceptible to viral infection. Spermatogonial, Sertoli, and Leydig cells are enriched with ACE2 and express TMPRSS2 as well, especially spermatogonia and spermatids (2). However, some studies show that the coexpression of ACE2 and TMPRSS2 is limited (5). Liu et al. performed scRNA-seq in human adult testes
(seven men with obstructive azoospermia and two healthy donors) and reported that TMPRSS2 is expressed at high levels in spermatogonial cells, while ACE2 is expressed at low levels (6). Sertoli cells have higher expression of ACE2 and lower expression of TMPRSS2. Zhao et al. and Whang et al. also reported that the expression of ACE2 in Leydig and
Sertoli cells was almost three-fold higher when compared to spermatogonia (7,8). One study analyzed semen samples of 34 men recovering from COVID-19 and did not detect the presence of SARS-CoV- 2 in any ejaculated sample after a median of 31 days (9). Another cohort study performed semen testing on 38 men positive for SARS-CoV-2 and found that six of them had positive reverse transcription polymerase chain reaction (PCR) for the virus (four men in acute stage of disease and two in recovery) (10). However, the information regarding viral shedding or concentration in semen samples remains elusive. In previous studies investigating SARS-CoV-2 RNA in the male reproductive tract, no viral material was detected in the prostatic fluid and 98% of the seminal fluid analyzed was negative for SARS-CoV-2 RNA. Although the details regarding
the semen collection protocol and PCR kit were scarce, viral shedding was not demonstrated. Therefore, the authors agreed that these results should be confirmed by other studies before introducing any change in clinical practice (1). Song et al. analyzed ACE2 and TMPRSS2 co-expression in prostate cells and found that both receptors were present in
less than 1% of the prostate cells (11), which is in accordance with previously published studies (1,5,9). Since viral shedding has not been found in semen, prostate, or seminal fluid and since viral transmission through intercourse or insemination has not been shown (for the disease to be considered sexually transmitted), there is currently no available evidence
to consider COVID-19 a sexually transmitted infection. However, sexual contact in the acute stage of the disease can lead to partner contamination due to respiratory droplets (1). Published cohort and case-

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control studies evaluating the presence of SARS-CoV-2 in the female reproductive tract found similar results (2,12). Further, over 98% of the vaginal
fluid samples and all the cervical smears tested negative for the virus RNA (1). Cui et al. reported that all fluids tested were negative; however, the infection rate of the sexual partners was 42.9% (12). This supports the hypothesis that, although not considered a sexually transmitted infection, the intimacy of the sexual contact can transmit SARS-CoV-2 through respiratory droplets. The ovaries have a gonadotropin-dependent expression of
ACE2 receptors which is present in both pre-menopausal and post-menopausal women (2,3). Interestingly, Barragan et al. reported the absence of SARS-CoV-2 RNA in 16 oocytes
from donors. The authors detected the presence of ACE2 in 5/16 oocytes but no expression of TMPRSS2 (13).

COVID-19 and male fertility

There is limited data on the effects of SARS-CoV-2 on male fertility. It seems unlikely that gametes are affected due to the limited co-expression of ACE2 and TMPRSS2 (5). Some studies, however, have analyzed mechanisms that could influence male fertility following COVID-19. Xu et al. reported that in situ hybridization, morphological analysis, and immunohistochemical analysis were undertaken on the testes of six men who died from COVID-19 and the results were compared with those from the autopsy of four noninfected
men. The authors found that the testes of affected men showed increased peritubular fibrosis, vascular congestion, and extensive germ cell destruction, but contained few spermatozoa within the seminiferous tubules and considerable inflammatory infiltrate (2,5,14). Fever during meiosis and spermiogenesis may reportedly alter sperm motility and concentration (15). Therefore, it could be hypothesized that COVID-19 could, at least temporarily, affect spermatogenesis. However, male infertility is not commonly seen in areas where febrile diseases are
endemic, such as malaria; therefore, the extent to which these observations are applicable to COVID-19 remains unknown. The SARS-CoV-2 infection can lead to a cytokine storm and activate pathogenic pathways that may increase sperm DNA fragmentation and oxidative stress, contributing to a decrease in fertilizing potential (16). As early embryos express high levels of ACE2, a deleterious impact on embryo development cannot be completely ruled out. Ma et al. and
Wang et al. both showed that the endocrine function in men affected by COVID-19 may be damaged due to lower levels of testosterone to luteinizing hormone (LH) ratio when compared
to controls, which can reflect a compromised testicular function (17,18). These observations show that, at least after 3 months following infection, spermatogenesis and testicular function may be impaired. It is unlikely that sperms are susceptible to infection, although inflammatory responses could alter the testis-blood barrier. However, testicular infection and orchitis has been observed, especially in elderly patients and in those with a more severe form of the disease; approximately 5–10% of the men of reproductive age have had infection of the testes (1).

