

آیا دیسترس روانی مادر در پاندمی کرونا پیشگویی کننده پیامدهای بارداری است؟

Zahra Sharifi-Heris

Sue & Bill Gross School of Nursing, University of California at Irvine, CA, USA

Saba Moodi

Counseling and Reproductive Health Research Center, Department of Nursing-Midwifery, Golestan University of Medical Sciences, Gorgan, Iran

Zahra Mehrbakhsh

PhD Candidate in Biostatistics, Department of Biostatistics, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran

Biostatistics department, School of Public health, Golestan University of Medical sciences, Gorgan, Iran (Mehrbakhsh.zahra@yahoo.com)

Sedigheh Moghasemi (corresponding author)

Counseling and Reproductive Health Research Centre, Department of Nursing-Midwifery, Golestan University of Medical Sciences, Gorgan, Iran
moghasemi.s@gmail.com



Introduction

- **The major pregnancy-related complications** including pregnancy-induced hypertension (PIH) (10%), pre-eclampsia (2-8%), and gestational diabetes mellitus (GDM) (14%) in pregnant women, and pre-term birth (10%), and low birthweight (15-20%) in newborns **are called for global action (CDC, 2021).**
- **Hypertensive disorders and GDM in pregnancy** are an important cause of severe morbidity, long-term disability and mortality among both mothers and their babies (WHO, 2021a; 2016).
- **Neonatal complications such as preterm birth**, on the other hand, **are globally known leading cause of death in children under the age of 5 years.** Survivors often suffer from lifetime of disabilities, including learning disabilities and visual and hearing problems (WHO, 2018).



Introduction

- Studies suggest that **maternal prenatal distress may be one of the important risk factors for the aforementioned maternal and neonatal complications** (Staneva et al, 2015; Shay et al, 2020; Kordi et al, 2017).
- **The Centers for Disease Control and Prevention (CDC) reported a 7-fold increase in the depression rate from 2000-2015, leading to significant prenatal morbidity and mortality in pregnant women and their children** (CDC, 2020).
- **Stress, anxiety, and depression are all psychological reactions to life's challenges that have cooccurrence in 50% of the affected people** (Groen et al, 2020).



Introduction

- Over the last decade, the world witnessed various devastating environmental disasters such as Ebola, West Nile encephalitis, severe acute respiratory syndrome (SARS), Avian flu, (Umeora et al, 2014) and recently COVID-19. Since these pandemics accompany with potential risk factors such as social distancing, decreased social activity, financial problems, job loss, and profound perceived risk of COVID-19 acquisition, they may trigger distress in pregnant women (Rahman et al, 2020; Sharifi-Heris et al, 2021).



Introduction

- On the other hand, due to the challenges related to vaccination, and occurring viral mutation, we may keep struggling with COVID-19 as a continuous stimulus for years (Ng, 2020).
- Unfortunately, neither in the previous infection outbreaks, nor in the worldwide COVID-19 pandemic, maternal mental health and its association with pregnancy complications had not been studied well. This study aimed to study the association between perceived risk of COVID-19, maternal mental distress, and poor pregnancy outcomes during pregnancy. The prenatal care visit also is studied as the secondary findings of this study.



Method

► Design

- A longitudinal cohort study was designed.
- The target populations were Iranian pregnant women during the first COVID-19 outbreak who were recruited from a pool of pregnant women in the Electronic Health Records in the Golestan university of medical sciences (Nab software) since April 2020 to June 2020.

Sample and setting

معیار ورود	معیار خروج
1. دسترسی مادر یا یکی از اعضای خانواده به اینترنت و تلفن همراه	1. ابتلای مادر به کووید 19 در زمان ورود به مطالعه یا قبل از آن
2. جنین زنده	2. نارسایی سرویکس
3. سواد خواندن و نوشتن (تحصیلات بالاتر از پنجم ابتدایی)	3. سابقه سقط اخیر
4. حاملگی تک قلو	4. بیماری قلبی - عروقی شدید
5. سن بالای 17 سال	5. بیماری ریوی شدید
6. متاهل بودن	6. چندقلویی
	7. ترومبوفلیت یا آمبولی ریه طی 5 سال اخیر
	8. مشکلات اندوکراین بجز کم کاری تیروئید و دیابت
	9. کم خونی شدید
	10. حاملگی با IVF
	11. سابقه جنین بسیار کم وزن (IUGR)
	12. ناهنجاری جنین تشخیص داده شده در سونوگرافی
	13. مصرف دخانیات ، الکل و مواد مخدر



