Living with the Threat of Covid-19: Exploring the Psychological Impact of Covid-19 in Those who Conceived Through ART Versus Spontaneously

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Abstract

Objectives To explore and compare anxiety relating to the threat of Covid-19 in pregnancy by women who conceived through assisted reproductive technology (ART) and spontaneously. We also examined the psychological coping strategies used and lived experience for both groups.

Methods A total of 21 women who conceived through ART at a private university based IVF and a matched sample of women who conceived spontaneously were enrolled from July 2020 to February 2021. This was a mixed methods study. Covid-19-specific anxiety was measured using the coronavirus anxiety scale (CAS) as well as a validating qualitative data model with the use of open-ended questions to expand on quantitative findings.

Results In both groups of women the level of anxiety detected by the CAS was low and mixed coping strategies (emotion-focused and problem-solving) were utilized. The ART group expressed more positive feelings towards pregnancy during the Covid-19 pandemic.

Conclusion The vulnerable ART group is no more at risk for negative emotional well-being during the Covid-19 pandemic. Additionally, healthcare providers ought to be knowledgeable of various Covid-19 coping strategies that may provide emotionally protective measures for all women of reproductive age. This is of particular importance as effective coping may ultimately prevent disruptions that could compromise prenatal care during the covid-19 pandemic.

Keywords Covid-19 · conception · assisted reproductive technology (ART) · coping strategies · lived experience

Significance: Though differences in mental health response have been documented between those who conceive through assisted reproductive technology (ART) and those conceiving spontaneously, little is known about pregnancy-related mental health challenges and response during the current pandemic for these two groups. Pregnant women engaging in general self-care has been linked to better well-being, however, it remains unclear which coping strategies are being utilized during the Covid-19 pandemic.

We found the vulnerable ART group is no more at risk for negative emotional well-being during the Covid-19 pandemic. Additionally, healthcare providers ought to be knowledgeable of emotion-focused and problem-solving Covid-19 coping strategies that may provide emotionally protective measures for all women of reproductive age.

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**Introduction**

Pregnancy for some can be stressful and the stress can be compounded when a global health crisis is introduced. One such example was the Zika outbreak in 2016 which reportedly significantly impacted pregnant women’s emotional well-being resulting in feelings of fear, helplessness, and uncertainty as they tried avoiding contracting the disease (Linde, 2018). The psychosocial adjustments of a worldwide health event and their influence on pregnancy outcomes are well documented (Meireles et al., 2017; Subissi et al., 2018). We are now faced with yet another global health crisis with the onset of the Covid-19 virus in 2020 (Dorothy & Bassey, 2020).

Emerging studies have shown a direct impact of coronavirus disease on pregnancy (Mascio et al., 2020). The literature has also suggested mental health challenges including increased depressive and anxiety symptoms associated with social isolation resulting from the fear of contracting the disease or perceived low control in preventing it (Durankus & Aksu, 2020). The degree to which Covid-19 impacts mental health is variable however, effective coping strategies may serve as a protective factor to mitigate its impact (Bhattacharjee & Acharya, 2020). While engaging in general self-care has been linked to better wellbeing for pregnant women (Davenport et al., 2018; Farewell et al., 2020), it remains unclear which specific coping strategies are being utilized by pregnant women during this pandemic. As many countries including Jamaica continue to adapt to outbreaks of increased Covid-19 infection rates, there is the need to investigate how pregnant women respond to and cope with occurrences of this threat.

Importantly as well, are the mental health needs of women during a global health crisis who have been assisted to a pregnancy following infertility. Several studies document increased stress and emotional effects from infertility and subsequent treatment (Rooney & Domar, 2018; Stevenson et al., 2016). A previous study on women who became pregnant after undergoing infertility treatment in Jamaica identified multiple stressors as part of the pregnancy experience and the role that certain coping styles played in a low control event as infertility (Pottinger, 2016). Though differences in mental health response have been found between those who conceive through assisted reproductive technology (ART) and those conceiving spontaneously (Garcia-Blanco et al., 2018; Stevenson et al., 2016), little is known about pregnancy-related mental health challenges during the current pandemic for these two groups.