Sex susceptibility to COVID-19

Epidemiologic studies have shown a susceptibility of male sex to more severe COVID-19 infection and higher mortality rates. This was believed to be due to the higher frequency of comorbidities, overall poorer health status, and lifestyle factors (smoking and sedentarism). However, some theories have been proposed to explain this susceptibility (5). One suggestion is that at first, the ACE2 expression is negatively regulated by the levels of estradiol (19). Androgens also play a role in the infection as transcriptional promoters for TMPRSS2 and in the up-regulation of this receptor. Therefore, women should have lower cellular expression levels of TMPRSS2 due to lower levels of circulating androgens (5). A difference in expression of ACE2 receptors in both sexes can also lead to a higher susceptibility for infection in males.

The ACE2 gene is located in the short arm of the X chromosome, a region that is more likely to escape from condensation into a Barr body and a cytologically detectable heterochromatic structure that results from the inactivation of one of the female X chromosomes. Females have two copies of ACE2, making it less likely for rapid viral saturation of receptors to occur, thus leading to less severe symptoms of COVID-19. Furthermore, the renin-angiotensin
system (RAS), which is also regulated by ACE2, protects against vascular compromise and severe organ damage (5). ACE2 is essential to deactivate the detrimental effects of
the RAS. The pathway that culminates in angiotensin II formation leads to vasoconstriction, sodium reabsorption, and fluid retention to increase blood pressure. The ACE2
axis is a counterregulatory branch of the renin-angiotensinsystem that converts angiotensin II into

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angiotensin 1-7, a peptide with anti-inflammatory, antifibrotic, and vasodilatory
properties. The enhanced expression of ACE2 seen in females could, therefore, be another protective mechanism against vascular damage in severe disease (20).

COVID-19 and the endometrium

The endometrium expresses low levels of ACE2 and high levels of TMPRSS2. However, other proteins and receptors are present in this tissue and can be related to SARS-CoV-2 infectivity. TMPRSS4 increases viral infectivity in the gut cells and is also present in the endometrium. Cathepsins B, L, and FURIN are other proteins that can cleave the "spike proteins"
and mediate membrane fusion, while Myxovirus resistance 1 (MX1) favors infection through protein S modification (enzyme modifying protein structure) by neutrophil elastase.

COVID-19 and the menstrual cycle

Viral infections can affect the female reproductive system and cause menstrual disturbances, as already demonstrated with hepatitis B and C viruses and HIV. Anovulation has been reported in acute diseases, probably related to transient ovarian function suppression to assure function of essential organs (22). Therefore, menstrual cycle changes because of
the SARS-CoV-2 infection may be plausible. Li et al. analyzed sex hormones levels and menstruation in a cohort comprising women of reproductive age hospitalized for COVID-19 (22). They divided patients into those with mild or severe symptoms and compared their hormonal levels to those of healthy women (controls) without ovulatory
disturbances undergoing hormonal dosages for fertility treatment. Patients who experienced menstrual changes during the SARS-CoV-2 infection were more likely to have
decreased menstrual volume and longer cycles (prolonged to 8–14 days). This difference, however, was not statistically significant when compared to women who had not experienced cycle changes or between those with mild or severe
symptoms. After 3 months of follow up, their menstrual cycles had returned to normal. Sex hormones (FSH, LH, E2, progesterone, and testosterone) and the anti-Mullerian hormone concentrations also did not differ between women with COVID-19 and the controls (22). To date, there is no evidence that COVID-19 can affect the ovarian reserve; however, further studies are required to clarify this.