Sample and setting

- The participants were excluded and referred to a relevant specialist if they experienced any complication that put the pregnancy in the high-risk category. Those who had severe distress and suicidal ideation were identified, excluded, and referred to a psychologist for more evaluation and potential interventions. Other exclusion criteria included not willing to continue participation for any reason or got infected by COVID-19 virus.



Sample size

- The G-power software version 3.1.9.6 was used for statistical power of the study. Considering the previous relevant study in SARS pandemic, we applied $\alpha=0.05$, power=0.8, proportion $p_1=0.4$, and $p_2=0.2$.
- Sample size calculated to be 246 for the original study



Enrollment

- Ethic Code: IR.GOUMS.REC.1399.008
- Online questionnaire

Enrollment

Analysis

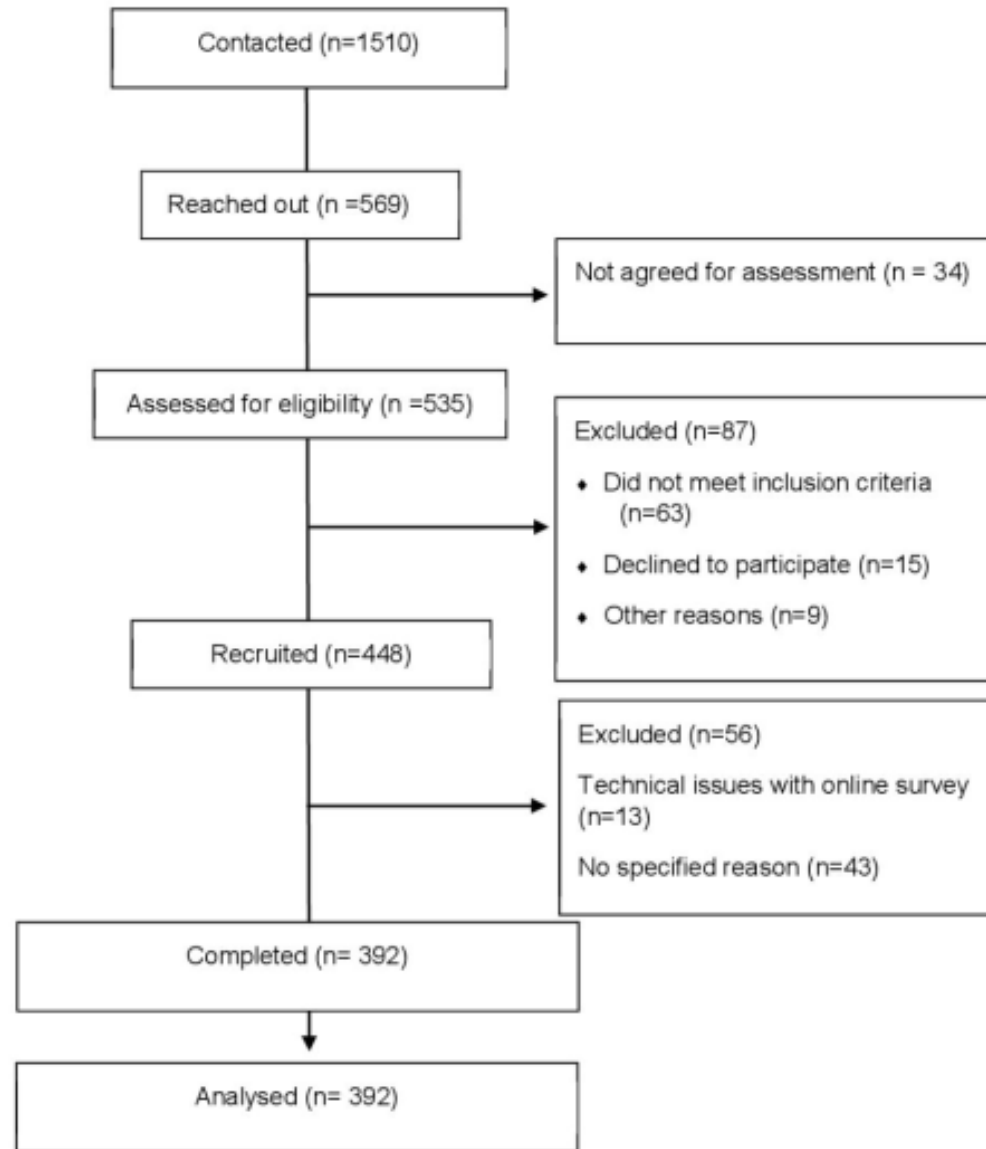


Figure 1. Flow chart



Measurement

- A socio-demographic form
- Some mental distress related scales including:
 - perceived stress scale (PSS-10)
 - State-Trait anxiety inventory (STAI-state)
 - Beck depression inventory (BDI-II)
 - perceived risk of COVID-19 questions
- pregnancy outcome checklist (Follow up)



PSS-10

- The Persian version of the Perceived Stress Scale (PSS-10) was applied to measure the frequency of perceived stress over the last month (Cohen et al, 1994). The scale measures an individual's attitudes of her/his life being unpredictable, uncontrollable, and overloaded. This five-point scale provides a possible response from zero (never) to four (very often). The total score ranged from 10–50 with a higher score indicating higher stress levels.
- This scale is reliable and valid in various populations across the world, including Iranian people (**Cronbach's alpha=0.9**) (Maroufizadeh et al, 2014; Kashanian et al, 2019).
- In the present study, perceived stress was classified as low (0–13), moderate (14–26), or high (27–40) (Rico).

State-Trait Anxiety Inventory (STAI-state)

- State-Trait Anxiety Inventory (STAI-state) was used for anxiety assessment following stressful situations. This instrument assesses dimensions, including apprehension, tension, nervousness, worry and activation/arousal of the autonomic nervous system. The validated and reliable Persian version was used for this study with a Cronbach's alpha of 0.78 (Bastani et al, 2005).