As such, in this study we aimed to explore and compare anxiety relating to the threat of Covid-19 during pregnancy for women who conceived through ART and those who conceived spontaneously. We also examined the lived experience for both groups during the pandemic and psychological coping strategies used by them.

**Materials and Methods**

**Study Design**

The study is a mixed methods study involving matched samples. We applied a validating qualitative data model (Creswell & Plano, 2007), with the use of open-ended questions, to expand on quantitative findings.

**Setting and Participants**

Data were gathered cross-sectionally from pregnant women who volunteered to participate from two different groups: (1) ART group - those who conceived through assisted reproductive technology (ART) i.e. In vitro fertilization (IVF) and (2) spontaneous group - those who conceived spontaneously. The ART group consisted of 21 pregnant women recruited from the registry at a University-based IVF center. For the spontaneous group, we recruited 21 participants that were matched to the ART group by gestational age. As ART is offered through private care, the spontaneous conception group was recruited from the offices of private practitioners. Ethical approval for the study was received by the Mona Campus Research Ethics Committee (MCREC).

**Instrument and Procedures**

Demographic variables including age, marital status, education level, occupation, obstetric history and Covid-19 exposure were obtained from the sample. Anxiety was measured quantitatively using The Coronavirus Anxiety Scale (CAS), a scale that is specific for screening for anxiety related to the Covid-19 pandemic (Lee, 2020). The CAS is a five-item scale with likert ratings from 0 to 4. It provides a cut-off score of 9 as sufficient for 90% specificity. Additionally, participants were asked to indicate whether they or someone they knew had a confirmed Covid-19 diagnosis, and whether the Covid-19 pandemic had a “negative, positive or no impact” on their emotional/ mental/ psychological health.

Data were also collected qualitatively through individually administered interviews consisting of open-ended questions relating to anxiety, coping, self-care and experiences of being pregnant during the Covid-19 pandemic. Examples of the types of open-ended question included “how have you been coping living with the threat of Covid-19?” and...
“In what ways do you think the threat of Covid-19 can affect or has affected your pregnancy process?”

Once verbal informed consent was provided, a member of the research team, not involved in the direct treatment of the participants, interviewed the participants individually via telephone and took notes throughout. Women were excluded from the study if they reported gestational diabetes, preeclampsia, cervical insufficiency, pre-term labor, ordered bed rest, antenatal complication, and/or history of known anxiety/psychiatric disorder(s). Data were collected between July 2020 and February 2021.

Data Analysis

Data were entered into SPSS version 26 and analysed using descriptive statistics. Notes from the interviews were transcribed and uploaded into the Dedoose software program (www.dedoose.com) for analysis. A deductive approach (Maxwell, 2009) was applied to the analysis where a-priori codes associated with patterns of coping (eg, controlling feelings, seeking information, and seeking emotional support), as well as lived experiences during the pandemic were discussed and developed by the members of the research team. Patterns of coping responses were taken from a previous study on coping with pregnancy following infertility in a sample of women from Jamaica (Pottinger, 2016). The four patterns identified through exploratory factor analysis were: (i) emotional coping with a focus on fantasizing or ‘escaping’; (ii) emotional coping with emphasis on expressing, avoiding or controlling feelings; (iii) problem-solving coping with emphasis on actively seeking emotional support; and (iv) problem-solving coping with emphasis on pursuing solutions. These subtypes formed pre-identified codes for the current study.

Pre-identified codes for the participants’ pregnancy experience were taken from a study on pregnant women’s experience with the Zika virus in Brazil (Meireles, 2017). These experiences were categorized into five factors: (i) reactions to finding out you are pregnant, (ii) changes in family planning, (iii) adoption of new customs (avoiding places of risk, use of specific clothes), (iv) changed attitudes regarding body image and (v) feelings of external demand regarding prevention (Meireles, 2017).