COVID-19 and human reproduction

Since WHO declared COVID-19 a pandemic, the main international fertility societies [ASRM, ESHRE, International Federation of Fertility Societies (IFFS)] have published and updated several guidelines, recommendations, and bulletins to guide physicians worldwide in the management of fertility treatments (27). The common points initially addressed
were to suspend initiation of reproductive treatments, including ovulation induction, intrauterine inseminations, in vitro fertilization, oocyte and sperm cryopreservation, and fresh/frozen embryo transfers (27). Medical appointments were advised to be provided via telemedicine as well (19). After the most critical period, the societies unanimously
agreed that infertility is considered a disease and human reproduction is an essential human right. Therefore, infertility treatment could be considered as an essential service. According to ARSM, ESHRE, and IFFS, as long as the efforts towards the control of SARS-CoV-2 spread succeeded, fertility care could be resumed (19). Special recommendations should be made regarding clinical and laboratorial management. Patients with comorbidities such as severe obesity; uncontrolled diabetes; hypertension; previous organ transplant; immunosuppressive
therapy; or hepatic, renal, or pulmonary diseases should be counseled to avoid initiation of treatment. Patient screening can be made with a checklist for symptoms or serology or PCR examinations. Mitigation measures should be considered depending on the incidence of infection, such as decreasing the number of patients treated, limiting access
to treated patients only, limiting staff exposure, allowing more time between patient appointments, enhancing sanitation measures, increasing the use of telemedicine, avoiding
embryo transfer, and advising a freeze-all strategy for all patients. All cycles should be cancelled if the patient tested positive for SARS-CoV-2, except in urgent cases, such as fertility
preservation for oncological reasons. Laboratories require level 2 biological containment measures when dealing with SARS-CoV-2 positive material. Although evidence on the
probability of cross contamination is lacking, it is advised to cryopreserve positive material in separate containers (19). ASRM 'recommends that both pregnant women and women in the periconceptional period should be vaccinated. Assisted reproductive treatments should be avoided at least 3 days prior and 3 days after the vaccination (28). ESHRE, on

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the other hand, states that the decision to receive or decline the vaccine rests on the individual's risk. Professional advice is strongly recommended both in pregnant women and those planning to conceive (29). It is important to mention that no pregnant women were included in any vaccine trial and there is uncertainty about their safety during pregnancy and lactation. Although pregnancy was an exclusion criterion for vaccine studies, some women enrolled in the Pfizer-BioNTech study and the Janssen study did get pregnant after enrollment. The incidence of abortion was similar between the vaccine and placebo groups, although the sample size was small. The Food and Drug Administration concluded that both vaccines "did not have any adverse effects on female reproduction, fetal/embryonal development, or postnatal development" (30). The AstraZeneca vaccine uses a viral vector (chimpanzee adenovirus vector) that has been modified to contain the gene encoding the spike protein of the SARS-CoV-2 . This technology has previously been used with the Ebola vaccine and has been proven safe when administered during pregnancy . Cases of thrombosis associated with thrombocytopenia have been reported after vaccination with the AstraZeneca vaccine and have been referred to as vaccineinduced immune thrombotic thrombocytopenia. However, these thrombotic events are rare in vaccinated individuals and have been fewer than that observed in the general population . It is also important to remember that the SARSCoV- 2 infection can lead to vascular damage, severe endothelial injury, and thromboembolic events associated with higher mortality rates in infected patients; therefore, the benefits of vaccination may outweigh the risks . Some countries, however, contraindicate the AstraZeneca vaccine during pregnancy. Considering the high estradiol levels during ovarian stimulation and its prothrombotic effect, more studies will be necessary to evaluate the safety of vaccination in women undergoing assisted reproductive treatment. Vaccines also appear to be safe during lactation. The halflife of mRNA is short; thus, it is unlikely to enter breastmilk. Even if it does, it probably will be broken down during the
digestive process (30). It is also important to remember that in the context of the potentially increased severity of COVID- 19, emergence of new virus variants, and community transmission in countries where the pandemic is not under control, it is important to guarantee vaccine access to people who are at risk of worse outcomes if infected.