- Anxiety was defined as a cutoff score of >40 points on the T-STAI scale, which was recommended to detect clinically relevant symptoms of anxiety during postpartum [33 rico].



Beck Depression Inventory (BDI-II)

- The Persian version of Beck Depression Inventory (BDI-II) was used to assess depression. Attitudes including depressed mood, pessimism, lack of satisfaction, sense of failure, guilt, self-harm, self-hate social withdrawal, indecisiveness, work difficulty, distorted body image, fatigue and loss of appetite are assessed in this scale. Its Likert scoring is zero (symptom absent) to three (severe symptoms).
- The higher score indicates worse status. The total score range is 0-39. Score classification is 0-3 (Normal), 4-7 (mild depression), 8-11 (mild to moderate depression), 12-15 (moderate depression), 16-39 (severe depression).
- BDI-II is a valid and reliable scale (Cronbach alpha ranged from 0.89 to 0.94) among Iranian population (Rajabi, 2005; Dadfar and Kalibatseva, 2016).



risk perception toward COVID-19 acquisition

- For risk perception toward COVID-19 acquisition, we used two questions developed in a relevant study (Kwok et al, 2020) including:
 - 1) How likely you will be infected by COVID-19 viral infection?
 - 2) How likely your families will be infected by COVID-19 viral infection?
- This five-point Likert scale ranging from one (not very likely) to five (very likely) was designed for these two questions.

Outcome variables

- **Abortion** (pregnancy termination before 20th week of gestation)
- **GDM** (diabetes diagnosed for first time during pregnancy),
- **PIH** (hypertension [blood pressure>140/90] diagnosed for first time during pregnancy)
- **Preeclampsia**
- **Preterm labor** (PTL) (GA<37 weeks and 0 day),
- **Low birthweight** (<2500gr),
- **Small for gestational age (SGA)** (birth weight that is below the 10th percentile at childbirth [SGA calculator by World Health Organization was used based on gestational age, birth weight and sex in this link: <https://srhr.org/fetalgrowthcalculator>).
- To obtain the information regarding the outcome variables, the obstetric and medical record on EHR (Nab software) were accessed after the childbirth.