With the use of both sets of a-priori codes, parent codes were developed and subdivided into child codes through a deductive process. The codebook with definitions was used by an independent coder (not involved in the data collection) to apply axial coding (application of pre-defined codes) to the transcripts. Triangulation of the data analysis process was applied to reduce bias and improve reliability as a second coder reviewed all transcripts, summarized the themes and sub-themes and compared findings with the first coder. Where there was discordance on the meaning of the codes and themes, this was discussed until consensus was reached.

Extracts were divided into two major categories, that is, those derived from questions about coping with Covid-19 and those derived from questions related to the lived experiences of participants. Additionally, the responses within both major categories were compared and contrasted between the spontaneous and ART groups (see Fig. 1). The responses of participants were also compared between those who had been diagnosed with Covid-19 and those who knew someone diagnosed with Covid-19.

Results

Sample Characteristics

Of the 42 persons who consented, 21 participants were assisted to conceive via ART and 21 conceived spontaneously. The majority of the participants were married (52%), had a bachelor’s degree or higher (69%) and employed (88%). The frequency and proportion of socio-demographic characteristics and obstetric history of the 42 participants are shown by conception status in Tables 1 and 2.

Most socio-demographic characteristics among both groups were similar (Table 1). In both groups the majority of the sample was employed, educated, had similar relationship status and occupation distributions. However, differences between both groups were seen with age and obstetric history. In the group who conceived through ART the majority of participants were of advanced maternal age (AMA, 35–39 years) or very advanced maternal age (vAMA, ≥ 40 years) as compared to those who conceived spontaneously (62% versus 19%). Additionally, when both groups were compared, more persons who conceived through ART were nulliparous (81% versus 52%) and reported a higher number of miscarriages (62% versus 31%) (Table 2).

Covid-19 Exposure and CAS- measured Anxiety

Table 3 shows the distribution of Covid-19 related experience and anxiety amongst the participants. Very few participants (7%, n = 3) had a confirmed diagnosis of Covid-19, all of whom were in the spontaneous group. Overall, roughly a third of the sample (36%) reported knowing someone diagnosed with Covid-19; more so in the spontaneous group as compared to the ART group (52% versus 19% respectively). Most respondents in both groups believed Covid-19 had a negative effect on their emotional/mental/psychological health (76%, Spontaneous; and 67%, ART).
When coping responses of participants who had spontaneous deliveries were compared with those who had ART pregnancies, both emotion-focused and problem-solving strategies were used in the sample. The most consistent responses by both groups were fantasizing/dreaming (emotion-focused) and information seeking (problem-solving). Daydreaming is illustrated by the statement of a participant who had a spontaneous conception “I just dreamt about a holiday in Belize or Cancun…” [Ca8]; another who delivered with ART shared “I fantasized about a vacation with no threat of Covid...” [Ca38]. Information seeking was captured by a Spontaneous participant [Ca18] who recounted her sources of information that she sought to help her cope “articles, stories on general wellbeing and pregnancy related information”. ART participant [Ca16] shared a similar strategy “I downloaded a covid app, and read WHO research online about pregnancy”. In analyzing the extracts for coping responses between those participants who knew someone with Covid-19 and those who did not, there seemed to be no differences in the coping strategies they employed.

Coping with the Threat of Covid-19

The participants expressed several ways in which they coped with being pregnant during the Covid-19 pandemic. We identified seven themes or emerging trends related to coping responses. These were: (1) prayerful hope for a safe delivery, (2) anticipating the end of the pandemic, (3) releasing emotions, (4) distracting oneself from sources of anxiety, (5) articulating fears, (6) alleviating anxiety through social support and (7) seeking information. The themes, parent codes from which they are derived and illustrative quotes from the participants are summarized in Table 4.
Covid-19 are summarized in Table 5. Frustration and isolation emerged as the most prominent themes/trends. Unfortunately, timing and concern about Covid-19 also featured prominently as a recurring theme (Table 5).

One important difference in trend/theme between the spontaneous group and the ART was the contented nonchalance and positive feelings expressed more often across data from the ART group. For example, participant Ca33 from the ART group in response to the question about her mental state while being pregnant during the Covid-19 pandemic said “Covid-19 has not affected me. I’m not worried; I am very cautious and stay away from people.” This varies from the response of Ca41 from the spontaneous group who said “I am anxious about getting Covid and feel paranoid when I have to go out to do errands.” There was no difference in trend/theme emanating from the responses of the participants when analysed by whether they knew someone who had been diagnosed with Covid-19. Similarly, the four women who had been positive for Covid-19 expressed similar lived experiences to those who had not.