COVID-19 and pregnancy outcomes

The physiological changes that occur during pregnancy, especially those involving the respiratory and cardiovascular systems, make pregnant women more prone to severe cases of respiratory tract infections, as observed in the H1N1 influenza pandemic . The beginning of the SARS-CoV-2 pandemic raised important concerns about COVID-19 and
pregnancy outcomes for both mothers and fetuses. Large cohorts involving more than 23,000 pregnant women in the UK and USA reported that most patients have mild symptoms of the disease and the mortality rate in pregnancy is similar to that in the general population, at around 1%. Moderate and severe cases of COVID-19 seemed to be more common in the third trimester of pregnancy. In these studies, the transmission rate to newborns was low . Hazari et al. performed a case-control study in Dubai including 77 SARS-CoV-2 infected pregnant women and 85 non-pregnant infected women and concluded that the frequency of symptoms was lower in pregnancy, but that the incidence of severe cases was higher and worse in women in the third trimester and in patients with comorbidities. Despite this, there were no statistical differences regarding mechanical ventilation, intensive care unit admission, systemic complications, and death. Moreover, there were no differences in neonatal outcomes when compared to the general

Will the COVID-19 vaccines affect fertility?

There is NO evidence suggesting that fertility problems are a side effect of ANY COVID-19 vaccine. If
you are trying to become pregnant now or want to get pregnant in the future, you are recommended
to receive a COVID-19 vaccine.
The Centers for Disease Control and Prevention (CDC) does not recommend routine pregnancy testing
before COVID-19 vaccination, and you do not need to avoid pregnancy after receiving a COVID-19
vaccine.

Is getting sick with COVID-19 more dangerous for pregnant
people than those who are not pregnant?

Yes! COVID-19 vaccination is recommended for people who are pregnant, breastfeeding, trying to get pregnant
now, or might become pregnant in the future.
Yes, pregnant people are at increased risk for severe illness, preterm birth (delivering the baby
earlier than 37 weeks) and possibly pregnancy loss (miscarriage). COVID-19 vaccines can help protect you!

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Can I get the COVID-19 vaccine if I am pregnant or breastfeeding?

Yes! COVID-19 vaccination is recommended for people who are pregnant, breastfeeding, trying to get pregnant
now, or might become pregnant in the future.