Data Analysis

- The SPSS (version 16) was used for statistical analysis. The significant level was considered 0.05 (two-sided) in all statistical analyses.
- Multiple logistic regression was used to assess the association between the independent and binary dependent variables. The potential effects of predicting factors were estimated through logistic regression analyses and the adjusted beta coefficient were presented with a 95% confidence interval. In these models, **pregnancy outcomes were set as dependent variables** and **identified confounding factors were considered as independent variables**.



Result

- Of 392 participants at the first phase of the study (stress and risk assessment at recruitment), the pregnancy outcome information for 44 women missed at the second phase (outcome measurement after childbirth) as they either gave birth in other centers (n=8), moved to other locations (n=11), did not return for postpartum services at the clinic and thus no recorded post-delivery information (n=7), didn't answer to the follow up call (n=18). **Finally, data of 348 participants was analyzed.**



Result

- The mean (SD) age of participants was 26.72 (4.74). The mean gestational age in time of enrollment to the study was 24.12 (8.83) weeks. 17.2%, 47.4% and 35.3% of participants were in the first, second and third trimester of pregnancy respectively. 162 (41.4%) was Primigravida and the rest were multigravida. Most of the women were housewife (86.8%), with low family income (84.4%). Table 1 shows demographic characteristic of the participants.

Table. Frequency or Mean \pm SD of maternal and neonatal Prenatal outcome in the study		
Variable		Mean \pm SD
Neonatal Birth Weight		3240.31\pm458.15
Neonatal Birth Height		49.60\pm2.13
Neonatal head Circumference		34.35\pm1.38
		Frequency (%)
		Yes No
GDM		32 (%9.1) 318 (%90.9)
Hypertension		16 (%4.6) 334 (%95.4)
Preeclampsia		9 (2.6) 341 (%97.4)
Hypothyroidism		47 (%13.4) 303 (%86.6)
Neonatal Weight Quantile (n=343, Missing=7)	Normal	248 (%72.3)
	SGA	70 (%20.4)
	LGA	25 (%7.3)
Neonatal Birth Weight	NL-BW (2500-4500)	328 (95.6%)
	LBW (<2500 gr)	15 (4.4%)
Gestational Age at delivery (weeks)	Abortion (\leq 20)	7 (2%)
	PTL (20-36 (+6d))	16 (4.6%)
	Term (\geq 37)	327 (93.4%)

Table 6. Comparison of mental distress variables between groups with/without adverse prenatal outcomes*

	GDM	Non-GDM	Hyperte nsive	Non- Hyperten sive	Preecla mpsia	Non- preecla mpsia	Hypothyroi dism	Normal- Thyroid	Q weight- NL	Q weight- Ab.NL
	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)
Depression	3.65 ± 2.77	4.21±3.91	2.50 ± 2.70	4.24 ±3.85	4.12 ± 3.68	4.16 ± 3.83	3.34 ± 3.17	4.29 ± 3.91	4.01 ± 3.41	4.24 ± 4.01
P value*	.430		.075		.975		.112		.617	
Trait Anxiety	46.31 ± 5.50	47.79 ±5.40	46.25 ± 5.81	47.72 ± 5.40	46.25 ± 3.49	47.69 ± 5.45	48.68 ± 4.49	47.49 ± 5.54	48.34 ± 5.52	47.31± 5.36
P value*	.141		.288		.458		.165		.116	
Positive. Affect	27.96 ±6.11	28.25 ± 5.48	29.43 ± 5.39	28.16 ± 5.54	27.12 ± 3.75	28.25 ± 5.57	30.04 ± 4.27	27.94 ± 5.65	28.49 ± 5.80	28.02 ± 5.41
P value*	.782		.371		.570		.004		.485	
Negative affect	18.34 ±5.19	19.54 ±5.65	16.81 ± 3.76	19.55 ± 5.66	19.12 ± 4.22	19.43 ± 5.65	18.63 ± 4.79	19.55 ± 5.73	19.85 ± 5.55	19.28 ± 5.64
P value*	.251		.012		.876		.299		.407	
Perceived Stress	17.62 ± 3.91	17.41 ± 4.38	15.06 ± 4.05	17.54 ± 4.32	17.62 ± 2.26	17.42 ± 4.37	18.02 ± 3.65	17.34 ± 4.43	17.98 ± 3.79	17.14 ± 4.50
P value*	.794		.025		.900		.319		.107	
Preventive behaviors	0.96 ± 1.06	0.98 ±1.17	0.93 ±1.48	0.98 ± 1.14	1.37 ± 1.18	0.97 ± 1.15	0.80 ± 0.82	1.01 ± 1.20	0.81 ± 1.07	1.06 ± 1.18
P value*	.931		.865		.338		.261		.074	
* t-test for evaluation of Equality of Means										