**Lived Experiences**

The major themes related to living with pregnancy and Covid-19 are summarized in Table 5. Frustration and isolation emerged as the most prominent themes/trends. Unfortunately, timing and concern about Covid-19 also featured prominently as a recurring theme (Table 5).

One important difference in trend/theme between the spontaneous group and the ART was the contented nonchalance and positive feelings expressed more often across data from the ART group. For example, participant Ca33 from the ART group in response to the question about her mental state while being pregnant during the Covid-19 pandemic said “Covid-19 has not affected me. I’m not worried; I am very cautious and stay away from people.” This varies from the response of Ca41 from the spontaneous group who said “I am anxious about getting Covid and feel paranoid when I have to go out to do errands.” There was no difference in trend/theme emanating from the responses of the participants when analysed by whether they knew someone who had been diagnosed with Covid-19. Similarly, the four women who had been positive for Covid-19 expressed similar lived experiences to those who had not.

**Table 1** Frequency distribution of participant demographics by conception status (n=42)

| Demographics          | Spontaneous (n (%) | ART (n (%)) |
|-----------------------|--------------------|-------------|
| Age                   |                    |             |
| <25 years             | 2 (9.5)            | 0           |
| 25–29 years           | 9 (42.9)           | 1 (4.8)     |
| 30–34 years           | 6 (28.6)           | 7 (33.3)    |
| 35–39 years           | 3 (14.3)           | 6 (28.6)    |
| vAMA                  | 1 (4.8)            | 7 (33.3)    |
| Employment Status     |                    |             |
| Employed              | 18 (85.7)          | 19 (90.5)   |
| Unemployed            | 3 (14.3)           | 2 (9.5)     |
| Health Care Worker    |                    |             |
| Yes                   | 7 (33.3)           | 4 (19)      |
| No                    | 14 (66.7)          | 17 (81)     |
| Highest level of education |            |             |
| Graduate              | 7 (33.3)           | 9 (42.9)    |
| Highschool            | 2 (9.5)            | 1 (4.8)     |
| Undergraduate         | 6 (28.6)           | 7 (33.3)    |
| Vocational Training   | 6 (28.6)           | 4 (19)      |
| Marital status        |                    |             |
| Single                | 9 (42.9)           | 7 (33.3)    |
| Visiting Relationship  | 2 (9.5)            | 0           |
| Common Law            | 0                  | 1 (4.8)     |
| Married               | 10 (47.6)          | 12 (57.1)   |
| Divorced              | 0                  | 1 (4.8)     |
| Occupation            |                    |             |
| Professional          | 10 (47.6)          | 8 (38.1)    |
| Business Operator/Manager | 1 (4.8) | 3 (14.3)    |
| Skilled Worker        | 5 (23.8)           | 8 (38.1)    |
| Unskilled Worker      | 4 (19)             | 2 (9.5)     |
| Student               | 1 (4.8)            | 0           |

ART - assisted reproductive technology; AMA - Advanced Maternal Age; vAMA - Very Advanced Maternal Age

**Table 2** Frequency distribution of obstetric history characteristics by conception status

| Obstetric History      | Spontaneous (n (%) | ART (n (%)) |
|------------------------|--------------------|-------------|
| Previous living children |                   |             |
| Yes                    | 10 (47.6)          | 4 (19)      |
| No                     | 11 (52.4)          | 17 (81)     |
| Number of miscarriages|                    |             |
| 0                      | 13 (61.9)          | 8 (38.1)    |
| 1                      | 6 (28.6)           | 7 (33.3)    |
| 2                      | 1 (4.8)            | 5 (23.8)    |
| 3 or more              | 1 (4.8)            | 1 (4.8)     |