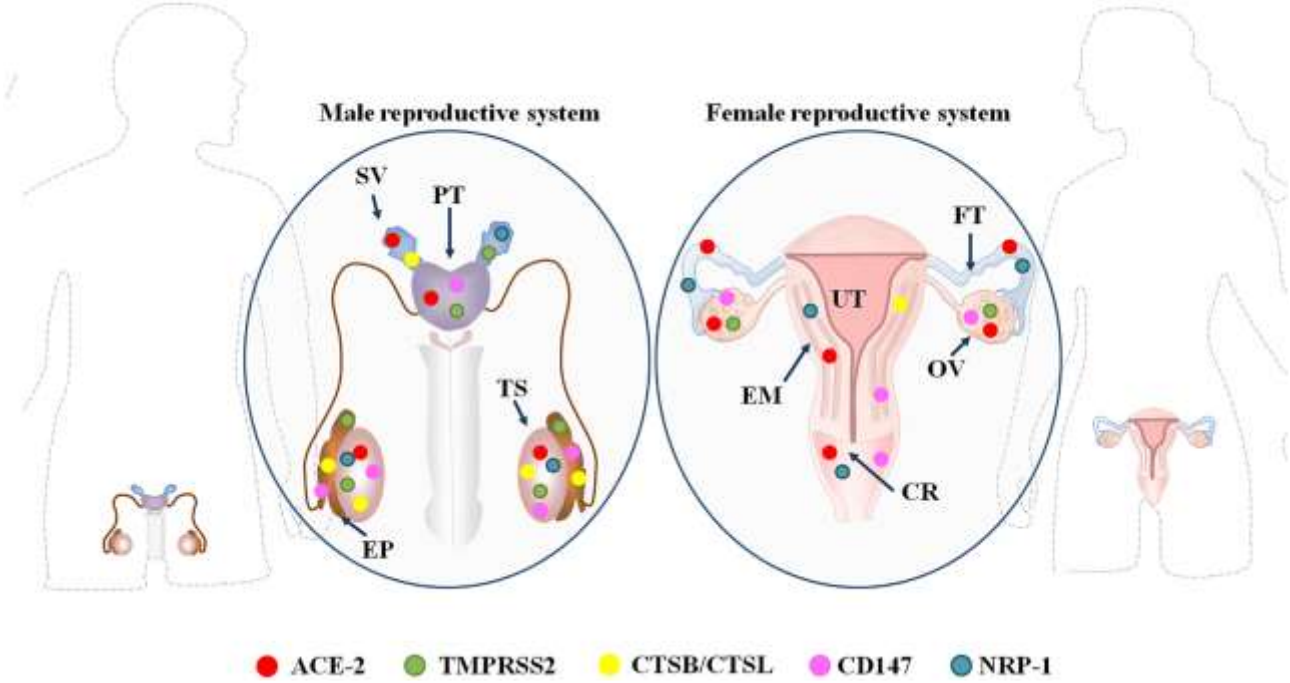

Fig. 1. Distribution of SARS-CoV-2 entry factors in male and female reproductive organs.
Abbreviations: SV: Seminal vesicle; PT: Prostate gland; EP: Epididymis; TS: Testis; OV: Ovary; EM: Endometrium; FT: Fallopian tube; UT: Uterus; CR: Cervix; ACE-2:
Angiotensin Converting Enzyme 2; TMPRSS2: Type II Membrane Serine Proteases; CSTB/CSTL: Lysosomal Cathepsin B / Cathepsin L; CD147: Cluster of Differentiation 147;
NRP-1: Neuropilin-1.

MATERIALS AND METHODS

The Purpose of the Study We intended to explore how Iraqi infertility treatment was changed by the emergence of COVID-19. The following are a few significant takeaways. A study was done during the pandemic to assess the level of disruption to infertility treatment services. The survey also sought to gauge patients' opinions on whether or not healthcare practitioners should persist in providing diagnostic and treatment services during these trying times. Infertility patients' worries regarding the possibility of COVID-19 infection during medication or pregnancy were the end purpose of the research.

Design of the Study and Selection of Participants a cross-sectional survey OF 210 PATIENTS was administered to Iraqi women who are either making plans for or are presently undergoing treatment for infertility. Through a number of social media outlets, including Iraqi women's health and fertility forums, an electronic survey questionnaire was delivered injuly2020. Staying away from people during data collection helped keep COVID-19 at bay.

A Study Aid

Our questionnaire was prepared using the Google Forms® survey software. It was required to ask a series of questions in Arabic, which is the country's official language.

To check the study's inclusion criteria, there are two questions:

(1) information on the participants' demographics;

(2) a woman's previous pregnancy and conceiving history;

infertility therapy, and how it was influenced by COVID-19, and a segment dedicated to assessing where the couple stood at the time of the breakout; and Patients worried about contracting COVID-19 will have access to testing, diagnosis, and treatment at clinics and hospitals as part of the pandemic. Tables in

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the results section give information about the questionnaire's content. It was established that an expert panel of hospital consultant gynaecologists examined the questionnaire's face and content validity to make certain that the questions covered the data required to study different aspects of infertility treatment offered throughout the pandemic era.

The Process of Data Collection and Evaluation In order to gather online answers, Facebook Ads were used to provide a link to an electronic survey to several social media women and fertility groups in Iraq over the course of 90 days. Only women having fertility issues at the time of enrollment were eligible to take part in the trial. Participants' names were kept secret at all times, as mentioned in the link's preamble. Three-fifths (35) of the 210 answers were discarded because they did not fulfil the inclusion criteria or provided insufficient information.

statistical analysis SPSS 25.0 was used for the statistical analysis (Chicago, USA). In order to determine the range of ages, we utilised the mean (standard deviation). Standard descriptive statistical requirements were met, and counts for sociodemographic factors were obtained from answers to questions asked along an ordinal five-point Likert scale (frequencies). All of these percentages are based on a college-level sample. Evaluating the reliability and validity of the surveys

RESULTS

The total numbers of patients 210.