Table 7. Multiple logistic regression analysis for assessing predictive variables for prenatal outcome with adjust FPNC, GA at time Study and gravidity (n=348)

	GDM		HTN		Preeclampsia		Hypothyroidism		SGA (Percentile)	
Predictive variables	Exp(B)	CI *	Exp (B)	CI	Exp (B)	CI	Exp (B)	CI	Exp (B)	CI
Perceived Stress	1.07	.96-1.19	.84	.73-0.97 Sig: 0.02	0.95	0.76-1.19	1.07	0.98-1.17	1.10	1.02-1.20 Sig:0.01
Trait Anxiety	.92	0.85-0.99 Sig:0.037	.98	.89-1.08	.95	0.83-1.08	1.03	0.96-1.10	1.02	0.97-1.08
Depression	.94	.83-1.06	.81	.63-1.03	.90	0.70-1.15	0.90	.80-1.01	1.00	0.92-1.09
Perceived risk family	1.13	.61-2.10	.51	.20-1.28	0.31	0.08-1.11	0.90	0.54-1.51	0.97	0.62-1.50
Perceived risk for myself	1.31	.67-1.89	.65	.29-1.44	0.75	0.27-2.06	1.13	0.73-1.75	1.18	0.80-1.73
Preventive behavior for my family	0.97	0.68-1.3	0.89	0.53-1.49	0.81	0.44-1.46	1.10	0.79-1.54	1.61	1.14-2.26 Sig:0.006
Frequency of Prenatal Care visit	1.11	1.00-1.22 Sig:0.034	1.00	0.88-1.14	0.96	0.80-1.17	0.97	0.89-1.06	0.92	0.85-0.99 Sig:0.04
Primiparous vs. Multiparous	.94	.83-1.06	1.60	.55-4.64	1.27	0.28-5.69	1.56	0.82-2.97	2.43	1.36-4.32 Sig:0.003
GA at the time of enrollment to the study	-	Sig: .011	-	-	-	-	-	-	-	-
GA T1 vs. T3	7.27	1.61-32.83 Sig:0.01	1.45	0.24-8.76	2.32	0.19-27.61	1.17	0.38-3.62	0.71	0.27-1.86
GA T2 vs. T3	5.78	1.80-18.53 Sig:0.003	0.73	0.20-2.66	1.27	0.19-8.46	1.47	0.67-3.24	0.85	0.44-1.65

*CI for EXP (B)
T1; First trimester
T2: Second trimester
GA: Gestational Age



Result

- The results of current study, that is conducted during first COVID-19 pandemic, indicated that the mean of perceived stress and negative affect (a domain of trait anxiety) in normotensive pregnant women are more than hypertensive group.
- According to multiple logistic regression GDM and HTN as a maternal outcome were predicted with trait anxiety and perceived stress score respectively. SGA as a neonatal outcome was predicted with perceived stress.



Discussion

- Several studies have previously suggested that women with socio-psychological distress during pregnancy are at significantly increased risk for poor pregnancy outcomes such as shorter gestational age, low birthweight (Staneva et al, 2015), pregnancy-induced hypertensive disorders, and GDM (Shay et al, 2020; Kordi et al, 2017).