ART - assisted reproductive technology

**Table 3** Frequency distribution of reported Covid-19 experiences by conception status

| Covid-19 Experience                | Spontaneous (n (%) | ART (n (%)) |
|------------------------------------|--------------------|-------------|
| Personal history of Covid-19       |                    |             |
| No                                 | 18 (85.7)          | 21 (100)    |
| Yes                                | 3 (14.3)           | 0           |
| Knows someone who was diagnosed with Covid-19 |         |             |
| No                                 | 10 (47.6)          | 17 (81)     |
| Yes                                | 11 (52.4)          | 4 (19)      |
| Perceived effect on emotional/mental/psychological health |            |             |
| Negatively affected                | 16 (76.2)          | 14 (66.7)   |
| Unaffected                         | 5 (23.8)           | 6 (28.6)    |
| Positively affected                | 0                  | 1 (4.8)     |
| COVID-19-related Anxiety           |                    |             |
| No anxiety                         | 11 (52.4)          | 18 (85.7)   |
| Some anxiety                       | 10 (47.6)          | 3 (14.3)    |

**Discussion**

To our knowledge, this is the first study of its kind pursuing how women who are pregnant by spontaneous conception and ART respond to and cope with the occurrences of the Covid-19 pandemic. In our study, we found that the level of anxiety detected by the CAS was low in both groups regardless of whether the participants were infected with Covid-19 or knew someone with it. We also found that

ART - assisted reproductive technology
both problem-solving and emotion focused coping strategies were utilized by both groups of women. Concurrently, the ART group expressed more positive feelings towards pregnancy during the Covid-19 pandemic.

The CAS has been shown to be a reliable and adequate instrument normed on an adult population in the United States for screening for dysfunctional anxiety induced by the current Covid-19 pandemic (Lee, 2020). In our study population CAS anxiety scores were low in both groups, suggesting no functional impairment due to Covid-19. Our failure to detect any Covid-19 related anxiety in this study group may be due to the timing of the study in relation to the introduction of the virus. The CAS was developed and tested on a population early in the pandemic (Xiang et al., 2020). This was not the case in our study which was conducted at a later point in the pandemic which allowed for a longer period of sensitization. Additionally, Jamaica experienced relatively low infection and death rates for several months after the virus was introduced in March of 2020 (Ministry of Health & Wellness, 2021), which may also have contributed to overall low CAS scores reported. This is also supported by the low number of confirmed Covid-19 diagnoses amongst participants. Furthermore, to assess dysfunctional anxiety in the pregnant population, it cannot be overlooked that several of the symptoms used to assess impairment by the CAS are common baseline pregnancy symptoms (Gartland, 2010). As such, there may not have been a clear distinction in whether any cognitive, behavioral, emotional, and/or physiological changes were attributed to pregnancy or were Covid-19-related. Regardless, our study may suggest that caution should be taken when using the CAS in the pregnant population.

Results from our study corroborate findings on the social consequences of a new virus on the pregnant population (Linde, 2018). Similar to the Zika virus infection (Meireles, 2017; Subissi et al., 2018), we also found Covid-19 to have a negative impact on the psychological well-being of pregnant women. Specifically, we found four of the five themes identified in the Brazilian population when they were impacted by the Zika virus (Meireles, 2017). The only theme that was not shared with our study population was “changes in family planning”, which can be attributed to the Zika virus being associated with fetal abnormalities including microcephaly (Heymann et al., 2016).

Some studies have found that emotion focused coping strategies are often used by women facing infertility because of the low control associated with this condition (Karaca & Unsal, 2015). Although the pandemic may also carry a sense of low control, the pregnant women in our study, whether facing infertility or not, used emotion focused strategies (such as embracing social support) and also problem solving coping (seeking information) to manage their response to Covid-19. Information seeking and social support coping strategies are described in the literature as attributing to enabling a sense of control over one’s health in infectious disease pandemics (Chew et al., 2020; Li & Peng, 2021). It is possible that a mixed strategy was found in this sample due to differences in how persons may have perceived their ability to control the threat of Covid-19. The sentiment of lack of control may be due to feelings that your own safety is directly linked to the behaviors of others. Conversely, others may feel increased control with the various restrictions that are mandated to protect against contracting Covid-19. In a previous study by Pottinger et al. they also found both strategies were used by Jamaican women struggling with infertility, but found active problem solving to be beneficial to pregnancy outcome (Pottinger et al., 2016).