Table 1 Sociodemographic and Reproductive Characteristics of Participants

Participant Characteristic	**n (%)**	
Age (years)		
20 –24	10 (4.2)	mean 33.2 SD 5.77
25 – 29	42(19.2)	
30– 34	60(28.2)	
35 – 39	66(31.3)	
40 – 50	32(16.7)	
Type of residence		
City	134	
Villag	64	
camp	12	
Level of education		
Primary school	6	
Secondary school	48	
Bachelor degree	100	

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collage diploma	34
master or doctorate	22
illiterate	0

Years married	
< 1 year	8
1–2 years	18
2 – 3 years	32
4 – 5years	32
> 5 years	120

number of children	
0	140
1	28
2	22
3	12
> 3	8

years trying to conceive	
< 1 year	24
1–2 years	38
2 – 3 years	42
4 – 5years	29
> 5 years	77

prior IVF trials	
0	99
1	50
2	22
3	14
>3	25

cause of infertility	
Unexplained	19
Poor ovarian reserve	14
More than one of the mentioned factors	10
I have not completed all of the tests yet	9

World Bulletin of Public Health (WBPH)
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Volume-15, October 2022
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Other	8
Polycystic Ovary Syndrome	7
blocked fallopian tubes or previous	4
salpingectomy	
endomtriosis	1
sperm count or quality	36

Planned intervention	
IVF/ICSI	69
IUI	6
Did not decide yet	32

Abbreviations: IVF, in vitro fertilization; IUI, intrauterine insemination.

DISCUSSION

Provides an outline of how each of the individual factors may affect fertility. Epidemics and high-fatality natural catastrophes have been shown to have similarities. Shortly after the peak in mortality, some nine months later, fertility dropped. resulting in a subsequent rise in the birthrate. However, even if this is true, it is still quite unlikely.

It's likely that the current pandemic will unfold similarly to previous outbreaks. Population characteristics of Unlike most other viruses, Covid-19 mostly attacks the elderly. It's death and ruin. As a consequence, two essential reproductive variables have decreased. Compared to other causes of death and illness, depression is less of a threat to the health of reproductive women and men. cases of COVID-19 have occurred before. Furthermore, the infant mortality rate in This recent increase in fertility is unlikely to be attributable to the low levels of COVID-19. crisis situations that have happened in the past. There are numerous additional components to the COVID-19 epidemic as well. no longer have a role in shaping fertility, but are likely to interact patterns, alternatives, and developments in the present epidemic. Market forces in low- and middle-income nations provides an outline of how each of the individual factors may affect fertility. Epidemics and high-fatality natural catastrophes have been shown to have similarities. Shortly after the peak in mortality, some nine months later, fertility dropped. resulting in a subsequent rise in the birthrate. However, even if this is true, it is still quite unlikely. It's likely that the current pandemic will unfold similarly to previous outbreaks. Population characteristics of Unlike most other viruses, Covid-19 mostly attacks the elderly. It's death and ruin. As a consequence, two essential reproductive variables have decreased. Compared to other causes of death and illness, depression is less of a threat to the health of reproductive women and men. cases of COVID-19 have occurred before. Furthermore, the infant mortality rate in This recent increase in fertility is unlikely to be attributable to the low levels of COVID-19. crisis situations that have happened in the past. There are numerous additional components to the COVID-19 epidemic as well. no longer have a role in shaping fertility, but are likely to interact patterns, alternatives, and developments in the present epidemic. In poor and middle-income nations, both supply and demand-side restrictions may make it difficult to get access to services. An rise in unintended births may occur between 2020 and 2020 despite increased family planning efforts. COVID-19's potential use is limited to situations where women have greater say over their reproductive choices. affect overall fertility rates in the near term (TFR) There is a detrimental effect on the work-life balance of women in these industries because of lockouts. It's likely that in a world where more individuals are freelancing and fewer children are in school, people will choose to put off having children. although the recession, joblessness, and layoffs have Inexperienced

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moms, in particular, may delay giving delivery out of fear. If