Primary negative emotional response to infertility and ART can be anxiety or depression. Expectedly, the added

| Table 4 Codes to Themes- Coping Responses |
| COPING | THEMES | SAMPLE QUOTATIONS |
|---------|----------|-------------------|
| Emotion-focused strategies including spiritual or fantasizing | Prayerful Hope for safe delivery | "I prayed for a safe delivery” (Ca23, ART) |
| | Anticipating the end of the Pandemic | "I want it [COVID-19] to go away and life can go back to normal” (Ca34, ART) |
| | Releasing emotions | "Sometimes, I get easily annoyed and short tempered with my son” (Ca22, Spts.) |
| | Distracting oneself from the source of anxiety | "Yes, I’m frustrated and bored. take it out on my husband” (Ca14, Spts.) |
| | Articulating fears | "Yes, I find myself talking about the virus, deaths and UK situation too much” (Ca41, Spts.) |
| Problem Solving strategies including seeking Support | Alleviating anxiety through social support networks | "Conversations with my OBGYN have been calming and reassuring, as well as conversations with colleagues” (Ca38, Spts.) |
| | Information seeking | "I ask the doctor or friends who are pregnant” (Ca8, ART) |
| | | "I don’t know where to find pregnancy information so I ask a friend who is friends with an OBGYN” (Ca42, Spts.) |

Spts – spontaneous; ART – assisted reproductive technology.
stress of a pandemic for pregnant women using ART is likely to compound psychological disturbance (Massarotti et al., 2019). However, our study has shown the opposite, with the ART group expressing more positive feelings towards pregnancy during the pandemic. The women using ART were counselled about the effects of the pandemic on their pregnancy. Besides, their pregnancies were likely anticipated and planned for, which allowed for sufficient time and motivation to prepare them for coping with the pandemic. During a pandemic, health care providers could consider counselling their clients who are pregnant about associated mental health effects of infectious epidemics such as Covid-19 and coping, as done with clients receiving ART. Additionally, simple screening tools can be effectively used in antenatal clinics to identify patients who are distressed (van Heyningen et al., 2018). Teaching patients coping strategies has been found to be effective in reducing anxiety and depression (Khoury et al., 2021). Providers including physicians, counselors, nurses, and health educators should be trained to educate obstetric patients about positive coping skills and taking responsibility for their own health.

**Limitations**

Some limitations of our study warrant mention. In addition to our small sample size, the spontaneous pregnancy group was not disaggregated into whether the pregnancy was planned or unplanned. As such, we cannot decipher whether this led to any underlying bias in the interpretation of our
results. Further, baseline mental health was not assessed before screening for anxiety during the pandemic. Furthermore, the CAS may not have been sufficiently sensitive to differentiate common emotional responses to pregnancy from that of anxiety related to the Covid-19 pandemic.

Conclusion

We have shown that the vulnerable ART group is no more at risk for negative emotional well-being during a pandemic than those who spontaneously conceive. Current international guidelines for ART preparation include mandated Covid-19 protocols, testing and dissemination of information, which may have accounted for the increased contentment observed during pregnancy in the ART population. As such, the Covid-19 specific preparations utilized in ART treatment may be a useful tool in reducing the negative psychological impact and therefore could be extended to all preconception services. Additionally, it is imperative that healthcare providers are knowledgeable of various strategies that may provide protective measures for the emotional well-being of all women of reproductive age. This is of particular importance as effective coping may ultimately prevent disruptions that could compromise prenatal care during the Covid-19 pandemic.

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Data Availability Not applicable.

Code Availability Not applicable.

Declarations

Ethics approval - Ethical approval for the study was received by the Mona Campus Research Ethics Committee (MCREC) [Ref: ECP 225, 19/20].

Consent to participate – Informed consent was sought from each participant.

Consent for publication – Not applicable.

Conflict of Interest The authors have no conflicts of interest to declare.

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