It is reasonable to anticipate a delay in births lasting a year or two, followed by a recovery in the years that follow. Temporary slowdown in TFR that may be attributed to the tempo effect. result in the long run. But a protracted crisis might lead to a permanent decline. resultant impact on future generational fertility. We also accounted for the potential consequences of temporary disruptions in ART service This factor is not expected to affect fertility because of the small number of ART babies. In spite of the trend, it presents a serious challenge to individual fertility. Options exist for those whose cycles have been thrown off. Considerations at the national level, including policy, culture, and institutions, will be essential. reviewing the results of the situation. Countries with a robust job market and To mitigate the devastation caused by the recession, society must come together to provide social safety nets and quickly implement programmes to preserve employment .Potentially less severe and shorter-lasting impacts of the recession on reproduction and fewer opportunities to conceive are to be predicted. nations suffering with excessive unemployment and inadequate social safety nets mechanisms for aid More probable a terrorist attack will happen the longer lockdowns and school closures continue. gender norms, including women's "double burden" of paid and unpaid labour Similarly, the availability of fertility treatments is expected to decline. greater and more sustained effect on reproduction. Preliminary evidence from five European nations (France, Germany, Italy, and Spain) and The concept that the virus's effects vary from nation to country is supported in the United Kingdom. a pandemic of sexual appetite (Luppi et al., 2020). A survey of twenty-somethings (18-34 years old) Luppi et al. (2020) looked at fertility expectations of women over a long period of time (e.g., decades) and found that they had been adversely revised throughout that time. individual COVID-19 crisis in each of the five nations. Pregnancy plans Youth in Germany and France were still very much involved in futures planning and preparation. delaying having a baby until at least the year 2020. Spanish society tends to be younger In comparison to those who did create a family, there were many more who either put it off or gave up altogether. who's plans might yet be implemented. Students were more likely to put off their graduation in the UK .People have been less likely to change their minds than in Spain. In However, the proportion of those who gave up was far greater in Italy than in any of the other countries. countries. They thought that differences across countries were due to factors like national culture that were exclusive to each nation. high unemployment among young people and the difficulty women have in juggling paid and unpaid work even before the recession because there is free public daycare available and gender norms are generally respected Contextual variables can impact individuals' ability to access family planning services. and the repercussions this has on unintended pregnancies. Government categorization of households raise SRH consciousness by highlighting the importance of SRH planning and other services human rights and ensure that all residents can afford basic necessities During the epidemic, unintended pregnancies and family planning were major issues. will be reduced by half As a result, COVID-19 may have varying impacts on subsets of society even within individual nations. groups. Employees in -the informal economy, workers in the migrant workforce, women, and children are disproportionately represented among those who experience the economic slump and suffer more severe repercussions As a result, fewer reproductive choices are available. How the epidemic affects women is comparable to how males are affected. Schedules will likely become more stressed as a result of increased domestic responsibilities.

The reproductive choices available to women. Programs that help with sexual and reproductive health, such those for family planning, are probably accessible. those in need, particularly those in humanitarian situations or living in remote places. Marginalized groups in rural areas include ethnic minorities and migrant labour. Teenagers from disadvantaged backgrounds suffer greatly when their parents do not step in to help. and the ensuing unexpected pregnancies.

CONCLUSION AND RECOMMENDATION

Significant changes in menstruation are found, however changes in ovarian reserve and hormonal balance are temporary and easily reversed, as shown by this review. When it comes to having children, The greatest effect of covid.19 infection was a decrease in both the quantity and quality of birds related to embryos. Even though vaccines seem to be safe and effective safe and recommended for nursing mothers women Because the potential benefits justify the little risk, more research needs required for drawing firm findings.

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The possible effects on human life need further research. the country's current birthrate. Because of potential vectors for SARS-CoV-2 in
Various virions may infect reproductive organs. reproductive systems and might potentially cause couples' fertility rates to drop
want to have a family soon and are making preparations to do so. Having low sperm count and suffering from orchitis Even in some healthy individuals, abnormal sperm quality, oligozoospermia, and priapism are all too clear. Corruption of the immune system virus 19 (COVID-19) and pregnancy loss, premature birth, and gestational age Some infected females have been shown to have irregular menstrual cycles. Except for these antibiotics and other medications may also have a role in causing this. used therapeutically for people suffering from any of these illnesses may have existed beforehand. To conclude, it's worth noting that most investigations studies performed so far in this case studies, which provide credence to the research with larger, more diverse samples is needed to determine the Checking the accuracy of the findings. Infection prevention is the first priority. that may be used to lessen the reproductive effects of COVID-19 pathology. People need to abide by the rules set out by To reduce the spread of COVID-19, WHO is working with regional authorities. infection, and the effects of infection on the reproductive health of both males and women.

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